



GODAVARI GAS PRIVATE LIMITED

{A joint venture of M/s Andhra Pradesh Gas Distribution Corporation Limited and
M/s Hindustan Petroleum Corporation Ltd.}
KAKINADA (INDIA)

CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS

BID DOCUMENT FOR

**SUPPLY OF DISTRICT REGULATORY SKID (DRS)
(ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)**

OPEN DOMESTIC COMPETITIVE BIDDING



Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003

PART – I and II





**PREPARED AND ISSUED BY
MECON LIMITED**
(A Govt. of India Undertaking)
Bengaluru, India

July, 2018

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p align="center">GODAVARI GAS PRIVATE LIMITED</p> <p align="center">CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p align="center">SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p align="center">Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>MECON मेकॉन ISO 9001 Company</p>
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Invitation for Bid

 GGPL <small>GODAVARI GAS PRIVATE LIMITED</small>	GODAVARI GAS PRIVATE LIMITED CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS) Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003	 मेकॉन <small>ISO 9001 Company</small>
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INVITATION FOR BID (IFB)

Ref No: MEC/23TS/01/51/S2/DRS/SU/0003

Date: 18.07.2018

Sub: Tender Document for Supply of District Regulatory Skid (DRS)

Dear Sir/Madam,

1.0 MECON Limited (CIN U74140JH1973GOI001199), EPMC for the project, on behalf of Godavari Gas Private Limited (GGPL) (CIN U40300AP2016PTC104159), a Joint Venture of APGDC & HPCL, invites bids from bidders for the subject works/services, in complete accordance with the following details and enclosed Tender Documents.

2.0 The brief details of the tender are as under:



(A)	SCOPE OF SUPPLY /PROCUREMENT	District Regulatory Skid (DRS)				
(B)	TENDER NO.	MEC/23TS/01/51/S2/DRS/SU/0003				
(C)	TYPE OF BIDDING SYSTEM	<table border="1" style="width: 100%;"> <tr> <td style="text-align: center;">SINGLE BID SYSTEM</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">TWO BID SYSTEM</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	SINGLE BID SYSTEM	<input checked="" type="checkbox"/>	TWO BID SYSTEM	<input type="checkbox"/>
SINGLE BID SYSTEM	<input checked="" type="checkbox"/>					
TWO BID SYSTEM	<input type="checkbox"/>					
(D)	BID DOCUMENT ON WEBSITE	From 18.07.2018				
(E)	DELIVERY PERIOD	<p>Ordered Quantity to be delivered on FOT site basis within six (6) months from date of Fax of Acceptance (FOA)/ Letter of Intimation(s).</p> <p>The Annual Rate Contract (ARC) will be valid for a period of twenty four (24) months from the date of Fax of Acceptance (FOA).</p> <hr/> <p>(Refer clause no. 4.0 of SCC/ Scope of Supply)</p>				



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(F)	TENDER FEE	<p>Applicability of Tender fee</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">APPLICABLE</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">NOT APPLICABLE</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table> <p>If applicable, the amount is INR _____ (Not Applicable) (Tender fee as per procedure inclusive of applicable GST)</p> <p>Note: Refer to Clause 5.2 of ITB for further information.</p>	APPLICABLE	<input checked="" type="checkbox"/>	NOT APPLICABLE	<input type="checkbox"/>										
APPLICABLE	<input checked="" type="checkbox"/>															
NOT APPLICABLE	<input type="checkbox"/>															
(G)	BID SECURITY / EARNEST MONEY DEPOSIT (EMD)	<p>Applicability of EMD</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">APPLICABLE</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">NOT APPLICABLE</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table> <p>If applicable, the amount shall be as detailed below:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Item No.</th> <th style="text-align: center;">Bid Security Requirement (INR)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">INR 1,61,000/-</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">INR 1,51,500/-</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">INR 1,11,500/-</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">INR 1,76,500/-</td> </tr> </tbody> </table> <p>If a bidder quotes for more than one item, then the Bid Security is to be calculated and submitted on cumulative basis clearly indicating the items quoted failing which the bid of such bidder shall be rejected for all the quoted groups.</p> <p>Note: Refer clause 16 of ITB for further details.</p>	APPLICABLE	<input checked="" type="checkbox"/>	NOT APPLICABLE	<input checked="" type="checkbox"/>	Item No.	Bid Security Requirement (INR)	1	INR 1,61,000/-	2	INR 1,51,500/-	3	INR 1,11,500/-	4	INR 1,76,500/-
APPLICABLE	<input checked="" type="checkbox"/>															
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(H)	AVAILABILITY OF TENDER DOCUMENT ON WEBSITE(S)	From 18.07.2018 (11.00 Hrs, IST) to 10.08.2018 (15.00 Hrs, IST) on following websites: (i) GGPL's website http://www.godavarigas.in (ii) Govt. CPP Portal - https://eprocure.gov.in (iii) MECON's website http://www.meconlimited.co.in
(I)	DATE, TIME & VENUE OF PRE-BID MEETING	Date : 26.07.2018 Time : 11.30 hrs. (IST) Venue : MECON Limited Bengaluru office
(J)	DUE DATE & TIME OF BID-SUBMISSION	Date : 10.08.2018 Time : Upto 15.00 hrs. (IST)
(K)	DATE, & TIME OF UN-PRICED BID OPENING	Date : 10.08.2018 Time : 16.00 hrs. (IST)
(L)	CONTACT DETAILS	DGM (I/c) (Contracts) MECON LIMITED No.89, South End Road, Basavanagudi, Bengaluru – 560 004, India Ph. No. 080-2657 6442 / 26252105 Fax No. 080-26576352 Email : contractsblr@meconlimited.co.in

In case of the days specified above happens to be a holiday in MECON, the next working day shall be implied.

- 3.0 Bids must be submitted strictly in accordance with Clause No. 11.0 of ITB of Tender document.
- 4.0 The following documents is to be submitted in Original:
- i) Tender Fee (if applicable)
 - ii) EMD/Bid Security (if applicable)
 - iii) Power of Attorney
 - iv) Integrity Pact
- 5.0 Clarification(s)/Corrigendum(s) if any shall also be available on above referred websites. Any revision, clarification, addendum, corrigendum, time extension, etc. to this Tender Document will be hosted on the above mentioned website(s) only. Bidders are requested to visit the website regularly to keep themselves updated.



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- 6.0 Bidders are advised to submit their bid strictly as per terms and conditions of tender documents and not to stipulate any deviation/exceptions.
- 7.0 Any bidder, who meets the Bid Evaluation Criteria (BEC) and wishes to quote against this Tender Document, may download the complete Tender Document along with its amendment(s) if any from websites as mentioned at 2.0 (H) of IFB and submit their Bid complete in all respect as per terms & conditions of Tender Document on or before the Due Date & Time of Bid Submission.
- 8.0 Bid(s) received from bidders to whom tender/information regarding this Tender Document has been issued as well as offers received from the bidder(s) by downloading Tender Document from above mentioned website(s) shall be taken into consideration for evaluation & award provided that the Bidder is found responsive subject to provisions contained in Clause No. 2 of ITB. The Tender Document calls for offers on single point “Sole Bidder” responsibility basis (except where JV/Consortium bid is allowed pursuant to clause no. 3.0 of ITB) and in total compliance of Scope of Works as specified in Tender Document.
- 9.0 Godavari Gas reserves the right to reject any or all the bids received at its discretion without assigning any reason whatsoever.

This is not an Order/ Contract.

For & on behalf of
Godavari Gas Private Limited

(V. IMAYAVARAMBAN)
DGM (I/c) (Contracts)
MECON Limited
No.89, South End Road, Basavanagudi,
Bengaluru – 560 004
Ph. No. 91-80-2657 6442 / 26252105
Fax No. 91-80-26576352
E-mail : contractsblr@meconlimited.co.in

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Standard Bidding Document (SBD) for Procurement of Goods - Domestic

Summary

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PART-I – BIDDING PROCEDURES



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- 2. ANNEXURE-II : BID DATA SHEET (BDS)
- 3. ANNEXURE-III: PROCEDURE FOR ACTION IN CASE CORRUPT/ FRAUDULENT/ COLLUSIVE/ COERCIVE PRACTICES
- 4. ANNEXURE-IV : VENDOR PERFORMANCE EVALUATION PROCEDURE
- 5. ANNEXURE-V : FORMS AND FORMATS

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Section 1.1: Bid Evaluation Criteria

	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	
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BID EVALUATION CRITERIA

A. Technical Criteria

- 1.1.1 The Bidder's proposed facility / workshop for fabrication, assembly and testing of the skids shall be certified by a reputed Inspection agency such as CEIL/ Lloyds/ BV / DNV/ TUV / ABS /MOODY / SGS / GLI / Velosi and bidder shall furnish a certificate from the said agency that the proposed workshop has the Capability for Fabrication / assembly / testing of skids complying the Specification of the quoted skid(s).
- 1.1.2 For qualifying against one & more items indicated in Table-1, the bidder shall have designed, fabricated, integrated, tested and supplied for natural gas service at least following number of skids in a single order for each item in previous seven years reckoned from bid due date:

Item No.	Qty Required as per MR (Nos.)	Experience required in a single order (Minimum Nos.)
1.0	03	01
2.0	04	01
3.0	03	01
4.0	05	01

- a) For Bidders quoting for more than one item, the BEC quantity will be on cumulative basis in addition to satisfying the condition mentioned above.
- b) The supplied District regulatory skid and Metering regulatory skid to qualify above shall comprise of filtration, Pressure Reduction and Flow Meter with EVC/Flow computer with the complete skid inside cabinet enclosure. The flow meter in the supplied skid can be of **Ultrasonic / Turbine / RPD** type.
- c) Further, the bidder qualifying for higher Rating/Type of the meter and inlet pipe size rating of the supplied skid will be considered qualified for lower Rating/Type of the meter and inlet pipe size rating also, subject to meeting the cumulative quantity requirement.



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TABLE-1

A. District regulator skid (DRS) – comprising of filtration and pressure regulation with RPD/Turbine meter (TM) and EVC/ flow computer - mounted inside a cabinet.			
Item No.	Item description	Type of Meter / Rating	Inlet pipe size rating
1.0	DRS-5000SCMH Inside cabinet enclosure	RPD G-1000	300 #
2.0	DRS-2500SCMH Inside cabinet enclosure	RPD G-400	300 #
3.0	DRS-1500SCMH Inside cabinet enclosure	RPD G-250	300 #
4.0	DRS-1000SCMH Inside cabinet enclosure	RPD G-160	300 #

Note:



- (i) A Job executed by a Bidder for its own plant/ project cannot be considered as experience for the purpose of meeting BEC of the tender. However, jobs executed for Subsidiary/Fellow subsidiary / Holding company will be considered as experience for the purpose of meeting BEC subject to submission of tax paid invoice (s) duly certified by Statutory Auditor of the Bidder towards payments of statutory tax in support of the job executed for Subsidiary/Fellow subsidiary/ Holding company. Such Bidders to submit these documents in addition to the documents specified to meet BEC.

B. Financial Criteria

1.2.1 Annual Turnover

The minimum annual turnover achieved by the bidder as per their audited financial results in any one of the preceding three financial years i.e. 2014-15, 2015-16 and 2016-17 shall be as under:

Item No.	Minimum Annual Turnover requirement (in INR) (in Lakhs)
1.0	20.10
2.0	18.91
3.0	13.91
4.0	22.06

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1.2.2 Net worth

Net worth of the bidder should be positive as per the immediate preceding audited financial results of financial year 2016-17.

1.2.3 Working Capital

The minimum working capital of the bidder as per the immediate preceding audited financial results of financial year 2016-17, shall be as under:



Item No.	Minimum Annual Working Capital requirement (in INR) (in Lakhs)
1.0	4.02
2.0	3.78
3.0	2.78
4.0	4.41

1.3 NOTES:

- i) If a bidder quotes for more than one item, then the requirement of Annual Turnover and minimum working capital will be calculated on cumulative basis.
- ii) Financial Criteria of BEC will be not applicable for bidders quoting only for individual Items Nos. 1, 2, 3 & 4.

Note:

- (i) **Annual Turnover:** In case the tenders having the bid closing date up to 30th September of the relevant financial year, and audited financial results of the immediate 3 preceding financial years are not available, the bidder has an option to submit the audited financial results of the 3 years immediately prior to that. Wherever the closing date of the bid is after 30th Sept. of the relevant financial year, bidder has to compulsorily submit the audited financial results for the immediate 3 preceding financial years.
- (ii) **Net worth and Working Capital:** In case the tenders having the bid closing date up to 30th September of the relevant financial year, and audited financial results of the immediate preceding financial year is not available, in such case the audited financial results of the year immediately prior to that year will be considered as last financial year for Net worth/ Working Capital calculation. Wherever the closing date of the bid is after 30th Sept. of the relevant financial year, bidder has to compulsorily submit the audited financial results for the immediate preceding financial years.

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- (iii) *If the bidder's working capital is negative or inadequate, the bidder shall submit a letter from their bank having net worth not less than Rs.100 crores (or equivalent in USD), confirming the availability of line of credit for at least working capital requirement as stated above.*

The line of credit letter from bank to be submitted strictly as per format at F-13.

C. DOCUMENTS TO BE SUBMITTED FOR COMPLIANCE TO BEC

D.

BEC Clause no.	Description	Documents required for qualification
1.1	Documents Required-Technical Criteria	
1.1.1	Manufacturing facility	Certificate from a reputed Inspection agency such as CEIL / Lloyds/ BV/ DNV/ TUV/ ABS/ Moody/ SGS/ GLI/ Velosi; The said certificate shall be valid as on bid due date.
1.1.2	Experience	i) Copies of Purchase Order/ Work Order along with its proof of execution i.e. Inspection release note / Completion certificate / commissioning report etc. issued by the end user in support of supplied skids for natural gas service in the last 7 (seven) years as detailed in BEC. The proof of execution should have cross-reference of the purchase order. ii) Approved P&ID drawings and approved GA drawings of the supplied skid comprising of filtration, Pressure reduction and Flow Meter with EVC/Flow computer with the complete skid inside cabinet enclosure. iii) Approved P&ID drawings and approved GA drawings of the skids or data sheets (linked to above referred Purchase order/ work order) indicating the details of ratings
1.2	Documents Required-Financial Criteria	
1.2.1	Annual Turn-over	Bidder(s) shall submit copy of Audited Annual Financial Statement [Balance Sheet and Profit & Loss Account Statement] of the three (3) preceding Financial Year(s), i.e. FY: 2014-15, 2015-16 and 2016-17 along with un-price bid.

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BEC Clause no.	Description	Documents required for qualification
1.2.2	Net Worth	Bidder(s) shall submit copy of Audited Annual Financial Statement of last Financial Year, i.e. FY: 2016-17 along with un-price bid
1.2.3	Working Capital	Bidder(s) shall submit copy of Audited Annual Financial Statement] of last Financial Year, i.e. FY: 2016-17 along with un-price bid. In case Bidder's working capital is negative or inadequate, the bidder shall supplement this with a letter (as per Format-13) from the Bidder's Bank having net worth not less than Rs 100 Crores (or equivalent in USD), confirming availability of the line of credit for at least Working Capital requirement as stated above.

E. AUTHENTICATION OF DOCUMENTS SUBMITTED IN SUPPORT OF BID EVALUATION CRITERIA (BEC)

Technical Criteria of Bid Evaluation Criteria (BEC):



All documents in support of Technical Criteria of Bid Evaluation Criteria (BEC) to be furnished by the bidders shall necessarily be duly certified/ attested by Chartered Engineer and notary public with legible stamp.

Financial Criteria of Bid Evaluation Criteria (BEC):



Bidder shall submit "Details of financial capability of bidder" in prescribed format 'F-14' duly signed and stamped by a chartered accountant.

Further, copy of audited annual financial statements submitted in bid shall be duly certified/ attested by notary public with legible stamp.

In absence of requisite documents Godavari Gas / MECON reserves the right to reject the bid without making any reference to bidders.

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Section 1.2: Bid Evaluation Methodology

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EVALUATION METHODOLOGY



- (1) The below evaluation / distribution methodology will be considered for price evaluation and awarding purpose:
 - i) Bidder may quote for any or all items(s) of the Price Schedule. Evaluation and ordering shall be done item-wise, on least cost basis.
 - ii) Bidder quoting for any item shall have to quote for entire quantity of that item otherwise their bid will not be considered.
 - iii) If a bidder qualifies for lesser number of item(s) and happens to be lowest (L1) bidder for more number of item(s), then the order shall be awarded on “least cost to GGPL” basis for the item(s) for which the bidder qualifies. Once certain item(s) awarded to such L1 bidder, the bidder ceases to be lowest bidder for the remaining item(s). The ordering of remaining item(s) will be done to next lowest bidder.

- (2) The evaluated price of bidders shall include the following:
 - i) Ex-works price quoted by the bidder (including packing, forwarding, but excluding Inland Transportation to Delivery Location) including cost of Inspection by Third Party Agency etc.
 - ii) Inland transportation upto Delivery location, Inland Transit insurance and other costs incidental to delivery of goods
 - iii) GST (CGST & SGST/UTGST or IGST) on the finished goods including inland transportation & Transit insurance (i.e. on sl. no. i and ii above)
 - iv) Other loading, if any, as specified in Tender Document

Note:

- (i) In case the bidder is covered under Composition Scheme under GST laws, then bidder should quote the price inclusive of the GST (CGST & SGST/UTGST or IGST). Further, such bidder should mention “Cover under composition system” in column for GST (CGST & SGST/UTGST or IGST) of price schedule.
- (ii) In case any unregistered bidder is submitting their bid, their prices will be loaded with applicable GST (CGST & SGST/UTGST or IGST) during evaluation of bid.
- (iii) In case any cess on GST is applicable, same shall also be considered in evaluation.

The bids will be evaluated based on total price including applicable GST (CGST & SGST/UTGST or IGST).

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INSTRUCTIONS TO BIDDERS [ITB]

[A] – GENERAL

1.0 SCOPE OF BID



- 1.1 The Purchaser/ Owner/ Employer/ Godavari Gas as defined in the "General Conditions of Contract-Goods [GCC-Goods]", wishes to receive Bids as described in the Bidding Document/ Tender Document.
- 1.2 SCOPE OF BID: The scope of Supply shall be as defined in the Tender Document.
- 1.3 The successful Bidder (the “Supplier”) shall complete delivery of Goods along-with its incidental services (if any) as per Specification, Scope of Supply/Job within the period stated in Special Conditions of Contract.
- 1.4 Throughout the Bidding Documents,
 - a. The terms 'Bid', 'Tender' & ‘Offer’ and their derivatives [Bidder/ Tenderer, Bid/ Tender/ Offer etc.] are synonymous.
 - b. 'Day' means 'Calendar Day'
 - c. The singular shall include the plural and vice versa wherever the context so requires.

2.0 ELIGIBLE BIDDERS

- 2.1 The Bidder shall not be under a declaration of ineligibility by Purchaser for Corrupt/ Fraudulent/ Collusive/ Coercive practices, as defined in ITB, Clause No. 38.0 (Action in case Corrupt/ Fraudulent/ Collusive/ Coercive Practices).
- 2.2 The Bidder is not put on ‘Holiday’/ Banning List by Godavari Gas or Public Sector Project Management Consultant (like EIL, Mecon only due to “poor performance” or “corrupt and fraudulent practices”) or banned/ blacklisted by Government department/ Public Sector on Due Date of Bid Submission.

If the bidding documents were issued inadvertently/ downloaded from website, offers submitted by such bidders shall not be considered for opening/ evaluation/Award.

In case there is any change in status of the declaration prior to award of contract, the same has to be promptly informed to Godavari Gas by the bidder.

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It shall be the sole responsibility of the bidder to inform Godavari Gas in case the bidder is put on ‘Holiday’/ ‘Banning List’ by Godavari Gas or Public Sector Project Management Consultant (such as EIL, Mecon. only due to “poor performance” or “corrupt and fraudulent practices”) or banned/blacklisted by Government department/ Public Sector on due date of submission of bid and during the course of finalization of the tender. Concealment of the facts shall tantamount to misrepresentation of facts and shall lead to action against such Bidders as per clause 38.0 of ITB.

- 2.3 The Bidder should not be under any liquidation, court receivership or similar proceedings on Due Date of Bid Submission.



In case there is any change in status of the declaration prior to award of contract, the same has to be promptly informed to Godavari Gas by the bidder.

It shall be the sole responsibility of the bidder to inform Godavari Gas in case the bidder is under any liquidation, court receivership or similar proceedings on Due Date of Bid Submission and during the course of finalization of the tender. Concealment of the facts shall tantamount to misrepresentation of facts and shall lead to action against such Bidders as per clause no. 38 of ITB.

- 2.4 Bidder shall not be affiliated with a firm or entity:
- (i) that has provided consulting services related to the work to the Employer during the preparatory stages of the work or of the project of which the works/ services forms a part of or
 - (ii) that has been hired (proposed to be hired) by the Employer as an Engineer/ Consultant for the contract.
- 2.5 Neither the firm/ entity appointed as the Project Management Consultant (PMC) for a contract nor its affiliates/ JV’s/ subsidiaries shall be allowed to participate in the tendering process unless it is the sole Licensor/ Licensor nominated agent/ vendor.
- 2.6 Pursuant to qualification criteria set forth in the bidding document, the Bidder shall furnish all necessary supporting documentary evidence to establish Bidder’s claim of meeting qualification criteria.

Power of Attorney:

In case of a Single Bidder, Power of Attorney issued by the Board of Directors/ CEO

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/Chairman/ MD / Company Secretary of the Bidder/ all partners in case of Partnership firm/any person authorized in terms of Deed of LLP/Proprietor in favour of the authorised employee(s) of the Bidder, in respect of the particular tender for signing the Bid and all subsequent communications, agreements, documents etc. pertaining to the tender and to act and take any and all decision on behalf of the Bidder, is to be submitted.

2.7 The authorized employee(s) of the Bidder shall be signing the Bid and any consequence resulting due to such signing shall be binding on the Bidder.

2.8 Bids shall be evaluated as per Bid Evaluation Criteria (BEC) as provided in Section 1.1



3.0 BIDS FROM "JOINT VENTURE"/"CONSORTIUM" (FOR APPLICABILITY OF THIS CLAUSE REFER BIDDING DATA SHEET(BDS)) – NOT APPLICABLE

3.1 Bids from consortium/ JV of two or more members (maximum three including leader) are acceptable provided that they fulfil the qualification criteria and requirements stated in the Bidding Documents. Participating Consortium/ JV shall submit the Agreement clearly defining the scope and responsibility of each member. Members of consortium/ JV shall assume responsibility jointly & severally. The EMD shall be submitted by the Bidder (Consortium/ JV). In case of award, payment shall be made to the Consortium/JV.

3.2 The Consortium/ JV Agreement must clearly define the Consortium Leader/ Lead Partner of JV, who shall be responsible on behalf of the Consortium/JV during the period of evaluation of the bid as well as during the execution of Contract for timely completion of supply and shall receive/ send instructions for and on behalf of the Consortium/JV.

3.3 All the members shall authorize the representative from the lead partner by submitting a Power of attorney (on a non-judicial stamp paper of appropriate value) signed by legally authorized signatories of all the member(s). Such authorization must be accompanied with the bid. The authorized signatory shall sign all the documents relating to the tender/ contract. However, in case of award, payment shall be made to the consortium.

3.4 A consortium/ JV once established at the time of submitting the Bid shall not be

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allowed to be altered with respect to constituting members of the JV/ Consortium or their respective roles/ scope of work, except if and when required in writing by owner. If during the evaluation of bids, a consortium/JV proposes any alteration/ changes in the orientation of consortium/JV or replacements or inclusions or exclusions of any partner(s)/ member(s) which had originally submitted the bid, bid from such a consortium/JV shall be liable for rejection.

- 3.5 Any member of the consortium/ JV shall not be eligible either in an individual capacity or be a part of any other consortium/JV to participate in this tender. Further, no member of the consortium/ JV shall be on ‘Holiday’ by Godavari Gas or Public Sector Project Management Consultant (like EIL, Mecon only due to “poor performance” or “corrupt and fraudulent practices”) or banned/blacklisted by Government department/ Public Sector on due date of submission of bid. Offer submitted by such consortium/ JV shall not be considered for opening/ evaluation/Award.

4.0 ONE BID PER BIDDER

- 4.1 A Firm/ Bidder shall submit only 'one [01] Bid' in the same Bidding Process. A Bidder who submits more than 'one [01] Bid' will cause all the proposals in which the Bidder has participated to be disqualified.



- 4.2 Alternative Bids shall not be considered.

5.0 COST OF BIDDING & TENDER FEE

- 5.1 **COST OF BIDDING:** The Bidder shall bear all costs associated with the preparation and submission of the Bid including but not limited to Bank charges, all courier charges including taxes & duties etc. incurred thereof. Further, Godavari Gas will in no case, be responsible or liable for these costs, regardless of the outcome of the bidding process.

- 5.2 **TENDER FEE (FOR APPLICABILITY OF THIS CLAUSE REFER BID DATA SHEET(BDS))**

- 5.2.1 Tender Fee, if applicable, will be acceptable in the form of ‘crossed payee accounts only’ Demand Draft/ Banker’s Cheque [in favor of **Godavari Gas Private Limited**]. Please refer BDS for further details. The Tender Fee is to be submitted along with the bid. Offers sent without payment of requisite Tender Fee will be ignored straightaway.

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5.2.2 MSEs (Micro & Small Enterprises) are exempted from submission of Tender Fee in accordance with the provisions of Public Procurement Policy for MSE-2012 As stipulated in Clause 39.0 of ITB. The Government Departments/ PSUs are also exempted from the payment of tender fee.

5.2.3 In the event of a particular tender being cancelled, the tender fee will be refunded to the concerned bidder without any interest charges. No plea in this regard shall be entertained by the Purchaser.



6.0 SITE VISIT

6.1 The Bidder is advised to visit and examine the site and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the Bid and entering into a Contract for the required supply/job. The costs of visiting the site shall be borne by the Bidder.

6.2 The Bidder or any of its personnel or agents shall be granted permission by the Purchaser to enter upon its premises and land for the purpose of such visits, but only upon the express conditions that the Bidder, its personnel and agents will release and indemnify the Purchaser and its personnel, agents from and against all liabilities in respect thereof, and will be responsible for death or injury, loss or damage to property, and any other loss, damage, costs, and expenses incurred as a result of inspection.

6.3 The intending bidders shall be deemed to have visited the site and familiarised submitting the tender. Non-familiarity with the site conditions will not be considered a reason either for extra claims or for not carrying out the Supply in strict conformity with the DRAWINGS and SPECIFICATIONS or for any delay in performance

6.4 The Bidder shall not be entitled to hold any claim against Godavari Gas for non-compliance due to lack of any kind of pre-requisite information, as it is the sole responsibility of the Bidder to obtain all the necessary information with regard to site, surrounding, working conditions, weather etc. on its own before submission of the Bid.

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[B] – BIDDING DOCUMENT

7.0 CONTENTS OF BIDDING DOCUMENT



7.1 The contents of Bidding Documents / Tender Documents are those stated below, and should be read in conjunction with any ‘Clarifications’ or ‘Addendum / Corrigendum’ issued in accordance with "ITB: Clause-8.0 and 9.0"

- | | |
|--|-------------|
| ➤ Invitation for Bids (IFB) | |
| ➤ Instructions to Bidders [ITB] | Section 1 |
| ➤ Bid Evaluation Criteria [BEC] | Section 1.1 |
| ➤ Bid Evaluation Methodology | Section 1.2 |
| ➤ General Condition of Contract [GCC]-Goods | Section 2 |
| ➤ Special Conditions of Contract [SCC] | Section 3 |
| ➤ Technical Specifications, Drawing and Scope of Supply / Material requisition | Section 4 |
| ➤ Price Schedule/ Schedule of Rates | Section 5 |

7.2 The Bidder is expected to examine all instructions, forms, terms & conditions in the Bidding Documents. The Instructions to Bidders together with all its attachments thereto, shall be considered to be read, understood and accepted by the Bidders. Failure to furnish all information required by the Bidding Documents or submission of a Bid not substantially responsive to the Bidding Documents in every respect will be at Bidder's risk and may result in the rejection of his Bid.

8.0 CLARIFICATION OF BIDDING DOCUMENTS

8.1 A prospective Bidder requiring any clarification(s) of the Bidding Documents may notify Godavari Gas/MECON in writing or by fax or email at Godavari Gas/MECON mailing address indicated in the **BDS** no later than 02 (two) days prior to pre-bid meeting (in cases where pre-bid meeting is scheduled) or 05 (five) days prior to the bid closing date in cases where pre-bid meeting is not held. Godavari Gas/MECON reserves the right to ignore the bidders request for clarification if received after the aforesaid period. Godavari Gas/MECON may respond in writing to the request for clarification. Godavari Gas/MECON response including an explanation of the query, but without identifying the source of the query will be uploaded on Godavari Gas/MECON and Government tendering websites, as mentioned in **BDS** / communicated to prospective bidders by e-mail/ fax.

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8.2 Any clarification or information required by the Bidder but same not received by the Employer by way of above is liable to be considered as "no clarification / information required".

8.3 The Bidder shall submit their queries / clarifications to MECON in the format "F-15"

9.0 AMENDMENT OF BIDDING DOCUMENTS

9.1 At any time prior to the Due Date and Time of Bid Submission, Owner may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify the Bidding Documents by addenda/ corrigendum.

9.2 Any addendum/ corrigendum thus issued shall be part of the Bidding Documents and shall be hosted on Godavari Gas', MECON and Government tendering websites, as provided in **BDS**. Bidders have to take into account all such addendum/ corrigendum before submitting their bid.

9.3 The Purchaser, if it considers necessary, may extend the date of submissions of Bid in order to allow the Bidders a reasonable time to furnish their most competitive bid taking into account the amendment issued thereof.

[C] – PREPARATION OF BIDS



10.0 LANGUAGE OF BID

The bid prepared by the bidder and all correspondence/ drawings and documents relating to the bid exchanged by bidder and Godavari Gas shall be written in English language alone. Any printed literature furnished by the bidder may be written in another language as long as accompanied by an ENGLISH translation duly authenticated by the chamber of commerce of Bidders' country in which case, for the purpose of interpretation of the bid, the ENGLISH translation shall govern.

In the event of submission of any document/ certificate by the Bidder in a language other than English, the English translation of the same duly authenticated by Chamber of Commerce of Bidder's country shall be submitted by the Bidder.



11.0 DOCUMENTS COMPRISING THE BID

11.1 In case the Bids are invited under the two Bid system, the Bid prepared by the Bidder shall comprise the following components.

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11.1.1 **ENVELOPE-I: "TECHNO-COMMERCIAL / UN-PRICED BID"** shall contain the following:

- a) 'Covering Letter' on Bidder's 'Letterhead' clearly specifying the enclosed contents.
- b) 'Bidder's General Information', as per 'Form F-1'.
- c) 'Bid Form', as per 'Form F-2'
- d) Copies of documents, as required in 'Form F-3'
- e) As a confirmation that the prices are quoted in requisite format complying with the requirements copy of Schedule of Rate (SOR) with prices blanked out mentioning quoted / not quoted (as applicable) written against each item.
- f) 'Letter of Authority' on the Letter Head, as per 'Form F-5'
- g) 'No Deviation Confirmation', as per 'Form F-6'
- h) 'Bidder's Declaration regarding Holiday/ Banning, Anti-Corruption, Conflict of Interest, Liquidation, Court Receivership and Bankruptcy', in 'Form F-7'
- i) 'Certificate for Non-Involvement of Government of India ' from Bidder, as per 'Form F-8'
- j) 'Agreed Terms and Conditions', as per 'Form F-9'
- k) Duly attested documents in accordance with the "BID EVALUATION CRITERIA [BEC]" establishing the qualification.
- l) Undertaking on the Letter head, as per the Form F-10.
- m) Power of Attorney for authorized signatory in non-judicial stamp paper/copy of Board Resolution, the authorized signatory shall be signing the bid and any consequence resulting due to such signing shall be binding on the bidder as per the Form F-11.
- n) Any other information/details required as per Bidding Document
- o) EMD/ Bid Security in original as per Clause 16.0 of ITB
- p) All forms and Formats including Annexures.
- q) Original Tender Fee, if applicable
- r) Tender Document signed by the Authorized Signatory.
- s) Additional document specified in Bid Data Sheet (BDS), Special Conditions of Contract (SCC), Scope of Supply, if any
- t) Integrity Pact as per Form F-17 (if applicable)
- u) List of JV member (s), if any, and Joint Venture Agreement as per clause no. 3 of ITB or as specified elsewhere in the Tender Document.

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11.1.1.1 PART-I of the bid must be submitted as follows:

All the documents mentioned above at 11.1.1 should be submitted. The “authorized signatory” of the Bidder holding Power of Attorney must sign on all pages to the address mentioned in clause 21.0 of ITB, in a sealed envelope, super scribing the Tender details & number.

However, bidders must submit the original "Bid Security / EMD & tender fee (if applicable), Power of Attorney, Integrity Pact and any other documents specified in the bidding documents.



Bidders are required to submit the EMD in original by Due Date and Time of Bid Submission in the Part-I of the Bid. If the Bidder is unable to submit EMD in original by Due Date and Time of Bid Submission, the Bid will be rejected irrespective of their status/ranking in tendering process.

11.1.2 ENVELOPE-II: PRICE BID

Part-II of the Bid shall contain original Price schedule / Schedule of Rates (SOR) duly filled and signed and stamped on each page.

Note:

- i) Prices are to be submitted strictly as per the Price Schedule/Schedule of Rate of the bidding documents and only in the Envelope-II; submission of prices in Unpriced bid shall lead to rejection of the bid Godavari Gas shall not be responsible for any failure on the part of the bidder to follow the instructions.
- ii) Bidders are advised NOT to mention Rebate/ Discount separately, either in the SOR format or anywhere else in the offer. In case Bidder(s) intend to offer any Rebate/ Discount, they should include the same in the item rate(s) itself under the “Schedule of Rates (SOR)” and indicate the discounted unit rate(s) only.
- iii) If any unconditional rebate has been offered in the quoted rate, the same shall be considered in arriving at evaluated price. However, no cognizance shall be taken for any conditional discount for the purpose of evaluation of the bids.
- iv) In case, it is observed that any of the bidder(s) has/ have offered suo-moto Discount/ Rebate after opening of unpriced bid but before opening of price bids

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such discount /rebate(s) shall not be considered for evaluation. However, in the event of the bidder emerging as the lowest evaluated bidder without considering the discount/ rebate(s), then such discount/ rebate(s) offered by the bidder shall be considered for Award of Services and the same will be conclusive and binding on the bidder.

- v) In the event as a result of techno-commercial discussions or pursuant to seeking clarifications / confirmations from bidders, while evaluating the un-priced part of the bid, any of the bidders submits a sealed envelope stating that it contains revised prices; such bidder(s) will be requested to withdraw the revised prices failing which the bid will not be considered for further evaluation.

11.2 DELETED

11.3 In case of bids invited under single bid system, a single envelope containing all documents specified at Clause 11.1.1 & 11.1.2 of ITB above form the bid. All corresponding conditions specified at Clause 11.1.1 & 11.1.2 of ITB shall become applicable in such a case.

12.0 PRICE SCHEDULE / BID PRICES

12.1 Bidders shall indicate the following in the Price Schedule/SOR format.



12.2 Ex-works Price including packing and forwarding charges (such price to include all costs as well as duties and taxes paid or payable on components and raw materials incorporated or to be incorporated in the goods).

12.3 GST (CGST & SGST/UTGST or IGST) on the finished goods including inland transportation and transit insurance (which will be payable on the finished goods, if this Contract is awarded).



12.4 Deleted

12.5 Inland transportation upto Delivery Location, Transit insurance and other costs incidental to delivery.

12.6 The material is required to be delivered through a reliable bank approved Road Transport Company.

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- 12.7 Also, Godavari Gas reserves the right to transport the material with it's own transporter.
- 12.8 Charges for incidental services and GST (CGST & SGST/UTGST or IGST) on these services as per the Price Schedule/ Schedule of Rates.
- 12.9 Deleted
- 12.10 Transit insurance is in the scope of the supplier (refer bidding document for details).
- 12.11 Prices must be filled exactly in the format for "Price Schedule/ Schedule of Rates [SOR]" enclosed as part of Tender Document. If quoted in separate typed sheets and any variation in item description, unit, quantity, any conditions of SOR etc. is noticed, the Bid is liable to be rejected.
- 12.12 The delivery basis of the goods is mentioned in bidding document. The date of LR/GR shall be considered as date of delivery. Other terms shall be interpreted as per INCOTERMS®2010 or its latest version.
- 12.13 All duties, taxes and other levies (if any) payable by the Seller under the Contract or for any other cause, except GST (CGST & SGST/UTGST or IGST) on finished product & on the incidental services, shall be included in the rates / prices and the total bid-price submitted by the Bidder. The quoted rate of GST (CGST & SGST/UTGST or IGST) on finished product & on the incidental services shall be indicated in the specific Format, as provided in ITB and the bid prices. Bidders are required to quote the prices after carefully reading the provisions mentioned in tender document including SCC, GCC, Scope of Work, etc.
- 12.14 Prices quoted by the Bidder, shall remain firm and fixed and valid until completion of the Contract and will not be subject to variation on any account, whatsoever.
- 12.15 The Bidder shall quote the rates in 'figures' & 'words', as per Price Schedule /SOR format provided in the Tender Document. There should not be any discrepancy between the prices indicated in figures and in words. In case of any discrepancy, the same shall be dealt as stipulated in ITB.
- 12.16 Further, Bidder shall also mention the Harmonized System Nomenclature (HSN) at the designated place in Price Schedule.

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13.0 TAXES AND DUTIES

13.1 Within the contractual delivery period, the statutory variation in applicable GST (CGST & SGST/UTGST or IGST) on supply and on incidental services, shall be to Godavari Gas's account.

Any increase in the rate of GST (CGST & SGST/UTGST or IGST) beyond the contractual delivery period shall be to Supplier's account whereas any decrease in the rate GST (CGST & SGST/UTGST or IGST) shall be passed on to the Purchaser.

The base date for the purpose of applying statutory variation shall be the Bid Due Date.



13.2 In case of statutory variation(s) in the taxes & duties mentioned at clause no. 13.1 above, the Supplier shall submit a copy of the 'Government Notification' to evidence the rate as applicable on the Bid Due Date and on the date of revision. Claim for payment of Statutory variation should be raised preferably along with the Invoice. Any claim for arrears on account of statutory variation shall be submitted to Purchaser within two [02] months from the date of issue of such 'Government Notification', otherwise such claim may not be entertained.

13.3 Deleted

13.4 New Taxes & duties: Any new taxes & duties, if imposed by the State/ Central Govt. of India on the finished goods after the due date of bid submission but before the Contractual Delivery/Completion Date, shall be reimbursed to the Supplier on submission of copy of notification(s) issued from State/ Central Govt. Authorities along with documentary evidence for proof of payment of such taxes & duties, but only after ascertaining it's applicability with respect to the Contract.

13.5 Deemed Export benefits are not applicable and Bidder should furnish prices without considering the same.



13.6 Supplier shall ensure timely submission of correct invoice(s), as per GST rules/regulation, with all required supporting document(s) within a period specified in Contract to enable Godavari Gas to avail input credit of GST (CGST & SGST/UTGST or IGST). Further, returns and details required to be filled under GST laws & rules should be timely filed by Supplier of Goods / Services with requisite details.

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- 13.7 If input tax credit is not available to Godavari Gas for any reason not attributable to Godavari Gas, then Godavari Gas shall not be obligated or liable to pay or reimburse GST (CGST & SGST/UTGST or IGST) claimed in the invoice(s) and shall be entitled to deduct/ setoff /recover such GST (CGST & SGST/UTGST or IGST) together with all penalties and interest, if any, against any amounts paid or payable by Godavari Gas to the Supplier.
- 13.8 The supplier shall mention the particulars of Godavari Gas Private Limited on the Invoice. Besides, if any other particulars of Godavari Gas are required to be mentioned, under GST rules/ regulations on the date of dispatch, the same shall also be mentioned on the Invoice.
- 13.9 In case CBEC (Central Board of Excise and Customs)/ any equivalent government agency brings to the notice of Godavari Gas that the Supplier has not remitted the amount towards GST (CGST & SGST/UTGST or IGST) collected from Godavari Gas to the government exchequer, then, that Supplier shall be put under Holiday list of Godavari Gas for period of six months as mentioned in Procedure for Evaluation of Performance of Vendors/ Suppliers/Contractors/ Consultants.
- 13.10 Godavari Gas will prefer to deal with registered supplier of goods/ services under GST. Therefore, bidders are requested to get themselves registered under GST, it not registered yet.
- 13.11 However, in case any unregistered bidder is submitting their bid, there prices will be loaded with applicable GST (CGST & SGST/UTGST or IGST) during evaluation of bid.
- 13.12 In case the GST rating of vendor on the GST portal / Govt. official website is negative / black listed, then the bids may be rejected by Godavari Gas. Further, in case rating of bidder is negative / black listed after award of work for supply of goods / services, then Godavari Gas shall not be obligated or liable to pay or reimburse GST (CGST & SGST/UTGST or IGST) to such vendor and shall also be entitled to deduct / recover such GST (CGST & SGST/UTGST or IGST) along with all penalties / interest, if any, incurred by Godavari Gas.

13.13 Anti-profiteering clause

As per Clause 171 of GST Act, it is mandatory to pass on the benefit due to reduction

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in rate of tax or from input tax credit to the consumer by way of commensurate reduction in prices. The Supplier may note the above and quote their prices accordingly.

13.14 GST (CGST & SGST/UTGST or IGST) is implemented w.e.f. 01.07.2017 which subsumed various indirect taxes and duties applicable before 01.07.2017. Accordingly, the provisions of General Condition of Contract relating to taxes and duties which are subsumed in GST are modified to aforesaid provisions mentioned in clause no. 12 and 13 of ITB.

14.0 BID CURRENCIES

Bidders must submit bid in Indian Rupees only.



15.0 BID VALIDITY

15.1 Bids shall be kept valid for a period of 90 days from the Due Date of Bid Submission. A Bid valid for a shorter period may be rejected by Godavari Gas as 'non-responsive'.



15.2 In exceptional circumstances, prior to expiry of the original 'Bid Validity Period', the Employer may request the Bidders to extend the 'Period of Bid Validity' for a specified additional period. The request and the responses thereto shall be made in writing or by fax/ email. A Bidder may refuse the request without forfeiture of his 'Bid Security'. A Bidder agreeing to the request will not be required or permitted to modify his Bid, but will be required to extend the validity of its 'Bid Security' for the period of the extension and in accordance with "ITB: Clause-15" in all respects.

16.0 EARNEST MONEY DEPOSIT/ BID SECURITY (FOR APPLICABILITY OF THIS CLAUSE REFER BID DATA SHEET(BDS))

16.1 Bids must be accompanied with '**Earnest Money Deposit/ Bid Security**' in the form of '**Demand Draft**' or '**Banker's Cheque**' [in favour of **Godavari Gas Private Limited**, payable at the place as defined in BDS] or '**Bank Guarantee**' or '**Letter of Credit**' as per the format given in **Form -4/4A of the bidding documents** or [in favor of **Godavari Gas Private Limited**]. Please refer BDS for further details. Bidders shall ensure that 'Bid Security', having a validity of at least 'two [02] months' beyond the validity of the bid, must accompany the Bid in the format(s) made available in the Bidding Document. Bid not accompanied with 'Bid Security', or 'Bid Security' not in requisite form shall be liable for rejection. The Bid Security shall be submitted in Indian Rupees only.

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- 16.2 The 'Bid Security' is required to protect Godavari Gas against the risk of Bidder's conduct, which would warrant the 'Bid Security's' forfeiture, pursuant to "ITB: Clause-16.7".
- 16.3 Godavari Gas shall not be liable to pay any Bank charges, commission or interest etc. on the amount of 'Bid Security'. In case 'Bid Security' is in the form of a 'Bank Guarantee', the same shall be from any Indian scheduled Bank or a branch of an International Bank situated in India and registered with 'Reserve Bank of India' as Scheduled Foreign Bank. However, in case of 'Bank Guarantee' from Banks other than the Nationalized Indian Banks, the Bank must be commercial Bank having net worth in excess of Rs. 100 Crores [Rupees One Hundred Crores] and a declaration to this effect should be made by such commercial Bank either in the 'Bank Guarantee' itself or separately on its letterhead. 'Earnest Money / Bid Security' shall be valid for 'two [02] months' beyond the 'Bid Validity Period'
- 16.4 Any Bid not secured in accordance with "ITB: Clause-16.1 & Clause-16.3" may be rejected by Godavari Gas as non-responsive.
- 16.5 Unsuccessful Bidder's 'Earnest Money Deposit/ Bid Security' will be discharged/ returned as promptly as possible, but not later than 'thirty [30] days' after finalization of tender.
- 16.6 The successful Bidder's 'Bid Security' will be discharged upon the Bidder's acknowledging the 'Award' and furnishing the 'Contract Performance Guarantee / Security Deposit' pursuant to clause 37.0 of ITB.
- 16.7 Notwithstanding anything contained herein, the 'Bid Security' may also be forfeited in any of the following cases:
- a) If a Bidder withdraws his Bid during the 'Period of Bid Validity'
 - b) If a Bidder has indulged in corrupt/fraudulent /collusive/coercive practice
 - c) If the Bidder modifies bids during the period of bid validity (after submission date).
 - d) Violates any other condition, mentioned elsewhere in the tender document, which may lead to forfeiture of EMD.
 - e) In the case of a successful Bidder, if the Bidder fails to:
 - i) to furnish "Contract Performance Guarantee / Security Deposit", in accordance with "ITB: Clause-37"

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ii) to accept 'arithmetical corrections' as per provision of the clause no. 30 of ITB.



- 16.8 Bid Security should be in favour of Godavari Gas Private Limited and addressed to Godavari Gas. In case Bid Security is in the form of 'Bank Guarantee' or 'Letter of Credit', the same must indicate the Bid Document No. and the Services for which the Bidder is quoting. This is essential to have proper correlation at a later date. The 'Bid Security' should be in the form provided at 'Form F-4'/'Form F-4A'.
- 16.9 MSEs (Micro & Small Enterprises) are exempted from submission of EMD/ Bid Security in accordance with the provisions of PPP-2012 as stipulated in Clause 39.0 of ITB. However, Traders/Dealers/ Distributors /Stockiest /Wholesaler registered with DIC are not entitled for exemption of EMD. The Government Departments/ PSUs are also exempted from the payment of Bid Security.

17.0 PRE-BID MEETING

- 17.1 The Bidder(s) or his designated representative are invited to attend a "Pre-Bid Meeting" which will be held at the time and address as specified in BDS. It is expected that a bidder shall not depute more than 02 representatives for the meeting.
- 17.2 Purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage. The Bidder must submit their queries / clarifications to Godavari Gas in the format "F-15", as mentioned at clause no. 8.0 of ITB.
- 17.3 Text of the questions raised and the responses given, together with any responses prepared after the meeting, will be uploaded on Godavari Gas website against the Tender. Any modification of the Contents of Bidding Documents listed in "ITB: Clause-7.1", that may become necessary as a result of the Pre-Bid Meeting shall be made by the Employer exclusively through the issue of an Addendum / Corrigendum pursuant to "ITB: Clause-9.0", and not through the minutes of the Pre-Bid Meeting.
- 17.4 Non-attendance of the Pre-Bid Meeting will not be a cause for disqualification of Bidder.

18.0 FORMAT AND SIGNING OF BID

- 18.1 The Bid shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the Bidder (as per POA). The name and position held by each person signing, must be typed or printed below the signature.

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All pages of the Bid except for un-amended printed literature where entry(s) or amendment(s) have been made shall be initialed by the person or persons signing the Bid.

- 18.2 The Bid shall contain no alterations, omissions, or additions, unless such corrections are initialed by the person or persons signing the Bid.



19.0 ZERO DEVIATION AND REJECTION CRITERIA

19.1 **ZERO DEVIATION:** Deviation to terms and conditions of "Bidding Documents" may lead to rejection of bid. Godavari Gas will accept bids based on terms & conditions of "Bidding Documents" only. Godavari Gas will determine the substantial responsiveness of each bid to the Bidding Documents pursuant to provision contained in clause 28 of ITB. For purpose of this, a substantially responsive bid is one which conforms to all terms and conditions of the Bidding Documents without deviations or reservations. Godavari Gas' determination of a bid's responsiveness is based on the content of the bid itself without recourse to extrinsic evidence. Godavari Gas reserves the right to raise technical and/or commercial query(s), if required, on the bidder(s). The response(s) to the same shall be submitted in writing within the permitted time frame and no change in the price(s) or substance of the bids shall be sought, offered or permitted. The substance of the bid includes but not limited to prices, completion, scope, technical specifications, etc. Bidders are requested not to take any deviation/exception to the terms and conditions laid down in this "Tender Documents", and submit all requisite documents as mentioned in this "Tender Documents", failing which their offer will be liable for rejection. If a bidder does not reply to the queries in the permitted time frame then its bid shall be evaluated based on the documents available in the bid.

19.2 REJECTION CRITERIA:

Notwithstanding the above, deviation to the following clauses of Tender document shall lead to summarily rejection of Bid:

- a) Firm Price
- b) Earnest Money Deposit / Bid Security
- c) Specifications & Scope of Services
- d) Schedule of Rates / Price Schedule / Price Basis
- e) Duration / Period of Contract/ Completion schedule
- f) Period of Validity of Bid
- g) Price Reduction Schedule
- h) Contract Performance Bank Guarantee / Security Deposit

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- i) Guarantee / Defect Liability Period
- j) Arbitration / Resolution of Dispute/Jurisdiction of Court
- k) Force Majeure & Applicable Laws
- l) Payment terms
- m) Integrity Pact, if Applicable
- n) Any other condition specifically mentioned in the tender document elsewhere that non-compliance of the clause lead to rejection of bid
- o) Submission of prices in unpriced/technical Bid

Note: Further, it is once again reminded not to mention any condition in the Bid which is contradictory to the terms and conditions of Tender document.

20.0 E-PAYMENT

- 20.1 Payments to Suppliers will be made electronically, through '**e-banking**'. The successful bidder should give the details of his bank account as per the bank mandate form.
- 20.2 Further, to promote cashless transactions, the onward payments by Contractors to their employees, service providers, sub-contractors and suppliers may be made through Cards and Digital means to the extent possible.



ID1 – SUBMISSION OF BIDS

21.0 BID SUBMISSION

- 21.1 Bids shall be submitted through Manual/ Hard Copy (Original) offer mode in the manner specified elsewhere in tender document, at the address specified in BDS.
- 21.2 However, Bidders are also required to submit original Bid Security/ EMD, tender fee (as applicable), Power of Attorney and any other documents (as specified in the tender) at the address specified in BDS
- 21.3 Bids submitted under the name of AGENT/ CONSULTANT/ REPRESENTATIVE/ RETAINER/ ASSOCIATE etc. on behalf of a bidder/ affiliate shall not be accepted.

22.0 DUE DATE AND TIME OF BID SUBMISSION

- 22.1 The bids must be submitted not later than the date and time specified in the tender documents/ BDS.

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22.2 Godavari Gas may, in exceptional circumstances and at its discretion, extend the deadline for submission of Bids (clause 9.0 of ITB refers). In which case all rights and obligations of Godavari Gas and the Bidders, previously subject to the original deadline will thereafter be subject to the deadline as extended. Notice for extension of bid submission date will be uploaded on Godavari Gas' website/ MECON's website / CPP portal /communicated to the bidders.

23.0 LATE BIDS

Bidders must ensure submission of bids within the Due Date and Time of Bid Submission and no bids can be accepted/submitted thereafter.

24.0 MODIFICATION AND WITHDRAWAL OF BIDS



24.1 The bidder may withdraw or modify its bid after bid submission but before the Due Date and Time of Bid Submission as per tender document.

24.2 The modification shall also be prepared and uploaded in accordance with the provision of the clause 22.0 of ITB. No bid shall be modified/ withdrawn after the Due Date and Time of Bid Submission.

24.3 Withdrawal/ Modification/Substitution of a bid during the interval between the Due Date and Time for Bid Submission and the expiration of the Bid Validity Period shall result in the bidder's forfeiture of his bid security pursuant to clause 16.0 of ITB and rejection of bid.

24.4 The latest bid submitted shall be considered for evaluation and all other bids shall be considered to be unconditionally withdrawn.

24.5 In case after price bid opening the lowest evaluated bidder (L1) is not awarded the job for any mistake committed by him in bidding or withdrawal of bid or modification of bid or varying any term in regard thereof leading to re-tendering, Godavari Gas shall forfeit EMD paid by the bidder and such bidders shall be debarred from participation in re-tendering of the same job(s)/item(s). Further, such bidder will be put on holiday for a period of six months after following the due procedure as per Annexure-IV.

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[E] – BID OPENING AND EVALUATION

25.0 EMPLOYER'S RIGHT TO ACCEPT ANY BID AND TO REJECT ANY OR ALL BIDS

Godavari Gas reserves the right to accept or reject any Bid, and to annul the Bidding process and reject all Bids, at any time prior to award of Contract, without thereby incurring any liability to the affected Bidder or Bidders or any obligations to inform the affected Bidder or Bidders of the ground for Godavari Gas' action. However, Bidder if so desire may seek the reason (in writing) for rejection of their Bid to which Godavari Gas shall respond quickly.

26.0 BID OPENING

26.1 ***Unpriced Bid Opening:*** Godavari Gas/MECON will open bids, in the presence of bidders' designated representatives who choose to attend, at date, time and location stipulated in the BDS. The bidders' representatives, who are present shall sign a bid opening statement/ register evidencing their attendance.

26.2 ***Price Bid Opening:***



26.2.1 Godavari Gas/MECON will open the price bids of those bidders who meet the qualification requirement and whose bids are determined to be technically and commercially responsive. Bidders selected for opening of their price bids shall be informed about the date of price bid opening. Bidders may depute their authorized representative to attend the bid opening. The bidders' representatives, who are present shall sign a register evidencing their attendance and may be required to be present on a short notice.

26.2.2 The price bids of those bidders who were not found to be techno-commercially responsive shall be unopened.

26.3 In case of bids invited under the single bid system, bid shall be opened on the specified due date & time.

27.0 CONFIDENTIALITY

During Bid Process: Information relating to the examination, clarification, evaluation, and comparison of Bids, and recommendations for the award of a

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Contract, shall not be disclosed to any person(s) not officially concerned with such process.

28.0 CONTACTING THE EMPLOYER

28.1 From the time of Bid opening to the time of award of Contract, if any Bidder wishes to contact the Employer on any matter related to the Bid, it should do so in writing.

28.2 Any effort by the Bidder to influence the Employer in the Employer's 'Bid Evaluation', 'Bid Comparison', or 'Contract Award' decisions may result in the rejection of the Bidder's Bid and action shall be initiated as per procedure in this regard.

29.0 EXAMINATION OF BIDS AND DETERMINATION OF RESPONSIVENESS

29.1 The Owner's determination of a bid's responsiveness is based on the content of the bid only. Prior to the detailed evaluation of Bids, the Employer will determine whether each Bid



- a) Meets the "Bid Evaluation Criteria" of the Bidding Documents;
- b) Has been properly signed;
- c) Is accompanied by the required 'Earnest Money / Bid Security';
- d) Is substantially responsive to the requirements of the Bidding Documents; and
- e) Provides any clarification and/or substantiation that the Employer may require to determine responsiveness pursuant to "ITB: Clause-29.2"

29.2 A substantially responsive Bid is one which conforms to all the terms, conditions and specifications of the Bidding Documents without material deviations or reservations or omissions. For this purpose, Employer defines the foregoing terms below:

- a) "Deviation" is departure from the requirement specified in the tender documents.
- b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirement in the tender documents.
- c) "Omission" is the failure to submit part or all of the information or documentation required in the tender document.

29.3 A material deviation, reservation or omission is one that,

- a) If accepted would,
 - i) Affect in any substantial way the scope, quality, or performance of the job as specified in tender documents.

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ii) Limit, in any substantial way, inconsistent with the Tender Document, the Employer's rights or the tenderer's obligations under the proposed Contract.

b) If rectified, would unfairly affect the competitive position of other bidders presenting substantially responsive bids.

29.4 The Employer shall examine all aspects of the bid to confirm that all requirements have been met without any material deviation, reservation or omission.

29.5 If a Bid is not substantially responsive, it may be rejected by the Employer and may not subsequently be made responsive by correction or withdrawal of the material deviation, reservation or omission.

30.0 CORRECTION OF ERRORS



30.1 Bids determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Errors will be corrected by the Employer as follows:

- i) When there is a difference between the rates in figures and words, the rate which corresponds to the amount worked out by the contractor (by multiplying the quantity and rate) shall be taken as correct.
- ii) When the rate quoted by the contractor in figures and words tallies but the amount is incorrect, the rate quoted by the contractor shall be taken as correct and not the amount and the amount will be corrected accordingly.
- iii) When it is not possible to ascertain the correct rate, in the manner prescribed above, the rate as quoted in words shall be taken as correct and the amount will be corrected accordingly.
- iv) If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected.

30.2 The amount stated in the bid will be adjusted by the Employer in accordance with the above procedure for the correction of errors. If the bidder does not accept the corrected amount of bid, its bid will be rejected, and the bid security shall be forfeited.

31.0 EVALUATION AND COMPARISON OF BIDS

Bid shall be evaluated as per evaluation criteria mentioned in Section 1.2 of bidding documents.

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32.0 QUANTITY VARIATION (NOT APPLICABLE FOR THIS TENDER)

- 32.1 Where nature of items is such that the items cannot be supplied in exact quantity of the Purchase Order as in case of cables/ steel/ chemicals etc., quantity tolerance upto \pm 5% may be allowed. For such tolerance, separate amendment to Purchase Order would not be necessary.
- 32.2 The Purchaser reserves the right to delete the requirement of any one or more items of Tender Document without assigning any reason.

33.0 PURCHASE PREFERENCE

- 33.1 Purchase preference to Central government Public Sector Undertaking, Domestically Manufactured Electronic Products and Micro and Small Enterprises (MSEs) shall be allowed as per Government instructions in vogue.
- 33.2 Preference for Domestically Manufactured Electronic Products (DMEP) shall be as per Format F-19. For applicability, please refer BDS.



[F] – AWARD OF CONTRACT

34.0 AWARD

Subject to "ITB: Clause-29.0", Godavari Gas will award the Contract to the successful Bidder whose Bid has been determined to be substantially responsive and has been determined as the lowest evaluated Bid.

35.0 NOTIFICATION OF AWARD / FAX OF ACCEPTANCE

- 35.1 Prior to the expiry of 'Period of Bid Validity', Notification of Award for acceptance of the Bid will be intimated to the successful Bidder by Godavari Gas either by Fax / E - mail / Letter or like means defined as the "Fax of Acceptance (FOA)". The Contract shall enter into force on the date of FOA and the same shall be binding on Godavari Gas and successful Bidder (i.e. Supplier/ Seller). The Notification of Award/ FOA will constitute the formation of a Contract. The detailed Purchase Order /Contract shall be issued thereafter incorporating terms & conditions of Tender Document, Corrigendum, Clarification(s), Bid and agreed variation(s)/acceptable deviation(s), if any. Godavari Gas may choose to issue Notification of Award in form of detailed Purchase Order without issuing FOA and in such case the Contract shall enter into force on the date of detailed Purchase Order only.

	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	
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35.2 Contract/ Delivery/ Completion Period shall commence from the date of Notification of Award/ FOA or as mentioned therein.

35.3 Upon the successful Bidder's / Supplier's furnishing of 'Contract Performance Guarantee / Security Deposit', pursuant to "ITB: Clause-37.0", Godavari Gas will promptly discharge his EMD, pursuant to "ITB: Clause-16.0".

36.0 DISPATCH SCHEDULE

36.1 If Purchase Order issued based on FOT (Free on Truck) / FOR (Free on Rail) (project site) basis, materials shall be delivered at the destination on freight prepaid & door delivery basis and for the cases where order(s) are finalized on Ex-works basis the transportation will be arranged by supplier(s) / Godavari Gas on 'freight to pay' basis and the freight will be paid at the destination.

Seller shall submit the following details of goods/cargo within 15 days from Notification of Award to the designated authority as specified in BDS or as per Purchase Order, if a separate person is mentioned therein:



- i) Shipments Schedule
- ii) Dimension details of packages
- iii) Detailed technical write-up along with Catalogue (if applicable)
- iv) Any other document/details, if mentioned in Purchase Order

36.2 The consignment should be handed over to transporter with E-way bill, wherever required as per law/act. In case such e-way bill is required to be issued by Godavari Gas, the concerned designated order issuing authority may be contacted in this regard.

36.3 It shall be responsibility of the seller to send intimation immediately on dispatch of the material so that necessary arrangements can be made at site. Delays on account of the same shall solely be attributable to the Supplier.

37.0 CONTRACT PERFORMANCE GUARANTEE/ SECURITY DEPOSIT

37.1 Within 30 days of the receipt of the notification of award/ FOA from Godavari Gas, the successful Bidder shall furnish the Contract Performance Guarantee/Security Deposit. The Contract Performance Guarantee shall be in the form of either Banker's Cheque or Demand Draft or Bank Guarantee or Letter of Credit and shall be in the currency of the Contract. However, CPG/SD shall not be applicable in cases wherein

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the individual order value as specified in Notification of Award is upto INR 5 Lakh (excluding GST). The successful bidder has the option to submit CPG/SD as per the following details:

i) Procurement of materials

10% of Contract/Order value within 30 days of award or 5% of Contract / Order value within 30 days of award and balance to be deducted against each invoice till balance 5% is deducted. This deducted amount can be released/deduction can be stopped against submission of bank guarantee of equivalent amount.

ii) Annual Rate Contracts for materials



2% of order/services/works value within 30 days (either through extension of EMD, if available or through equivalent BG) and 8% of Individual release order value.

37.2 The Contract Performance Guarantee shall be for an amount as specified in BDS towards faithful performance of the contractual obligations and performance of equipment/material. For the purpose of Contract Performance Guarantee, Contract Value shall be exclusive of taxes and duties / **GST (CGST & SGST/UTGST or IGST)**.

37.3 Bank Guarantee towards Contract Performance Guarantee shall be from any Indian scheduled bank or a branch of an International bank situated in India and registered with Reserve bank of India as scheduled foreign bank in case of Indian bidder as well as foreign bidder. However, in case of bank guarantees from banks other than the Nationalized Indian banks, the bank must be a commercial bank having net worth in excess of Rs 100 crores and a declaration to this effect should be made by such commercial bank either in the Bank Guarantee itself or separately on its letterhead. This bank guarantee shall be valid for a period as three months beyond the Warranty/ Guarantee Period specified in Tender Document.

37.4 Failure of the successful Bidder to comply with the requirements of this article shall constitute sufficient grounds for the annulment of the award and forfeiture of the EMD.

37.5 Further, the bidder can submit CPBG on line through issuing bank to Godavari Gas Private Limited directly as per Ministry of Finance (MOF) Department of financial service direction vide letter ref number F.No.7/112/2011-BOA dated 17th July 2012. In such cases confirmation will not be sought from issuing banker by Godavari Gas Private Limited.

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38.0 PROCEDURE FOR ACTION IN CASE CORRUPT/ FRAUDULENT/ COLLUSIVE/ COERCIVE PRACTICES

38.1 Procedure for action in case Corrupt/ Fraudulent/Collusive/Coercive Practices is enclosed at Annexure-III.

38.2 The Fraud Prevention Policy document is available on GAIL’ website (www.gailonline.com)



38.3 NON-APPLICABILITY OF ARBITRATION CLAUSE IN CASE OF BANNING OF VENDORS/ SUPPLIERS / CONTRACTORS /BIDDERS/ CONSULTANTS INDULGED IN FRAUDULENT/ COERCIVE PRACTICES

Notwithstanding anything contained contrary in GCC and other "CONTRACT DOCUMENTS", in case it is found that the Vendors/ Suppliers / Contractors/Bidders/ Consultants indulged in fraudulent/ coercive practices at the time of bidding, during execution of the contract etc., and/or on other grounds as mentioned in Godavari Gas’ “Procedure for action in case Corrupt/Fraudulent/Collusive/Coercive Practices” (Annexure-III), the contractor/bidder shall be banned (in terms of aforesaid procedure) from the date of issuance of such order by Godavari Gas Pvt. Ltd., to such Vendors/ Suppliers / Contractors/Bidders/ Consultants.

The Vendor/ Supplier / Contractor/ Bidder/Consultant understands and agrees that in such cases where Vendor/ Supplier / Contractor/ Bidder/Consultant has been banned (in terms of aforesaid procedure) from the date of issuance of such order by Godavari Gas Private Limited, such decision of Godavari Gas Private Limited shall be final and binding on such Vendor/ Supplier / Contractor/ Bidder/Consultant and the ‘Arbitration clause’ in the GCC and other "CONTRACT DOCUMENTS" shall not be applicable for any consequential issue /dispute arising in the matter.

39.0 PUBLIC PROCUREMENT POLICY FOR MICRO AND SMALL ENTERPRISES

39.1 Following provision has been incorporated in tender for MSEs, in line with notification of Government of India, vide Gazette of India No. 503 dated 26.03.2012 proclaiming the Public Procurement Policy on procurement of goods and services

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from Micro and Small Enterprises (MSEs)

- i) Issue of tender document to MSEs free of cost.
- ii) Exemption to MSEs from payment of EMD/Bid Security.
- iii) In Tender participating Micro and Small Enterprises quoting price within the price band of L1 + 15% shall also be allowed to supply a portion of requirement by bringing down their prices to L1 price in a situation where L1 price is from someone other than a micro and small enterprise and such micro and small enterprises shall be allowed to supply upto 20% of the tendered value. In case of more than one such Micro and Small Enterprises, the supply shall be shared proportionately (to tendered quantity). Further, out of above 20%, 4% shall be from MSEs owned by SC/ST entrepreneurs. This quota is to be transferred to other MSEs in case of non-availability of MSEs owned by SC/ST entrepreneurs.

The quoted prices against various items shall remain valid in case of splitting of quantities of the items above.



In case tendered item is non-splitable or non-dividable (specified in Bid Data Sheet), MSE quoting price within price band L1 (other than MSE) + 15% , may be awarded for full/ complete supply of total tendered value subject to matching of L1 price.

39.2 The MSEs owned by SC/ST entrepreneurs shall mean:

- a) In case of proprietary MSE, Proprietor(s) shall be SC/ST.
- b) In case of partnership MSE, the SC/ST partners shall be holding atleast 51% share in the unit
- c) In case of private Limited Companies, at least 51%share is held by SC/ST. If the MSE is owned by SC/ST entrepreneurs, the bidder shall furnish appropriate documentary evidence in this regard.

39.3 In case bidder is a Micro or Small Enterprise under the Micro, Small and Medium Enterprises Development Act, 2006, the bidder shall submit the following:

- a) Documentary evidence that the bidder is a Micro or Small Enterprises registered with District Industries Centers or Khadi and Village Industries National Small Industries Corporation or Directorate of Handicrafts and Handloom or any other body specified by Ministry of Micro, Small and Medium Enterprises or Udyog Aadhaar Memorandum.

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- b) If the MSE is owned by SC/ST Entrepreneurs, the bidder shall furnish appropriate documentary evidence in this regard.

The above documents submitted by the bidder shall be duly certified by the Statutory Auditor of the bidder or a Chartered Accountant (not being an employee or a Director or not having any interest in the bidder's company/firm) where audited accounts are not mandatory as per law and notary public with legible stamp.



If the bidder does not provide the above confirmation or appropriate document or any evidence, then it will be presumed that they do not qualify for any preference admissible in the Public Procurement Policy (PPP) 2012.

Further, MSEs who are availing the benefits of the Public Procurement Policy (PPP) 2012 get themselves registered with MSME Data Bank being operated by NSIC, under SME Division, M/o MSME, in order to create proper data base of MSEs which are making supplies to CPSUs.

- 39.4 If against an order placed by Godavari Gas, successful bidder(s) (other than Micro/Small Enterprise) is procuring material/services from their sub-vendor who is a Micro or Small Enterprise registered with District Industries Centers or Khadi and Village Industries Commission or Khadi and Village Industries Board or Coir Board or National Small Industries Corporation or Directorate of Handicrafts and Handloom or any other body specified by Ministry of Micro, Small and Medium Enterprises with prior consent in writing of the purchasing authority/Engineer-in-charge, the details like Name, Registration No, Address, Contact No. details of material & value of procurement made, etc. of such Enterprises shall be furnished by the successful bidder at the time of submission of invoice/Bill.
- 39.5 The benefit of policy are not extended to the traders/dealers/ Distributors/Stockiest/Wholesalers.

40.0 PACKING INSTRUCTIONS



- 40.1 Packing shall be strong and sturdy such that it can withstand loading/unloading & pushing by mechanical devices. All packaging shall be done in such a manner as to reduce volume and weight as much as possible without jeopardizing the safety of the material. All packing materials shall be new.
- 40.2 Fragile articles should have special packing materials depending on type of materials.

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- 40.3 All soft and delicate surfaces on equipment/material should be carefully protected / painted with suitable coating and wrapped to prevent rusting and damage. All mechanical and electrical equipment and other heavy articles should be securely fastened to the bottom of the case, to avoid damage.
- 40.4 Attachments and spare parts of equipment and all small pieces shall be packed separately in wooden cases with adequate protection inside the case and sent along with main equipment. Each item shall be tagged so as to identify it with the main equipment and part number and reference number shall be indicated.
- 40.5 All protrusions shall be suitably protected and openings shall be blocked by wooden/steel covers as may be required.
- 40.6 Detailed case wise packing list in water proof envelope shall be inserted in each package together with equipment/material. One copy of 'Detailed Packing List' shall be fastened outside of the package in waterproof envelope and covered by metal cover.
- 40.7 Each package shall be marked on three sides with proper paints/indelible waterproof ink as follows:

PURCHASER:
DESTINATION:
Purchase Order No.....
Net Wt..... Kgs,
Gross Wt..... Kgs.
Dimensions.....X.....X.....CM.
Package No. (Sl. No. of total packages).....
Seller's Name.....

- 40.8 Permits are to be obtained separately for entry/use of vehicles/trailers etc. inside the plant. The following requirements are to be met to obtain vehicle permit:-
- Vehicle/Equipment etc. should be brought to site in good conditions.
 - Valid Road Tax Certificate, fitness certificate and insurance policy from Competent Authority
 - Valid operating/driving license of driver/operator
 - Any other requirement mentioned elsewhere in Tender Document

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41.0 VENDOR PERFORMANCE EVALUATION

The procedure for evaluation of performance of Supplier containing provisions for putting a Bidder / Supplier on suspension and/or holiday list (as the case may be) is enclosed as Annexure IV.

42.0 MENTIONING OF PAN NO. IN INVOICE/BILL



As per CBDT Notification No. 95/2015 dated 30.12.2015, mentioning of PAN no. is mandatory for procurement of goods/services/works/consultancy services exceeding Rs. 2 Lacs per transaction.

Accordingly, service provider should mention their PAN no. in their invoice/ bill for any transaction exceeding Rs. 2 lakhs. As provided in the notification, in case service provider do not have PAN no., they have to submit declaration in Form 60 along with invoice/ bill for each transaction.

Payment of supplier/ contractor / service provider/ consultant shall be processed only after fulfilment of above requirement.

43.0 SETTLEMENT OF COMMERCIAL DISPUTES BETWEEN PUBLIC SECTOR ENTERPRISE(S) INTER-SE AND PUBLIC SECTOR ENTERPRISE(S) AND GOVERNMENT DEPARTMENT (S) THROUGH PERMANENT MACHINERY OF ARBITRATION (PMA) IN THE DEPARTMENT OF PUBLIC ENTERPRISES

In the event of any dispute or difference relating to the interpretation and application of the provisions of the Contracts, such dispute or difference shall be referred by either party for Arbitration to the sole Arbitrator in the Department of Public Enterprises to be nominated by the Secretary to the Government of India in-charge of the Department of Public Enterprises. The Arbitration and Conciliation Act, 1996 shall not be applicable to arbitrator under this clause. The award of the Arbitrator shall be binding upon the parties to the dispute, provided, however, any party aggrieved by such award may make a further reference for setting aside or revision of the award to the Law Secretary, Department of Legal Affairs, Ministry of Law & Justice, Government of India. Upon such reference the dispute shall be decided by the Law Secretary or the Special Secretary / Additional Secretary, when so authorized by the Law Secretary, whose decision shall bind the Parties finally and conclusively. The parties to the dispute will share equally the cost of arbitration as intimated by the Arbitrator.

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44.0 DELETED

45.0 REPEAT ORDER

PURCHASER reserves the right, within 6 months of order to place repeat order upto 50% of the original ordered quantity (s) without any change in unit price or other terms and conditions.



46.0 DELETED

===== X =====

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p align="center">GODAVARI GAS PRIVATE LIMITED</p> <p align="center">CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p align="center">SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p align="center">Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>MECON मेकॉन ISO 9001 Company</p>
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Annexure-I

(DELETED)

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p align="center">GODAVARI GAS PRIVATE LIMITED</p> <p align="center">CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p align="center">SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p align="center">Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>MECON मेकॉन ISO 9001 Company</p>
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Annexure-II

Bid Data Sheet (BDS)

	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	
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ITB clause	Description				
A. GENERAL					
1.1	<p>The Purchaser is: Godavari Gas Private Limited</p> <p>The consignee details for the goods are as under:-</p> <p>_____</p> <p>_____</p>				
1.2	The name of the Procurement to be performed is: Supply of District Regulatory Skid (DRS)				
3	<p>Bid From a Consortium / Joint Venture</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">APPLICABLE</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">NOT APPLICABLE</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table>	APPLICABLE	<input checked="" type="checkbox"/>	NOT APPLICABLE	<input checked="" type="checkbox"/>
APPLICABLE	<input checked="" type="checkbox"/>				
NOT APPLICABLE	<input checked="" type="checkbox"/>				
5.2.1	<p>Applicability of Tender fee</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">APPLICABLE</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">NOT APPLICABLE</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table> <p>Note: Refer clause 5.2 of ITB for further details</p>	APPLICABLE	<input checked="" type="checkbox"/>	NOT APPLICABLE	<input checked="" type="checkbox"/>
APPLICABLE	<input checked="" type="checkbox"/>				
NOT APPLICABLE	<input checked="" type="checkbox"/>				
5.2.2	<ul style="list-style-type: none"> Demand Draft/ Banker's Cheque towards Tender fee (if applicable) shall be in favour of <i>Godavari Gas Private Limited</i> payable at Bengaluru. 				
B. BIDDING DOCUMENT					
8.1	<p>For clarification purposes only, the communication address is:</p> <p>V. IMAYAVARAMBAN DGM (I/c) (Contracts) MECON Limited No.89, South End Road, Basavanagudi, Bengaluru – 560 004 Ph. No. 91-80-2657 6442 / 26252105 Fax No. 91-80-26576352 E-mail : contractsblr@meconlimited.co.in</p>				
8.1	<p>Websites : :</p> <p>http://www.godavarigas.in; https://eprocure.gov.in;</p>				



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(ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)
Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003



ITB clause	Description								
	http://www.meconlimited.co.in								
C. PREPARATION OF BIDS									
11.1.1 (s)	The Bidder shall submit with its Techno-commercial/ Unpriced bid the following additional documents (Refer clause(s) XX of SCC): _____ _____								
12	Additional Provision for Schedule of Rate/ Bid Price are as under: _____ _____								
12.3	Transit Insurance shall be arranged by :- <table border="1" style="width: 100%;"> <tr> <td align="center">GODAVARI GAS PRIVATE LIMITED</td> <td align="center"><input checked="" type="checkbox"/></td> </tr> <tr> <td align="center">SUPPLIER</td> <td align="center"><input checked="" type="checkbox"/></td> </tr> </table> <p>In case, transit insurance to be arranged by Godavari Gas, the details of Transit Insurance Policy are as under:- Not Applicable</p>	GODAVARI GAS PRIVATE LIMITED	<input checked="" type="checkbox"/>	SUPPLIER	<input checked="" type="checkbox"/>				
GODAVARI GAS PRIVATE LIMITED	<input checked="" type="checkbox"/>								
SUPPLIER	<input checked="" type="checkbox"/>								
12.5	Delivery basis shall be <table border="1" style="width: 100%;"> <tr> <td align="center">FOT, Site, EAST & WEST GODAVARI DISTRICTS</td> <td align="center"><input checked="" type="checkbox"/></td> </tr> <tr> <td align="center">EX-WORKS,(Bidder to indication location)</td> <td align="center"><input checked="" type="checkbox"/></td> </tr> </table>	FOT, Site, EAST & WEST GODAVARI DISTRICTS	<input checked="" type="checkbox"/>	EX-WORKS,(Bidder to indication location)	<input checked="" type="checkbox"/>				
FOT, Site, EAST & WEST GODAVARI DISTRICTS	<input checked="" type="checkbox"/>								
EX-WORKS,(Bidder to indication location)	<input checked="" type="checkbox"/>								
13.7 and 13.8	Details of Buyer: <table border="1" style="width: 100%;"> <tr> <td align="center">Consignee</td> <td>M/s Godavari Gas Private Limited D. No.70-14/5/1, Sidharth Nagar, Near RTO Junction, NFCL Road, Kakinada – 533001</td> </tr> <tr> <td align="center">PAN NO.</td> <td>AAGCG5701K</td> </tr> <tr> <td align="center">GST NO.</td> <td>37AAGCG5701K1ZI</td> </tr> <tr> <td align="center">Godavari Gas Bank details</td> <td>Operations a/c No: 2423201000324 Canara Bank, IF Brach, Hyderabad</td> </tr> </table>	Consignee	M/s Godavari Gas Private Limited D. No.70-14/5/1, Sidharth Nagar, Near RTO Junction, NFCL Road, Kakinada – 533001	PAN NO.	AAGCG5701K	GST NO.	37AAGCG5701K1ZI	Godavari Gas Bank details	Operations a/c No: 2423201000324 Canara Bank, IF Brach, Hyderabad
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 <p>GAPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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ITB clause	Description				
16.1 a)	<p>Applicability of EMD/ Bid Security</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">APPLICABLE</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">NOT APPLICABLE</td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table> <p>Note: Refer clause 16 of ITB for further details and refer 16.1 b) below</p>	APPLICABLE	<input checked="" type="checkbox"/>	NOT APPLICABLE	<input type="checkbox"/>
APPLICABLE	<input checked="" type="checkbox"/>				
NOT APPLICABLE	<input type="checkbox"/>				
16.1 b)	<ul style="list-style-type: none"> In case 'Earnest Money Deposit/ Bid Security' is in the form of 'Demand Draft' or 'Banker's Cheque', the same should be in favour of Godavari Gas Private Limited, payable at Kakinada 				
17.1	<p>Date, Time and Venue of Pre-Bid meeting</p> <p>Date and Time: At 11.30 hrs. (IST) on 26.07.2018</p> <p>Venue: MECON Limited No.89, South End Road, Basavanagudi, Bengaluru – 560 004</p>				
D. SUBMISSION AND OPENING OF BIDS					
21	<p>The Tender No. of this bidding process is: MEC/23TS/01/51/S2/DRS/SU/0003</p>				
21.2	<p>For bid submission purposes only, the Consultant's contact details are as below:</p> <p>V. IMAYAVARAMBAN DGM (Contracts) MECON Limited No.89, South End Road, Basavanagudi, Bengaluru – 560 004 Ph. No. 91-80-2657 6442 / 26252105 Fax No. 91-80-26576352 E-mail : contractsblr@meconlimited.co.in</p>				
22.1	<p>Due Date and Time of Bid Submission shall be, Date: 10.08.2018 Time: Upto 15.00 hrs. (IST)</p>				



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GODAVARI DISTRICTS
SUPPLY OF DISTRICT REGULATORY SKID (DRS)
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Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003





ITB clause	Description									
26	<p>The bid opening shall take place at: Date: 10.08.2018 Time: 16.00 hrs. (IST)</p> <p>MECON Limited No.89, South End Road, Basavanagudi, Bengaluru – 560 004 Ph. No. 91-80-2657 6442 / 26252105 Fax No. 91-80-26576352 E-mail : contractsblr@meconlimited.co.in</p>									
33.2	<p>Whether Domestically Manufactured Electronic Products (DMEP) is applicable or not:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">YES</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">NO</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table>	YES	<input checked="" type="checkbox"/>	NO	<input checked="" type="checkbox"/>					
YES	<input checked="" type="checkbox"/>									
NO	<input checked="" type="checkbox"/>									
E. EVALUATION, AND COMPARISON OF BIDS										
31	Evaluation Methodology is mentioned in Section 1.2.									
F. AWARD OF CONTRACT										
37	<p>Contract Performance Guarantee / Security Deposit</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">APPLICABLE</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">NOT APPLICABLE</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td rowspan="2" style="text-align: center; vertical-align: middle;">Applicability</td> <td style="text-align: center;">37.1 (i)</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">37.1 (ii)</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table>	APPLICABLE	<input checked="" type="checkbox"/>	NOT APPLICABLE	<input checked="" type="checkbox"/>	Applicability	37.1 (i)	<input checked="" type="checkbox"/>	37.1 (ii)	<input checked="" type="checkbox"/>
APPLICABLE	<input checked="" type="checkbox"/>									
NOT APPLICABLE	<input checked="" type="checkbox"/>									
Applicability	37.1 (i)	<input checked="" type="checkbox"/>								
	37.1 (ii)	<input checked="" type="checkbox"/>								
39	<p>Whether tendered item is non-split able or non-divisible:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">YES</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td style="text-align: center;">NO</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table>	YES	<input checked="" type="checkbox"/>	NO	<input checked="" type="checkbox"/>					
YES	<input checked="" type="checkbox"/>									
NO	<input checked="" type="checkbox"/>									

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p align="center">GODAVARI GAS PRIVATE LIMITED</p> <p align="center">CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p align="center">SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p align="center">Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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Annexure-III

Procedure for Action in Case of Corrupt/ Fraudulent/ Collusive/ Coercive Practices

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Introduction:

In the endeavour to maintain and foster most ethical and corruption free business environment, this Banning Procedure containing provision for putting a Vendor/ Supplier on Suspension and/or banning list if such agency indulges in corrupt/ fraudulent/ collusive/ coercive practice is being followed.

A] Definitions:

A.1 “Corrupt Practice” means the offering, giving, receiving or soliciting, directly or indirectly, anything of value to improperly influence the actions in selection process or in contract execution.

“Corrupt Practice” also includes any omission for misrepresentation that may mislead or attempt to mislead so that financial or other benefit may be obtained or an obligation avoided.

A.2 “Fraudulent Practice” means and include any act or omission committed by a agency or with his connivance or by his agent by misrepresenting/ submitting false documents and/ or false information or concealment of facts or to deceive in order to influence a selection process or during execution of contract/ order.



A.3 “Collusive Practice amongst bidders (prior to or after bid submission)” means a scheme or arrangement designed to establish bid prices at artificial non-competitive levels and to deprive the Employer of the benefits of free and open competition.

A.4 “Coercive practice” means impairing or harming or threatening to impair or harm directly or indirectly, any agency or its property to influence the improperly actions of an agency, obstruction of any investigation or auditing of a procurement process.

A.5 “Vendor/Supplier/Contractor/Consultant/Bidder” is herein after referred as “Agency”

A.6 “Appellate Authority” shall mean Committee of Directors of Godavari Gas

A.7 “Competent Authority” shall mean the authority, who is competent to take final decision for Suspension of business dealing with an Agency/ ies and Banning of business dealings with Agency/ ies,

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A.8 “Allied Agency” shall mean all the concerns within the sphere of effective influence of banned/ suspended agencies. In determining this, the following factors may be taken into consideration:

- (a) Whether the management is common;
- (b) Majority interest in the management is held by the partners or directors of banned/ suspended firm.
- (c) substantial or majority shares are owned by banned/ suspended agency and by virtue of this it has a controlling voice.

A.9 “Investigating Agency” shall mean any department or unit of Godavari Gas investigating into the conduct of Agency/ party and shall include the Vigilance Department of the Godavari Gas, Central Bureau of Investigation, State Police or any other agency set up by the Central or state government having power to investigate.

B] Actions against bidder(s) indulging in corrupt /fraudulent/ collusive/ coercive practice

B.1 Irregularities noticed during the evaluation of the bids :

If it is observed during bidding process/ bids evaluation stage that a bidder has indulged in corrupt/fraudulent /collusive/coercive practice, the bid of such Bidder (s) shall be rejected and its Earnest Money Deposit (EMD) shall be forfeited.



Further, such agency shall be banned for future business with Godavari Gas for a period specified in para B.2.2 below from the date of issue of banning order.

B.2 Irregularities noticed after award of contract

(i) During execution of contract:

If an agency, is found to have indulged in corrupt/fraudulent/ collusive/coercive practices, during execution of contract, the agency shall be banned for future business with Godavari Gas for a period specified in para B.2.2 below from the date of issue of banning order.

The concerned order (s)/ contract(s) where corrupt/ fraudulent/ collusive practices is observed, shall be suspended with immediate effect by Engineer-in-Charge (EIC)/ Employer whereby the supply/ work/ service and payment etc. will be suspended. The action shall be initiated for putting the agency on banning.

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After conclusion of process, the order (s)/ contract (s) where it is concluded that such irregularities have been committed shall be terminated and Contract Performance Guarantee submitted by agency against such order (s)/ contract (s) shall also be forfeited. The amount that may have become due to the contractor on account of work already executed by him shall be payable to the contractor and this amount shall be subject to adjustment against any amounts due from the contractor under the terms of the contract.

No risk and cost provision will be enforced in such cases.

(ii) After execution of contract and during Defect liability period (DLP)/ Warranty/Guarantee Period:

If an agency is found to have indulged in corrupt/ fraudulent/ collusive/ coercive practices, after execution of contract and during DLP/ Warranty/ Guarantee Period, the agency shall be banned for future business with Godavari Gas for a period specified in para B.2.2 below from the date of issue of banning order.



Further, the Contract Performance Guarantee submitted by agency against such order (s)/ contract (s) shall be forfeited.

(iii) After expiry of Defect liability period (DLP)/ Warranty/Guarantee Period

If an agency is found to have indulged in corrupt/fraudulent/ collusive/coercive practices, after expiry of Defect liability period (DLP)/Warranty/Guarantee Period, the agency shall be banned for future business with Godavari Gas for a period specified in para B.2.2 below from the date of issue of banning order.



B.2.2 Period of Banning

The period of banning of agencies indulged in Corrupt /Fraudulent /Collusive /Coercive Practices shall be as under and to be reckoned from the date of banning order:

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Sl. No.	Description	Period of banning from the date of issuance of Banning order
1	<p>Misrepresentation/False information other than pertaining to BEC of tender but having impact on the selection process.</p> <p>For example, if an agency confirms not being in holiday/ banning list of PSUs/ Govt. Dept., liquidation, bankruptcy etc. and subsequently it is found otherwise, such acts shall be considered in this category.</p>	02 years
2	Corrupt/Fraudulent (pertaining to BEC of tender) /Collusive/Coercive Practices	03 years
2.1	If an agency again commits Corrupt/Fraudulent (pertaining to BEC of tender) /Collusive/ Coercive Practices in subsequent cases after their banning, such situation of repeated offense to be dealt with more severity and following shall be the period of banning:	
	(i) Repeated once	7 years (in addition to the period already served)
	(ii) Repeated twice or more	15 years (in addition to the period already served)
3	Indulged in unauthorized disposal of materials provided by Godavari Gas	7 years
4	If act of vendor/ contractor is a threat to the National Security	15 years

In exceptional cases where the act of vendor/ contractor is a threat to the National Security, the banning shall be for indefinite period.

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C] Effect of banning on other ongoing contracts/ tenders

C.1 If an agency is put on Banning, such agency should not be considered in ongoing tenders/future tenders.

C.2 However, if such an agency is already executing other order (s)/ contract (s) where no corrupt/fraudulent/ collusive/coercive practice is found, the agency should be allowed to continue till its completion without any further increase in scope except those incidental to original scope mentioned in the contract.

C.3 If an agency is put on the Banning List during tendering and no irregularity is found in the case under process:

C.3.1 after issue of the enquiry /bid/tender but before opening of Technical bid, the bid submitted by the agency shall be ignored.

C.3.2 after opening Technical bid but before opening the Price bid, the Price bid of the agency shall not be opened and BG/EMD submitted by the agency shall be returned to the agency.



C.3.3 after opening of price, BG/EMD made by the agency shall be returned; the offer of the agency shall be ignored & will not be further evaluated. If the agency is put on banning list for fraud/ mis-appropriation of facts committed in the same tender/other tender where errant agency emerges as the lowest (L1), then such tender shall also be cancelled and re-invited.

D] Procedure for Suspension of Bidder

D.1 Initiation of Suspension

Action for suspension business dealing with any agency/ (ies) shall be initiated by C&P Department when

- (i) Corporate Vigilance Department based on the fact of the case gathered during investigation by them recommend for specific immediate action against the agency.
- (ii) Corporate Vigilance Department based on the input from Investigating agency, forward for specific immediate action against the agency.

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- (iii) Non performance of Vendor/Supplier/Contractor/Consultant leading to termination of Contract/ Order.



D.2 Suspension Procedure:

- D.2.1 The order of suspension would operate initially for a period not more than six months and will be communicated to the agency and also to Corporate Vigilance Department. Period of suspension may be extended by one month at a time with a ceiling of six months pending a conclusive decision to put the agency on banning list.
- D.2.2 During the period of suspension, no new business dealing may be held with the agency.
- D.2.3 Period of suspension will be accounted for in the final order passed for banning of business with the agency.
- D.2.4 The decision regarding suspension of business dealings should also be communicated to the agency.

D.3 Effect of Suspension of business:

Effect of suspension on other on-going/future tenders will be as under:

- D.3.1 No enquiry/bid/tender shall be entertained from an agency as long as the name of agency appears in the Suspension List.
- D.3.2 If an agency is put on the Suspension List during tendering:
- D.3.2.1 after issue of the enquiry /bid/tender but before opening of Technical bid, the bid submitted by the agency shall be ignored.
- D.3.2.2 after opening Technical bid but before opening the Price bid, the Price bid of the agency shall not be opened and BG/EMD submitted by the agency shall be returned to the agency.
- D.3.2.3 after opening of price, BG/EMD made by the agency shall be returned; the offer of the agency shall be ignored & will not be further evaluated. If the agency is put on Suspension list for fraud/ mis-appropriation of facts conducted in the same tender/other tender where errant agency emerges as the lowest (L1), then such

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tender shall also be cancelled and re-invited.

D.3.3 The existing contract (s)/ order (s) under execution shall continue.



E] Appeal against the Decision of the Competent Authority:

E.1 The agency may file an appeal against the order of the Competent Authority for putting the agency on banning list. The appeal shall be filed to Appellate Authority. Such an appeal shall be preferred within one month from the receipt of banning order.

E.2 Appellate Authority would consider the appeal and pass appropriate order which shall be communicated to the party as well as the Competent Authority.



E.3 Appeal process may be completed within 45 days of filing of appeal with the Appellate Authority.

F] Wherever there is contradiction with respect to terms of ‘Integrity Pact’, GCC and ‘Procedure for action in case of Corrupt/Fraudulent/ Collusive/Coercive Practice’, the provisions of ‘Procedure for action in case of Corrupt/ Fraudulent/ Collusive/ Coercive Practice’ shall prevail.

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Annexure-IV

Procedure for Evaluation of Performance of Vendor/ Suppliers

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1.0 GENERAL

A system for evaluation of Vendor/ Suppliers and their performance is a key process and important to support an effective purchasing & contracting function of an organization.

Performance of all participating Vendor/ Suppliers need to be closely monitored to ensure timely receipt of supplies from a Vendor, completion of an assignment by a Consultant or complete execution of order by a contractor within scheduled completion period. For timely execution of projects and meeting the operation & maintenance requirement of operating plants, it is necessary to monitor the execution of order or contracts right from the award stage to completion stage and take corrective measures in time.



2.0 OBJECTIVE

The objective of Evaluation of Performance aims to recognize, and develop reliable Vendor/ Suppliers so that they consistently meet or exceed expectations and requirements.

The purpose of this procedure is to put in place a system to monitor performance of Vendor/ Suppliers associated with Godavari Gas in Projects and in O&M so as to ensure timely completion of various projects, timely receipt of supplies including completion of works & services for operation and maintenance of operating plants and quality standards in all respects.

3.0 METHODOLOGY

- i) **Preparation of Performance Rating Data Sheet**
Performance rating data Sheet for each and every Vendor/ Supplier for all orders/Contracts with a value of Rs. 7 Lakhs and above shall be drawn up. These data sheets shall be separately prepared for orders/ contracts related to Projects and O&M. Format, Parameters, Process, responsibility for preparation of Performance Rating Data Sheet are separately mentioned.
- ii) **Measurement of Performance**
Based on the parameters defined in Data Sheet, Performance of concerned Vendor/ Supplier would be computed and graded accordingly. The measurement of the

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performance of the Party would be its ability to achieve the minimum scoring of 60% points in the given parameters.

- iii) **Initiation of Measures:**
Depending upon the Grading of Performance, corrective measures would be initiated by taking up the matter with concerned Vendor/ Supplier. Response of Vendor/ Supplier would be considered before deciding further course of action.
- iv) **Implementation of Corrective Measures:**
Based on the response of Vendor/ Supplier, concerned Engineer-in-Charge for the Projects and/or OIC in case of O&M would recommend for continuation or discontinuation of such party from the business of Godavari Gas.
- v) Orders/contracts placed on Proprietary/OEM basis for O&M will be evaluated and, if required, corrective action will be taken for improvement in future.



4.0 Deleted

**5.0 PROCESS OF EVALUATION OF PERFORMANCE OF VENDORS/
SUPPLIERS/ CONTRACTORS / CONSULTANTS**

5.1 FOR PROJECTS AND OPERATIONS & MAINTENANCE

- i) Evaluation of performance of Vendors/ Suppliers/Contractors/ Consultants in case of PROJECTS shall be done immediately with completion of contract/supply order.
- ii) On completion of contract/supply order, EIC (Engineer-in-charge)/ Project- in-charge shall prepare a Performance Rating Data Sheet (Format at Annexure-1 for Projects and Annexure-2 for O&M) for all Orders and Contracts excluding cases under para 4.0
- iii) Depending upon the Performance Rating, following action need to be initiated by Engineer-in-charge/Project-in-charge:

SI. No.	Performance Rating	Action
1	POOR	Seek explanation for Poor performance

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2	FAIR	Seek explanation for Fair performance
3	GOOD	Letter to the concerned for improving performance in future
4	VERY GOOD	No further action

iv) Reply from concerned Vendor/ Supplier/Contractor/ Consultant shall be examined. In case of satisfactory reply, Performance Rating data Sheet will be closed with a letter to the concerned for improving performance in future.

v) When no reply is received or reasons indicated are unsatisfactory, the following actions need to be taken:

A) Where Performance rating is “POOR”:

Such defaulting Vendor/ Supplier/Contractor/ Consultant will be considered for putting on Holiday for a period from one to three years as given below:

- (i) Poor Performance due to reasons other than Quality : **One Year**
- (ii) Poor Performance on account of Quality (if any mark obtained against Quality parameter is less than 30): **Two Years**
- (iii) Poor Performance leading to termination of contract or Offloading of contract due to poor performance solely attributable to Vendor/ Supplier or Repeated Offence: **Three Years**



Non performance of a Vendor/ Supplier leading to termination of Contract/ Order, such Vendor/ Supplier are also to be considered for suspension as per process defined for suspension in “Procedure for Action in case of Corrupt/ Fraudulent/ Collusive/ Coercive Practices”

B) Where Performance rating is “FAIR”:

Warning will be issued to such defaulting Vendor/ Supplier to improve their performance.

vi) A draft show cause notice providing a final opportunity to alleged defaulter to defend his case will be put up.

The show cause notice will contain all the allegations towards the breach

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committed by agency including mentioning the provisions of the tender so breached and seeking explanation as to why the action should not be taken against the agency as per provisions of tender. All the supporting documents will also be provided to the agency along with show cause notice.

An opportunity to the concerned party will be given to respond to the same within 15 days.

In response to the show cause notice if the party seeks any additional document (applicable only once), the same will be provided to the party as the earliest but not later than 7 days. However, the period to respond in such a case will be appropriately adjusted.

- vii) If the party desires for personal hearing to the committee prior to submission of reply to show cause notice, the same can also be given.
- viii) The reply to show cause notice will be examined. In case the decision is to put the party on holiday for a specific period, a letter in form of speaking order will be issued to the party.
- ix) However, Holiday restrictions shall not apply on Vendors/ Supplier for procurement of spares from them on proprietary basis.

6.0 REVIEW & RESTORATION OF PARITES PUT ON HOLIDAY



6.1 An order for Holiday passed for a certain specified period shall deemed to have been automatically revoked on the expiry of that specified period and it will not be necessary to issue a specific formal order of revocation.

Further, in case Vendor/ Supplier/Contractor/ Consultant is put on holiday due to quality, and new order is placed on bidder after restoration of Vendor/ Supplier, such order will be properly monitored during execution stage.

7.0 EFFECT OF HOLIDAY

7.1 If a Vendor/ Supplier is put on Holiday, such Vendor/ Supplier will not be considered in ongoing tenders/ future tenders.

7.2 However, if such Vendor/ Supplier is already executing any other order/ contract and

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their performance is satisfactory in terms of the relevant contract, should be allowed to continue till its completion without any further increase in scope except those incidental to original scope mentioned in the contract. In such a case CPBG will not be forfeited and payment will be made as per provisions of concerned contract. However, this would be without prejudice to other terms and conditions of the contract.

7.3 Effect on other ongoing tendering:

7.3.1 after issue of the enquiry /bid/tender but before opening of Technical bid, the bid submitted by the party shall be ignored.

7.3.2 after opening Technical bid but before opening the Price bid, the Price bid of the party shall not be opened and BG/EMD submitted by the party shall be returned to the party.

7.3.3 after opening of price, BG/EMD made by the party shall be returned; the offer of the party shall be ignored & will not be further evaluated. If errant party emerges as the lowest (L1), then such tender shall also be cancelled and re-invited.



8.0 While putting the Vendor/ Supplier/Contractor/ Consultant on holiday as per the procedure, the holding company, subsidiary, joint venture, sister concerns, group division of the errant Vendor/ Supplier/Contractor/ Consultant shall not be considered for putting on holiday list.

Any bidder, put on holiday, will not be allowed to bid through consortium route also in new tender during the period of holiday.

9.0 If an unsuccessful bidder makes any vexatious, frivolous or malicious complaint against the tender process with the intention of delaying or defeating any procurement or causing loss to Godavari Gas or any other bidder, such bidder will be put on holiday for a period of six months, if such complaint is proved to be vexatious, frivolous or malicious, after following the due procedure.

10.0 APPEAL AGAINST THE DECISION OF THE COMPETENT AUTHORITY:

(a) The party may file an appeal against the order of the Competent Authority for putting the party on Holiday list. The appeal shall be filed to Appellate Authority. Such an appeal shall be preferred within one month from the of

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receipt of Holiday order.



- (b) Appellate Authority would consider the appeal and pass appropriate order which shall be communicated to the party as well as the Competent Authority.
- (c) Appeal process may be completed within 45 days of filing of appeal with the Appellate Authority.
- (d) “Appellate Authority” shall mean Committee of Directors

11.0 ERRANT BIDDER

In case after price bid opening the lowest evaluated bidder (L1) is not awarded the job for any mistake committed by him in bidding or withdrawal of bid or modification of bid or varying any term in regard thereof leading to re-tendering, Godavari Gas shall forfeit EMD paid by the bidder and such bidders shall be debarred from participation in re-tendering of the same job(s)/ item(s).

Further, such bidder will be put on holiday for a period of six months after following the due procedure.

- 12.0** In case CBEC (Central Board of Excise and Customs)/ any equivalent Central Government agency/ State Government agency brings to the notice of Godavari Gas that the Supplier of Goods / Services (Service Provider) has not remitted the amount towards GST (CGST & SGST/UTGST or IGST) collected from Godavari Gas to the government exchequer, then party will be put on holiday for a period of six months.

	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	
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Annexure-1

Godavari Gas Private Limited
PERFORMANCE RATING DATA SHEET (FOR PROJECTS)

- i) Project/Work Centre :
- ii) Order/ Contract No. & date :
- iii) Brief description of Items :
Works/Assignment
- iv) Order/Contract value (Rs.) :
- v) Name of Vendor/Supplier/ :
Contractor/ Consultant
- vi) Contracted delivery/ :
Completion Schedule
- vii) Actual delivery/ : Completion date

Performance Parameter	Delivery/ Completion Performance	Quality Performance	Reliability Performance#	Total
Maximum Marks	40	40	20	100
Marks Allocated				

Remarks (if any)

PERFORMANCE RATING (**)

Note:

(#) Vendor/Supplier/Contractor/Consultant who seek repeated financial assistance or deviation beyond contract payment term or seeking direct payment to the sub-vendor/sub-contractor due to financial constraints, then '0' marks should be allotted against Reliability Performance.

(*) Allocation of marks should be as per enclosed instructions

(**) Performance rating shall be classified as under:



Sl. No.	Range (Marks)	Rating
1	60 & below	POOR
2	61-75	FAIR
3	76-90	GOOD
4	More than 90	VERY GOOD

Signature of
Authorised

Signatory:

Name:

Designation:

	GODAVARI GAS PRIVATE LIMITED CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS) Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003	
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Instructions for allocation of marks

1. Marks are to be allocated as under :



1.1 DELIVERY/ COMPLETION PERFORMANCE 40 Marks

Delivery Period/ Completion Schedule	Delay in Weeks	Marks
a) Upto 3 months	Before CDD	40
	Delay upto 4 weeks	35
	” 8 weeks	30
	” 10 weeks	25
	” 12 weeks	20
	” 16 weeks	15
	More than 16 weeks	0
b) Above 3 months	Before CDD	40
	Delay upto 4 weeks	35
	” 8 weeks	30
	” 10 weeks	25
	” 16 weeks	20
	” 20 weeks	15
	” 24 weeks	10
	More than 24 weeks	0

1.2 QUALITY PERFORMANCE 40 Marks

For Normal Cases: No Defects/ No Deviation/ No failure: 40 marks

i) Rejection/Defects	Marks to be allocated on pro rata basis for acceptable quantity as compared to total quantity for normal cases	10 marks
ii) When quality marks failure endanger marks system integration marks and safety of the system	Failure of severe nature - Moderate nature - low severe nature	0 5 10-25



 GGPL <small>GODAVARI GAS PRIVATE LIMITED</small>	GODAVARI GAS PRIVATE LIMITED CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS) Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003	 मेकॉन <small>ISO 9001 Company</small>
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iii) Number of deviations	1. No deviation	5 marks
	2. No. of deviations < 2	2 marks
	3. No. of deviations > 2	0 marks

1.3 RELIABILITY PERFORMANCE

20 Marks

A.	FOR WORKS/CONTRACTS	
i)	Submission of order acceptance, agreement, PBG, Drawings and other documents within time	4 marks
ii)	Mobilization of resources as per Contract and in time	4 marks
iii)	Liquidation of Check-list points	4 marks
iv)	Compliance to statutory and HS&E requirements or Reliability of Estimates/Design/Drawing etc. in case of Consultancy jobs	4 marks
v)	Timely submission of estimates and other documents for Extra, Substituted & AHR items	4 marks
B.	FOR SUPPLIES	
i)	Submission of order acceptance, PBG, Drawings and other documents within time	5 marks
ii)	Attending complaints and requests for after sales service/ warranty repairs and/ or query/ advice (upto the evaluation	5 marks
iii)	Response to various correspondence and conformance to standards like ISO	5 marks
iv)	Submission of all required documents including Test Certificates at the time of supply	5 marks

 GGPL <small>GODAVARI GAS PRIVATE LIMITED</small>	GODAVARI GAS PRIVATE LIMITED CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS) Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003	 मेकॉन <small>ISO 9001 Company</small>
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Annexure-2

**Godavari Gas Private Limited PERFORMANCE RATING DATA SHEET
(FOR O&M)**

- i) Location :
- ii) Order/ Contract No. & date :
- iii) Brief description of Items :
Works/Assignment
- iv) Order/Contract value (Rs.) :
- v) Name of Vendor/Supplier/ :
Contractor/ Consultant
- vi) Contracted delivery/ :
Completion Schedule
- vii) Actual delivery/ : Completion date

Performance Parameter	Delivery Performance	Quality Performance	Reliability Performance#	Total
Maximum Marks	40	40	20	100
Marks Allocated(*)				

Remarks (if any)

PERFORMANCE RATING (**)

Note:

(#) Vendor/Supplier/Contractor/Consultant who seek repeated financial assistance or deviation beyond contract payment term or seeking direct payment to the sub-vendor/sub-contractor due to financial constraints, then '0' marks should be allotted against Reliability Performance

(*) Allocation of marks should be as per enclosed instructions

(**) Performance rating shall be classified as under:

Sl. No.	Range (Marks)	Rating
1	60 & below	POOR
2	61-75	FAIR
3	76-90	GOOD
4	More than 90	VERY GOOD

Signature of
Authorised
Signatory:

Name:
Designation:



GODAVARI GAS PRIVATE LIMITED
CITY GAS DISTRIBUTION PROJECT AT EAST & WEST
GODAVARI DISTRICTS
SUPPLY OF DISTRICT REGULATORY SKID (DRS)
(ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)
Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003



Instructions for allocation of marks (For O&M)

1. Marks are to be allocated as under :



1.1 DELIVERY/ COMPLETION PERFORMANCE 40 Marks

Delivery Period/ Completion Schedule	Delay in Weeks	Marks
a) Upto 3 months	Before CDD	40
	Delay upto 4 weeks	35
	” 8 weeks	30
	” 10 weeks	25
	” 12 weeks	20
	” 16 weeks	15
	More than 16 weeks	0
b) Above 3 months	Before CDD	40
	Delay upto 4 weeks	35
	” 8 weeks	30
	” 10 weeks	25
	” 16 weeks	20
	” 20 weeks	15
	” 24 weeks	10
More than 24 weeks	0	



1.2 QUALITY PERFORMANCE 40 Marks

For Normal Cases : No Defects/ No Deviation/ No failure: 40 marks

i) Rejection/Defects	Marks to be allocated on Pro rata basis for acceptable quantity as compared to total quantity for normal cases	10 marks
ii) When quality marks failure endanger marks system integration marks and safety of the system	Failure of severe nature	0
	- Moderate nature	5
	- low severe nature	10-25

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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iii) Number of deviations	1. No deviation	5 marks
	2. No. of deviations < 2	2 marks
	3. No. of deviations > 2	0 marks

 GGPL <small>GODAVARI GAS PRIVATE LIMITED</small>	GODAVARI GAS PRIVATE LIMITED CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS) Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003	 मेकॉन <small>ISO 9001 Company</small>
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1.3 RELIABILITY PERFORMANCE



20 Marks

A.	FOR WORKS/CONTRACTS	
i)	Submission of order acceptance, agreement, PBG, Drawings and other documents within time	4 marks
ii)	Mobilization of resources as per Contract and in time	4 marks
iii)	Liquidation of Check-list points	4 marks
iv)	Compliance to statutory and HS&E requirements or Reliability of Estimates/Design/Drawing etc. in case of Consultancy jobs	4 marks
v)	Timely submission of estimates and other documents for Extra, Substituted & AHR items	4 marks
B.	FOR SUPPLIES	
i)	Submission of order acceptance, PBG, Drawings and other documents within time	5 marks
ii)	Attending complaints and requests for after sales service/ warranty repairs and/ or query/ advice (upto the evaluation period).	5 marks
iii)	Response to various correspondence and conformance to standards like ISO	5 marks
iv)	Submission of all required documents including Test Certificates at the time of supply	5 marks

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p align="center">GODAVARI GAS PRIVATE LIMITED</p> <p align="center">CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p align="center">SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p align="center">Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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Annexure-V

Forms & Format

 GGPL <small>GODAVARI GAS PRIVATE LIMITED</small>	GODAVARI GAS PRIVATE LIMITED CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS) Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003	 मेकॉन <small>ISO 9001 Company</small>
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LIST OF FORMS & FORMAT

Form No.	Description
F-1	BIDDER'S GENERAL INFORMATION
F-2	BID FORM
F-3	LIST OF ENCLOSURES
F-4	PROFORMA OF "BANK GUARANTEE" FOR "EARNEST MONEY / BID SECURITY"
F-4A	PROFORMA OF "LETTER OF CREDIT" FOR "EARNEST MONEY / BID SECURITY"
F-5	LETTER OF AUTHORITY
F-6	NO DEVIATION CONFIRMATION
F-7	DECLARATION REGARDING HOLIDAY/BANNING
F-8	CERTIFICATE FOR NON-INVOLVMENT OF GOVT. OF INDIA
F-9	AGREED TERMS & CONDITIONS
F-10	UNDERTAKING ON LETTERHEAD
F-11	FORMAT FOR POWER OF ATTORNEY
F-12	CHECK LIST
F-13	FORMAT FOR CERTIFICATE FROM BANK IF BIDDER'S WORKING CAPITAL IS INADEQUATE
F-14	FORMAT FOR CHARTERED ACCOUNTANT CERTIFICATE FOR FINANCIAL CAPABILITY OF THE BIDDER
F-15	BIDDER'S QUERIES FOR PRE BID MEETING
F-16	E-BANKING FORMAT
F-17	INTEGRITY PACT
F-18	PROFORMA OF "BANK GUARANTEE" FOR "CONTRACT PERFORMANCE GUARANTEE/ SECURITY DEPOSIT"
F-19	PREFERENCE FOR DOMESTICALLY MANUFACTURED ELECTRONIC PRODUCTS (DMEP)
F-20	FREQUENTLY ASKED QUESTIONS (FAQs)

 GAPL <small>GODAVARI GAS PRIVATE LIMITED</small>	GODAVARI GAS PRIVATE LIMITED CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS) Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003	 मेकॉन <small>ISO 9001 Company</small>
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F-1

BIDDER'S GENERAL INFORMATION



To,
M/s Godavari Gas Private Limited
D. No.70-14/5/1, Sidharth Nagar,
Near RTO Junction, NFCL Road,
Kakinada – 533001
India

Sub:
Tender no:

1	Bidder's Name	
2	Status of Firm	Proprietorship Firm/Partnership firm/ Limited/Others If Others Specify: _____ [Enclose certificate of Registration]
3	Name of Proprietor/Partners/Directors of the firm/company	
4	Number of Years in Operation	
5	Address of Registered Office: *In case of Partnership firm, enclose letter mentioning current address of the firm and the full names and current addresses of all the partners of the firm.	City: District: State: PIN/ZIP:
6	Operation Address (if different from above)	City: District: State: PIN/ZIP:
8	Mobile Number	_____
9	E-mail address	
10	Website	
11	Fax Number:	_____ (Country Code) (Area Code) (Telephone



 GGPL <small>GODAVARI GAS PRIVATE LIMITED</small>	GODAVARI GAS PRIVATE LIMITED CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS) Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003	 मेकॉन <small>ISO 9001 Company</small>
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		No.)
12	ISO Certification, if any	{If yes, please furnish details}
13	Bid Currency	INR
14	Banker's Name	
15	Branch	
16	Bank account number	
17	IFSC code	
18	PAN No.	[Enclose copy of PAN Card]
19	GST No.	[Enclose copy of GST Certificate]
20	We (Bidder) are cover under the definition of section 2 (n) of the MSMED Act	Yes / No <i>(If the response to the above is 'Yes", Bidder to provide Purchaser a copy of the Entrepreneurs Memorandum (EM) filled with the authority specified by the respective State Government.)</i>
21	Whether Micro/Small/Medium Enterprise a) Documentary evidence that the bidder is a Micro or Small Enterprises registered with District Industries Centers or Khadi and Village Industries National Small Industries Corporation or Directorate of Handicrafts and Handloom or any other body specified by Ministry of Micro, Small and Medium Enterprises or Udyog Aadhaar Memorandum. b) If the MSE is owned by SC/ST Entrepreneurs, the bidder shall furnish appropriate documentary evidence in this regard.	(Bidder to submit documents as specified in Clause 37 of ITB)
22	Type of Entity	Corporate/ Non-Corporate (As per CGST/SGST/UTGST Act). (In case of Non-Corporate Entity, bidder will

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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		submit documentary evidence for same).
23	Offer No.	

Place: [Signature of Authorized Signatory of Bidder]
Date: Name:
Designation:
Seal:

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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F-2

BID FORM

To,

To,

M/s Godavari Gas Private Limited
D. No.70-14/5/1, Sidharth Nagar,
Near RTO Junction, NFCL Road,
Kakinada – 533001
India

Sub:

Tender no:

Dear Sir,



After examining / reviewing the Bidding Documents for the tender of
“ _____ ” including
"Specifications & Scope of Services", "General Conditions of Contract [GCC]", "Special
Conditions of Contract [SCC]" and "Schedule of Rates [SOR]", etc. the receipt of which is
hereby duly acknowledged, we, the undersigned, are pleased to offer to execute the whole
part of the job and in conformity with the said Bid Documents, including Addenda /
Corrigenda Nos. _____.

We confirm that this Bid is valid for a period of 90 days from the Due Date of Bid
Submission, and it shall remain binding upon us and may be accepted by any time before the
expiry of that period.

If our Bid is accepted, we will provide the "Contract Performance Guarantee / Security
Deposit" as mentioned in Tender Document for the due performance within "Thirty [30]
days" of such Award.

Until a final Agreement/Letter of Award is prepared and executed, the tender document
(including addenda/ corrigenda) together with the "Notification of Award"/ "Fax of
Acceptance" shall constitute a binding Agreement between us.

We understand that Bidding Document is not exhaustive and any action and activity not

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>MECON मेकॉन ISO 9001 Company</p>
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mentioned in Bidding Documents but may be inferred to be included to meet the intent of the Bidding Documents shall be deemed to be mentioned in Bidding Documents unless otherwise specifically excluded and we confirm to perform for fulfilment of Agreement and completeness of the Services in all respects within the time frame and agreed price.

We understand that you are not bound to accept the lowest priced or any Bid that you may receive.

Place: [Signature of Authorized Signatory of Bidder]
Date: Name:
Designation:
Seal:

Duly authorized to sign Bid for and on behalf of _____

[Signature of Witness]
Name of Witness:
Address:

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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F-3

LIST OF ENCLOSURES

To,
M/s Godavari Gas Private Limited
D. No.70-14/5/1, Sidharth Nagar,
Near RTO Junction, NFCL Road,
Kakinada – 533001
India



Sub:
Tender no:

Dear Sir,

- A.** We are enclosing the following documents in Original as part of the bid:
1. Power of Attorney of the signatory to the bid document (F-11)
 2. Bid Security/EMD
 3. Tender fee
 4. Integrity Pact
- B.** We are also enclosing the following documents as part of the bid:
1. Documentary evidence required for meeting the Bidder Qualification Criteria as per bidding document.
 2. Power of Attorney of the signatory to the bid document (F-11)
 3. Annual Report (duly certified/ attested by notary public with legible stamp) for the last three years showing details such as annual turn over, profit and loss account, net worth etc. (F-13 and F-14)
 4. Execution schedule with interlinking of various activities ^
 5. All documents as per clause 11.0 of ITB i.e. “Documents Comprising the Bid” along with addendums/corrigendum.

^ If specifically required as per bidding document

(SEAL AND SIGNATURE OF BIDDER)

	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	
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F-4

**PROFORMA OF "BANK GUARANTEE" FOR "EARNEST MONEY / BID
SECURITY"**

(To be stamped in accordance with the Stamp Act)

Ref.....

Bank Guarantee No.....

Date.....

To,

M/s Godavari Gas Private Limited
D. No.70-14/5/1, Sidharth Nagar,
Near RTO Junction, NFCL Road,
Kakinada – 533001
India

Sub:

Tender no:

Dear Sir(s),



In accordance with Letter Inviting Tender under your reference No _____ M/s.

_____ having their Registered / Head Office at _____ (hereinafter called the Tenderer), wish to participate in the said tender for _____

As an irrevocable Bank Guarantee against Earnest Money for the amount of _____ is required to be submitted by the Tenderer as a condition precedent for participation in the said tender which amount is liable to be forfeited on the happening of any contingencies mentioned in the Tender Document.

We, the _____ Bank at _____ having our Head Office _____ (Local Address)

guarantee and undertake to pay immediately on demand without any recourse to the tenderers by Godavari Gas Private Ltd., the amount _____ without any reservation, protest, demur and recourse. Any such demand made by Godavari Gas, shall be conclusive and binding on us irrespective of any dispute or difference raised by the Tenderer.

	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	
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This guarantee shall be irrevocable and shall remain valid up to _____ [this date should be two (02) months beyond the validity of the bid]. If any further extension of this guarantee is required, the same shall be extended to such required period on receiving instructions from M/s. _____ whose behalf this guarantee is issued.

In witness whereof the Bank, through its authorized officer, has set its hand and stamp on this _____ day of _____ 20__ at _____.



WITNESS:

(SIGNATURE)
(NAME)

(SIGNATURE)
(NAME)
Designation with Bank Stamp



(OFFICIAL ADDRESS)

Attorney as per
Power of Attorney No. _____
Date: _____

 <p>GAPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>MECON मेकॉन ISO 9001 Company</p>
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**INSTRUCTIONS FOR FURNISHING "BID SECURITY / EARNEST MONEY" BY
"BANK GUARANTEE"**

1. The Bank Guarantee by successful Bidder(s) will be given on non-judicial stamp paper of Rs. 100/- or the value prevailing in the State where executed as per the Stamp Act, whichever is higher. The non-judicial stamp paper should be in name of the issuing bank.
2. The expiry date should be arrived at in accordance with "ITB: Clause-15.1 and 16.3".
3. The Bank Guarantee by bidders will be given from Bank as specified in "ITB".
4. A letter (preferably digitally signed secured e-mail) from the issuing bank of the requisite Bank Guarantee confirming that said bank guarantee and future communication relating to the Bank Guarantee may be forwarded to Employer
5. Bidders must indicate the full postal address of the Bank along with the Bank's E-mail / Fax / Phone from where the Earnest Money Bond has been issued.
6. If a Bank Guarantee is issued by a commercial Bank, then a letter to Employer confirming its net worth is more than Rs. 1,000,000,000.00 [Rupees One Hundred Crores] or equivalent along with documentary evidence.

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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F-4A

**PROFORMA OF "LETTER OF CREDIT" FOR "EARNEST MONEY / BID
SECURITY"**

To,

M/s Godavari Gas Private Limited
D. No.70-14/5/1, Sidharth Nagar,
Near RTO Junction, NFCL Road,
Kakinada – 533001
India

Sub:

Tender no:

Irrevocable and confirmed Letter of Credit No. Amount: Rs.



Validity of this Irrevocable: (in India)

Letter of Credit (2 months beyond validity of Offer)

Dear Sir,

1. You are hereby authorized to draw on (Name of Applicant with full address) for a sum not exceeding available by your demand letter (draft) on them at sight drawn for Rs. accompanied by a certificate by Godavari Gas Private Limited, with the Tender No. duly incorporated therein, that one or more of the following conditions has/have occurred, specifying the occurred condition(s):

- (i) The Bidder withdraws its Bid during the period of Bid validity or any extension thereof duly agreed by the Bidder.
- (ii) The Bidder varies or modifies its Bid in a manner not acceptable to Godavari Gas Private Limited during the period of bid validity or any extension thereof duly agreed by the Bidder.
- (iii) The Bidder, having been notified of the acceptance of its Bids,
 - (a) Fails or refuses to execute the Supply Order/Contract
 - (b) Fails or refuses to furnish the Contract Performance Guarantee within 30 days before expiry of Bid Security.

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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(c) Fails to accept arithmetic corrections as per tender conditions.

2. This Irrevocable Letter of Credit has been established towards Bid Security Tender No for (Item)
3. We hereby guarantee to protect the Drawers, Endorsers and bonafide holders from any consequences, which may arise in the event of the non-acceptance or non-payment of Demand Letter (draft) in accordance with the terms of this credit.
4. This Credit is issued subject to the Uniform Customs and Practices for Documentary Credits (1993 Revised) International Chamber of Commerce brochure No. 500.
5. Please obtain reimbursement as under:
6. All foreign as well as Indian bank charges will be on the account of M/s. (Applicant)

FOR

Authorized Signature
(Original Bank)

Counter Signature

	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	
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LETTER OF AUTHORITY

[Pro forma for Letter of Authority for Attending Subsequent 'Negotiations' / 'Pre-Bid Meetings' / 'Un-priced Bid Opening' / 'Price Bid Opening']

Ref:

Date:

To,

M/s Godavari Gas Private Limited
D. No.70-14/5/1, Sidharth Nagar,
Near RTO Junction, NFCL Road,
Kakinada – 533001
India

Sub:

Tender no:

Dear Sir,

I/We, _____ hereby authorize the following representative(s) for attending any 'Negotiations' / 'Meetings [Pre-Bid Meeting]', 'Un-priced Bid Opening', 'Price Bid Opening' and for any subsequent correspondence / communication against the above Bidding Documents:

[1] Name & Designation _____ Signature _____

Phone/Cell:

Fax:

E-mail: @



[2] Name & Designation _____ Signature _____

Phone/Cell:

Fax:

E-mail: @



We confirm that we shall be bound by all commitments made by aforementioned authorised

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>MECON मेकॉन ISO 9001 Company</p>
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representative(s).

Place: [Signature of Authorized Signatory of Bidder]
Date: Name:
Designation:
Seal:

Note: This "Letter of Authority" should be on the **"letterhead"** of the Firm / Bidder and should be signed by a person competent and having the 'Power of Attorney' to bind the Bidder. Not more than 'two [02] persons per Bidder' are permitted to attend "Techno-commercial / Un-priced" & "Price Bid" Openings. Bidders authorized representative is required to carry a copy of this authority letter while attending the un-priced and priced bid opening, the same shall be submitted to Godavari Gas.

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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F-6

"NO DEVIATION" CONFIRMATION

To,

M/s Godavari Gas Private Limited
D. No.70-14/5/1, Sidharth Nagar,
Near RTO Junction, NFCL Road,
Kakinada – 533001
India

Sub:

Tender no:

Dear Sir,



We understand that any 'deviation / exception' in any form may result in rejection of Bid. We, therefore, certify that we have not taken any 'exception / deviation' anywhere in the Bid and we agree that if any 'deviation / exception' is mentioned or noticed, our Bid may be rejected.

Place: [Signature of Authorized Signatory of Bidder]

Date: Name:

Designation:

Seal:

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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DECLARATION REGARDING HOLIDAY/BANNING

To,

M/s Godavari Gas Private Limited
D. No.70-14/5/1, Sidharth Nagar,
Near RTO Junction, NFCL Road,
Kakinada – 533001
India

Sub:

Tender no:

Dear Sir,

We hereby confirm that we are not on ‘Holiday’ by Godavari Gas or Public Sector Project Management Consultant (like EIL, Mecon only due to “poor performance” or “corrupt and fraudulent practices”) or banned by Government department/ (any) Public Sector Undertaking(s) as on due date of submission of bid.

Further, we confirm that neither we nor our allied agency/(ies) (as defined in the Procedure for Action in case of Corrupt/ Fraudulent/ Collusive/ Coercive Practices) are on banning list of Godavari Gas or the Ministry of Petroleum and Natural Gas.

In case it comes to the notice of Godavari Gas that the bidder has given wrong declaration in this regard, the same shall be dealt as ‘fraudulent practices’ and action shall be initiated as per the Procedure for action in case of Corrupt/ Fraudulent/ Collusive/ Coercive Practices.



Further, we also confirm that in case there is any change in status of the declaration prior to award of Contract or till complete execution of the Contract, the same will be promptly informed to Godavari Gas by us.

Place: [Signature of Authorized Signatory of Bidder]

Date: Name:

Designation:

Seal:

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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CERTIFICATE FOR NON-INVOLVMENT OF GOVT. OF INDIA

To,

M/s Godavari Gas Private Limited
D. No.70-14/5/1, Sidharth Nagar,
Near RTO Junction, NFCL Road,
Kakinada – 533001
India

Sub:

Tender no:

Dear Sir,

If we become a successful Bidder and pursuant to the provisions of the Bidding Documents, award is given to us for the tender for “
_____”, the following Certificate shall be automatically enforceable:



"We agree and acknowledge that the Employer is entering into the Agreement solely on its own behalf and not on behalf of any other person or entity. In particular, it is expressly understood & agreed that the Government of India is not a party to the Agreement and has no liabilities, obligations or rights thereunder. It is expressly understood and agreed that the Employer is authorized to enter into Agreement, solely on its own behalf under the applicable laws of India. We expressly agree, acknowledge and understand that the Employer is not an agent, representative or delegate of the Government of India. It is further understood and agreed that the Government of India is not and shall not be liable for any acts, omissions, commissions, breaches or other wrongs arising out of the Agreement. Accordingly, we hereby expressly waive, release and forego any and all actions or claims, including cross claims, VIP claims or counter claims against the Government of India arising out of the Agreement and covenants not to sue to Government of India as to any manner, claim, cause of action or things whatsoever arising of or under the Agreement."

Place:

[Signature of Authorized Signatory of Bidder]

Date:

Name:

 GGPL <small>GODAVARI GAS PRIVATE LIMITED</small>	GODAVARI GAS PRIVATE LIMITED CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS) Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003	 मेकॉन <small>ISO 9001 Company</small>
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Designation:

Seal:

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AGREED TERMS & CONDITIONS

To,



M/s Godavari Gas Private Limited
D. No.70-14/5/1, Sidharth Nagar,
Near RTO Junction, NFCL Road,
Kakinada – 533001
India

Sub:



Tender no:

This Questionnaire duly filled in, signed & stamped must form part of Bidder's Bid and should be returned along with Un-priced Bid. Clauses confirmed hereunder need not be repeated in the Bid.



Sl.	DESCRIPTION	BIDDER'S CONFIRMATION
1	Bidder's name and address	
2.	Please confirm the currency of quoted prices is in Indian Rupees.	
3.	Confirm quoted prices will remain firm and fixed till complete execution of the order.	
4.	Please specify the Dispatch Point	
5	Rate of applicable GST (CGST & SGST/ UTGST or IGST)	CGST: % Plus SGST/UTGST..... % Total:% Or IGST:..... %
5.1	Freight charges and transit insurance, quoted separately	
5.2	Service Accounting Codes (SAC)/ Harmonized System of Nomenclature (HSN)	

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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Sl.	DESCRIPTION	BIDDER'S CONFIRMATION
5.3	We hereby confirm that the quoted prices is in compliance with the Section 171 of CGST Act/ SGST Act as mentioned as clause no. 13.13 of ITB	
6. a	i) Confirm acceptance of relevant Terms of Payment specified in the Bid Document. ii) In case of delay, the bills shall be submitted after deducting the price reduction due to delay.	
6.b	Confirm that Contract Performance Bank Guarantee will be furnished as per Bid Document.	
6. c	Confirm that Contract Performance Security shall be from any Indian scheduled bank or a branch of an International bank situated in India and registered with Reserve bank of India as scheduled foreign bank. However, in case of bank guarantees from banks other than the Nationalised Indian banks, the bank must be a commercial bank having net worth in excess of Rs 100 crores and a declaration to this effect shall be made by such commercial bank either in the Bank Guarantee itself or separately on its letterhead.	
7.	Confirm compliance to Completion Schedule as specified in Bid document. Confirm contract period shall be reckoned from the date of Fax of Acceptance.	
8.	Confirm acceptance of Price Reduction Schedule for delay in completion schedule specified in Bid document.	
9.	Confirm acceptance of all terms and conditions of Bid Document (all sections). b) Confirm that printed terms and conditions of bidder are not applicable.	
10.	Confirm your offer is valid for period specified in BDS from Final/Extended due date of opening of Techno-commercial Bids.	
11.	Please furnish EMD/Bid Security details : a) EMD/ Bid Security No. & date b) Value c) Validity	
12.	Confirm acceptance to all provisions of ITB read in conjunction with Bid Data Sheet (BDS).	



 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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Sl.	DESCRIPTION	BIDDER'S CONFIRMATION
13.	Confirm that Annual Reports (duly certified/ attested by notary public with legible stamp) for the last three financial years are furnished along with the Un-priced Bid. (F-14)	
14.	Confirm that, in case of contradiction between the confirmations provided in this format and terms & conditions mentioned elsewhere in the offer, the confirmations given in this format shall prevail.	
15.	Confirm that none of Directors of bidder is a relative of any Director of Owner or the bidder is a firm in which any Director of Owner/ Godavari Gas or his relative is a partner.	
16.	All correspondence must be in ENGLISH language only.	
17.	Owner reserves the right to make any change in the terms & conditions of the TENDER/BIDDING DOCUMENT and to reject any or all bids.	
18.	Confirm that all Bank charges associated with Bidder's Bank shall be borne by Bidder.	
19.	Confirm that you have not been banned or de-listed by any Government or Quasi-Government agencies or Public Sector Undertakings. If you have been banned or de-listed by any Government or Quasi-Government agency or Public Sector Undertakings, then this fact must be clearly stated. If this declaration is not furnished bid shall be treated as non-responsive and liable for rejection. * It shall be the sole responsibility of the bidder to inform Godavari Gas about the changes that may occur in the stated declaration during the course of finalization of the tender.	
20.	Confirm that any correction in documents submitted in the Un-priced part has been initialled and with signatures of the authorized person	CONFIRMED
21.	a) Please confirm whether you are MSE and if so then you have submitted Documentary evidence that you are a Micro or Small Enterprises registered with District Industries Centers or Khadi and Village Industries Commission or Khadi and Village Industries Board or Coir Board or National Small Industries Corporation or Directorate of Handicrafts and Handloom or any other body specified by Ministry of Micro, Small and Medium	

 GGLPL <small>GODAVARI GAS PRIVATE LIMITED</small>	GODAVARI GAS PRIVATE LIMITED CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS) Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003	 मेकॉन <small>ISO 9001 Company</small>
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Sl.	DESCRIPTION	BIDDER'S CONFIRMATION
	Enterprises. b) If the MSE is owned by SC/ST Entrepreneurs, the bidder shall furnish appropriate documentary evidence in this regard. c) The above documents submitted by shall be duly certified by the Statutory Auditor of the bidder or a practicing Chartered Accountant (not being an employee or a Director of the entity)	
22.	Confirm that all documents submitted with bid against the subject tender are true and genuine and in case of any discrepancy noticed or observed at any stage, bidder shall be personally responsible not only for the damages or loss to Godavari Gas, but also for criminal proceedings under the relevant laws.	CONFIRMED
23.	Confirm that the original BG/DD towards EMD / Bid Bond has been submitted	CONFIRMED
24.	Confirm that no Price disclosing files have been attached with unpriced/ technical bid. <i>*In case price disclosing files are attached in techno-commercial unpriced bid area, bid will be summarily rejected as per clause 19.0 of ITB.</i>	CONFIRMED
25.	Confirm that bid documents are considered in full while preparing the bid and in case of award, work will be executed in accordance with the provisions detailed in bid document.	CONFIRMED

Place: [Signature of Authorized Signatory of Bidder]
 Date: Name:
 Designation:
 Seal:

 <p>GAPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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UNDERTAKING ON LETTERHEAD

To,

M/s Godavari Gas Private Limited
D. No.70-14/5/1, Sidharth Nagar,
Near RTO Junction, NFCL Road,
Kakinada – 533001
India



SUB:

TENDER NO:

Dear Sir

We hereby confirm that “The contents of this Tender Document No. _____ have not been modified or altered by M/s.(Name of the bidder with complete address). In case, it is found that the tender document has been modified / altered by the bidder, the bid submitted by M/s.....(Name of the bidder) shall be liable for rejection”.



Place: [Signature of Authorized Signatory of Bidder]
Date: Name:
Designation:
Seal:

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p align="center">GODAVARI GAS PRIVATE LIMITED</p> <p align="center">CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p align="center">SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p align="center">Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>MECON मेकॉन ISO 9001 Company</p>
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POWER OF ATTORNEY

[Bidder shall use own Power of Attorney Format]

 GGPL <small>GODAVARI GAS PRIVATE LIMITED</small>	GODAVARI GAS PRIVATE LIMITED CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS) Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003	 मेकॉन <small>ISO 9001 Company</small>
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CHECK LIST

Bidders are requested to duly fill in the checklist. This checklist gives only certain important items to facilitate the bidder to make sure that the necessary data/information as called for in the bid document has been submitted by them along with their offer. This, however, does not relieve the bidder of his responsibilities to make sure that his offer is otherwise complete in all respects.



Please ensure compliance and tick (√) against following points:

S. No.	DESCRIPTION	CHECK BOX	REFERENCE PAGE NO. OF THE BID SUBMITTED
1.0	Signing on each sheet of offer, original bidding document including SCC, ITB, GCC ,SOR drawings, addendum (if any)		
2.0	Confirm that the following details have been submitted in the Un-priced part of the bid		X
i	Covering Letter, Letter of Submission		
ii	Bid Security		
iii	Signed original copy of bidding document along with drawings and addendum (if any)		
iv	Power of Attorney in the name of person signing the bid. (F-11)		
v	Copies of documents defining constitution or legal status, place of registration and principal place of business of the company		
vi	Bidders declaration that regarding, Holiday/ Banning, liquidation court receivership or similar proceedings (F-7)		
vii	Details and documentary proof required against		

 GGLP <small>GODAVARI GAS PRIVATE LIMITED</small>	GODAVARI GAS PRIVATE LIMITED CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS) Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003	 मेकॉन <small>ISO 9001 Company</small>
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	qualification criteria along with complete documents establishing ownership of equipment as per SCC are enclosed		
viii	Confirm submission of document along with techno-commercial bid as per bid requirement.		X
3.0	Confirm that all forms duly filled in are enclosed with the bid duly signed by authorised person(s)		
i	Confirm that no Price disclosing files have been attached with unpriced/ technical bid		
4.0	Confirm that proper page nos. have been given in sequential way in all the documents submitted along with your offer with Index.		
5.0	Confirmation that no deviations are taken against commercial and technical specifications of the bid document.		
6.0	Confirm that the price part of bid as per Price Schedule format enclosed with Bidding Document has been duly filled in for each item, signed on each page separately		
7.0	Confirm that annual reports for last three financial years & duly filled in Form 14 are enclosed in the offer for financial assessment (where financial criteria of BEC is applicable).		

Place: [Signature of Authorized Signatory of Bidder]
Date: Name:
Designation:
Seal:

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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F-13

**FORMAT FOR CERTIFICATE FROM BANK IF BIDDER'S WORKING CAPITAL
IS NEGATIVE OR INADEQUATE**

(To be provided on Bank's letter head)

Date:

Bidder's Name: _____

Tender No.: _____

To,

M/s Godavari Gas Private Limited
D. No.70-14/5/1, Sidharth Nagar,
Near RTO Junction, NFCL Road,
Kakinada – 533001
India

This is to certify that M/s (name of the bidder with address)
(hereinafter referred to as Customer) is an existing customer of our Bank.

The Customer has informed that they wish to bid for Godavari Gas's RFQ/Tender no.
..... dated for
.....(Name of the supply) and as per the terms of the said
RFQ/Tender they have to furnish a certificate from their Bank confirming the availability of
line of credit.



Accordingly M/s (name of the Bank with address) confirms
availability of line of credit to M/s (name of the bidder) for at least an
amount of Rs. _____ / USD _____.

It is also confirmed that the net worth of the Bank is more than Rs. 100 Crores and the
undersigned is authorized to issue this certificate.

Yours Truly,

For _____

(Authorized Signatory)

 GAPL <small>GODAVARI GAS PRIVATE LIMITED</small>	GODAVARI GAS PRIVATE LIMITED CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS) Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003	 मेकॉन <small>ISO 9001 Company</small>
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Name of the Signatory:

Designation:

Registration No.

Stamp of Bank

F-14

**FORMAT FOR CHARTERED ACCOUNTANT CERTIFICATE/ CERTIFIED
PUBLIC ACCOUNTANT (CPA) FOR FINANCIAL CAPABILITY OF THE BIDDER**

We have verified the Audited Financial Statements and other relevant records of M/s..... (Name of the bidder) and certify the following:

1. AUDITED ANNUAL TURNOVER* OF LAST 3 YEARS:

Year	Amount (Currency)
Year 1:	
Year 2:	
Year 3:	

2. NETWORTH* AS PER LAST AUDITED FINANCIAL STATEMENT:

Description	Year _____
	Amount (Currency)
1. Net Worth	

3. WORKING CAPITAL* AS PER LAST AUDITED FINANCIAL STATEMENT :



Description	Year _____
	Amount (Currency)
1. Current Assets	
2. Current Liabilities	
3. Working Capital (Current Assets-Current liabilities)	

****Refer Instructions***

Note: It is further certified that the above mentioned applicable figures are matching with the returns filed with Registrar of Companies (ROC) [Applicable only in case of Indian Companies]

Name of Audit Firm:
Chartered Accountant/CPA
Date:

[Signature of Authorized Signatory]
Name:
Designation:



 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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Seal:

Membership No.:

Instructions:

1. The Separate Pro-forma shall be used for each member in case of JV/ Consortium.
2. The financial year would be the same as one normally followed by the bidder for its Annual Report.
3. The bidder shall provide the audited annual financial statements as required for this Tender document. Failure to do so would result in the Proposal being considered as non-responsive.
4. For the purpose of this Tender document:
 - (i) **Annual Turnover** shall be “Sale Value/ Operating Income”
 - (ii) **Working Capital** shall be “Current Assets less Current liabilities” and
 - (iii) **Net Worth** shall be Paid up share capital plus Free Reserves & Surplus less accumulated losses, deferred expenditure and miscellaneous expenditure not written off, if any.
5. Above figures shall be calculated after considering the qualification, if any, made by the statutory auditor on the audited financial statements of the bidder including quantified financial implication.
6. This certificate is to be submitted on the letter head of Chartered Accountant/CPA.

 GGPL <small>GODAVARI GAS PRIVATE LIMITED</small>	GODAVARI GAS PRIVATE LIMITED CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS) Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003	 MECON <small>मेकॉन</small> <small>ISO 9001 Company</small>
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BIDDER'S QUERIES FOR PRE BID MEETING

To,

M/s Godavari Gas Private Limited
D. No.70-14/5/1, Sidharth Nagar,
Near RTO Junction, NFCL Road,
Kakinada – 533001
India

Sub:

Tender no:

SL. NO.	REFERENCE OF BIDDING DOCUMENT				BIDDER'S QUERY	Godavari Gas's / MECON's REPLY
	SEC. NO.	Page No.	Clause No.	Subject		



NOTE: The Pre-Bid Queries may be sent by fax / e-mail before due date for receipt of Bidder's queries in terms of Clause No.8.1 of ITB.

Place:

[Signature of Authorized Signatory of Bidder]

Date:

Name:

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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Designation:

Seal:

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E-Banking Mandate Form



(To be issued on vendors letter head)

1. Vendor/customer Name :
2. Vendor/customer Code:
3. Vendor /customer Address:
4. Vendor/customer e-mail id:
5. Particulars of bank account
 - a) Name of Bank
 - b) Name of branch
 - c) Branch code:
 - d) Address:
 - e) Telephone number:
 - f) Type of account (current/saving etc.)
 - g) Account Number:
 - h) RTGS IFSC code of the bank branch
 - i) NEFT IFSC code of the bank branch
 - j) 9 digit MICR code

I/We hereby authorize Godavari Gas Private Limited to release any amount due to me/us in the bank account as mentioned above. I/We hereby declare that the particulars given above are correct and complete. If the transaction is delayed or lost because of incomplete or incorrect information, we would not hold the Godavari Gas Private Limited responsible.

(Signature of vendor/customer)

BANK CERTIFICATE



 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p align="center">GODAVARI GAS PRIVATE LIMITED</p> <p align="center">CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p align="center">SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p align="center">Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>MECON मेकॉन ISO 9001 Company</p>
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We certify that ----- has an Account no. ----- with us and we confirm that the details given above are correct as per our records.

Bank stamp

Date

(Signature of authorized officer of bank)

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>MECON मेकॉन ISO 9001 Company</p>
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F-17
INTEGRITY PACT

INTRODUCTION:

Godavari Gas as one of its endeavor to maintain and foster most ethical and corruption free business environment, have decided to adopt the Integrity Pact, a tool developed by the Transparency International, to ensure that all activities and transactions between the Company (Godavari Gas) and its Counterparties (Bidders, Contractors, Vendors, Suppliers, Service Providers/Consultants etc.) are handled in a fair and transparent manner, completely free of corruption.

Considering the above, the details mentioned at attached Annexure-1 are applicable as stated in Instruction to Bidders of Bid Document in addition to the existing stipulation regarding Corrupt and Fraudulent Practices.

The copy of the Integrity Pact at Annexure- 2 shall be included in the Bid submitted by the bidder. In case a bidder does not sign the Integrity Pact, his bid shall be liable for rejection.

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ANNEXURE-1



Bidder is required to sign the Integrity Pact with Godavari Gas as per format & terms and conditions enclosed with tender. In case a bidder does not sign the Integrity Pact, his bid shall be liable for rejection.

I COMMITMENTS AND OBLIGATIONS OF THE “COUNTERPARTY”

- a) The Counterparty, directly or indirectly (through agent, consultant, advisor, etc.), shall not pay any bribe/ influence or give undue/ unlawful benefit to anyone to gain undue advantage in dealing with Godavari Gas.
- b) The Counterparty will not engage in collusion of any kind including price fixation etc. with other Counterparts.
- c) The counterparty will not pass Godavari Gas’s confidential information to any third party unless specifically authorized by Godavari Gas in writing.
- d) The Counterparties shall promote and observe best ethical practices within their respective organizations.
- e) The Counterparty shall inform the Independent External Monitor.
 - i) If it received any demand, directly or indirectly, for a bribe/ favour or any illegal gratification/ payment / benefit;
 - ii) If it comes to know of any unethical or illegal payment / benefit;
 - iii) If it makes any payment to any Godavari Gas associate.
- f) The Counterparty shall not make any false or misleading allegations against Godavari Gas or its associates.

II VIOLATIONS & CONSEQUENCES:

- a) If a Counterparty commits a violation of its Commitments and Obligations under the Integrity Pact Programme during bidding process, their entire Earnest Money Deposit/ Bid Security, would be forfeited and in addition, they would be banned from the Godavari Gas business in future as per Section 3.
- b) In case of violation of the Integrity pact by Counterparty after award of the Contract, Godavari Gas shall be entitled to terminate the Contract. Further, Godavari Gas would forfeit the security deposits/ Contract Performance Bank Guarantee.

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- c) In case it is found that the Counterparty has made any frivolous, untrue and misleading allegations against Godavari Gas or its associates, Godavari Gas reserves its right to initiate criminal proceedings against the violating Counterparty and may also impose exemplary cost for the same

INDEPENDENT EXTERNAL MONITORS (IEMS)

The following Independent External Monitors (IEMs) have been appointed by Godavari Gas, in terms of Integrity Pact(IP) which forms part of Godavari Gas Tenders / Contracts.



- i) *****
- ii) *****
- iii) *****

The bidder(s), in case of any dispute(s) / complaint(s) pertaining to this tender may raise the issue either with the designated tender issuing officer in Godavari Gas or directly with Vigilance office, Godavari Gas Private Limited, D. No.70-14/5/1, Sidharth Nagar, Near RTO Junction, NFCL Road, Kakinada – 533001.



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ANNEXURE-2

INTEGRITY PACT

(To be executed on plain paper)

Between Godavari Gas Private Limited, a Government of India Public Sector, (here-in-after referred to as “Principal”).

AND

_____ (here-in-after referred to as “The Bidder/ Contractor”).

(Principal and the Bidder / Contractor are here-in-after are referred to individually as “Party” or collectively as “Parties”).



PREAMBLE

The Principal intends to award under laid down organizational procedures, contract/s for _____. The Principal values full compliance with all relevant laws and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder/s and Contractor/s.

In order to achieve these goals, the Principal will appoint Independent External Monitor (s) (in consultation with Central Vigilance Commission) who will monitor the tender process, the execution of the contract etc. for compliance with the principles mentioned above.

Section 1 – Commitments of the Principal

1. The Principal commits itself to take all measures necessary to prevent corruption and to observe the following Principles in this regard:-
 - i) No employee of the Principal, either in person or through family members, including relatives, will in connection with the tender for or the execution of a contract, demand or accept a promise for or accept for him/herself or for a third person, any material or immaterial benefit to which he/she is not legally entitled.
 - ii) The Principal shall, during the tender process treat all Bidders with equity. The Principal undertakes and ensures that before and during the tender process shall provide and share the same information to all Bidders and will not provide to any Bidder confidential / additional information through which one particular Bidder could take an advantage in relation to the tender process or the contract execution.

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iii) In case, any misconduct on the part of any official (s) is reported by the BIDDER to the PRINCIPAL with full and verifiable facts and the same is prima facie found to be correct by the PRINCIPAL, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings may be initiated by the PRINCIPAL and such person shall be debarred from further dealings related to the contract process. In such a case, while an enquiry is being conducted by the PRINCIPAL the proceedings under the contract would not be stalled.

2. If the Principal obtains information on the conduct of any of its employees which is a criminal offence under the Anti-Corruption Laws of India, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.



Section 2 – Commitments and Undertakings by the Bidder/Contractor

1. The Bidder / Contractor commits and undertakes to take all measures necessary to prevent malpractices & corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution till the validity of Integrity Pact:

i) The Bidder / Contractor undertakes not to, directly or through any other person or firm offer, promise or give or influence to any employee of the Principal associated with the tender process or the execution of the contract or to any other person on their behalf any material or immaterial benefit to which he / she is not legally entitled in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract till the validity of Integrity Pact.



ii) The Bidder / Contractor undertakes not to enter into any undisclosed agreement or understanding, whether formal or informal with other Bidders. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other action to restrict competitiveness or to introduce cartelization in the bidding process.

iii) The Bidder / Contractor undertakes not to commit any offence under the relevant Anti-corruption Laws of India. Further, the Bidder / Contractor will not use improperly any information or document provided by the Principal as part of the business relationship regarding plans, technical proposals and business details, including information contained or transmitted electronically for the purposes of competition or personal gain and will not pass the information/document so acquired on to others.

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- iv) The Bidder / Contractor will, when presenting his bid undertakes to disclose any and all payments made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.
 - v) The bidder (s)/ Contractor (s) of foreign origin shall disclose the name and address of the Agents/ representatives in India, if any. Similarly, the bidder (s)/ contractor (s) of Indian Nationality shall furnish the name and address of the foreign principals, if any.
2. The Bidder/ Contractor shall not instigate or cause to instigate any third person to commit any of the actions mentioned above.
 3. The Bidder/Contractor commits to refrain from giving any complaint directly or through any other manner without supporting it with full and verifiable facts.
 4. The Bidder/Contractor shall not lend to or borrow any money from or enter into any monetary dealing or transactions, directly or indirectly, with any employee of the Principal.
 5. In case of any allegation of violation of any provision (s) of this pact or payment of commission, the Principal or its agencies shall be entitled to examine all the documents including the book of accounts of the Bidder and the Bidder shall provide necessary information and documents in English and shall extend all possible help for the purpose of such examination.
 6. The Bidder/ Contractor will not collude with other parties interested in the contract to impair the transparency, fairness and progress of the bidding process, bid evaluation, contracting and implementation of contract.
 7. The Bidder/ Contractor will not accept any advantage in exchange for any corrupt practice, unfair means and illegal activities.

**Section 3 – Disqualification from tender process and exclusion
from future contracts**

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1. If it is found that the Bidder / Contractor or any one employed by it has committed a transgression through a violation of any provisions of Section 2 so as to put his reliability or credibility into question, the Principal shall be entitled to disqualify such Bidder / Contractor from the tender including banning such Bidder / Contractor from entering into any Godavari Gas's future contract/ tender processes for a period specified in Godavari Gas's "Procedure for action in case Corrupt /Fraudulent/ Collusive/Coercive Practices" and also to terminate the contract, if already signed, on that ground as per provision of Godavari Gas's "Procedure for action in case Corrupt /Fraudulent/ Collusive/Coercive Practices". Further, the period of banning shall be as per Godavari Gas's policy and the decision of the Principal in this regard will be final and binding on the Bidder/ Contractor.
2. A transgression is considered to have occurred if the Principal after due consideration of the available evidence, concludes that there is a transgression of the provisions of the Pact.
3. The Bidder with its free consent and without any influence agrees and undertakes to respect and uphold the Principal's absolute rights to resort to and impose such exclusion and further accepts and undertakes not to challenge or question such exclusion on any ground, including the lack of any hearing before the decision to resort to such exclusion is taken. This undertaking is given freely and after obtaining independent legal advice.
4. Principal is entitled to recover all sums paid by Bidder/ contractor to any middleman or agent or broker with a view to securing the contract.



In cases where irrevocable Letters of credit has to be established in respect of any contract signed by the Principal with the Bidder, the same shall not be opened.

Principal is entitled to forfeit the Performance Bond clearly assigning reason in case Bidder/ Contractor violates this Pact.

Section 4 – Forfeiture of EMD / Security Deposits

1. If due to transgression as per the provisions of the Pact, the Principal has disqualified the Bidder from the tender process prior to the award in terms of Section 3, the Principal is entitled to forfeit earnest money deposit / bid security money. In addition to this, such Bidder/Contractor shall also be banned from the future business with Principal with consequential actions as per provisions of Godavari Gas's "Procedure for action in case Corrupt /Fraudulent/ Collusive/Coercive Practices".

Section 5 – Previous transgression

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1. The Bidder declares that no previous transgression has occurred during the last three years immediately before signing of this Integrity Pact, with any other Company in any country in respect of any corrupt practices envisaged hereunder or with any other Public Sector Enterprise / Undertaking or any Government Department in India that could justify Bidder's exclusion from the tender process.
2. If the Bidder makes incorrect statement on this subject, he shall be disqualified from the tender process or the contract, if already awarded, could be liable to be terminated on this ground and other actions can be taken by Godavari Gas as per Godavari Gas's "Procedure for action in case Corrupt /Fraudulent/ Collusive/Coercive Practices"

In case of any transgression in the last three years from the date of signing of Integrity Pact, Bidder to provide the details of same in their bid.

Section 6 – Equal treatment to all Bidders / Contractors / Subcontractors



1. The Bidder / Contractor undertakes to demand from all its sub-contractors, if any, an undertaking and commitment in conformity with this Integrity Pact, and to submit it to the Principal before signing of the contract.
2. The Principal will enter into agreements with similar conditions, as stipulated herein, with all Bidders, Contractors and Subcontractors.
3. The Principal shall disqualify from the tender process all Bidders who do not sign this Pact or violate any of its provisions.

**Section 7 – Criminal charges against violating Bidders /
Contractors / Sub-contractors**



If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes corruption of an offence as defined in Chapter IX of the Indian Penal Code 1860 or prevention of corruption Act 1988 and amendments thereof or any other enacted statute for prevention of corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the same to the Vigilance Office / Department for initiating appropriate action for above.

Section 8 –Independent External Monitor / Monitors

1. The Principal appoints competent and credible external independent Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.

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2. The Monitor is not subject to any instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the Chairperson of the Board of the Principal.
3. The Bidder/ Contractor accepts that the Monitor has the right to access without restriction to all Project documentation of the Principal including that provided by the Contractor. The Contractor will also grant the Monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to Sub-contractors. The Monitor is under contractual obligation to treat the information and documents of the Bidder / Contractor / Sub-contractor with confidentiality.
4. The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.
5. As soon as the Monitor notices, or believes to notice, a violation of this Pact he will so inform the Management of the Principal and request the Management to discontinue or heal the violation or to take other relevant action. The monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action. However, the Independent External Monitor shall give an opportunity to the bidder / contractor to present its case before making its recommendations to the Principal.
6. The Monitor will submit a written report to the Chairperson of the Board of the Principal within 6 to 8 weeks from the date of reference or intimation to him by the 'Principal' and should the occasion arise, submit proposals for taking corrective measures.
7. Remuneration payable to Monitor (s) shall be borne by Principal.
8. If the Monitor has reported to the Chairperson of the Board a substantiated suspicion of an offence under relevant Anti-Corruption laws of India, and the Chairperson has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.
9. The word 'Monitor' would include both singular and plural.
10. Independent External Monitor shall be required to maintain confidentiality of the information acquired and gathered during their tenure / role as Independent Monitor. Any breach in this regard would be subject to the legal judicial system of India.

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11. The Independent External Monitors shall be responsible to oversee the implementation of Integrity Pact Program to prevent corruption, bribes or any other unethical practices in the Godavari Gas.
12. Independent External Monitor(s) shall be required to furnish an Undertaking and shall disclose before taking any assignment that he / she has no interest in the matter or connected with the party (bidder / contractor) in any manner.

Section 9 – Pact Duration

The provisions of this Pact shall come into effect from the date of signing of this Pact by the both parties. It expires for the Contractor 12 months after the last payment under the respective contract, and for all other Bidders 6 months after the contract has been awarded.



If any claim is made / lodged by either party during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/determined by the Chairperson of the Principal.

Section 10 – Miscellaneous provisions

1. This agreement is subject to Indian Law. Place of performance and exclusive jurisdiction is the Registered Office of the Principal, i.e. New Delhi. The Arbitration clause provided in main tender document / contract shall not be applicable for any issue / dispute arising under Integrity Pact.
2. Changes and supplements as well as termination notices, if any, need to be made in writing. Side agreements have not been made.
3. If the Contractor / Bidder is a partnership concern or a consortium, this agreement must be signed by all partners or consortium members.
4. In case any or several of the provisions of this agreement turn out to be void, the remainder of this pact shall remain valid. The parties to this pact however, shall strive to come to an agreement to their original intentions in such a case.
5. The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provision of the extant law in force relating to any civil or criminal proceeding.

 (Name & Designation)
 For the Principal
 Place -----
 Date -----

 (Name & Designation)
 For the Bidder/Contractor
 Witness 1: -----
 Witness 2: -----

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F-18

**PROFORMA OF "BANK GUARANTEE" FOR "CONTRACT PERFORMANCE
GUARANTEE / SECURITY DEPOSIT"**
(ON NON-JUDICIAL STAMP PAPER OF APPROPRIATE VALUE)

To,

M/s Godavari Gas Private Limited
D. No.70-14/5/1, Sidharth Nagar,
Near RTO Junction, NFCL Road,
Kakinada – 533001
India

PERFORMANCE GUARANTEE No.

Dear Sir(s),

M/s. _____ having registered office at _____ (herein after called the “contractor/supplier” which expression shall wherever the context so require include its successors and assignees) have been placed/ awarded the job/work of _____ vide PO/LOA /FOA No. _____ dated _____ for Godavari Gas Private Limited having registered office at D. No.70-14/5/1, Sidharth Nagar, Near RTO Junction, NFCL Road, Kakinada – 533001 (herein after called the “Godavari Gas” which expression shall wherever the context so require include its successors and assignees).

The Contract conditions provide that the SUPPLIER/CONTRACTOR shall pay a sum of Rs. _____ (Rupees _____) as full Contract Performance Guarantee in the form therein mentioned. The form of payment of Contract Performance Guarantee includes guarantee executed by Nationalized Bank/Scheduled Commercial Bank, undertaking full responsibility to indemnify Godavari Gas Private Limited, in case of default.





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The said M/s. _____ has approached us and at their request and in consideration of the premises we having our office at _____ have agreed to give such guarantee as hereinafter mentioned.



- 1 We _____ hereby undertake to give the irrevocable & unconditional guarantee to you that if default shall be made by M/s. _____ in performing any of the terms and conditions of the tender/order/contract or in payment of any money payable to Godavari Gas Private Limited we shall on first demand pay without demur, contest, protest and/ or without any recourse to the supplier / contractor to Godavari Gas in such manner as Godavari Gas may direct the said amount of Rupees _____ only or such portion thereof not exceeding the said sum as you may require from time to time.
- 2 You will have the full liberty without reference to us and without affecting this guarantee, postpone for any time or from time to time the exercise of any of the powers and rights conferred on you under the order/contract with the said M/s. _____ and to enforce or to forbear from endorsing any powers or rights or by reason of time being given to the said M/s. _____ and such postponement forbearance would not have the effect of releasing the bank from its obligation under this debt.
- 3 Your right to recover the said sum of Rs. _____ (Rupees _____) from us in manner aforesaid is absolute & unequivocal and will not be affected or suspended by reason of the fact that any dispute or disputes have been raised by the said M/s. _____ and/or that any dispute or disputes are pending before any officer, tribunal or court or arbitrator or any other authority/forum and any demand made by you in the bank shall be conclusive and binding. The bank shall not be released of its obligations under these presents by any exercise by you of its liberty with reference to matter aforesaid or any of their or by reason or any other act of omission or commission on your part or any other indulgence shown by you or by any other matter or changed what so ever which under law would, but for this provision, have the effect of releasing the bank.
- 4 The guarantee herein contained shall not be determined or affected by the liquidation or winding up dissolution or changes of constitution or insolvency of the said

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supplier/contractor but shall in all respects and for all purposes be binding and operative until payment of all money due to you in respect of such liabilities is paid.



- 5 This guarantee shall be irrevocable and shall remain valid upto _____ (this date should be 90 days after the expiry of defect liability period/ Guarantee period) _____. The bank undertakes not to revoke this guarantee during its currency without your previous consent and further agrees that the guarantee shall continue to be enforceable until it is discharged by Godavari Gas in writing. However, if for any reason, the supplier/contractor is unable to complete the supply/work within the period stipulated in the order/contract and in case of extension of the date of delivery/completion resulting extension of defect liability period/guarantee period of the supplier/contractor fails to perform the supply/work fully, the bank hereby agrees to further extend this guarantee at the instance of the supplier/contractor till such time as may be determined by Godavari Gas. If any further extension of this guarantee is required, the same shall be extended to such required period on receiving instruction from M/s. _____ (supplier / contractor) on whose behalf this guarantee is issued.
- 6 Bank also agrees that Godavari Gas at its option shall be entitled to enforce this Guarantee against the bank (as principal debtor) in the first instant, without proceeding against the supplier/contractor and notwithstanding any security or other guarantee that Godavari Gas may have in relation to the supplier's/contractor's liabilities.
- 7 The amount under the Bank Guarantee is payable forthwith without any delay by Bank upon the written demand raised by Godavari Gas. Any dispute arising out of or in relation to the said Bank Guarantee shall be subject to the exclusive jurisdiction of courts at New Delhi.
- 8 Therefore, we hereby affirm that we are guarantors and responsible to you on behalf of the Supplier/Contractor up to a total amount of _____ (amount of guarantees in words and figures) and we undertake to pay you, upon your first written demand declaring the Supplier/Contractor to be in default under the order/contract and without caveat or argument, any sum or sums within the limits of (amounts of guarantee) as aforesaid, without your needing to prove or show grounds or reasons for your demand or the sum specified therein.
- 9 We have power to issue this guarantee in your favor under Memorandum and Articles of Association and the undersigned has full power to do under the Power of Attorney, dated _____ granted to him by the Bank.

Yours faithfully,

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p align="center">GODAVARI GAS PRIVATE LIMITED</p> <p align="center">CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p align="center">SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p align="center">Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>MECON मेकॉन ISO 9001 Company</p>
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Bank by its Constituted Attorney

Signature of a person duly
Authorized to sign on behalf of the
Bank

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>MECON मेकॉन ISO 9001 Company</p>
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INSTRUCTIONS FOR FURNISHING
"CONTRACT PERFORMANCE GUARANTEE / SECURITY DEPOSIT" BY "BANK
GUARANTEE"

- 1 The Bank Guarantee by successful Bidder(s) will be given on non-judicial stamp paper of Rs. 100/- or the value prevailing in the State where executed as per the Stamp Act, whichever is higher. The non-judicial stamp paper should be in name of the issuing bank.
- 2 The Bank Guarantee by Bidders will be given from bank as specified in Tender.
- 3 A letter (preferably digitally signed secured e-mail) from the issuing bank of the requisite Bank Guarantee confirming that said bank guarantee and future communication relating to the Bank Guarantee may be forwarded to Employer
- 4 Bidder must indicate the full postal address of the Bank along with the Bank's E-mail / Fax / Phone from where the Bank Guarantee has been issued
- 5 If a Bank Guarantee is issued by a commercial bank, then a letter to Employer and copy to Consultant (if applicable) confirming its net worth is more than Rs. 100,00,00,000.00 [Rupees One Hundred Crores] or its equivalent in foreign currency along with documentary evidence.
- 6 Bidder can submit CPBG on line through issuing bank to Godavari Gas Private Limited directly as per Ministry of Finance (MOF) Department of financial service direction vide letter ref number F.No.7/112/2011-BOA dated 17th July 2012. In such cases confirmation will not be sought from issuing banker by Godavari Gas Private Limited.

 <p>GAPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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PREFERENCE FOR DOMESTICALLY MANUFACTURED ELECTRONIC PRODUCTS (DMEP)

- 1) Godavari Gas Private Limited reserves the right for providing preference to domestically manufactured electronic products in terms of the Department of Electronics and Information Technology (DeitY) Notification No.33(3)/2013-IPHW dated 23.12.2013 read with Notification No. 33(3)/2013-IPHW dated 22.05.2015.

A copy of the aforesaid Notifications/Guidelines can be downloaded from DeitY website i.e. URL www.deity.gov.in/esdm. Purchase preference for domestic manufacturer, methodology of its implementation, value addition to be achieved by domestic manufacturers, self-certification and compliance and monitoring shall be as per the aforesaid Guidelines/ Notifications. The Guidelines may be treated as an integral part of the Tender Documents.

- 2) Accordingly, domestic manufacturer shall be asked to provide following confirmation/undertaking/documents along with the Bid:-
 - a) An undertaking that the products meet all the technical specifications as per Form-1.
 - b) Affidavit of Self Certification regarding Domestic Value Addition in an Electronic Product. The responsibility of correctness of Affidavit of self-certification shall be that of the Bidder when asked to do so.
 - c) Documents/ certifications to ensure security and quality.
 - d) Undertaking that the Domestic manufacture shall be able to manufacture required quantity in stipulated time frame.
- 3) The modalities through which the preference for Domestically Manufactured Electronic Products (DMEPs) shall be operated are as follows:-
 - a) The electronic products for which preference will be provided to domestic manufacturers shall be
 - b) The quantity of procurement for which preference will be provided to domestic manufacturers shall be _____%.
 - c) Percentage of domestic value addition which qualifies the electronic product to be classified as domestically manufactured shall be _____%.
 - d) The preference to DMEP shall be subject to meeting technical specifications and



	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	
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matching rate of L1 Bidder.

- 4) Domestic manufacturers are required to indicate the domestic value addition in terms of BoM for the quoted product, in terms of aforesaid guidelines, in their Bid in the following format:-

Item No	Item Description	Manufacturer / Supplier	Country of Origin	Value	Domestic Value Addition in Percentage
1.					

- 5) Bidders claiming to Bid in the status of domestic manufacturer are required to give an undertaking in the format as given at Form 1. The procedure for certification and assessment of the Domestic Value Addition shall be as per relevant notifications and guidelines in this regard. Furnishing of false information on this account shall attract penal provisions as per procedure for action in case of Corrupt/Fraudulent/Collusive/Coercive Practice.
- 6) Procedure for award of contracts involving procurement from domestic manufacturers: “For each electronic product proposed to be procured, among all technically qualified bids, the lowest quoted price will be termed as L1 and the rest of the bids shall be ranked in ascending order of price quoted, as L2, L3, L4 and so on. If L1 bid is of a domestic manufacturer, the said Bidder will be awarded full value of the order. If L1 bid is not from a domestic manufacturer, the value of the order awarded to L1 Bidder will be the balance of procurement value after reserving specified percentage of the total value of the order for the eligible domestic manufacturer. Thereafter, the lowest bidder among the domestic manufacturers, whether L2, L3, L4 or higher, will be invited to match the L1 bid in order to secure the procurement value of the order earmarked for the domestic manufacturer. In case first eligible bidder (i.e. domestic manufacturer) fails to match L1 bid, the bidder (i.e. domestic manufacturer) with next higher bid will be invited to match L1 bid and so on. However, the procuring agency may choose to divide the order amongst more than one successful bidder as long as all such bidders match L1 and the criteria for allocating the tender quantity amongst a number of successful bidders is clearly articulated in the Tender Document itself. In case all eligible domestic manufacturers fail to match the L1 bid, the actual bidder holding L1 bid will secure the order for full procurement value”. Only those domestic manufacturers whose bids are within 20% of the L1 bid would be allowed an opportunity to match L1 bid.
- 7) In case of turnkey/ system-integration projects, eligibility of a bidder as a domestic manufacturer would be determined on the domestic value addition calculated only for the value of notified DMEPs i.e. forming part of the turnkey/system-integration project and not on the value of whole project.

	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	
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FORM 1

**Format for Affidavit of Self Certification regarding Domestic Value Addition in an
Electronic Product on Rs. 100/- Stamp Paper**

Date:

I.....S/o, D/o, W/o
Resident ofdo
hereby solemnly affirm and declare as under:

That I will agree to abide by the terms and conditions of the policy of Government of India issued vide Notification No. 8(78)/2010-IPHW dated 10.02.2012 and Notification No. 33(3)/2013-IPHW dated 23.12.2013.

That the information furnished hereinafter is correct to best of my knowledge and belief and I undertake to produce relevant records before the procuring authority or any authority so nominated by the Department of Electronics and Information Technology, Government of India for the purpose of assessing the domestic value-addition.



That the domestic value addition for all inputs which constitute the said electronic products has been verified by me and I am responsible for the correctness of the claims made therein.

That in the event of the domestic value addition of the product mentioned herein is found to be incorrect and not meeting the prescribed value-addition norms, based on the assessment of an authority or auditors accredited by the Department of Electronics and Information Technology, Government of India for the purpose of assessing the domestic value-addition. I will be disqualified from any Government Tender for a period of 36 months. In addition, I will bear all costs of such an assessment. Further, Action shall also be initiated as per the provisions contained Procedure for action in case of Corrupt /Fraudulent/ Collusive/Coercive Practice.

That I have complied with all conditions referred to in the Notification(s) in this regard, wherein preference to domestically manufactured electronic products in Government procurement is provided and that the procuring authority is hereby authorized to forfeit and adjust my EMD and other security amount towards such assessment cost and I undertake to pay the balance, if any, forthwith.

I agree to maintain the following information in the Company's record for a period of 8 years and shall make this available for verification to any statutory authorities.

- i. Name and details of the Domestic Manufacturer (Registered Office, Manufacturing unit location, nature of legal entity)
- ii. Date on which this certificate is issued
- iii. Electronic Products for which the certificate is produced



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- iv. Procuring agency to whom the certificate is furnished
- v. Percentage of domestic value addition claimed
- vi. Name and contact details of the unit of the manufacturer
- vii. Sale price of the product
- viii. Ex-factory Price of the product
- ix. Freight, insurance and handling
- x. Total Bill of Material
- xi. List and total cost value of inputs used for manufacture of the electronic product
- xii. List and total cost of inputs which are domestically sourced. Please attach certificates from suppliers, if the input is not in-house.
- xiii. List and cost of inputs which are imported, directly or indirectly

For and on behalf of

..... (Name of firm/entity)

Authorized signatory (To be duly authorized by the Board of Directors)
 <Insert Name, Designation and Contact No.>



 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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FREQUENTLY ASKED QUESTIONS (FAQs)

SL.NO.	QUESTION	ANSWER
1.0	Can any vendor quote for subject Tender?	Yes. A Vendor has to meet Bid Evaluation Criteria given under Section 1.1 of Tender document in addition to other requirements.
2.0	Should the Bid Evaluation Criteria documents be attested?	Yes. Please refer clause no. D of Section 1.1 of Tender document
3.0	Is attending Pre Bid Meeting mandatory.	No. Refer Clause No. 17 of Instruction to Bidders of Tender Document. However attending Pre Bid Meeting is recommended to sort out any issue before submission of bid by a Bidder.
4.0	Can a vendor submit more than 1 offer?	No. Please refer Clause No. 4 of Instruction to Bidders of Tender Document.
5.0	Are there are any MSE (Micro & Small Enterprises) benefits available?	Yes. Refer Clause No. 39 of Instructions to Bidders of Tender Document.

All the terms and conditions of Tender remain unaltered.

	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	
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Performa of NO CLAIM CERTIFICATE

[On the Letter-head of Supplier]

We,, a Company incorporated under the laws of India having its registered office at and carrying on business under the name and style M/s. were awarded the contract by M/s. Godavari Gas Private Limited, Kakinada in reference to P.O. No. dated __.__.2018 after completion of the above said Purchase Order under the contract, we have scrutinized all our claims, contentions, disputes, issued and we hereby confirm that after adjusting all payments received by us against our Invoices, our balance entitlement under the Contract is to a sum of Rs...../- (Rupees only) as per our final various bills towards full and final settlement of all our claims, dues, issues and contentions from Godavari Gas Private Limited, against the aforementioned Purchase Order.



We confirm and declare that with the receipt of aforesaid money's, all our claims, dues, disputes, differences between M/s. and Godavari Gas Private Limited under and with reference to said Contract stands fully and finally settled.

We further absolve Godavari Gas Private Limited from all liabilities present or future arising directly or indirectly out of the said Contract.

We further confirm that the present settlement has been arrived at after mutual negotiations and is freely and fairly into between the parties. There is no economic duress or any other compulsion on us in entering into this settlement.

Supplier's Name:

Authorized Signatory:

	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	
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CUT – OUT SLIP: DO NOT OPEN - THIS IS A QUOTATION

PART – A (UN-PRICED Bid)

**(Original Power of Attorney and Complete Technical and Commercial offer WITOUT
ANY REFERENCE TO PRICE)**

Owner : **GODAVARI GAS PRIVATE LIMITED**

Project : **CITY GAS DISTRIBUTION PROJECT AT EAST &
WEST GODAVARI DISTRICTS**

Bid Document No. : **MEC/23TS/01/51/S2/DRS/SU/0003**



Item : **SUPPLY OF GAS DISTRICT REGULATORY SKID
(DRS) (ANNUAL RATE CONTRACT FOR A PERIOD
OF 2 YEARS)**

Due Date & Time : **Upto 15.00 Hrs. (IST) on 10.08.2018**

From : **To :**

	<p>Dy. General Manager (I/c) (Contracts) MECON LIMITED No.89, South End Road, Basavanagudi, Bengaluru – 560 004 Ph. No. 91-80-2657 6442 / 26252105 Fax No. 91-80-26576352 E-mail : contractsblr@meconlimited.co.in</p>
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(To be pasted on the physical envelope containing Original Power of Attorney and complete technical and commercial offer without any reference to Price) (Part A)

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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Part – B (PRICED Bid)

Owner : **GODAVARI GAS PRIVATE LIMITED**

Project : **CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS**

Bid Document No. : **MEC/23TS/01/51/S2/DRS/SU/0003**



Item : **SUPPLY OF GAS DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)**

Due Date & Time : **Upto 15.00 Hrs. (IST) on 10.08.2018**

From : **To :**

	<p>Dy. General Manager (I/c) (Contracts) MECON LIMITED No.89, South End Road, Basavanagudi, Bengaluru – 560 004 Ph. No. 91-80-2657 6442 / 26252105 Fax No. 91-80-26576352 E-mail : contractsblr@meconlimited.co.in</p>
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(To be pasted on the physical envelope containing Price Bid) (Part B)

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>MECON मेकॉन ISO 9001 Company</p>
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CUT – OUT SLIP: DO NOT OPEN - THIS IS A QUOTATION

***Part – C (EMD – Bid Security)
(Original Bid Security)***

Owner : ***GODAVARI GAS PRIVATE LIMITED***

Project : ***CITY GAS DISTRIBUTION PROJECT AT EAST &
WEST GODAVARI DISTRICTS***

Bid Document No. : ***MEC/23TS/01/51/S2/DRS/SU/0003***



Item : ***SUPPLY OF GAS DISTRICT REGULATORY SKID
(DRS) (ANNUAL RATE CONTRACT FOR A PERIOD
OF 2 YEARS)***

Due Date & Time : ***Upto 15.00 Hrs. (IST) on 10.08.2018***



From : ***To :***

	<p><i>Dy. General Manager (I/c) (Contracts)</i> <i>MECON LIMITED</i> <i>No.89, South End Road, Basavanagudi,</i> <i>Bengaluru – 560 004</i> <i>Ph. No. 91-80-2657 6442 / 26252105</i> <i>Fax No. 91-80-26576352</i> <i>E-mail : contractsblr@meconlimited.co.in</i></p>
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(To be pasted on the physical envelope containing Original Bid Security) (Part C)

 <p>GAPL GODAVARI GAS PRIVATE LIMITED</p>	<p align="center">GODAVARI GAS PRIVATE LIMITED</p> <p align="center">CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p align="center">SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p align="center">Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>MECON मेकॉन ISO 9001 Company</p>
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PART-II – CONDITIONS OF CONTRACT

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p align="center">GODAVARI GAS PRIVATE LIMITED</p> <p align="center">CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p align="center">SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p align="center">Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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Section 2

GENERAL CONDITIONS OF CONTRACT – GOODS (GCC - GOODS)

GODAVARI GAS PRIVATE LIMITED

 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>मेकॉन ISO 9001 Company</p>
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General Conditions of Contract-GOODS

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Article Title

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GODAVARI GAS PRIVATE LIMITED

**CITY GAS DISTRIBUTION PROJECT AT EAST & WEST
GODAVARI DISTRICTS**

**SUPPLY OF DISTRICT REGULATORY SKID (DRS)
(ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)**

Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003



 <p>GGPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>MECON मेकॉन ISO 9001 Company</p>
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1	Definitions	<p>In this document, General Conditions of Contract (GCC-Goods), the following terms shall have the following respective meanings:</p> <p>1.0 BIDDER: Designates the individual or legal entity which has made a proposal, a tender or a bid with the aim of concluding a Contract with the PURCHASER.</p> <p>1.1 CONSULTANT <i>[if engaged]</i> shall mean M/s _____ having its registered office at _____. The term consultant includes successors, assigns of M/s _____.</p> <p>1.2 CONTRACT shall mean Purchase Order/Contract and all attached exhibits and documents referred to therein and all terms and conditions thereof together with any subsequent modifications thereto.</p> <p>1.3 CONTRACT PRICE shall mean the price payable to the Seller under the Contract for the full and proper performance of his contractual obligations.</p> <p>1.4 COMPLETION DATE shall mean the date on which the goods are successfully commissioned by the Seller and handed over to the PURCHASER.</p> <p>1.5 COMMERCIAL OPERATION shall mean the condition of the operation in which the complete equipment covered under the Contract is officially declared by the PURCHASER to be available for continuous operation at different loads upto and including rated capacity.</p> <p>1.6 DELIVERY terms shall be interpreted as per INCO TERMS 2000 in case of Contract with a foreign Bidder and as the date of LR/GR in the case of a contract with an Indian Bidder.</p> <p>1.7 DRAWINGS shall mean and include Engineering drawings, sketches showing plans, sections and elevations in relation to the Contract together with modifications and/or revisions thereto.</p> <p>1.8 ENGINEER or Engineer-in-Charge of the Project SITE shall mean the person designated from time to time by PURCHASER/CONSULTANT at SITE and shall include those who are expressly authorized by him to act for and on his behalf for operation of this</p>
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GODAVARI GAS PRIVATE LIMITED

CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS

SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)

Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003



		<p>CONTRACT.</p> <p>1.9 FINAL ACCEPTANCE shall mean the PURCHASER's written acceptance of the Works performed under the Contract after successful completion of performance and guarantee test.</p> <p>1.10 GOODS shall mean articles, materials, equipment, design and drawings, data and other property to be supplied by Seller to complete the contract.</p> <p>1.11 INSPECTOR shall mean any person or outside Agency nominated by PURCHASER/CONSULTANT through CONSULTANT to inspect equipment, stagewise as well as final, before dispatch, at SELLER's works and on receipt at SITE as per terms of the CONTRACT.</p> <p>1.12 INITIAL OPERATION shall mean the first integral operation of the complete equipment covered under the Contract with sub-systems and supporting equipment in service or available for service.</p> <p>1.13 PURCHASER shall mean GODAVARI GAS PRIVATE LIMITED (GODAVARI GAS) having its registered office at D. No.70-14/5/1, Sidharth Nagar, Near RTO Junction, NFCL Road, Kakinada – 533001. The term PURCHASER includes successors, assigns of GODAVARI GAS.</p> <p>1.14 PERFORMANCE AND GUARANTEE TESTS shall mean all operational checks and tests required to determine and demonstrate capacity, efficiency and operating characteristics as specified in the Contract documents.</p> <p>PROJECT designates the aggregate of the Goods and/or Services to be provided by one or more Contractors.</p> <p>Quantities – Bills of quantities</p> <p>Bills of quantities</p> <p>Designate the quantity calculations to be taken into account when these calculations are made from detailed or construction drawings, or from work actually performed, and presented according to a jointly agreed breakdown of the Goods and/or</p>
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GODAVARI GAS PRIVATE LIMITED



CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS

SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)

Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003



		<p>Services.</p> <p>1.15 SELLER shall mean the person, firm or company with whom PURCHASE ORDER/CONTRACT is placed/entered into by PURCHASER for supply of equipment, materials and services. The term Seller includes its successors and assigns.</p> <p>1.16 SERVICE shall mean erection, installation, testing, commissioning, provision of technical assistance, training and other such obligations of the Seller covered under the Contract.</p> <p>1.17 SITE designates the land and/or any other premises on, under, in or across which the Goods and/or Services have to be supplied, erected, assembled, adjusted, arranged and/or commissioned.</p> <p>1.18 SPECIFICATIONS shall mean and include schedules, details, description, statement of technical data, performance characteristics, standards (Indian as well as International) as applicable and specified in the Contract.</p> <p>1.19 SUB-CONTRACT shall mean order placed by the Seller, for any portion of the contracted work, after necessary consent and approval of PURCHASER.</p> <p>1.20 SUB-CONTRACTOR shall mean the person named in the CONTRACT for any part of the work or any person to whom any part of the CONTRACT has been sub-let by the SELLER with the consent in writing of the CONSULTANT/PURCHASER and will include the legal representatives, successors, and permitted assigns of such person.</p> <p>1.21 START-UP shall mean the time period required to bring the equipments covered under the Contract from an inactive condition, when construction is essentially complete to the state of readiness for trial operation. The start-up period shall include preliminary inspection and check out of equipment and supporting subsystems, initial operation of the complete equipments covered under the Contract to obtain necessary pre-trial operation data, perform calibration and corrective action, shutdown inspection and adjustment prior to the trial operation period.</p> <p>1.22 TESTS shall mean such process or processes to be carried out by the Seller as are prescribed in the</p>
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		<p>Contract or considered necessary by PURCHASER or his representative in order to ascertain quality, workmanship, performance and efficiency of equipment or part thereof.</p> <p>1.23 TESTS ON COMPLETION shall mean such tests as prescribed in the Contract to be performed by the Seller before the Works are taken over by the PURCHASER.</p>
2	Seller To Inform	<p>2.1 The Seller shall be deemed to have carefully examined all contract documents to his entire satisfaction. Any lack of information shall not in any way relieve the Seller of his responsibility to fulfill his obligation under the Contract.</p>
3	Application	<p>3.1 These General Conditions of Contract (GCC-Goods) shall apply to the extent that they are not superseded by provisions of other parts of the Contract.</p>
4	Country of Origin	<p>4.1 For purposes of this Clause "origin" means the place where the Goods were mined, grown or produced, or from which the services are supplied. Goods are produced when, through manufacturing, processing or substantial and major assembling of components, a commercially recognized new product results that is substantially different in basic characteristics or in purpose or utility from its components.</p>
5	Scope of Contract	<p>5.1 Scope of the CONTRACT shall be as defined in the PURCHASE ORDER/CONTRACT specifications, drawings and Annexure thereto.</p> <p>5.2 Completeness of the EQUIPMENT shall be the responsibility of the SELLER. Any equipment, fittings and accessories which may not be specifically mentioned in the specifications or drawings, but which are usual or necessary for the satisfactory functioning of the equipment (successful operation and functioning of the EQUIPMENT being SELLER's responsibility) shall be provided by SELLER without any extra cost.</p> <p>5.3 The SELLER shall follow the best modern practices in the manufacture of high grade EQUIPMENT notwithstanding any omission in the specifications. The true intent and meaning of these documents is that SELLER shall in all respects, design, engineer, manufacture and supply the equipment in a thorough</p>



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		<p>workmanlike manner and supply the same in prescribed time to the entire satisfaction of PURCHASER.</p> <p>5.4 The SELLER shall furnish twelve (12) copies in English language of Technical documents, final drawings, preservation instructions, operation and maintenance manuals, test certificates, spare parts catalogues for all equipments to the PURCHASER.</p> <p>5.5 The documents once submitted by the SELLER shall be firm and final and not subject to subsequent changes. The SELLER shall be responsible for any loss to the PURCHASER/CONSULTANT consequent to furnishing of incorrect data/drawings.</p> <p>5.6 All dimensions and weight should be in metric system.</p> <p>5.7 All equipment to be supplied and work to be carried out under the CONTRACT shall conform to and comply with the provisions of relevant regulations/Acts(State Government or Central Government) as may be applicable to the type of equipment/work carried out and necessary certificates shall be furnished.</p> <p>5.8 The Seller shall provide cross sectional drawings, wherever applicable, to identify the spare part numbers and their location. The size of bearings, their make and number shall be furnished.</p> <p>5.9 Specifications, design and drawings issued to the SELLER alongwith RFQ and CONTRACT are not sold or given but loaned. These remain property of PURCHASER/CONSULTANT or its assigns and are subject to recall by PURCHASER/CONSULTANT. The SELLER and his employees shall not make use of the drawings, specifications and technical information for any purpose at any time except for manufacture against the CONTRACT and shall not disclose the same to any person, firm or corporate body, without written permission of PURCHASER/CONSULTANT. All such details shall be kept confidential.</p> <p>5.10 SELLER shall pack, protect, mark and arrange for despatch of EQUIPMENT as per instructions given in the CONTRACT.</p>
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6	Standards	<p>6.1 The GOODS supplied under the CONTRACT shall conform to the standards mentioned in the Technical Specifications, or such other standards which ensure equal or higher quality, and when no applicable standard is mentioned, to the authoritative standard appropriate to the GOODS' country of origin and such standards shall be the latest issued by the concerned institution.</p>
7	Instructions, Direction & Correspondence	<p>7.1 The materials described in the CONTRACT are to be supplied according to the standards, data sheets, tables, specifications and drawings attached thereto and/or enclosed with the CONTRACT, itself and according to all conditions, both general and specific enclosed with the contract, unless any or all of them have been modified or cancelled in writing as a whole or in part.</p> <p>a. All instructions and orders to SELLER shall, excepting what is herein provided, be given by PURCHASER/CONSULTANT.</p> <p>b. All the work shall be carried out under the direction of and to the satisfaction of PURCHASER/CONSULTANT.</p> <p>c. All communications including technical/commercial clarifications and/or comments shall be addressed to CONSULTANT in quintuplicate with a copy to PURCHASER and shall always bear reference to the CONTRACT.</p> <p>d. Invoices for payment against CONTRACT shall be addressed to PURCHASER.</p> <p>e. The CONTRACT number shall be shown on all invoices, communications, packing lists, containers and bills of lading, etc.</p>
8	Contract Obligations	<p>8.1 If after award of the contract, the Seller does not acknowledge the receipt of award or fails to furnish the performance guarantee within the prescribed time limit, the PURCHASER reserves the right to cancel the contract and apply all remedies available to him under the terms and conditions of this contract.</p> <p>8.2 Once a contract is confirmed and signed, the terms and conditions contained therein shall take precedence over the Seller's bid and all previous correspondence.</p>
9	Modification In Contract	<p>9.1 All modifications leading to changes in the CONTRACT with respect to technical and/or commercial aspects including terms of delivery, shall</p>

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		<p>be considered valid only when accepted in writing by PURCHASER/CONSULTANT by issuing amendment to the CONTRACT. Issuance of acceptance or otherwise in such cases shall not be any ground for extension of agreed delivery date and also shall not affect the performance of contract in any manner except to the extent mutually agreed through a modification of contract.</p> <p>9.2 PURCHASER/CONSULTANT shall not be bound by any printed conditions or provisions in the SELLER's Bid Forms or acknowledgment of CONTRACT, invoices, packing list and other documents which purport to impose any conditions at variance with or supplemental to CONTRACT.</p>
10	Use of Contract Documents & Information	<p>10.1 The Seller shall not, without the PURCHASER's/CONSULTANT's prior written consent, disclose the CONTRACT or any provision thereof, or any specification, plan, drawing, pattern, sample or information furnished by or on behalf of the PURCHASER in connection therewith, to any person other than a person employed by the SELLER in the performance of the CONTRACT. Disclosure to any such employed person shall be made in confidence and shall extend only so far as may be necessary for purpose of such performance.</p> <p>10.2 The SELLER shall not, without the PURCHASER's prior written consent, make use of any document or information enumerated in Article 10.1. except for purpose of performing the CONTRACT.</p>
11	Patent Rights, Liability & Compliance of Regulations	<p>11.1 SELLER hereby warrants that the use or sale of the materials delivered hereunder will not infringe claims of any patent covering such material and SELLER agrees to be responsible for and to defend at his sole expense all suits and proceedings against PURCHASER based on any such alleged patent infringement and to pay all costs, expenses and damages which PURCHASER and/or CONSULTANT may have to pay or incur by reason of any such suit or proceedings.</p> <p>11.2 The SELLER shall indemnify the PURCHASER against all third party claims of infringement of patent, trade mark or industrial design rights arising from use of the GOODS or any part thereof in the</p>



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		<p>PURCHASER's country.</p> <p>11.3 SELLER shall also protect and fully indemnify the PURCHASER from any claims from SELLER'S workmen/employees or their heirs, dependants, representatives, etc. or from any other person/persons or bodies/companies etc. for any acts of commissions or omission while executing the CONTRACT.</p> <p>11.4 SELLER shall be responsible for compliance with all requirements under the laws and shall protect and indemnify completely the PURCHASER from any claims/penalties arising out of any infringements.</p>
12	Performance Guarantee	<p>12.1 Within 15 days after the SELLER's receipt of notification of award of the CONTRACT, the SELLER shall furnish Performance Guarantee in the form of Bank Guarantee/irrevocable Letter of Credit to the PURCHASER, in the form provided in the Bidding Documents, for an amount equivalent to 10% of the total value of the CONTRACT.</p> <p>12.2 The proceeds of Performance Guarantee shall be appropriated by the PURCHASER as compensation for any loss resulting from the SELLER's failure to complete his obligations under the CONTRACT without prejudice to any of the rights or remedies the PURCHASER may be entitled to as per terms and conditions of CONTRACT. The proceeds of this Performance Guarantee shall also govern the successful performance of Goods and Services during the entire period of Contractual Warrantee/Guarantee.</p> <p>12.3 The performance guarantee shall be denominated in the currency of the CONTRACT.</p> <p>12.4 The Performance Guarantee shall be valid for the duration of 90 days beyond the expiry of Warrantee/Guarantee period. The Bank Guarantee will be discharged by PURCHASER not later than 6 months from the date of expiration of the Seller's entire obligations, including any warrantee obligations, under the CONTRACT.</p>
13	Inspection, Testing & Expediting	<p>13.1 The PURCHASER or its representative shall have the right to inspect and/or to test the GOODS to confirm their conformity to the CONTRACT specifications.</p>



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		<p>The special conditions of CONTRACT and/or the Technical Specifications shall specify what inspections and tests the PURCHASER requires and where they are to be conducted. The PURCHASER shall notify the SELLER in writing the identity of any representative(s) retained for these purposes.</p> <p>13.2 The inspections and tests may be conducted on the premises of the SELLER or his sub-contractor(s), at point of DELIVERY and/or at the GOODS' final destination, When conducted on the premises of the SELLER or his sub-contractor (s), all reasonable facilities and assistance including access to the drawings and production data shall be furnished to the inspectors at no charge to the PURCHASER.</p> <p>13.3 Should any inspected or tested GOODS fail to conform to the specifications, the PURCHASER may reject them and the SELLER shall either replace the rejected GOODS or make all alterations necessary to meet Specifications' requirements, free of cost to the PURCHASER.</p> <p>13.4 The PURCHASER's right to inspect, test and where necessary reject the GOODS after the GOODS' arrival in the PURCHASER's country shall in no way be limited or waived by reason of the GOODS having previously been inspected, tested and passed by the PURCHASER, or their representative prior to the GOODS shipment from the country of origin.</p> <p>13.5 The INSPECTOR shall follow the progress of the manufacture of the GOODS under the CONTRACT to ensure that the requirements outlined in the CONTRACT are not being deviated with respect to schedule and quality.</p> <p>13.6 SELLER shall allow the INSPECTOR to visit, during working hours, the workshops relevant for execution of the CONTRACT during the entire period of CONTRACT validity.</p> <p>13.7 In order to enable PURCHASER's representatives to obtain entry visas in time, SELLER shall notify PURCHASER two months before assembly, testing and packing of main EQUIPMENT. If requested, SELLER shall assist PURCHASER's representatives in getting visas in the shortest possible time (applicable only in case of foreign order).</p>
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		<p>13.8 SELLER shall place at the disposal of the INSPECTOR, free of charge, all tools, instruments, and other apparatus necessary for the inspection and/or testing of the GOODS. The INSPECTOR is entitled to prohibit the use and dispatch of GOODS and/or materials which have failed to comply with the characteristics required for the GOODS during tests and inspections.</p> <p>13.9 SELLER shall advise in writing of any delay in the inspection program at the earliest, describing in detail the reasons for delay and the proposed corrective action.</p> <p>13.10 ALL TESTS and trials in general, including those to be carried out for materials not manufactured by SELLER shall be witnessed by the INSPECTOR. Therefore, SELLER shall confirm to PURCHASER by fax or e-mail about the exact date of inspection with at least 30 days notice. SELLER shall specify the GOODS and quantities ready for testing and indicate whether a preliminary or final test is to be carried out.</p> <p>13.11 If on receipt of this notice, PURCHASER should waive the right to witness the test, timely information will be given accordingly.</p> <p>13.12 Any and all expenses incurred in connection with tests, preparation of reports and analysis made by qualified laboratories, necessary technical documents, testing documents and drawings shall be at SELLER's cost. The technical documents shall include the reference and numbers of the standards used in the construction and, wherever deemed practical by the INSPECTOR, copy of such standards.</p> <p>13.13 Nothing in Article-13 shall in any way release the SELLER from any warranty or other obligations under this CONTRACT.</p> <p>13.14 Arrangements for all inspections required by Indian Statutory Authorities and as specified in technical specifications shall be made by SELLER.</p> <p>13.15 Inspection & Rejection of Materials by consignees When materials are rejected by the consignee, the supplier shall be intimated with the details of such rejected materials, as well as the reasons for their rejection, also giving location where such materials</p>
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		<p>are lying at the risk and cost of the contractor/supplier. The supplier will be called upon either to remove the materials or to give instructions as to their disposal within 14 days and in the case of dangerous, infected and perishable materials within 48 hours, failing which the consignee will either return the materials to the contractor freight to pay or otherwise dispose them off at the contractor's risk and cost. The PURCHASER shall also be entitled to recover handling and storage charges for the period, during which the rejected materials are not removed @ 5% of the value of materials for each month or part of a month till the rejected materials are finally disposed off.</p>
<p>14</p>	<p>Time Schedule & Progress Reporting</p>	<p>14.1 Time Schedule Network/Bar Chart</p> <p>14.1.1 Together with the Contract confirmation, SELLER shall submit to PURCHASER, his time schedule regarding the documentation, manufacture, testing, supply, erection and commissioning of the GOODS.</p> <p>14.1.2 The time schedule will be in the form of a network or a bar chart clearly indicating all main or key events regarding documentation, supply of raw materials, manufacturing, testing, delivery, erection and commissioning.</p> <p>14.1.3 The original issue and subsequent revisions of SELLER's time schedule shall be sent to PURCHASER.</p> <p>14.1.4 The time schedule network/bar chart shall be updated at least every second month.</p> <p>14.2 Progress Trend Chart/Monthly Report</p> <p>14.2.1 SELLER shall report monthly to PURCHASER, on the progress of the execution of CONTRACT and achievement of targets set out in time bar chart.</p> <p>14.2.2 The progress will be expressed in percentages as shown in the progress trend chart attached to the Time Schedule specification.</p> <p>14.2.3 The first issue of the Progress Trend Chart will be forwarded together with the time bar chart alongwith CONTRACT confirmation.</p> <p>14.3.1 PURCHASER's/CONSULTANT's representatives shall have the right to inspect SELLER's premises with a view to evaluating the actual progress of work on the basis of</p>

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		<p>SELLER's time schedule documentation.</p> <p>14.3.2 Irrespective of such inspection, SELLER shall advise CONSULTANT, with copy to PURCHASER, at the earliest possible date of any anticipated delay in the progress.</p> <p>14.4 Notwithstanding the above, in case progress on the execution of contract at various stages is not as per phased time schedule and is not satisfactory in the opinion of the PURCHASER/CONSULTANT which shall be conclusive or SELLER shall neglect to execute the CONTRACT with due diligence and expedition or shall contravene the provisions of the CONTRACT, PURCHASER/CONSULTANT may give notice of the same in writing to the SELLER calling upon him to make good the failure, neglect or contravention complained of. Should SELLER fail to comply with such notice within the period considered reasonable by PURCHASER/ CONSULTANT, the PURCHASER/CONSULTANT shall have the option and be at liberty to take the CONTRACT wholly or in part out of the SELLER's hand and make alternative arrangements to obtain the requirements and completion of CONTRACT at the SELLER's risk and cost and recover from the SELLER, all extra cost incurred by the PURCHASER on this account. In such event PURCHASER/CONSULTANT shall not be responsible for any loss that the SELLER may incur and SELLER shall not be entitled to any gain. PURCHASER/CONSULTANT shall, in addition, have the right to encash Performance Guarantee in full or part.</p>
<p>15</p>	<p>Delivery & Documents</p>	<p>15.1 Delivery of the GOODS shall be made by the SELLER in accordance with terms specified in the CONTRACT, and the goods shall remain at the risk of the SELLER until delivery has been completed.</p> <p>15.2 Delivery shall be deemed to have been made :</p> <p>a) In the case of FOB, CFR & CIF Contracts, when the Goods have been put on board the ship, at the specified port of loading and a clean Bill of Lading is obtained. The date of Bill of Lading shall be considered as the delivery date.</p> <p>b) In case of FOT despatch point contract (For Indian bidder), on evidence that the goods have been loaded on the carrier and a negotiable copy of the GOODS receipt obtained. The date</p>

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		<p>of LR/GR shall be considered as the date of delivery.</p> <p>c) In case of FOT site (for Indian bidders) on receipt of goods by PURCHASER/Consultant at the designated site(s).</p> <p>15.3 The delivery terms are binding and essential and consequently, no delay is allowed without the written approval of PURCHASER/CONSULTANT. Any request concerning delay will be void unless accepted by PURCHASER/CONSULTANT through a modification to the CONTRACT.</p> <p>15.4 Delivery time shall include time for submission of drawings for approval, incorporation of comments, if any, and final approval of drawings by PURCHASER/CONSULTANT.</p> <p>15.5 In the event of delay in delivery, Price Reduction Schedule as stipulated in Article – 26 shall apply.</p> <p>15.6 The documentation, in English Language, shall be delivered in due time, in proper form and in the required number of copies as specified in the contract.</p> <p>15.7 The additional copies of final drawings and instructions will be included in the package of goods, properly enveloped and protected.</p> <p>15.8 The SELLER should comply with the Packing, Marking and Shipping Documentation Specifications enclosed.</p>
16	Transit Risk Insurance	<p>16.1 All goods supplied under the contract shall be fully insured in a freely convertible currency against loss or damage incidental to manufacture or acquisition, transportation, storage and delivery.</p> <p>16.2 Where delivery is on FOB or CFR basis, marine insurance shall be the responsibility of the Purchaser. Insurance Requirements :</p> <p style="padding-left: 40px;">Indigenous Bidders: Transit risk insurance from F.O.T. despatch point onwards shall be arranged and borne by GODAVARI GAS.</p> <p style="padding-left: 40px;">Foreign Bidders : Marine insurance as well as</p>

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		<p>transit insurance in Purchaser's country shall be arranged and borne by GODAVARI GAS.</p> <p>The SELLER shall ensure that in effecting despatch of materials, the primary responsibility of the carriers for safe movement is always retained so that the PURCHASER's interests are fully safeguarded and are in no way jeopardised. The Seller shall furnish the cost of materials against each equipment.</p> <p>16.3 PURCHASER's Insurance Agent : [The name and address-as mentioned under SCC]</p>
17	Transportation	<p>17.1 Where the SELLER is required under the CONTRACT to deliver the GOODS FOB, transport of the GOODS until delivery, that is, upto and including the point of putting the GOODS on board the export conveyance at the specified port of loading, shall be arranged and paid for by the SELLER and the cost thereof shall be included in the Contract price.</p> <p>17.2 Where the SELLER is required under the CONTRACT to deliver the GOODS CFR or CIF, transport of the Goods to the port of discharge or such other point in the country of destination as shall be specified in the CONTRACT shall be arranged and paid for by the SELLER and the cost thereof shall be included in the Contract price.</p>
18	Incidental Services	<p>18.1 The Seller may be required to provide any or all of the following services:</p> <p>18.1.1 Performance or supervision of onsite assembly and/or start-up of the supplied Goods:</p> <p>18.1.2 Furnishing tools required for assembly and/or maintenance of the supplied Goods:</p> <p>18.1.3 Performance or supervision or maintenance and/or repair of the supplied Goods, for a period of time agreed by the parties, provided that this service shall not relieve the Seller of any warranty/guarantee obligations under the Contract.</p> <p>18.1.4 Training of the Purchaser's personnel at the Seller's plant and/or at Site, in assembly, start-up operation, maintenance and/or repair of the supplied Goods at no extra cost. However, Purchaser will bear boarding, lodging & personal expenses of Trainees.</p>

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		<p>18.2 Prices charged by the Seller for the preceding incidental services, shall not exceed the prevailing rates charged to other parties by the Seller for similar services.</p> <p>18.3 When required, Seller shall depute necessary personnel for supervision and/or erection of the Equipment at site for duration to be specified by Purchaser on mutually agreed terms. Seller's personnel shall be available at Site within seven days for emergency action and twenty-one days for medium and long-term assistance, from the date of notice given by Purchaser.</p> <p>18.4 The cost of incidental services shall not be included in the quoted prices. The cost of applicable incidental services should be shown separately in the price schedules.</p>
19	Spare Parts, Maintenance Tools, Lubricants	<p>19.1 Seller may be required to provide any or all of the following materials and notification pertaining to spare parts manufactured or distributed by the Seller.</p> <p>19.1.1 Such spare parts as the Purchaser may opt to purchase from the Seller, provided that his option shall not relieve the Seller of any warranty obligations under the Contract, and</p> <p>19.1.2 In the event of termination of production of the spare parts:</p> <p style="margin-left: 20px;">i) Advance notification to the Purchaser of the pending termination, in sufficient time to permit the Purchaser to procure needed requirements, and</p> <p style="margin-left: 20px;">ii) Following such termination, furnishing at no cost to the Purchaser, the blue prints, drawings and specifications of the spare parts, if any when requested.</p> <p>19.2 Seller shall supply item wise list with value of each item of spare parts and maintenance tools requirements, along with full details of manufacturers/vendors for such spares/maintenance tools for :</p> <p>19.2.1 The construction, execution and commissioning.</p> <p>19.2.2 2 years operation and maintenance.</p> <p>19.3 Spare parts shall be new and of first class quality as per engineering standards/ codes, free of any defects (even concealed), deficiency in design,</p>



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		<p>materials and workmanship and also shall be completely interchangeable with the corresponding parts.</p> <p>19.4 Type and sizes of bearings shall be clearly indicated.</p> <p>19.5 Spare parts shall be packed for long storage under tropical climatic conditions in suitable cases, clearly marked as to intended purpose.</p> <p>19.6 A list of special tools and gauges required for normal maintenance and special handling and lifting appliances, if any, for the Goods shall be submitted to Purchaser.</p> <p>19.7 Bidders should note that if they do not comply with Clause 19.2 above, their quotation may be rejected.</p> <p>19.8 Lubricants</p> <p>19.8.1 Whenever lubricants are required, Seller shall indicate the quantity of lubricants required for the first filling, the frequency of changing, the quantity of lubricants required for the one year's continuous operation and the types of recommended lubricants indicating the commercial name (trade-mark), quality and grade.</p> <p>19.8.2 If Seller is unable to recommend specific oil, basic recommended characteristics of the lubricants shall be given.</p> <p>19.8.3 Seller shall indicate various equivalent lubricants available in India.</p>
<p>20</p>	<p>Guarantee</p>	<p>20.1 All Goods or Materials shall be supplied strictly in accordance with the specifications, drawings, data sheets, other attachments and conditions stated in the Contract.</p> <p>No deviation from such specifications or alterations or of these conditions shall be made without PURCHASER'S /CONSULTANT'S agreement in writing which must be obtained before any work against the order is commenced. All materials supplied by the SELLER pursuant to the Contract (irrespective of whether engineering, design data or other information has been furnished, reviewed or approved by PURCHASER/CONSULTANT) are guaranteed to be of the best quality of their respective kinds (unless otherwise specifically authorised in writing by PURCHASER/CONSULTANT) and shall be free from faulty design, workmanship and materials,</p>



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		<p>and to be of sufficient size and capacity and of proper materials so as to fulfill in all respects all operating conditions, if any, specified in the Contract.</p> <p>If any trouble or defect, originating with the design, material, workmanship or operating characteristics of any materials, arises at any time prior to twelve(12) months from the date of the first commercial operation of the Plant for which the materials supplied under the Contract form a part thereof, or twenty four (24) months from the date of last shipment whichever period shall first expire, and the SELLER is notified thereof, SELLER shall, at his own expense and as promptly as possible, make such alterations, repairs and replacements as may necessary to permit the materials to function in accordance with the specifications and to fulfill the foregoing guarantees.</p> <p>PURCHASER/CONSULTANT may, at his option, remove such defective materials, at SELLER'S expense in which event SELLER shall, without cost to PURCHASER/CONSULTANT and as promptly as possible, furnish and install proper materials. Repaired or replaced materials shall be similarly guaranteed by the SELLER for a period of no less than twelve (12) months from the date of replacement/repair.</p> <p>In the event that the materials supplied do not meet the specifications and/or not in accordance with the drawings data sheets or the terms of the Contract and rectification is required at site, PURCHASER/CONSULTANT shall notify the SELLER giving full details of differences. The SELLER shall attend the site within seven (7) days of receipt of such notice to meet and agree with representatives of PURCHASER/CONSULTANT, the action required to correct the deficiency. Should the SELLER fail to attend meeting at Site within the time specified above, PURCHASER/CONSULTANT shall immediately rectify the work/materials and SELLER shall reimburse PURCHASER all costs and expenses incurred in connection with such trouble or defect.</p> <p>20.2 PERFORMANCE GUARANTEE OF EQUIPMENT</p> <p>20.2.1 SELLER shall guarantee that the performance of the EQUIPMENT supplied under the CONTRACT shall be strictly in conformity with the specifications and</p>
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		<p>shall perform the duties specified under the CONTRACT.</p> <p>20.2.2 If the SELLER fails to prove the guaranteed performance of the EQUIPMENT set forth in the specification, the SELLER shall investigate the causes and carry out necessary rectifications/modifications to achieve the guaranteed performance. In case the SELLER fails to do so within a reasonable period, the SELLER shall replace the EQUIPMENT and prove guaranteed performance of the new equipment without any extra cost to PURCHASER.</p> <p>20.2.3 If the SELLER fails to prove the guarantee within a reasonable period, PURCHASER/CONSULTANT shall have the option to take over the EQUIPMENT and rectify, if possible, the EQUIPMENT to fulfill the guarantees and/or to make necessary additions to make up the deficiency at Seller's risk and cost. All expenditure incurred by the PURCHASER/CONSULTANT in this regard shall be to SELLER's account.</p>
<p>21</p>	<p>Terms of Payment</p>	<p>21.1 The method of payment to be made to the SELLER under this CONTRACT shall be specified in the Special Conditions of Contract.</p> <p>21.2 The type(s) of payment to be made to the SELLER under this CONTRACT shall be specified in the Special Conditions of Contract.</p> <p>21.3 The SELLER's request(s) for payment shall be made to the PURCHASER in writing accompanied by an invoice describing, as appropriate, the Goods delivered and services performed, and by shipping documents submitted, and upon fulfillment of other obligations stipulated in the Contract.</p> <p>21.4 Payment will be made in the currency or currencies in which the Contract Price has been stated in the SELLER's bid, as well as in other currencies in which the SELLER had indicated in his bid that he intends to incur expenditure in the performance of the Contract and wishes to be paid. If the requirements are stated as a percentage of the bid price alongwith exchange rates used in such calculations these exchange rates shall be maintained.</p>

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		<p>General Notes:</p> <ol style="list-style-type: none"> 1. All foreign currency payments to foreign bidder shall be released through an irrevocable Letter of Credit, which shall be opened through Government of India Nationalised Bank and hence shall not be confirmed. In case any bidder insists on confirmation, charges towards confirmation shall be borne by him. L/C shall be established within 30 days after receipt of unconditional acceptance of Letter /Fax of Intent together with Performance Guarantee for 10% of total order/Contract value. 2. For dispatches on FOT dispatch point (in India) basis, the payment shall be through PURCHASER's bank. Payment through Bank, wherever applicable, shall be released as per normal banking procedures. 3. Payment shall be released within 30 days after receipt of relevant documents complete in all respects. 4. All bank charges incurred in connection with payments shall be to Seller's account in case of Indian bidders and to respective accounts in case of Foreign bidder. 5. Unless otherwise specifically stated in bid document, all payments shall be made in the currency quoted. 6. No interest charges for delay in payments, if any, shall be payable by PURCHASER. 7. In case of Indian bidder, variation, if any, on account of customs duty on their built-in- import content, as per terms of bid document, shall be claimed separately by bidder after receipt of goods at site (s). However, any price benefits to the PURCHASER, on account of such variation as per terms specified in the bid document, shall be passed on to the PURCHASER alongwith invoicing itself. 8. Agency commission, if any, to Indian agent for Foreign bidders, indicated in prices, shall be paid to the agent in equivalent Indian Rupees on receipt and acceptance of material at site.
22	Prices	<p>22.1 Prices charged by the SELLER for Goods delivered and services performed under the CONTRACT shall not, with the exception of any price adjustments authorized by the Contract vary from the prices</p>

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		quoted by the SELLER in his bid.
23	Subletting & Assignment	23.1 The contractor shall not without previous consent in writing of the PURCHASER authority, sublet, transfer or assign the contract or any part thereof or interest therein or benefit or advantage thereof in any manner whatsoever. Provided, nevertheless, that any such consent shall not relieve the contractor from any obligation, duty or responsibility under the contract.
24	Time As Essence of Contract	24.1 The time and date of delivery/completion of the GOODS/SERVICES as stipulated in the Contract shall be deemed to be the essence of the Contract.
25	Delays In The Seller's Performance	<p>25.1 If the specified delivery schedule is not adhered to or the progress of manufacture or supply of the items is not satisfactory or is not in accordance with the progress schedule the PURCHASER has the right to:</p> <ul style="list-style-type: none"> i) hire for period of delay from elsewhere goods which in PURCHASER's opinion will meet the same purpose as the goods which are delayed and SELLER shall be liable without limitation for the hire charges; or ii) cancel the CONTRACT in whole or in part without liability for cancellation charges. In that event, PURCHASER may procure from elsewhere goods which PURCHASER's opinion would meet the same purpose as the goods for which CONTRACT is cancelled and SELLER shall be liable without limitations for the difference between the cost of such substitution and the price set forth in the CONTRACT for the goods involved; or iii) hire the substitute goods vide (i) above and if the ordered goods continue to remain undelivered thereafter, cancel the order in part or in full vide (ii) above. <p>25.2 Any inexcusable delay by the SELLER or his sub-contractor shall render the SELLER liable, without prejudice to any other terms of the Contract, to any or all of the following sanctions: forfeiture of Contract performance guarantee, imposition of price reduction for delay in delivery and termination of the contract for default.</p>
26	Price Reduction Schedule For Delayed Delivery	26.1 Subject to Article -29, if the SELLER fails to deliver any or all of the GOODS or performance the services within the time period (s) specified in the CONTRACT,



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		<p>the PURCHASER shall, without prejudice to his other remedies under the CONTRACT, deduct from the CONTRACT PRICE, a sum calculated on the basis of the CONTRACT PRICE, including subsequent modifications.</p> <p>26.1.1 Deductions shall apply as per following formula: In case of delay in delivery of equipment/materials or delay in completion, total contract price shall be reduced by ½ % (half percent) of the total contract price per complete week of delay or part thereof subject to a maximum of 5% (five percent) of the total contract price.</p> <p>26.2 In case of delay in delivery on the part of Seller, the invoice/document value shall be reduced proportionately for the delay and payment shall be released accordingly.</p> <p>26.3 In the event the invoice value is not reduced proportionately for the delay, the PURCHASER may deduct the amount so payable by SELLER, from any amount falling due to the SELLER or by recovery against the Performance Guarantee.</p> <p>Both seller and PURCHASER agree that the above percentages of price reduction are genuine pre estimates of the loss/damage which the PURCHASER would have suffered on account of delay/breach on the part of the SELLER and the said amount will be payable on demand without there being any proof of the actual loss/or damage caused by such breach/delay. A decision of the PURCHASER in the matter of applicability of price reduction shall be final and binding.</p>
<p>27</p>	<p>Rejections, Removal of Rejected Equipment & Replacement</p>	<p>27.1 Preliminary inspection at SELLER's works by INSPECTOR shall not prejudice PURCHASER's/CONSULTANT's claim for rejection of the EQUIPMENT on final inspection at SITE or claims under warranty provisions.</p> <p>27.2 If the EQUIPMENTS are not of specification or fail to perform specified duties or are otherwise not satisfactory the PURCHASER/CONSULTANT shall be entitled to reject the EQUIPMENT/MATERIAL or part thereof and ask free replacement within reasonable time failing which obtain his requirements from elsewhere at SELLER's cost and risk.</p>



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		<p>27.3 Nothing in this clause shall be deemed to deprive the PURCHASER AND/OR AFFECT ANY rights under the Contract which it may otherwise have in respect of such defects or deficiencies or in any way relieve the SELLER of his obligations under the Contract.</p> <p>27.4 EQUIPMENT rejected by the PURCHASER/CONSULTANT shall be removed by the Seller at his cost within 14 days of notice after repaying the amounts received against the SUPPLY. The PURCHASER shall in no way be responsible for any deterioration or damage to the EQUIPMENT under any circumstances whatsoever.</p> <p>27.5 In case of rejection of EQUIPMENT, PURCHASER shall have the right to recover the amounts, if any, from any of CONTRACTOR'S invoices pending with PURCHASER or by alternative method(s).</p>
<p>28</p>	<p>Termination of Contract</p>	<p>28.1 Termination for Default</p> <p>28.1.1 The PURCHASER may, without prejudice to any other remedy for breach of CONTRACT, by written notice of default sent to the SELLER, terminate the CONTRACT in whole or in part:</p> <ul style="list-style-type: none"> A) If the SELLER fails to deliver any or all of the GOODS within the time period(s) specified in the CONTRACT; or B) If the SELLER fails to perform any other obligation(s) under the CONTRACT, and C) If the SELLER, in either of the above circumstances, does not cure his failure within a period of 30 days (or such longer period as the PURCHASER may authorize in writing) after receipt of the default notice from the PURCHASER. <p>28.1.2 In the event the PURCHASER terminates the CONTRACT in whole or in part, pursuant to Article 28.1.1, the PURCHASER may procure, upon such terms and in such manner as it deems appropriate, goods similar to those undelivered and the SELLER shall be liable to the PURCHASER for any excess costs for such similar GOODS. However, the SELLER shall continue performance of the CONTRACT to the extent not terminated.</p> <p>28.1.3 In case of termination of CONTRACT herein set forth (under clause 28) except under conditions of Force Majeure and termination after expiry of contract, the VENDOR shall be put under holiday [i.e. neither any enquiry will be issued to the party by GODAVARI GAS</p>



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		<p>PRIVATE LIMITED Against any type of tender nor their offer will be considered by GODAVARI GAS against any ongoing tender (s) where contract between GODAVARI GAS and that particular VENDOR (as a bidder) has not been finalized] for three years from the date of termination by GODAVARI GAS PRIVATE LIMITED to such VENDOR.</p> <p>28.2 Termination for Insolvency The PURCHASER, may at any time, terminate the CONTRACT by giving written notice to the SELLER, without compensation to the SELLER, if the SELLER becomes bankrupt or otherwise insolvent, provided that such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the PURCHASER.</p> <p>28.3 Termination for Convenience 28.3.1 The PURCHASER may, by written notice sent to the SELLER, terminate the CONTRACT, in whole or part, at any time for his convenience. The notice of termination shall specify that termination is for the PURCHASER's convenience, the extent to which performance of work under the CONTRACT is terminated and the date upon which such termination becomes effective. 28.3.2 The GOODS that are complete and ready for shipment within 30 days after the SELLER's receipt of notice of termination shall be purchased by the PURCHASER at the CONTRACT terms and prices. For the remaining GOODS, the PURCHASER may opt: a) to have any portion completed and delivered at the CONTRACT terms and prices, and /or b) to cancel the remainder and pay to the SELLER an agreed amount for partially completed GOODS and for materials and parts previously procured by the SELLER.</p>
29	Force Majeure	<p>29.1 Shall mean and be limited to the following: a) War/hostilities b) Riot or Civil commotion c) Earthquake, flood, tempest, lightening or other natural physical disaster. d) Restrictions imposed by the Government or other Statutory bodies which prevents or delays the execution of the Contract by the SELLER.</p> <p>The SELLER shall advise</p>

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		<p>PURCHASER/CONSULTANT by a registered letter duly certified by the local Chamber of Commerce or statutory authorities, the beginning and end of the above causes of delay within seven (7) days of the occurrence and cessation of such Force Majeure Conditions. In the event of delay lasting over one month, if arising out of causes of Force Majeure, PURCHASER/CONSULTANT reserves the right to cancel the Contract and the provisions governing termination stated under Article 28.0 shall apply.</p> <p>For delays arising out of Force Majeure, the SELLER shall not claim extension in completion date for a period exceeding the period of delay attributable to the causes of Force Majeure and neither PURCHASER/CONSULTANT nor SELLER shall be liable to pay extra costs provided it is mutually established that Force Majeure Conditions did actually exist.</p> <p>SELLER shall categorically specify the extent of Force Majeure Conditions prevalent in their works at the time of submitting their bid and whether the same have been taken into consideration or not in their quotations. In the event of any force majeure cause, the SELLER or the PURCHASER shall not be liable for delays in performing their obligations under this order and the delivery dates will be extended to the SELLER without being subject to price reduction for delayed deliveries, as stated elsewhere.</p>
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<p>30</p>	<p>Resolution of Disputes/Arbitration</p>	<p>30.1 The PURCHASER and the SELLER shall make every effort to resolve amicably by direct informal negotiations any disagreement or dispute arising between them under or in connection with the contract.</p> <p>30.2 If, after thirty days from the commencement of such informal negotiations, the PURCHASER and the SELLER have been unable to resolve amicably a Contract dispute, either party may require that the dispute be referred for resolution to the formal mechanism as specified hereunder.</p> <p>30.3 Legal Construction The Contract shall be, in all respects be construed and operated as an Indian Contract and in accordance with Indian Laws as in force for the time being and is subject to and referred to the Court of Law situated within Kakinada.</p> <p>30.4 Arbitration All disputes, controversies, or claims between the parties (except in matters where the decision of the Engineer-in-Charge is deemed to be final and binding) which cannot be mutually resolved within a reasonable time shall be referred to Arbitration by a sole arbitrator. The PURCHASER (GODAVARI GAS PRIVATE LIMITED) shall suggest a panel of three independent and distinguished persons to the Seller to select any one among them to act as the sole Arbitrator.</p> <p>In the event of failure of the Seller to select the Sole Arbitrator within 30 days from the receipt of the communication suggesting the panel of arbitrators, the right of selection of Sole Arbitrator by the other party shall stand forfeited and the PURCHASER shall have discretion to proceed with the appointment of the Sole Arbitrator. The decision of the PURCHASER on the appointment of Sole Arbitrator shall be final and binding on the parties.</p> <p>The award of the Sole Arbitrator shall be final and binding on the parties and unless directed/awarded otherwise by the Sole Arbitrator, the cost of arbitration proceedings shall be shared equally by the parties. The arbitration proceeding shall be in English language and the venue shall be at Kakinada, India.</p> <p>Subject to the above, the provisions of (Indian)</p>
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		<p>Arbitration & Conciliation Act, 1996 and the rules framed there under shall be applicable. All matters relating to this contract are subject to the exclusive jurisdiction of the Courts situated in Kakinada (India).</p> <p>Seller may please note that the Arbitration & Conciliation Act 1996 was enacted by the Indian Parliament and is based on United Nations Commission on International Trade Law (UNCITRAL model law), which were prepared after extensive consultation with Arbitral Institutions and centers of International Commercial Arbitration. The United Nations General Assembly vide resolution 31/98 adopted the UNCITRAL Arbitration rules on 15 December 1996.</p> <p>The WORK under the CONTRACT shall, however, continue during the Arbitration proceedings and no payment due or payable to the Seller shall be withheld on account of such proceedings.</p>
31	Governing Language	<p>31.1 The Contract shall be written in English language as specified by the PURCHASER/CONSULTANT in the Instruction to Bidders. All literature, correspondence and other documents pertaining to the Contract which are exchanged by the parties shall be written in English language. Printed literature in other language shall only be considered, if it is accompanied by an English translation. For the purposes of interpretation, English translation shall govern and be binding on all parties.</p>
32	Notices	<p>32.1 Any notice given by one party to the other pursuant to the Contract shall be sent in writing or by telegram or fax, telex/cable confirmed in writing.</p> <p>32.2 A notice shall be effective when delivered or on the notice's effective date, whichever is later.</p>
33	Taxes & Duties	<p>33.1 A foreign Seller shall be entirely responsible for all taxes, stamp duties, license fees, and other such levies imposed outside the PURCHASER's country.</p> <p>33.2 A domestic Seller shall be entirely responsible for all taxes, duties, license fees etc. incurred until the</p>



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		<p>delivery of the contracted goods to the PURCHASER. However, Sales Tax and Excise duty on finished products shall be reimbursed by PURCHASER.</p> <p>33.3 Customs duty payable in India for imported goods ordered by PURCHASER on foreign Seller shall be borne and paid by PURCHASER.</p> <p>33.4 Any income tax payable in respect of supervisory services rendered by foreign Seller under the Contract shall be as per the Indian Income Tax Act and shall be borne by SELLER. It is upto the bidder/seller to ascertain the amount of these taxes and to include them in his bid price.</p>
34	Books & Records	<p>34.1 SELLER shall maintain adequate books and records in connection with Contract and shall make them available for inspection and audit by PURCHASER/CONSULTANT or their authorized agents or representatives during the terms of Contract until expiry of the performance guarantee. Fixed price (lumpsum or unit price) Contract will not be subject to audit as to cost except for cost reimbursable items, such as escalation and termination claims, transportation and comparable requirements.</p>
35	Permits & Certificates	<p>35.1 SELLER shall procure, at his expense, all necessary permits, certificates and licenses required by virtue of all applicable laws, regulations, ordinances and other rules in effect at the place where any of the work is to be performed, and SELLER further agrees to hold PURCHASER and/or CONSULTANT harmless from liability or penalty which might be imposed by reason of any asserted or established violation of such laws, regulations, ordinances or other rules. PURCHASER will provide necessary permits for SELLER's personnel to undertake any work in India in connection with Contract.</p>
36	General	<p>36.1 In the event that terms and conditions stipulated in the General Conditions of Contract should deviate from terms and conditions stipulated in the Contract, the latter shall prevail.</p> <p>36.2 Losses due to non-compliance of Instructions Losses or damages occurring to the PURCHASER owing to the SELLER's failure to adhere to any of the instructions given by the PURCHASER/CONSULTANT in connection with the</p>



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		<p>contract execution shall be recoverable from the SELLER.</p> <p>36.3 Recovery of sums due All costs, damages or expenses which the PURCHASER/CONSULTANT may have paid, for which under the CONTRACT SELLER is liable, may be recovered by the PURCHASER (he is hereby irrevocably authorized to do so) from any money due to or becoming due to the SELLER under this Contract or other Contracts and/or may be recovered by action at law or otherwise. If the same due to the SELLER be not sufficient to recover the recoverable amount, the SELLER shall pay to the PURCHASER, on demand, the balance amount.</p> <p>36.4 Payments, etc. not to affect rights of the PURCHASER No sum paid on account by the PURCHASER nor any extension of the date for completion granted by the PURCHASER/CONSULTANT shall affect or prejudice the rights of the PURCHASER against the SELLER or relieve the SELLER of his obligation for the due fulfillment of the CONTRACT.</p> <p>36.5 Cut-off Dates No claims or correspondence on this Contract shall be entertained by the PURCHASER/Consultant after 90 days after expiry of the performance guarantee (from the date of final extension, if any)</p> <p>36.6 Paragraph heading The paragraph heading in these conditions shall not affect the construction thereof.</p>
37	Import License	37.1 No import license is required for the imports covered under this document.
38	FALL CLAUSE	38.1 The price charged for the materials supplied under the order by the supplier shall in no event exceed the lowest price at which the supplier or his agent/principal/dealer, as the case may be, sells the materials of identical description to any persons/organizations including the Purchaser or any department of the Central Govt. or any Deptt. Of a State Govt. or any Statutory Undertaking of the Central or State Govt. as the case may be, during the currency of the order.



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		<p>38.2 If at any time during the said period, the supplier or his agent/principal/dealer, as the case may be, reduces the sale price, sells or offers to sell such materials to any persons/organizations including the Purchaser or any Deptt. Of Central Govt. or State Govt. as the case may be, at a price lower than the price chargeable under the order, he shall forthwith notify such reduction or sale or offer of sale to the Purchase Authority who has issued this order and the price payable under the order for the materials supplied after the date of coming into force of such reduction or sale or offer of sale shall stand correspondingly reduced.</p> <p>The above stipulation will, however, not apply to:</p> <ol style="list-style-type: none"> Exports by the Contractor/Supplier or Sale of goods as original equipment at prices lower than the prices charged for normal replacement sale of goods such as drugs which have expiry dates. <p>38.3 The supplier shall furnish the following certificate to the concerned Paying Authority alongwith each bill for payment for supplies made against this order:- "I/We certify that there has been no reduction in sale price of the items/goods/materials of description identical to those supplied to the GODAVARI GAS under the order herein and such items/goods/materials have not been offered/sold by me/us to any person/organizations including the Purchaser or any Deptt. Of Central Govt. or any Deptt. Of State Govt. or any Statutory Undertaking of the Central or State Govt. as the case may be upto the date of bill/during the currency of the order whichever is later, at a price lower than the price charged to the GODAVARI GAS under the order."</p> <p>Such a certificate shall be obtained, except for quantity of items/goods/materials categories under sub-clause (a),(b) & (c) of sub-para 38.2 above, of which details shall be furnished by the supplier.</p>
39	Publicity & Advertising	<p>39.1 Seller shall not without the written permission of PURCHASER/Consultant make a reference to PURCHASER/Consultant or any Company affiliated with PURCHASER/Consultant or to the destination or the description of goods or services supplied under the contract in any publication, publicity or</p>

 <p>GAPL GODAVARI GAS PRIVATE LIMITED</p>	<p>GODAVARI GAS PRIVATE LIMITED</p> <p>CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS</p> <p>SUPPLY OF DISTRICT REGULATORY SKID (DRS) (ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)</p> <p>Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003</p>	 <p>MECON मेकॉन ISO 9001 Company</p>
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		advertising media.
40	Repeat Order	40.1 PURCHASER reserves the right, within 6 months of order to place repeat order upto 50% of the total order value without any change in unit price or other terms and conditions.
41	Limitation of Liability	41.1 Notwithstanding anything contrary contained herein, the aggregate total liability of Seller under the Agreement or otherwise shall be limited to 100% of Agreement / Order price. However, neither party shall be liable to the other party for any indirect and consequential damages, loss of profits or loss of production.





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SECTION – 3

SPECIAL CONDITIONS OF CONTRACT – GOODS
(SCC - GOODS)

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Special Conditions of Contract (SCC)

The Special Condition of Contract shall be read in conjunction with the General Conditions of Contract, Schedule of rates, specifications, drawings and any other documents forming part of tender, wherever the context so requires.

Where any portion of the General Condition of Contract is repugnant to or at variance with any provisions of the Special Conditions of Contract, unless a different intention appears, the provisions of the Special Conditions of Contract shall be deemed to over-ride the provisions of the General Conditions of Contract and shall to the extent of such repugnancy, or variations, prevail. Similarly, provisions of Technical Specifications shall over-ride any such provisions mentioned in SCC & GCC.

1. SCOPE OF SUPPLY

- 1.1 Seller's scope shall include (a) manufacturing of above mentioned items as per Material Requisition technical specifications; (b) preparation of Quality Assurance / Quality control programme; (c) obtaining Owner's approval; (d) arranging Inspection and Testing certification; (e) Inspection and obtaining Inspection Release Note; (f) obtaining dispatch clearance; (g) Packing; (h) Loading on truck/trailer for Indian Bidder including transit insurance and Unloading of DISTRICT REGULATORY SKID (DRS) at Godavari Gas's store/site.

2. PACKING, MARKING AND SHIPMENT

- 2.1. The Seller, wherever applicable shall after proper painting, pack and crate all goods for sea/air/road/rail transportation in a manner suitable to tropical humid climatic region in accordance with the internationally accepted practices and in such a manner so as to protect it from damage and deterioration, in transit by sea or air or road or rail and during storage at the storehouse. The Seller shall be held responsible for all damages due to improper packing. The Seller shall ensure sizing or packing of all oversized consignments in such a way that availability of carrier and/or road/rail route is properly taken into consideration.

3. EVALUATION AND COMPARISON OF BIDS WILL BE AS PER SECTION 1.2.

4. COMPLETION SCHEDULE



The Annual rate Contract will be valid for a period of 24 months from the date of Fax of Acceptance (FOA).

- 4.1 The following items are to be delivered on FOT site basis within 6 months from the date of FOA:

<u>Item no.</u>	<u>Supplier</u>
1	1
2	1
3	1
4	2

The balance units to be delivered on FOT site basis will be indicated in the Fax/ Letter of Intimation(s).

The ordered units are to be delivered on FOT site basis within 6 months from the date of Fax/ Letter of Intimation.

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However if the ordered quantity through subsequent Fax/ Letter of Intimation(s) is more than the quantity mentioned in the Table above an additional time period of 15 days beyond 6 months will be given for each additional unit ordered.

The basis of delivery will be FOT site at any town as indicated by GGPL/MECON in East & West Godavari districts.

4.2 FOR Supervision of Erection, testing & commissioning of the units:

Within Two (02) Weeks from the date of intimation by EIC, GGPL regarding readiness of site the supplier has to deploy the required man-power for Supervision of Installation, testing & commissioning of the unit(s).

PRS applicability on Supervision of Installation, testing & commissioning of the unit(s) will be from Two (02) Weeks from the date of intimation by EIC, GGPL.

5. DESPATCH INSTRUCTIONS

- 5.1. Seller shall obtain dispatch clearance from the Purchaser prior to each dispatch.
- 5.2. Copy of Inspection Release Certificate, Dispatch Clearance and Statement showing the name of the vessel/transporter, description and weight of material and shipping marks etc. to be submitted along with the documents.

6. INDEPENDENT SELLER

- 6.1. It is expressly understood and agreed that Seller is an independent party and that neither the Seller/ its personnel are servants, agents or employees of Purchaser nor the Seller has any kind of interest in other sellers.

7. LIEN

- 7.1. Seller shall ensure that the Scope of Supply supplied under the Agreement shall be free from any claims of title/liens from any third party. In the event of such claims by any party, Seller shall at his own cost defend, indemnify and hold harmless Purchaser or its authorised representative from such disputes of title/liens, costs, consequences etc.

8. DELETED

9. REJECTION

- 9.1. Any materials/goods covered under scope of supply, which during the process of inspection by appointed third party, at any stage of manufacture/fabrication and subsequent stages, prior to dispatch is found not conforming to the requirements/specifications of the Purchase Requisition/Order, shall be liable for immediate rejection.
- 9.2. Supplier shall be responsible and liable for immediate replacement of such material with acceptable material at no extra cost or impact on the delivery schedule to OWNER.

10. LIMITATION OF LIABILITY

- 10.1. Notwithstanding anything contrary contained herein, the aggregate total liability of Supplier under the Contract or otherwise shall be limited to 100% of contract value. However, neither party shall be liable to the other party for any indirect and consequential damages, loss of profits or loss of production.



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11. INSURANCE

The name of the Insurance Company and Policy no. shall be intimated in purchase order.

12. GOVERNING LAW

12.1. Laws of India will govern the Agreement and Kakinada courts will have exclusive jurisdiction on all matters related to Agreement.

13. OWNER'S RIGHTS AND REMEDIES

13.1. Without prejudice to Owner's right and remedies under Agreement, if SUPPLIER fails to commence delivery as per agreed schedule and/or in reasonable opinion of the OWNER, CONTRACTOR is not in a position to make up the delay to meet the intended purpose, the OWNER may terminate the AGREEMENT in full or part at SUPPLIER's default and may get supplies from other sources at SUPPLIER's risk and cost.

14. GUARANTEE

14.1. If any trouble or defect, originating with the design, material, workmanship or operating characteristics of any materials, arises at any time prior to expiry of twelve(12) months from the date of commissioning of the equipment or prior to expiry of twenty four (24) months from the date of last shipment (particular delivery LOT), whichever is earlier, first expire, and the SELLER is notified thereof, SELLER shall, at his own expense and as promptly as possible, make such alterations, repairs and replacements as may necessary to permit the materials to function in accordance with the specifications and to fulfill the foregoing guarantees.

15. PRICE REDUCTION SCHEDULE (PRS)

15.1. *In case of delay in delivery of District Regulatory Skid (DRS) & Metering Regulatory Skid (MRS) beyond the contractual delivery period indicated in the FOA or against each Letter of Intimation, PRS will be applicable. PRS will be @½% (half percent) per complete week of delay or part thereof for the unsupplied portion, subject to maximum of 5% of the total order value.*

15.2. *In case of delay in Supervision of Installation, Testing and Commissioning beyond contractually agreed Supervision of Installation, Testing and Commissioning schedule, price reduction schedule will be applicable @0.5% of Supervision of Installation, Testing and Commissioning value per week of delay or part thereof, subject to ceiling of 5% (FIVE PERCENT) of the total order value. For details, please refer GCC-Goods*

15.3. *However the total price reduction against delay in delivery of materials as well as delay in supervision of installation, testing and commissioning will be limited to ceiling of 5% (five percent) of the total order value.*

15.4. *Price reduction schedule to be applicable against order value of individual letter of intimation and not on the total ARC value.*

15.5. *Completion Period will be counted from date of issuance of written intimation (Letter of intimation).*

15.6. *For PRS purpose the date of delivery at FOT site, East & West Godavari Districts will be considered.*

15.7. *The value referred in PRS clause is excluding taxes, duties & freight.*



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16. TERMS AND MODE OF PAYMENT

16.1. The terms and mode of payment shall be as per Section III C.

17. REPEAT ORDER

CLAUSE NO. 40.1 OF GCC (GOODS) SHALL BE MODIFIED TO THE FOLLOWING EXTENT:-
"PURCHASER reserves the right, within 6 months of order to place repeat order upto 50% of the original quantity without any change in unit price or other terms and conditions."

18. DELETED

19. FALL CLAUSE

Fall Clause under Clause 38 of Godavari Gas's GCC Goods stand deleted.

20. QUALITY ASSURANCE/QUALITY CONTROL

20.1. The Bidder shall prepare a detailed quality assurance plan for the execution of Contract for the various supplies for approval of GODAVARI GAS/ MECON.

20.2. The Bidder shall establish document and maintain an effective quality assurance system outlined in recognized codes.

20.3. The Purchaser, while agreeing to a quality assurance plan shall mark the stages for witness of Tests, review at any or all stages of work at shop/site as deemed necessary for quality assurance.

21. PERFORMANCE EVALUATION



21.1. The performance of Contractor to whom the award is placed shall be evaluated right from submission of bid till the final completion. Vendor Performance Evaluation Procedure will be as per Attachment II of this bidding document.

22. POST ORDER CORRESPONDENCE

All post-order correspondence shall be addressed to:

- a) DGM (M&C) & Project Co-ordinator
MECON Limited
89, South End Road, Basavanagudi,
Bengaluru : 560 004, Karnataka
- b) Ch. Manager (Construction)
Godavari Gas Private Limited
D. No.70-14/5/1, Sidharth Nagar,
Near RTO Junction, NFCL Road,
Kakinada – 533001
- c) DGM (C&P)
Godavari Gas Private Limited
D. No.70-14/5/1, Sidharth Nagar,
Near RTO Junction, NFCL Road,
Kakinada – 533001

22. DELETED

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23. DELETED

24. Clause no. 30.4 of GCC shall be appended with the following :

SETTLEMENT OF COMMERCIAL DISPUTES BETWEEN PUBLIC SECTOR ENTERPRISE(S) INTER-SE AND PUBLIC SECTOR ENTERPRISE(S) AND GOVERNMENT DEPARTMENT(S) THROUGH PERMANENT MACHINERY OF ARBITRATION (PMA) IN THE DEPARTMENT OF PUBLIC ENTERPRISES

In the event of any dispute or difference relating to the interpretation and application of the provisions of the contracts, such dispute or difference shall be referred by either party for Arbitration to the sole Arbitrator in the Department of Public Enterprises to be nominated by the Secretary to the Government of India in-charge of the Department of Public Enterprises. The Arbitration and Conciliation Act, 1996 shall not be applicable to arbitrator under this clause. The award of the Arbitrator shall be binding upon the parties to the dispute, provided, however, any party aggrieved by such award may make a further reference for setting aside or revision of the award to the Law Secretary, Department of Legal Affairs, Ministry of Law & Justice, Government of India. Upon such reference the dispute shall be decided by the Law Secretary or the Special Secretary / Additional Secretary. When so authorized by the Law Secretary, whose decision shall bind the Parties finally and conclusively. The parties to the dispute will share equally the cost of arbitration as intimated by the Arbitrator.

25. Other clauses

1) **Failure and termination Clause**

Time and date of delivery shall be the essence of the contract. If the vendor/contractor fails to deliver the entire quantity of materials ordered/ complete the work or a part thereof within the contractual delivery/ completion period agreed to for such part or total quantity as per the delivery / time schedule or at any time repudiates the contract before the expiry of such period, Godavari Gas may without prejudice to any other right or remedy available to it recover damages for breach of the contract in any manner stipulated hereunder:-



(a) Recover from the vendor/ contractor an agreed amount towards Price Reduction Schedule and not by way of penalty a sum equivalent to 1/2% (half per cent) of the contract price of the whole unit per week for such delay or part thereof (this is a genuine pre-estimate of damages duly agreed by the parties) which the vendor/ contractor has failed to deliver within the period fixed for delivery in the schedule, where delivery thereof is accepted after expiry of the aforesaid period.

It may be noted that such recovery of PRS may be up to 5% of the contract price / of the total quantity of items of materials / equipment which the contractor has failed to deliver within the period fixed for delivery; or

(b) Purchase or authorise the purchase elsewhere on the account and at the risk of the contractor, of the materials not so delivered or others of a similar description, by serving prior notice to the contractor / supplier without canceling the contract in respect of the installment not yet due for delivery;

or

(c) Cancel the contract or a portion thereof by serving prior notice to the contractor and if so desired, purchase or authorise the purchase of the materials not so delivered or others of a similar description (where such materials exactly complying with particulars are not, in the opinion of the purchaser, which shall be final, readily procurable) at the risk and cost of the contractor. If the

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contractor had defaulted in the performance of the original contract, the purchaser shall have the right to ignore his tender for risk purchases even through the lowest. Where the contract is terminated at the risk and cost of the firm under the provisions of this clause, if shall be solely upto the purchaser to exercise his discretion to collect or not, the security deposit from the firm, on whom the contract is placed, at the risk and expense of the defaulting firm.

- (d) Where action is taken under sub-clause (b) or sub-clause(c) above, the contractor shall be liable for any loss which the purchaser may sustain on that account, provided the purchase or if there is an agreement to purchase, such agreement is made, in case of failure to deliver the materials within six months from the date of such failure and in case repudiation of the contract within six months from the date of cancellation of contract. The contractor shall not be entitled to any gain on such purchase and the manner and method of such purchase shall be at the entire discretion of the purchaser. It shall be necessary for the purchaser to give a notice of such purchase on the contractor.
- (e) It may further be noted that clause (a) above provides for recovery of PRS on the cost of contact price of delayed supplies (whole unit) at the rate of 1/2% (half per cent) of the contract price of the whole unit per week for such delay or part thereof upto a ceiling of 5% of the contract price of delayed supplies thus accrued will be recovered by the paying authorities of the purchaser specified in the supply order, from the bill for payment of the cost of the material submitted by the vendor/ contractor in accordance with terms of supply order, or otherwise.
- (f) Notwithstanding any thing stated above equipment and materials will be deemed to have been delivered only when all its components, parts are also delivered. If certain components are not delivered in time the equipment and material will be considered as delayed until such time all the missing parts are also delivered.

26. General Conditions

- (i) When the materials are dispatched to the consignee intimation must also be given to this effect. Reference to the supply order should invariably be given in all the relevant correspondence.
- (ii) The tender is liable to be rejected in case the tender does not comply with tender stipulations or the goods, works and services offered do not conform to the required specifications indicated there in.
- (iii) Any other terms and conditions offered by the firm and not included in the order/contract, are not acceptable to Godavari Gas.

27. DELETED

**28. DESTINATION /STORE
As per Material Requisition (MR) in Vol.-II**

29. DELETED

30. DELETED



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SECTION – III C

PAYMENT TERMS AND MODE OF PAYMENT



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1. TERMS OF PAYMENT

The following shall be read in conjunction with Clause no. 21 of GCC (Goods)

1.1 SUPPLY:

1.1.1 90 % (Ninety percent) payment of the supplied portion along with freight & transit insurance including taxes & duties will be paid on receipt & acceptance of goods at FOT site after adjustment of PRS, if any along with submission of following documents: -

- i) Invoice in triplicate in compliance with GST law in force
- ii) Inspection Release note by Owner or his appointed or approved agency.
- iii) Original GR / LR
- iv) Packing List

For FINAL BILL, following documents are to be provided:

- v) No Claim Certificate
- vi) Statement of Completion
- vii) Extended BG period, in case supply is delayed beyond contractual time period

Note: Documents related to point no. v) and vi) shall be submitted in company letter head duly signed and stamped.

1.1.2 Balance 10% (ten percent) of the supplied portion will be paid within 30 days after successful Supervision of Installation, Testing and commissioning of the units as specified in the Technical Specifications/ Material Requisition after adjustment of PRS, if any duly certified by Engineer-in-Charge (EIC).

However, if the Supervision of Installation, Testing and commissioning of the system is delayed due to non availability of site clearance by Owner, this balance payment of 10% will be released by GODAVARI GAS after 6 months from the date of material acceptance at site, against submission of bank guarantee for equivalent amount. The BG will be valid for 12 months initially and will be extended till completion of the installation, testing and commissioning of the DRS units, duly certified by Engineer-in-Charge (EIC). Such rescheduling, if any, will be intimated by EIC.

1.2 Supervision of Installation, Testing and Commissioning etc.

100 % Payment on Supervision of Installation, Testing and commissioning of the units including all taxes & duties will be paid on completion of all works and on final acceptance by owner after adjustment of PRS, if any.

2. MODE OF PAYMENT



2.1. Payment will be released through E-payment as detailed in clause 20 of Section 1.

3. **For Price Reduction Schedule (PRS) refer clause no. 15 of SCC.**

4 DEDUCTION AT SOURCE

4.1 Purchaser will release the payment to the Seller after effecting deductions as per applicable law in force.

4.2 Purchaser will release payments to the Contractor after offsetting all dues to the Purchaser payable by the Contractor under the Contract.

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PAYING AUTHORITY:

Chief Financial Officer
M/s Godavari Gas Private Limited
Rajamahendravaram – 533103
Andhra Pradesh



GODAVARI GAS LIMITED

{A Joint venture of APGDC & HPCL}

CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GADAVARI DISTRICTS BID DOCUMENT FOR SUPPLY OF

**SUPPLY OF DISTRICT REGULATORY SKID (DRS)
(ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)**

OPEN DOMESTIC COMPETITIVE BIDDING

Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003

PART - III



PREPARED AND ISSUED BY

MECON LIMITED

(A Govt. of India Undertaking)

Bengaluru, India

JULY, 2018



**GODAVARI GAS PRIVATE LIMITED
CITY GAS DISTRIBUTION PROJECT AT EAST & WEST
GODAVARI DISTRICTS
SUPPLY OF DISTRICT REGULATORY SKID (DRS)
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SECTION-1

Technical specification for District regulatory Skids (DRS)

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1.0 GENERAL

This specification together with all Annexures enclosed cover the requirement for the design, engineering, manufacturing, testing, inspection, supply of **RPD Meter based above ground skid mounted twin stream District Regulatory Skid (DRS) mounted inside Cabinet for District Regulating Station** along with all accessories for various site/ location and capacities as per the typical P & ID, Technical specifications, datasheets provided in the bid document.

The scope of work/ supply includes Design, Engineering, Manufacturing, Testing, Inspection, Supply and unloading upto FOT site, Training and Supervision for Installation & commissioning of DRS consisting of minimum twin streams of Filtration, Pressure Reduction system, flow measurement (through RPD Meter) at common header for DRS including field mounted Battery operated EVC along with all the accessories and valves, piping, instruments & fittings as per P & ID's.

The Required capacity, Pressure Rating and Quantity of the Skids shall be as per P & ID's and technical datasheets attached with this document.

- 1.1 The DRS shall be manufactured as per all the prevailing requirements of PNGRB Technical Standard T4S and as per this technical specification.
- 1.2 The description and requirements contained in this specification are concise by necessity and cannot include all the details. However, it is the responsibility of the bidder to execute the job in accordance with the specifications and internationally recognized good engineering practices.
- 1.3 Any activity specifically not listed in this document, does not absolve the bidder of their responsibility to include such activities in their scope of work and supply, which otherwise is necessary, to complete instrumentation work for the project. All such activities shall be carried out by the bidder without any cost/ time implication.
- 1.4 In the event of any conflict between these specifications, related standards and codes, any other attachment to this package, the bidder shall follow the following documents in the order of their priority:
 - a) Job Specifications for District Regulatory Skid
 - b) Data Sheets and Typical P&ID
 - c) Standard specifications and Technical Specification attached in the tender document.

In case of any conflict in various documents, same shall be referred to GGPL/MECON for clarification. Bidder shall not proceed without getting written approval in such a case.

- 1.5 The design and fabrication of the skid shall be such that each of the equipment in the DRS is easily operable and maintainable, and the same shall not obstruct the operation and maintenance of any other equipment in the skid.

2.0 SCOPE OF WORK & RESPONSIBILITY OF BIDDER

2.1 Scope of Work

- 2.1.1 General : Bidder shall be responsible for execution of the package on turnkey basis with scope of work as listed below and the P&ID attached but not limited to the following :-

- a) Design and Engineering
- b) Procurement/Supply up to FOT site, Inspection, Factory testing and Acceptance
- c) Supervision for Installation, field calibration/testing and commissioning.

2.1.2 Design and Engineering:

- (a) Owner shall provide the bidder with this bid package consisting of typical Piping & Instrumentation Diagrams and technical specifications of individual skid items/components. The bidder shall be



GODAVARI GAS PRIVATE LIMITED
CITY GAS DISTRIBUTION PROJECT AT EAST & WEST
GODAVARI DISTRICTS
SUPPLY OF DISTRICT REGULATORY SKID (DRS)
(ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)
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responsible to carry out the design and detailed engineering based on the data provided in the bid package and in line with other technical requirements specified elsewhere in this document. Scope shall also include sizing and verification for all items including where data is dependent upon detailed engineering, detailing of basic engineering designs, preparation of data sheets, coordination drawings for instruments and system oriented items, engineering drawings etc.

(b) Residual Engineering

The bidder shall also be responsible for carrying out any residual basic engineering necessary for proceeding with detailed engineering like equipment/ instrument sizing, utility consumption, specifying derived data in data sheets, type and material selection of instruments/ equipment wherever required.

(c) Engineering Drawings & Documents

- i) Vendor Data Requirements indicate the list of drawings and documents required to be supplied by the bidder, as a minimum. Bidder to note that list specifies only the major deliverables. Documents and drawings not listed but necessary for proper engineering, construction, operation and maintenance shall also be prepared by the bidder.
 - ii) Bidder shall be responsible for preparation of all engineering drawings and documents including those necessary for construction like instrument index, tray layouts, location plans, cable schedules, installation standards, bill of material etc.
 - iii) Bidder shall also be responsible for providing all drawings and documents for package/ sub package units.
 - iv) It is expected that bidder utilizes uniform data sheet formats enclosed along with this document, for preparing specifications for various instruments, including those, which are being prepared by package/ sub package vendors. Items for which no format has been attached with the document, bidder may use standard ISA formats. Use of manufacturer standard formats shall be avoided.
 - v) The bidder shall supply all the documents in both hard copy and soft copy. This includes all the documentation including those for package units.
- d) The design and engineering work shall also include review of post-order vendor drawings and documents for all instruments and system oriented items. Following methodology must be followed for drawings and documents being forwarded to MECON.
- i) The Bidder shall thoroughly review and approve vendor drawings for all equipment/instruments including sub-package items, before forwarding to MECON. Only the approved drawings duly stamped and signed by a competent representative/ engineer of Bidder shall be forwarded.
 - ii) The Bidder shall be responsible for all System Engineering documents for the District Regulatory Skid. This shall include all related documents such as Functional design specifications, sizing calculations, pressure drop calculation etc. and Engineering documents such as functional loop schematics, instrument details and cable schedule, Power supply distribution schemes etc. These documents shall be reviewed and approved by Bidder based on philosophy specified/ agreed for the engineering before forwarding to MECON.
 - iii) All multidisciplinary fabrication and construction drawings shall be reviewed and signed by bidder's respective departmental representatives before forwarding to MECON for review/ approval/record.
- e) Bidder shall be fully responsible for coordinating with all agencies concerned to ensure proper, uniform and smooth engineering. This shall include coordination with:
- i) All individual item suppliers for uniformity in engineering and documentation supplied by them including P&ID's, equipment, instrument, electrical, mechanical, piping, valves specifications, installation standards etc. and obtaining all requisite drawing and documents for review, record and final documentation.



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- ii) All equipment, instrument, mechanical, piping, valves and other item suppliers including suppliers/ manufacturers of various system oriented items.
- iii) Bidder's own inter-departmental coordination with departments like mechanical, piping, electrical, QC, pressure vessel group etc. This shall include furnishing all necessary engineering data in the form of drawings & documents and review of drawings & data supplied by other departments.
- f) Bidder shall be responsible for preparation of all As-Built drawing / documents including
 - i) All P&IDs and GADs
 - ii) All Datasheets, specifications of instruments
 - iii) All Purchase documents.
 - iv) All System documents including hardware and software documentation.

2.1.3 Procurement/Supply, Factory testing and Acceptance

- a) Engineering for procurement shall include preparation of various material requisitions which shall include process data sheets, typical data sheets for instruments, instrument standard specifications, special requirements etc., evaluation of offers received from various manufacturers/vendors, preparation of Technical Bid Analysis, preparation of purchase requisition and review/approval of vendor drawings, incorporation of MECON comments.
- b) All Instrument items and Gas metering systems shall be procured from vendor list attached elsewhere in this package. Bidder must desist from procuring any items from vendors not approved by MECON.
- c) Bidder shall prepare purchase requisitions for all instruments/ systems which shall consist of a consolidated purchase document including all purchase specifications including data sheets, special instructions/ requirements (if any), standard specifications/purchase specifications, testing requirements, quality requirements etc. All purchase requisitions shall be furnished to MECON for information/review/approval as applicable.
- d) Testing & calibration of all instruments, Factory Acceptance Test (FAT) and Site acceptance Test (SAT) shall be carried out by the bidder. Range/ calibration span, set points, EVC Configuration, reports etc shall be modified as per Client requirement by the bidder during FAT and SAT. Client / MECON shall witness testing of any or all items at various stages during manufacture and/or at final stage before shipment at their discretion. Testing shall be carried out as per approved procedures. No instrument shall leave manufacturer's works without factory acceptance test. All necessary changes shall be incorporated/ implemented as suggested by CLIENT / MECON during FAT/ SAT etc. As built drawing/ documentation to be submitted by the bidder shall contain all such changes.

2.1.4 Installation, Field Calibration/ Testing and Commissioning

- a) Bidder shall carry out installation of all instruments in the skid as described in this document. Installation shall include but not limited to installation of all supplied items, installation skid assemblies explained in this package, fabrication, laying and painting of cable trays, laying of all cables in the skid, earthing/grounding, Field Instruments earthing, tagging, ferruling, cable glanding and pair/core identification of all field cables.
- b) Installation shall be carried out as per MECON standards or as recommended in the tender. For special instruments, the installation may be carried out as per vendor/ manufacturer's recommendations however all such installation standards shall be subject to MECON review.
- c) Bidder's scope of supply/ work shall include earthing cable/strips (as applicable) etc. (along with cable tray with supports for installation) in the skid/ JB, as per the requirements of various instruments.



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- d) Supply, laying, connection of insulated 16 sqmm copper wire from field instruments to earth-pit is in bidder's scope.
- e) Bidder shall quote for Lumpsum amount for each skid as per price schedule for supervision of installation, testing and commissioning of the complete skids. Bidder shall depute qualified and competent person for supervision of installation, testing & commissioning.
- f) Testing & Calibration

Bidder scope of work includes testing of all supplied items and systems including impulse lines, pneumatic signal tubes and instrument cables and special instruments/items if any. Bidder shall also carryout testing and calibration of all instruments as per the requirements specified elsewhere in tender document. Testing and calibration of Gas metering system shall be as described elsewhere in the document.

- h) Commissioning

It is the responsibility of Bidder to co-ordinate and make available the services of vendors/ sub-vendors for District Regulatory system package, control system, etc. and other special instruments/ equipments like Gas flowmeters, Pressure regulators, testing, FAT, Site acceptance, startup/commissioning of the station. The bidder shall provide assistance during commissioning without any condition/ pre-requisite. It is the responsibility of the vendor to get the certification from site Engineer. Installation of all the loose supplied items, its interconnection etc shall be in the scope of supplier. In case of any dispute / conflict arising due to difference in opinion/ interpretation, the interpretation of Client /MECON shall be considered final.

2.2 SCOPE OF SUPPLY

- 2.1 Supply of all items as indicated on the typical Piping & Instrumentation diagrams (P&ID) and other technical documents attached with this document.

The scope of supply shall be as per the P& ID attached and shall include but not limited to the following as a minimum:

- a) Skid mounted District Regulatory system package inclusive of Filtration, Pressure let down skid & Gas metering (through RPD Meter) complete in all respect as per P&IDs, Process data sheets & as described in Job specification for Gas metering system package.
- b) The system shall also be designed for alternate power source for operation of EVC for which the tender shall consider power converters (230V AC to 12V / 14V DC), intrinsically safe barrier at output circuit and installed in ex-proof enclosure with cabling to EVC. The enclosure shall be weatherproof, installed outside the skid-cabinet.
- c) Vendor shall provide suitable weatherproof cabinet for the DRS as specified respective in the P& ID.
- d) All instruments such as DP Gauges, Pressure Gauges, Temperature Gauge, Pressure Control valves, Slam shut valves, Limit switches, Pressure relief valves.
- e) All installation and erection materials such as impulse piping, pipe fittings and valves, tubing, tube fittings, cable tray and supports, foundation bolts of the skid, gaskets, companion flanges for inlet and outlet of the skid, all type of consumables and accessories for mounting of instruments, instrument supports, tray supports, canopies/sunshields for all field mounted instruments.
- f) Painting of pipes, equipments, instruments, enclosures, as required; in line with the painting specifications attached elsewhere in this document.
- g) Supply, laying & connection of Earthing strip / earthing cables for earthing of all instrumentation items to earth pit is in bidder's scope. Distance to earthpit shall be considered as 25mtrs approx. Making of earth pit and laying of earthing cable/ strips is not in bidder's scope.



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- h) Suitable environmental enclosure for custody transfer field instruments for environmental effect protection with a provision of locking. Any other erection material necessary for installation and commissioning of special instruments, if any.
- i) Proper accessibility shall be ensured for the operation and maintenance of all the equipments/ instruments/JBs installed in the skid. Proper spacing to be maintained between the equipments for operation & maintenance. The vent & drains shall be properly supported in the skid. All the vents shall be at a height of minimum 3 meters above the working platforms. All flanges shall be connected through flexible jumpers of Minimum 3 mm thickness and 20 mm wide copper strips.
- j) Any special tools/ tackles required shall be in scope of vendor.
- k) All the software used in the system and as specified elsewhere, shall be licensed in the name of Client.
- l) Compulsory spares and commissioning spares (for each skid separately) as listed elsewhere in this document.
- m) Drawings and documents as listed elsewhere in this document.
- n) All pipes, tubing, fittings, valves, gaskets, bolts, nuts, spades, etc., within the skid battery limit.
- o) Earth bonding system and earthing boss.
- p) Lifting lugs and spreader beam / frame, foundation Anchor bolts for the skid.
- q) Stainless steel nameplate for each skid, each tagged equipment and component/Approved information's
- r) All Tie-ins (flanged connections) with nuts and bolts.
- s) Inlet and Outlet matching flanges and Studs & nuts shall also be supplied along-with the skid.
- t) The sun/ rain protection shed for electronic instruments as applicable shall also be supplied by the bidder.
- u) Operation and maintenance manual, for instruments/ equipment, as built drawing/ documentation.

2.3 Further Scope of Work and supply:

- a) Vendor scope includes Design, Engineering, Manufacturing, Inspection, Testing, Transportation, unloading, Supervision for Installation & commissioning of complete work of DRS consisting of two Independent streams of Filtration, PRS, safety valves, Pressure Instruments, Temperature Instruments, Diff Pressure instruments, flow measurement at common delivery header for DRS, complete integrated field instruments, piping, fittings and valves in a skid.
- b) Supply of RPD Meters with EVC for DRS as per Price schedule and P&ID attached.
- c) Skid shall consist of DRS package (consisting of Filtration, PRS and RPD flow meter for flow measurement) with two independent and redundant streams (1 operating + 1 stand by stream) should be designed for 100% of maximum flow capacity indicated above (each stream should be designed for 100% of maximum flow capacity). Each of the Gas filtration, PRS and Metering Section shall be of required design flow capacity meeting the specified operating design conditions as per process data of respective skids. The Vendor's scope of work shall include supply of the complete Gas Filtration, PRS & Metering System in accordance with this specification and any other codes, standards and regulations stated herein. In each skid, one complete stream will be kept on a hot stand-by mode (including filtration, Pressure reduction, Metering etc)



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- d) The scope of supply as a minimum and as shown on the P& ID shall include, but not limited to the following.
- i. One gas filtration system with two dry gas horizontal type filters (1 operating + 1 standby stream), each of 100 % of maximum flow capacity. The dry gas filtration system shall be used to remove dust particles less than 5 micron and to remove condensate if any. Fire case Pressure safety Valves (PSV) shall also be provided on each filter as indicated in the P&ID. Filter cover shall have arrangement of Davit arm for ease of maintenance.
 - ii. One gas metering system with one metering stream of **RPD Meter** at common delivery header of both the streams of DRS with conical flow conditioner. EVC shall be provided with all interface accessories. Metering stream shall be designed for 100 % of capacity.
- e) The Pressure Reduction system with 2 streams of Slam shut and Pressure Regulators (1 operating + 1 standby stream) shall be designed. Each stream to contain two regulators (Active – monitor), it means, if one regulator fails the other one will maintain output parameters. Under normal conditions, the downstream regulator is considered as active regulator and upstream regulator performs the monitoring function. Active regulator shall be “fail to open” and monitor regulator shall be “fail to close” type. Vendor shall confirm that the noise level for the PCV (ACTIVE & MONITER) and Slam Shut Valves is within 85 dBA. In case, noise level is ≥ 85 dBA, Vendor shall provide noise treatment to limit the noise level and include silencers or expanders as required in the scope of supply. Set Point of the PCV Pilots and Slam Shut Valves shall be adjustable. Vendor shall furnish the adjustable range of the offered pilots and slam shut valves. The construction of the Pressure Regulator shall be such that there will be no continuous gas bleeding.
- f) The Filtration, pressure reduction system shall be designed to minimize the generation of noise in the frequency range of metering. Bidders shall provide frequency analysis for all the Noise generating devices and the Manufacturer of Meters shall confirm that the noise generated by these equipments shall not affect the performance.
- g) Skid mounted field instruments like Pressure & Diff. Pressure gauges, Temperature gauges with thermowell, limit switches for slam shut valves shall be supplied along-with the skid.
- h) Tenderer shall provide tapping point with thermowell for RTD and tapping point with isolation valve for pressure transmitter as indicated in the P&ID. However RTD & pressure transmitters are not in scope of the tenderer.
- i) Inbuilt Battery operated Electronic Volume Corrector (EVC) shall be supplied. The system shall be designed in such a way that it should operate through battery. Bidder shall submit Product Technical Literature along with offer. Please refer enclosed EVC datasheet for detailed specification.
- j) Supply of all pipes, fittings, valves, gaskets, bolts, nuts, spades, etc, within the skid battery limit are in bidder’s scope. Supply of all tubing and fittings, pipes, pipe fittings etc within the skid are in bidder’s scope.
- k) All cables (including earthing cable), cable trays, earthing strips for grounding/ earthing of skid and wiring within the skid. All Interconnecting cables between skid Instrument / Junction boxes. Bidder to supply required mounting accessories for Cabling, tray work etc.
- l) Details of skid assembly, supporting positions, Anchor bolt layout and equipment weights to be provided prior to equipment supply.
- m) Lifting lugs and spreader beam / frame, foundation Anchor bolts, copper jumpers for flanges for the skid, Stainless steel nameplate for each tagged equipment and component; All Tie-ins with flanged connections shall be in bidder’s scope. Earth bonding system and earthing boss for skid are in bidder’s scope.



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- n) Inlet and Outlet matching flanges and Studs & nuts (for skid interconnection and Inlet & Outlet piping connection), suitable Gaskets shall also be supplied along-with the skid.
- o) The DRS Skid will be designed considering the inlet connection and outlet connection will be in opposite side to each other not in the same side.
- p) Cabinet doors of the DRS shall be foldable/sliding type due to space constraints.
- q) **Software:**
- a) Vendor to provide licensed Software in the name of CLIENT for the supplied EVC.
- b) Vendor to provide in the EVC - one no. port for Connectivity to PC/Laptop for EVC configuration along with required hardware/ software (licensed in favor of CLIENT).
- c) Vendor to provide in the EVC - one no. RS 485 port with Intrinsically safe Barrier, cables between barrier & EVC for Remote communication along with the details and configuration parameters required for Remote communication like SCADA.
- d) The Vendor's scope of work shall also include:
- a) Inspection and testing of all components, sub-assemblies, and complete assemblies of items manufactured at Vendor's works, and other sub-vendor's works in accordance with approved QA/QC procedure.
- b) Shop assembly and hydro-test.
- c) Factory Acceptance Test (FAT) for the complete package at Vendor's works as per approved FAT procedure.
- d) Preparation for shipment, packing and delivery of all packages, equipment and material to site including unloading.
- e) Supervision of Installation, start-up and commissioning of the complete package at site. Site acceptance test (SAT) for the complete skid as per approved SAT procedure
- g) Preparation and submission of all documents as per requisition with the bid and after award of contract.
- h) Preparation and submission Final Documentation / Completion files as per this specification. Two copy (hard copy and soft copy) shall be submitted along with the complete system at stores / site for each skid.
- 2.3.1 Any work not specifically mentioned but otherwise required, as per statutory rules/ codes and standards/ specifications and/or for the completion and operation of equipment to the entire satisfaction of CLIENT/MECON have to be done by the VENDOR without any commercial implications.
- 2.3.2 The scope of work also includes the mechanical and structural detailed design of the skid, procurement of materials, preparation of fabrication drawings, detailing of internals, fabrication, inspection and testing of the piping and structural items at fabrication shop, painting, internal coating if any, preservation, transportation and undertaking Guarantee for the equipment.
- 2.3.3 The scope of supply of skid also includes mandatory spares mentioned elsewhere.
- 2.3.4 The VENDOR shall assume single point responsibility for all aspects of the work. This shall include timely completion, liaison with CONTRACTOR, liaison with VENDOR of specified items, co-ordination of the work, quality and guarantee for the equipment.
- 2.3.5 Where parts of the package are subcontracted and purchased by the VENDOR, these become part of the Vendor's package and it is the Vendor's responsibility to ensure that the complete package complies with the



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specifications, codes and standards and statutory regulations.

- 2.3.6 Scope to include all instruments shown in the P&ID/ schematic, as within the Vendor's scope.
- 2.3.7 The Vendor shall be responsible for obtaining necessary approvals, authorization and certification from local Government / Local Statutory bodies, Authorized Inspector and Third Party Inspection Agency as applicable.
- 2.3.8 The equipment shall be suitable for the site conditions specified. All components/ consumables used shall be new and of current manufacture.
- 2.3.9 In the event of any conflict between this specifications, data sheets, related standards codes etc., vendor shall refer the matter to the PURCHASER for clarifications and only after obtaining the clarification shall proceed with the manufacture of the items in question.
- 2.3.10 Vendor shall take single point responsibility for the engineering, design, certification, procurement, inspection, testing, supply & performance of the DRS along with all instruments, equipment and valves of the skids based on the data sheets and the specifications furnished and taking into consideration successful operation, safety and the established International standards for the complete skids. As a part of skid design & engineering, the following shall be undertaken/ decided/furnished by vendor:
- a) RPD flow meters shall be air calibrated near atmospheric pressure at minimum 7 different points (7 different flow rates: Q_{min} , $0.05Q_{max}$, $0.2Q_{max}$, $0.25Q_{max}$, $0.40Q_{max}$, $0.70Q_{max}$ and Q_{max}).
 - b) Based on the approved design Sizing of flow meters, self actuated Pressure control valves, Safety Shut Off (Slam Shut) valves, Pressure relief valves.
 - c) Set points for Pressure Regulators, Monitor and slam shut valves.
 - d) Instrument ranges to meet the Process operating and design conditions.
 - e) Noise calculations for Regulator. Vendor to provide detailed Noise calculation and standard used and any assumption considered.
 - f) All the instruments/ equipments to be procured as per the approved vendor list of CLIENT/MECON.
- 2.3.11 Typical instrument data sheets for Pilot operated control valves (PCVs), Slam shut valves, pressure relief valves, pressure gauges, and accessories indicate materials for body, internals etc. However, this does not absolve the Vendor of the responsibility for proper selection with respect to the fluid and its operating and design conditions. Proper sizing and selection of the pipe, isolation valves, self actuated pressure control valves for monitor and active regulator, slam shut valves, pressure relief valves and accessories are vendor's responsibility.
- 2.3.12 All the major items like valves (Globe/Plug & Ball), Pressure control valves, Slam shut valves, Pressure relief valves, Temperature instruments etc. shall be supplied from the vendor list attached:

3.0 DESIGN PHILOSOPHY

3.1 GENERAL

- 3.1.1 This Document together with the attachments covers the minimum requirements for the design and engineering of skid complete with all accessories. Bidder shall be responsible for Design, engineering, sizing, selection, manufacture and/ or procurement of materials, components and equipment necessary for complete package.
- 3.1.2 This document provides in detail, the minimum qualitative requirements of most of the instruments. For



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instruments, where no such requirements are indicated in this document, the bidder shall submit the same for CLIENT's/ MECON approval. The total uncertainty calculation of the metering system to be submitted as per the design data prior to the fabrication of skid. Bidder to obtain approval of P&ID and GAD of skid, from OEM of Meters.

3.2 CODES AND STANDARDS

3.2.1 The District Regulatory Skid and all the equipments/instruments/valves of the skid shall be designed with respect to the guidelines mentioned PNGRB and the overall system shall comply to the same.

3.2.2 Design and terminology shall comply, as a minimum, with the latest edition prior to the date of bid enquiry of following codes, standard practices and publications:

AGA	American Gas Association, Gas Measurement Committee Report No.7 - Measurement of Gas by Turbine Meter (for Volume flow calculation in EVC) Report No. 8- Compressibility factors of Natural Gas and other related hydrocarbon gases
ANSI / ASME	American National Standards Institute/ American Society of Mechanical Engineers. B 1.20.1 Pipe Threads. B 16.47 Steel Pipe Flanges and Flanged Fittings. B 16.20 Ring Joint Gaskets and Grooves for Steel Pipe Flanges. ASME Section VIII Boiler and Pressure Vessel Code
ANSI/FCI	American National Standards Institute/Fluid Controls Institute 70.2 Control valve seat leakage classification.
API	American Petroleum Institute
RP 520	Sizing, selection and installation of pressure relieving system in refineries. Part-I - Sizing and selection Part-II - Installation
RP 521	Guide for pressure relieving and depressurizing systems
P 526	flanged steel safety relief valves.
RP 527	Seat tightness of pressure relief valves.
MPMS	Manual of Petroleum Measurement Standards.
RP 551	Process Measurement Instrumentation. Part 1 - Process Control and Instrumentation
RP 552	Transmission Systems
S 1101	Measurement of Petroleum liquid hydrocarbon by Positive Displacement meter.
S 2000	Venting Atmospheric and low pressure storage tank.
S 2534	Measurement of liquid hydrocarbons by Turbine Meter / RPD Meter systems.
S 670	Vibration, Axial-Position and Bearing-Temperature Monitoring Systems.
ASTM	American Society for Tests and Materials.
BS	British Standards
BS-1042	Measurement of fluid flow in closed conduits.
BS-4368	Compression coupling for tubes.
BS-4800	Colours for ready mixed paint.
BS-5308	Part-2 Specification for PVC insulated cables.
BS-6364	Specification for valves for cryogenic service.



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BS-7244	Flame Arrestors for general use
DIN-43760	Temperature vs Resistance curves for RTDs.
DIN-19234	Electrical Distance Sensors; DC interface for Distance Sensor and Signal Converter.
IBR	Indian Boiler Regulations.
IEC	International Electro-technical Commission.
IEC 60079	Electrical Apparatus for Explosive Gas atmosphere
IEC 60085	Thermal Evaluation and Classification of Electrical Insulation
IEC 60332	Test on bunched wires or cables. Part 3 Cat 1
IEC 60331	Fire resistance characteristics of electrical cables
IEC 60529	Classification of degree of protection provided by enclosures.
	IEC 60534-2 Industrial Process Control Valves-Flow capacity
	IEC 60751 Industrial platinum resistance thermometer sensors
IS	Indian Standard
	IS-5 Colours for ready mixed paints.
	IS-319 Specification for free cutting Brass bars, rods and sections
	IS-1239 Mild steel tubes, tubulars and other wrought steel fittings.
	IS-1271 Specification of Thermal Evaluation and Classification of Electrical Insulation.
	IS-1554- PVC insulated (heavy duty) electric cables-working Part I voltage upto and including 1100 V.
	IS-2074 Ready mixed paints, air drying, red oxide- zinc chrome.
	IS-13947 Degree of Protection provided by enclosures for low voltage switch gear and control gear.
	IS-2148 Flame proof enclosures for electrical apparatus.
	IS-3624 Specification for pressure and vacuum gauges
	IS-5831 PVC insulation and sheath of electric cables.
ISA	Instrument Society of America.
	S-5.2 Binary logic diagrams for process operations.
	S-7.3 Quality standard for instrument air.
	S-75.01 Flow equations for sizing control valves.
	ISO 5167 Measurement of fluid flow by means of orifice plates, nozzles and venturi tubes inserted in circular cross-section conduits.
NEC	National Electric Code.
NFPA	National Fire Protection Association.
	NFPA-496 Purged and pressurized enclosures for electrical equipment.
EN	European Standard
	EN12480 Gas meters - Rotary displacement gas meters
	EN334 European standard for pressure regulators upto 100 bar
	EN12186 Gas Pressure Regulating Stations for Transmission and distribution
	EN14382 Safety systems for Gas distribution
	BS EN 837-1 Pressure gauges - Part 1: Bourdon tube pressure gauges; dimensions, metrology, requirements and testing
	BS EN 837-2 Pressure Gauges - Part 2: Selection and Installation Recommendations for Pressure Gauges
	BS EN 837-3 Pressure gauges - Part 3: Diaphragm and capsule pressure gauges; dimensions, metrology, requirements and testing
	OIML R32 Rotary piston gas meters

3.2.3 In general, Bidder shall carry out engineering as per IEC/BIS standards.

3.2.4 Pressure Regulating Valve (PRV) and Slam Shut Valve (SSV) shall be conforming to the requirements of EN 334 and EN 14382 respectively. Creep Relief Valve (CRV) shall be designed and installed as per PNGRB guidelines have capacity of 1% of stream capacity with spring diaphragm type design for 1% flow capacity.

Any other standard, if necessary, can also be referred by bidder during the execution of the job, without diluting the basic requirements, however with prior information to Owner/ Owner's Representative. In any case bidder must furnish a list of codes and standards other than those specified in this document, which shall be



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followed by them during engineering.

3.3. EQUIPMENT/ INSTRUMENT DESIGN CRITERIA

- 3.3.1 No instrument air shall be provided by CLIENT. Special care to be paid for dealing the problem arising from possible condensation due to pressure reduction. A well proven system to be used for this application. Filter regulators, Actuators, shall be suitable for Natural gas(sour) application.
- 3.3.2 The Equipments and instrumentation selected for the skids shall be rugged in design and must be well proven in the hydrocarbon industry. Prototype design or equipment of experimental nature or design undergoing testing etc. shall not be selected and supplied.
- 3.3.3 All the mainline ball valves of complete skid package shall be full bore type.
- 3.3.4 The complete station shall be designed in such a way that the mean gas velocity remains within 30 Meter per second except in Pressure regulating valve / slam shut valve. Velocity in the piping upstream / downstream of Pressure reduction station shall be within 30 Meter per second. Maximum seat velocity of Slam shut valves is limited to 40 meter / second. Materials selected should be suitable to prevent erosion at such high velocities and the allowable sound pressure values should not be exceeded. Each stream shall be designed for 100 % of the maximum flow capacity.
- 3.3.5 Integral type Slam shut device with pressure control valve (Monitor) shall be considered for each stream.
- 3.3.6 All the connections in the skid having design rating of 300# shall be of welded type only.
- 3.3.7 Hole tight / leak tight should not be used on threaded / flange joints. Stud nuts only are to be provided on flange joints.
- 3.3.8 Valves body, bonnet, cover and / or end flanges components made of cast iron and / ductile iron (as per ASTM A 395) shall not be used.
- 3.3.9 Flanges made of cast iron, ductile iron and non-ferrous materials (brass or bronze) shall not be used. Flanged end connections (inlet and outlet) of the DRS should be in sizes of 2", 3", 4", 6" and 8" only, to ensure compatibility with the transition fittings employed by GGPL. All stud bolts and nuts shall be hot dipped galvanized as per ASTM A 153 or equivalent.
- 3.3.10 All the skid cabinets shall be provided with suitable louvers in order to prevent pressure build-up inside the cabinet due to entrapped gas in the cabinet.
- 3.3.11 Instrument Requirements for classified area:
- a) All electronic/electrical instruments and equipment shall be suitable for area classification as per IEC codes and shall be tested by any recognized authority like BASEEFA/ FM/ PTB/ CMRI/CCOE etc. All the configurators, gas cylinders shall be certified by BASEEFA/ FM/ PTB/ CMRI/CCOE etc.
 - b) Certified Intrinsically Safe (IS) equipment as per IEC-60079-11 shall be used, in general, in hazardous area. In case intrinsically safe equipment is not available, flameproof enclosures as per IEC-60079.01 may be considered.
 - c) Junction boxes and accessories required for flameproof instruments shall also be certified flameproof.
 - d) All non flameproof panels and cabinets installed in classified area shall be purged as per requirements specified in NFPA-496, as a minimum.
 - e) Other type of protection as specified in IEC-60079 shall not be used.
- 3.3.12 Statutory Approvals
- a) Bidder shall responsible for obtaining model approvals for meters from Legal Metrology department and



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- comply with The Legal Metrology Act 2009.
- b) Bidder shall be responsible for obtaining all statutory approvals, as applicable for all instruments, equipments and control systems.
- c) In general following certification shall be given:
- For all intrinsically safe/explosion proof/flameproof equipment/ instruments/systems or equipment with any other type of protection allowable as per this package certified by any statutory authority like BASEEFA/ FM/ UL/ PTB/ LCIE/CCOE etc.& the same shall be submitted during detailed engineering stage.
 - For all flame proof equipment manufactured locally (indigenously), the testing shall be carried out by any of the approved test house like CMRI/ERTL etc. and a valid BIS license.

3.3.13 All instruments in the skid shall be certified for IEC Zone 1 Gas Group IIA/IIB, T3.

3.3.14 Instruments, which are not available as per their standard design from any reputed manufacturer as intrinsic safe, can be supplied in flameproof design. All such instruments shall be certified flameproof for the area classification and requirements indicated.

3.3.15 Flame-proof (explosion proof) junction boxes as applicable shall be certified for IEC-Zone-1, IIA/IIB for all the classified areas for flame proof instruments.

3.3.16 The sizing for PIPES, Safety valves, Pilot operated self actuating pressure controlvalve, Monitor valve, slam shut valve, RPD Meter.

3.3.17 Any change in instrument size or revision in line sizes because of sizing shall be carried out by bidder without any financial implications to CLIENT.

3.3.18 All the instruments shall be provided with canopies of adequate size to protect instruments from direct rain & sunlight. All such canopies shall be prefabricated type.

3.3.19 Tube Fittings used for the installation of instruments shall be tested as per BS 4368 or equivalent standards.

3.4 INSTRUMENT PAINTING REQUIREMENTS

3.4.1 All instrument impulse lines (except SS 316 Tubing) and instrument structural items shall be painted by the bidder.

3.4.2 The painting/coating shall be performed in totality for all instrument items such as:

- a) All line mounting and equipment mounted instruments.
- b) All instrument impulse piping (except SS 316 Tubing)
- c) All instrument structural items like M.S. cable trays, instrument supports and tray supports, instrument stanchion, impulse line supports etc.
- d) All surfaces of GI items wherever repair has been carried out shall also undergo painting.
- e) All cabinets/panels, base frames which have undergone repair at site shall also be painted.
- f) The final coating on external surfaces shall be applied just before handing over the plant or commissioning of the plant.
- g) Name of the manufacturer, colour and quality of all types of primers and paint shall be subject to approval of the owner/owner's representative.

3.4.3 Painting of other equipments shall be as per Painting specifications attached elsewhere.

4.0 PROCESS DESCRIPTION



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- 4.1. The bidders shall design the skid considering the worst case process condition scenario.
- The set pressure of Pilots for PCV (ACTIVE & MONITER)& SDV shall cover the complete range of inlet & outlet condition. For PCV (ACTIVE & MONITER), SDV, if one pilot is not able to cater the complete range then additional pilot / loose springs to be supplied for each skid. The slam shut valves shall have two set points, one for low pressure and one for high pressure shut-off.
 - The PSV to be designed in such a way that the set pressure can be adjusted within the operating pressure range/ set points. Separate spring(s) shall be provided, if one spring is not sufficient to meet the requirement.
 - 10 % of the maximum flow capacity shall be considered as the minimum flow.
 - Design Temperature: -20 to 65 deg C.
 - Design flow: 100% of maximum flow capacity.
 - The maximum permissible pressure drop across the complete skid is 4.0 kg/cm²g.
 - Vendor shall confirm that the DRS is suitable for outdoor installation in tropical climate with the following conditions:
 - ❖ Ambient temperature: 10 – 60°C.
 - ❖ Humidity: 100%.

4.2. Detailed Process conditions:

The quoted skid shall be designed for flow capacity of 100% of maximum flow mentioned above and refer Annexure-II for design case gas composition.

The Upstream of PRS of skid and its components shall be designed for Pressure as specified in the P& ID's& Data Sheet. The Slam shut valves and Pressure Regulators shall be selected such that these instruments can be set in the Pressure range as specified in the data sheet. In case a single Pilot/ spring is not capable of meeting the above pressure set point requirement, additional spring/ pilot shall be provided along with the Pressure Regulators. The PSVs for each Filter shall be designed for fire case and shall have set point as specified in the data sheet.

- 4.3. All the calculations for the sizing of the valves, meters etc shall be based on the design flow capacity with worst case Process Temperature and Pressure, However for mechanical strength of the equipments, design temperature / pressure shall be considered.
- 4.4. All the Equipments shall be able to withstand maximum/ minimum design Pressure and temperature. Worst case process pressure and temperature with design flow is to be considered for noise calculation of valves.

5.0 JOB SPECIFICATION

5.1 GENERAL

This document defines the instrument Job requirements over and above various Standards attached along with this document.

The selection of type of instruments is Bidder's responsibility. For the instruments where type is already identified in the P & IDs / data sheets, the Bidder shall follow the same. However during the engineering procurement stage if it is found that a different type of instrument is most suited for a particular application then the same shall be referred to MECON for review, and if suitable, the changed instrument shall be supplied by the bidder. Bidder shall also be responsible for selecting and reviewing the type of instrument where specifically indicated in P& ID.

Instrument selection and specifications shall be carried out as per specification, typical instrument data sheets



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and Standard Specifications in general, as appended by special requirements specified here in.

The referred Standard specification, Technical Specification together with the P&IDs, Process data sheets, data sheets, standard specifications attached with the Package, defines the requirement for the design, engineering, manufacture, fabrication & assembly, integration, calibration, factory testing, supply, packaging, shipping and documentation including deliverables, statutory and other special approval, inspection, testing overall skid performance guarantee of Gas custody transfer. If required, then installation supervision, commissioning of the same at the same terms & condition of the contract/tender.

6.0 TESTING AND INSPECTION

6.1 GENERAL

- 6.1.1 All pressure boundary materials shall have certified material test reports (CMTRs) or certificate of compliance per the design code. Certifications shall be to **EN 10204 Type 3.1 for pressure parts and Type 2.2 for other parts**. A system of positive material identification (PMI) shall be implemented for the items mentioned in PMI specification attached elsewhere.
- 6.1.2 Vendor shall submit the QAP&FAT Manual/ procedure to MECON for review and approval. A typical MECON QAP and FAT Manual/ procedure is attached elsewhere.
- 6.1.3 Vendor to carry out 3.1 certification for the complete supplied items.
- 6.1.4 All materials and equipment shall be factory tested before shipment in the presence of Purchaser's representative. No material shall be transported to site until all required tests have been carried out and equipment is certified as ready for shipment. Acceptance of equipment or the exemption of inspection or tests thereof, shall in no way absolve vendor of the responsibility for delivering equipments meeting the requirements of the specifications.
- 6.1.5 Vendor shall furnish the following
- Material test certificate, Hydrostatic test certificate, certificates of radiography for all line mounted items/ instruments on the skid.
 - Certificates from statutory body for hazardous area approval for all electrical items mounted on the skid.
 - Calibration certificates, certificates for custody transfer, certificates for the conformity to the standards to be submitted.
 - All other certificates mentioned in individual general specification.
- 6.1.6 Supplier shall perform the usual standard tests to maintain quality control procedures. These test certificates shall be submitted for review before starting final inspection/FAT by Purchaser. Supplier shall be responsible for testing and complete integration of the system. Detailed procedures of test and inspection shall be submitted by the supplier for review before order and mutually agreed upon.
- 6.1.7 Vendor scope shall include inspection by third party personnel at vendor's shop. For this inspection, labour, consumable, equipment and utilities as required shall be in vendor's scope. Third Party Inspectors shall be deployed by the successful bidder/suppliers from the recognized Third Party Inspection agencies like Lloyds, ABS, SGS, TUV, DNV, BV, Engineers India Limited, Certification Engineers International Limited, International Certification Services Limited or any other Third Party Inspection agency only with prior approval of GGPL GAS/MECON, for witnessing inspection and testing of the items as per approved QAP at his workshop and at his sub-vendors workshop as required.
- 6.1.8 In case, successful bidder proposes to engage any third party inspection (TPI) agency other than the agencies mentioned above, minimum 03 TPI agencies shall be proposed by the successful bidder, from which one shall be selected/ approved by GGPL/MECON. Qualification credentials of the TPI proposed by the Vendor/ supplier for deputation and witnessing at various stages of Fabrication shall be provided by the supplier well in advance for review and approval for TPI agencies other than the mentioned above. The TPI involved to witness the tests shall have relevant experience.
- 6.1.9 Other inspection and testing requirements shall be as per respective Standard specifications of various



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instrument items.

6.2 SKID:

The following tests shall be conducted for the skid

- a. Hydro testing for the individual pipe spools.
Hydro testing of the individual pipe spools of the skid shall be carried out. Hydro testing shall be carried out using water as the testing medium. The test pressure shall be 1.5 times the design pressure and holding time for the test shall be 2 hours. Wherever necessary, regulators, relief valves and similar components that have been tested independently should be removed from the line. Blind flanges or double flange pipes should be installed temporarily in their place. All small bore connections and impulse lines should be disconnected and suitable plugs or blank flanges should be installed.
- b. Pneumatic Leak test of complete integrated skid at 7 Kg/cm²(g).

Tightness test of the complete integrated skid shall be carried out at operating pressure, the test medium shall be air for up to 7 bars and the holding time for the test shall be 2 hours.
 - i. Pneumatic testing using air or an inert gas should be undertaken on all installations and should include all equipment and associated small bore pipe work. Care must be taken to disconnect equipment, which might get damaged at the testing pressure.
 - ii. It should be confirmed that all main, by pass and impulse valves within the section under test are in the open position. Any open ends should be blanked off. The installation should be pressurized slowly up to the recommended test level as detailed in specific requirements column.
 - iii. All joints, flanges and glands on valves and fittings should be tested for leakage with a suitable foaming fluid.
- c. Skid functional testing considering metering, pressure regulation, limiting and safety characteristics. (Functional testing of Slam shut valves, PC's (ACTIVE & MONITER) shall be demonstrated by simulation in vendor's shop)
- d. Skid piping material testing and NDT of welds as per Piping material specifications. Radiography/X-ray shall be carried out for all welded joints and vendor shall furnish test certificate for the same. Dye-penetration test certificate shall be provided for joints wherever radiography/ X-ray is not possible.
- e. Radiography/ X-ray, Charpy impact testing for line mounted instrument items such as pilot operated pressure control valves in active monitoring configuration, pressure relief valves, slam shut valves, RPD meter etc.
- f. Testing and inspection requirements for skid piping materials shall be as per specifications attached elsewhere in the bid package.
- h. Following are the minimum Test requirements for District Regulatory System as per PNGRB guidelines and same shall be complied for each skid:

Design Pressure	Min. Test Pressure	Test medium	Min. Test Duration
Up to 138 mbarg (2 psig)	3.45 barg (50 psig)	Air	2 hours
From 138 mbarg to 4.14 barg (2 to 60 psig)	1.5 times Design Pressure	Air	2 hours
Above 4.14 barg (60 psig)	1.5 times Design Pressure	Water	2 hours

Test Certificates: A record of all hydrostatic testing and pneumatic testing carried out should be prepared for every installation. A material test certificate for all components of DRS should be furnished at the time of inspection by third party / MECON / GGPL representative. MECON/ GGPL reserves the right to witness all the tests.



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6.3 Skid Equipments

The following tests shall be conducted:

6.3.1 Requirements of non-destructive testing like radiography, magnetic particle test, hardness test, hydro-test, Charpy test for pressure relief valves, slam shut valves, Conical Straightner and meter runs shall be carried out strictly as per following specification.

- a) 100% radiography shall be carried out on all casting. Radiography procedure and area of casting to be radiographed shall be as per ANSI B16.34 and acceptance criteria shall be as per ANSI B16.34 Annexure B. Two shots shall be taken for each area to be radiographed, as a minimum.
- b) Radiography/X-ray shall be carried out for all welded joints and vendor shall furnish test certificate for the same. Dye-penetration test certificate shall be provided for joints wherever radiography/ X-ray is not possible.
- c) Charpy impact test on each heat of base material shall be conducted as per A370 for all pressure containing parts such as body, end flanges and welding ends as well as bolting material for pressure containing parts. Unless specified otherwise, the Charpy impact test shall be conducted at 0°C. The Charpy impact test specimen shall be taken in the direction of principal grain flow and notched perpendicular to the original surface of plate or forging. The minimum average absorbed energy per set of three specimens shall be 27J with an individual minimum per specimen of 22 J.

6.3.2 Flow Meter, Meter run, EVC and accessories shall be offered for pre-dispatch inspection to CLIENT and / or CLIENT's representatives. Following tests, checks shall be conducted:

- a) Functional and simulation tests including checking of hardware including RPD flow meters with all its sub-systems in fully integrated configuration.
- b) Review of all certificates and test reports.
- c) In the event the purchaser is unable to witness a test, the test shall anyway be completed by the vendor and documents for the same shall be submitted for scrutiny before shipment.
- d) All tests as per Standard specifications attached with this bid document.

Following tests shall be carried out by vendor at their works and test certificates shall be furnished:

Calibration/ test certificates for all instruments. Calibration test reports for flow meters duly signed and certified from the recognized laboratories. Statutory body certificates for instruments. Type test report for enclosure of all electronics/electrical equipments. Radiographic / Charpy test certificates for RPD Meters. Material test certificate for all line mounted instruments.

6.3.3 In addition vendor shall also refer the inspection & testing requirements of the standard specifications attached to this requisition and follow the same.

6.3.4 Vendor shall include in his scope the shop inspection charges including factory acceptance test (FAT) inspection by CLIENT's representative at vendor's works.

6.3.5 Inspection of Slam Shut Valves, Pressure Regulators, Pressure Relief Valves includes:

- a) Testing to demonstrate set point accuracy and actuation time for Slam shut valves
- b) Calibration certificate for Pressure relief valve set pressure
- c) Seat tightness test for PCVs (ACTIVE & MONITER), Slam shut valves and pressure relief valves (shall be conducted at manufacturer's shop and certificates shall be submitted)

6.3.6 The following certificates are required to be submitted during inspection for review before dispatch of materials :

- Verification of certificates as applicable for the material certificates, NDT reports like radiography/ X-ray/ dye-penetration/ MP, etc., statutory certificates for intrinsic safety and explosion proof, certificates of conformity etc.



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- Visual verification for quantity, quality and workmanship.
- Hydro testing and pneumatic testing as applicable.
- Functional and performance testing including calibration, accuracy, repeatability testing.
- Seat leakage tests & hydraulic Pressure test, actuator cycling & fail condition tests for control valves
- Set pressure, reseal pressure & seat leakage for pressure relief valves.
- Calibration report of Flow Meters, TG, DPG, PG.
- Radiographic test for thermo-wells etc.
- Bidder must detail out performance specifications of each item which shall be verified by bidder or bidder appointed agency/Owner/ PMC during factory testing.
- Inspection and testing requirements as per the respective standard specification shall be referred.
- Bidder shall submit all test records / test results for records to purchaser as bound volume along with the test procedure for each test carried out.
- Acceptable criteria for Radiography and other NDT requirements for all the instruments / instrument castings shall be inline with those specified in 'valve/ piping specifications' for the similar service. Valve specifications/piping specifications have been attached elsewhere in this package.
- Type approval certificate for meters from Legal Metrology Department
- Approval of skid design (For RPD Meter based meter based skids) from approving agencies mentioned elsewhere.

6.3.7 The inspection and testing shall be carried out as per related specifications, international codes and practices/standards, approved documents and/or any other document attached along-with specifically suggesting extent of testing to be carried out at manufacturer's works.

6.3.8 Items for which 'Witness Inspection' is specifically exempted, manufacturer shall forward the test certificates as desired for review.

6.3.9 Testing and inspection for all items shall be carried out as per approved factory testing procedures. The material shall be dispatched only after obtaining written dispatch clearance. For items where no testing is witnessed by the purchaser test certificate shall be forwarded for review before dispatch of such equipment

6.3.10 Contractor must detail out performance specifications of each item which shall be verified by contractor or contractor appointed agency/Owner/ PMC during factory testing.

6.3.11 Inspection and testing requirements as per the respective standard specification shall be referred.

6.3.12 Contractor shall submit all test records / test results for records to purchaser as bound volume along with the test procedure for each test carried out.

6.3.13 Acceptable criteria for Radiography and other NDT requirements for all the instruments/ instrument castings shall be inline with those specified in 'valve/ piping specifications' for the similar service. Valve specifications/piping specifications have been attached elsewhere in this package.

6.3.14 Statutory certificate shall be supplied by the contractor for all electronic instruments, cylinders installed/ for use in hazardous area.

7.0 DOCUMENTATION

7.1 Detailed drawings, data and catalogues required from the Vendor are indicated by the PURCHASER in vendor data requirement sheet. The required number of reproducible and prints should be dispatched to the address mentioned, adhering to the time limits indicated.

7.2 Final drawings from the Vendor shall include dimensional details, weight, mounting details and any other special requirements etc for the skids. All dimensions in general shall be in millimeters.

7.3 Vendor shall furnish all the required software, manuals necessary to test, operate and maintain the system. All the certificates, licensed software etc. shall be provided in name of CLIENT (India) Ltd.

7.4 Manufacturer shall also submit the 2 sets hard copies and one (1) digital copy on Compact Disc of following



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documents along with the skid:

- a) Bill of Material.
- b) P&ID (Process and Instrumentation Diagram) and GAD (General Arrangement Drawing)
- c) Approved Quality Assurance Plan
- d) Catalogs of each component of DRS.
- e) Instrument Installation (Hook-Up) Drawings
- f) Construction drawings, design calculations, material specifications and technical data sheets (in English language only) of components such as regulators, slam shut valves, Creep relief valve.
- g) Material test certificate for all the pipe and fittings material and traceability records.
- h) Filter – Construction drawing, flow calculation, cartridge details & specification;
- i) Mechanical Gauge / Instrument Calibration Certificates
- j) Performance / Functional test certificate.
- k) Certificate of each component of DRS from DVGW or equivalent.
- l) Instructions and recommendations regarding installation, operation, and maintenance of all the components of the unit.
- m) WPS, WPQR and PQR wetted by TPIA
- n) Non Destructive Test reports wetted by TPIA
- o) Dimensional check report
- p) Painting Specification and report
- q) Pressure Hydrostatic & pneumatic test certificates.
- r) Warranty Certificate
- s) FAT report and TPI inspection report
- t) Operation and maintenance instruction manual & requirement.
- u) Start up and commissioning procedure.
- v) Specify the weight of the skid.
- w) Canopy and Foundation details and drawing.
- x) Dispatch details.
- y) As build drawing.
- z) Calibration report of RPD meters
- aa) Certificates from Statutory bodies(W&M Stamping from legal metrology for EVC & RPD Meters, ATEX/CMRI, PESO/CCOE) for field instruments,

8.0 MISCELLANEOUS

8.1 NAMEPLATE IDENTIFICATION

In addition to the instruments and equipment nameplate, the structural skid shall be supplied with a permanent, weather resistant, stainless steel nameplate affixed to the skid, with the following details, as a minimum: Project title and number

- Owner and Owner name
- Equipment name and tag number
- Manufacturer's name and serial number
- Skid overall dimension data.
- Skid weight data.

Each skid and all the instruments in the skid shall have a S.S nameplate attached firmly to it at a visible place furnishing the following information:

- Tag number of the skid.
- Project Name with location: " CLIENT -----(name of site/ station)"
- Inlet size (in inch) and Outlet Size (in inch) with class rating
- Min/ Normal/ Max. Flow capacity in SM³/Hr.
- Tag number of Instruments, JB as per purchaser's data sheets
- Body sizes with class rating in inches and the Valve Cg value or meter G rating
- Set pressure range and flow capacity of pressure safety valves
- Flow range in SM³/hr for Flow meters
- Rating for all the individual instruments
- Manufacturer's name and model number



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All cable should have tag no. at JB/ panel end and Instrument end. All wires terminated inside skid should have identification mark, ferrules etc. (for the termination of supplied cables, Identification Tag no, Ferrule etc. shall be provided by bidder).

9.0 SHIPPING & PACKAGING

- Vendor shall indicate the shipping and packaging methodology for DRS / Each pieces of skid along with its size, weight and no. of pieces.
- Vendor shall try to fix as many types of equipment/ instruments as possible in skid before shipment.
- If any of the items are shipped loose, then it shall be properly packed inside metallic or wooden cartoon with identification tags painted on it. Loose materials, spares etc for any two skid shall not be mixed in one cartoon/package. A System of tagging, segregation to be followed for easy identification of parts and due care to be taken to avoid intermixing of some parts of different skids.

10.0 PERFORMANCE GUARANTEE

- 10.1 The VENDOR shall guarantee that all work/ job will be performed in accordance with good and sound engineering and construction practices and within the requirements of this specification. The equipment, accessories and all the materials supplied by the VENDOR shall be free from defects, shall be suitable for the use for which they are intended and shall perform in accordance with the requirements of this specification.
- 10.2 The VENDOR shall furnish a guarantee for the entire skid package comprising of all of its component/ equipments including instruments, piping, valves, fittings, internals, etc., for a period of 12 months from the date of commissioning or 24 months from the date of receipt at CLIENT store/ site, whichever is earlier.
- 10.3 The VENDOR shall take single point responsibility for the complete skid, including the sub contractor supplied components, the proprietary equipment and components included in skid package and supplied loose in accordance with this specification.

11.0 INSTALLATION AND COMMISSIONING OF SKID

- 11.1 The VENDOR shall provide **qualified and experienced** personnel for installation, field-testing and commissioning of the equipments.

11.2 INSTALLATION REQUIREMENTS:

- All instruments shall be accessible for operation and maintenance.
- Bidder shall consider the, "CLIENT installation standards "as attached or equivalent for installation of each instrument. In case, any instrument require a special installation or any instrument not provided with installation standard the bidder shall prepare the standard and get it approved from CLIENT along with other documents.
- Impulse tube/pipe of size ½" shall be used as impulse lines. The Impulse pipe/ pipe fittings for instrument installation shall be as per the piping material specifications of respective process lines. Tubing when used between manifold and the instrument shall be, 12mm OD with SS316 material of construction as a minimum. The material selected shall be suitable for the process fluid conditions.
- Instrument in gas service are to be installed only above or at least parallel to the tapping with a slope in the impulse towards the tapping to achieve self draining condition.
- Pressure Relief valves to be installed in line only after proper flushing of the lines.
- No unions shall be used in impulse lines instead break flanges shall be used.
- Gate valves in combination with Plug/ball / globe valve shall be used for isolation and vent & drain valves, however combination of plug valve and ball/globe valves shall be used for equalizing service.
- Minimum ½" sized valves shall be used for Instrument isolation.
- Impulse piping is to be suitably painted (except SS 316 tubing)
- Schedule 80 seamless pipe with at least 3000 lb rating fittings should be used as a minimum for impulse piping.
- Tube fitting shall be double ferrule type.



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- Based on the installation standards for each type of instrument, bidders shall prepare Bill of materials (BOM) which indicates the requirements of different materials for installation of each instrument. However completeness of BOM is bidder's responsibility.
- Mounting of field instruments (if remote mounted)/JBs on the stanchion or instrument support shall be at the height of 1.3M from the grade level / finished floor level.
- The installation and erection materials like, cables (signal, control, thermocouple extension and power), cable glands, junction boxes, instrument valves and manifolds, impulse pipe and pipe fittings, pneumatic signal tubes, instrument air line fittings and valves and cable trays required for installation of complete instrumentation shall be as per standard specifications enclosed in this tender. Power supply for different instruments/ equipments having different power/ voltage rating shall be installed in different JB's (if applicable).

11.3 LOOP CHECKING AND COMMISSIONING

11.3.1 Bidder is fully responsible for all work related to loop checking (inside the skid), including cable laying, tray work, dressing, identification, ferruling, calibrations, loop testing.

11.3.2 Bidder shall be responsible for commissioning of each & every equipments installed in the skid and (Functionality, simulation for these equipments shall be demonstrated during FAT).

12.0 BIDS:-

Bidders Proposal shall include the following (as minimum):

12.1 Bidder's proposal shall include:

- a) The Bidder shall submit signed format of Technical details / catalogue for the items of skid like filter, pilot operated pressure control valve, pressure control valve with integral slam shut valve, flow meter, pressure relief valve, pressure/ DP/ temperature gauges, limit switches, Ball valves, plug valves/Globe valves, Check valves, EVC, list of items etc.
- b) P&ID for skid shall be as per Bid document attached.

12.11 The Bidder shall furnish details mentioned in Technical questionnaire attached with tender doc.

12.12 VENDOR shall include in the bid, list of specific deviations, separately, if any, to this specification and all attachment thereof, otherwise, the quotation will be deemed to be in compliance with the specification requirements and subsequent claims for extra arising out of non-compliance with the specification will not be considered.

13.0 SPARES PHILOSOPHY:

Mandatory spares, commissioning spares and materials required for Erection and commissioning of skid / shall be provided with skid. In case the tender consists of more than one price schedule item (for supply portion), Bidder shall provide all the relevant skid-wise spares for all the Price items/ all the Skids.

13.1 Mandatory Spares: Shall be provided separately with each skid / each price item as per the following list.

i. **For Pressure reduction system & Metering:**

- a) Repair kit for PCV (Diaphragm, Springs, O-rings, Gasket, cone etc) – 02 sets.
- b) Repair kit for pilot (Diaphragm, filter, seat, Springs, O-rings, Gasket etc.) – 02 sets
- c) Repair kit for SDV (**Valve seat, springs, Diaphragm, O-rings gaskets, SSV resetting handle** etc.) – 02 set.
- d) Lubricant cartridge for plug valves – 01 Set.

ii. **For filtration system:**

x

- a) Filter Element installed in each Filter – 02 set (each set shall consist of the No. of Filter elements installed in both streams of Filtration skid.)



**GODAVARI GAS PRIVATE LIMITED
CITY GAS DISTRIBUTION PROJECT AT EAST & WEST
GODAVARI DISTRICTS
SUPPLY OF DISTRICT REGULATORY SKID (DRS)
(ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)
Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003**



- b) O-Ring for Filters (all type of O-Rings) -02 set (each set shall consist of all the o-rings / gaskets installed in both streams of Filters.
- c) All types of Gasket & Studs for one complete skid - 01 Set.

iii. **Relief Valve: Standard spare kit containing diaphragms, valve seat springs, 'O' rings and gaskets.**

13.2 Special Tools and Equipment:

Any special tools and equipment required for the installation or routine maintenance of DRS should be listed and priced separately.

14.0 LIST OF ATTACHMENTS

Annexure-I	INSTRUMENT, MECHNICAL AND PROCESS DATA SHEETS
Annexure-II	NARUTAL GAS COMPOSITION PARAMETERS
Annexure-III	P&ID OF DRS
Annexure-IV	APPROVED VENDOR LIST
Annexure-V	QAP
Annexure-VI	FAT PROCEDURE AND MANUAL
Annexure-VII	-Deleted-
Annexure-VIII	STANDARD SPECIFICATIONS



**GODAVARI GAS PRIVATE LIMITED
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SECTION-2

Material requisition for District regulatory Skids (DRS)



GODAVARI GAS PRIVATE LIMITED
CITY GAS DISTRIBUTION PROJECT AT EAST & WEST
GODAVARI DISTRICTS
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Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003



MATERIAL REQUISITION

Item No	Description	Unit	Qty	Remarks
	Design, Engineering, Manufacturing, Testing, Nameplate marking, Painting, Inspection, Calibration, Supply and unloading up to FOT site: RPD Meter based DRS with battery operated EVC, and its accessories, Consumables, Compulsory Spares and Commissioning Spares including Assistance in Configuration, Interfacing, Integrated Testing & Commissioning as per Job specifications and Special Instructions enclosed.			
1	DRS of 5000 SCMh capacity (Ref P & ID No.: MEC/23TS/01/E5/D2/DRS /TE/0001) Mandatory spares as per TS	Nos.	3	
2	DRS of 2500 SCMh capacity (Ref P & ID No.: MEC/23TS/01/E5/D2/DRS /TE/0001) Mandatory spares as per TS	Nos.	4	
3	DRS of 1500 SCMh capacity (Ref P & ID No.: MEC/23TS/01/E5/D2/DRS/TE/0001) Mandatory spares as per TS	Nos.	3	
4	DRS of 1000 SCMh capacity (Ref P & ID No.: MEC/23TS/01/E5/D2/DRS/TE/0001) Mandatory spares as per TS	Nos.	5	
5	Two years operational & maintenance spares as per Annexure A of the Price schedule indicating the detailed breakup of the items, quantities & its price(Optional)	Set	1	
6	Supervision of Installation, Testing and Commissioning of DRS skid at respective site, consisting of Filtration, Pressure reduction, Metering through RPD Meter, Battery operated EVC. The price shall be inclusive of Airfare Boarding, Lodging, Local Transport, Incidental, Traveling etc. & all other expenses. (For DRS of 5000 SCMh capacity item no. 1.0 above)	Lump sum per skid	3	
7	Supervision of Installation, Testing and Commissioning of DRS skid at respective site, consisting of Filtration, Pressure reduction, Metering through RPD Meter, Battery operated EVC. The price shall be inclusive of Airfare Boarding, Lodging, Local Transport, Incidental, Traveling etc. & all other expenses. (For DRS of 2500 SCMh capacity item no. 2.0 above)	Lump sum per skid	4	



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GODAVARI DISTRICTS
SUPPLY OF DISTRICT REGULATORY SKID (DRS)
(ANNUAL RATE CONTRACT FOR A PERIOD OF 2 YEARS)
Bid Document No.: MEC/23TS/01/51/S2/DRS/SU/0003**



8	Supervision of Installation, Testing and Commissioning of DRS skid at respective site, consisting of Filtration, Pressure reduction, Metering through RPD Meter, Battery operated EVC. The price shall be inclusive of Airfare Boarding, Lodging, Local Transport, Incidental, Traveling etc. & all other expenses. (For DRS of 1500 SCMh capacity item no. 3.0 above)	Lump sum per skid	3	
9	Supervision of Installation, Testing and Commissioning of DRS skid at respective site, consisting of Filtration, Pressure reduction, Metering through RPD Meter, Battery operated EVC. The price shall be inclusive of Airfare Boarding, Lodging, Local Transport, Incidental, Traveling etc. & all other expenses. (For DRS of 1000 SCMh capacity item no. 4.0 above)	Lump sum per skid	5	

Notes:

- 1 Evaluation shall be done on Item wise basis.
- 2 The skids supplier for Item Nos. 1 to 9 shall be responsible for assistance in Installation, Testing and Commissioning.
- 3 The Vendor shall be completely responsible for the design, materials, manufacture & fabrication, testing, inspection, preparation for shipment and transport of the above equipment strictly in accordance with the MR and all attachment thereto.



**CITY GAS DISTRIBUTION PROJECT AT
EAST & WEST GADAVARI DISTRICTS**


Supply of District Regulatory Skid (DRS)

Bid Document No.: MEC/23TS/01/ S2/DRS/SU/0003



ANNEXURE - I

DATASHEET FOR TEMPERATURE GAUGE


Units:- Flow : Liquid-T/hr Gas-MMSCMD Steam- kg/hr Pressure- Kg/cm ² (G) Temperature- °C Level/Length-mm									
GENERAL									
1	Type	Bi-METALLIC			15	Over range protection	125% OF RANGE		
2	Well	REQUIRED							
3	Mounting	LOCAL			16	Enclosure	WEATHER PROOF TO IS 2147		
4	Dial size	150 mm							
5	Colour	WHITE (Non rusting plastic with black figs.)			17	Enclosure class	IP 67 / NEMA 4		
6	Case material	DIE CAST ALUMINIUM (EPOXY PAINTED)			18	Adjustable Union	*		
7	Window material	SHATTER PROOF GLASS			19	Extension Type	Rigid		
8	Conn. Location	BOTTOM			20				
9	Accuracy	±1% FSD							
10	Zero adj. Screw	MICROMETER POINTER (Internal)			21				
BIMETAL					THERMOWELL				
11	Stem:	Required			22	Material	SS 316		
	Type				23	Construction	DRILLED BAR STOCK		
12	Material	SS 316			24	Process connection	1½" FLANGED 300# / 150#		
14	Size	*Vendor to specify			25	Gauge connection	½" NPT (F)		
15	Stem diameter	8 mm(min)			26	Thermowell as per drg	Drg enclosed		
14	Stem Length	*Vendor to specify			27	Options a)	LIQUID FILLED		
					28	Make & Model	*		
Tag No.	Range	Temperature (°C)		Well Dimensions		Flange		Location	Qty
		Operating	Design	U	T	Material	Rating/Face/Finish		
TG - **	**	0-50 deg.C	-25 to 65 deg.C	*	*	ASTM A 105	300# RF 125 AARH	**	**
<p>Note: '***' As per P & ID '**' Information to be supplied by the Vendor / Contractor.</p> <ol style="list-style-type: none"> 1. Vender shall furnish Make & Model No. with product catalogues along with the offer. 2. Make of the TG shall be from approved vendor list of tender document. 3. Vendor shall submit the Matching flanges also. 4. Vendor to furnish installation drawing 									
0	DATASHEET OF TEMPERATURE GAUGES							 MECON LTD. BANGALORE	
Rev.	DISTRICT REGULATORY SKID (DRS							DS No: MEC/23TS/01/E5/D2/DRS /TG/0505	

PRESSURE GAUGES

Units:- Flow : Liquid-T/hr Gas-MMSCMD Steam- kg/hr Pressure- Kg/cm ² (G) Temperature- °C Level/Length-mm							
1	Make & Model	*	13	Zero adjustment	Micrometer pointer (External)		
2	Manufacturing Standard	IS 3624/ EN 837	14	Gauge Connections	½” NPT (M)		
3	Type	Direct	15	Movement	SS 304		
4	Mounting	Local	16	Blow out protection	Required		
5	Dial size	150 mm	17	Measuring Unit	Kg/Cm ²		
	Colour	White with black numerals.	18	Diaphragm seal	NA		
6	Case material	Cast aluminium	19	Over range protection	130% of range		
7	Bezel ring	Screwed/Bayonet	20	Options			
8	Window material	Shatter proof glass		a)	Liquid filled casing		
9	Enclosure	Min.IP 65		b)	2 Way Manifold		
10	Pressure element	Bourdon tube					
11	Element material	SS 316					
12	Socket material	SS 316					
	Accuracy	± 1% FSD					
	Pointer	Aluminium					
Tag No.	Range	Pressure		Design Temp.	Fluid	Location	Options
		Operating	Design				
PG -**	*	**	49	-25 to 65 deg.C	Natural Gas	**	a & b


NOTES:

- 1) ‘*’ Information to be supplied by the Vendor / Contractor.
- 2) ‘**’ As per P&ID
- 3) The pressure gauges range shall be selected so that the operating pressure shall be within 35% to 65% of the instrument range.
- 4) The quantity of pressure gauges shall be as indicated in P&ID
- 5) Make of the PG shall be from approved vendor list of tender document.
- 6) Installation Drawing to be furnished.

0	DATASHEET OF PRESSURE GAUGES	 MECON LTD. BANGALORE
Rev.	DISTRICT REGULATORY SKID (DRS	DS No: MEC/23TS/01/E5/D2/DRS /PG/0504


Data Sheet of Online Battery Operated Electronic Volume Corrector:

Type	:	Microprocessor based, internal battery operated Electronic Volume corrector with integral pressure transmitter and temperature sensor suitable for mounting in the field location. EVC may be separately mounted on yoke or inbuilt with RPD
Make		* Vendor to specify
Model No.		* Vendor to specify
Quantity		As per SOR
Function		To measure actual gas volume, pressure & temperature and calculates compressibility factors of the gas meter error and based on which calculates standard volume of gas. The unit shall be complete in all respect to achieve this functionality
Input		HF Pulse signal from RPD meter(complying with EN12480) for volume
		Temperature signal from RTD (3 or 4 wire) thermal element in accordance with IEC/EN 60751 standard in the range of -40°C- 70°C. with an accuracy of $\pm 0.25\%$ of measured value. The sensor, equipped in a stainless steel tube having an IP 67 protection degree, can be inserted into a thermowell of 6mm diameter. The external sensor allows ease of calibration as well as replacement, if desired without having to de-install the system.
		Pressure signal from built-in pressure sensor in the range of 1.0-6.0 bar. With an accuracy of $\pm 0.15\%$ of measured value or better Pressure sensor to be individually calibrated and characteristics stored within the volume corrector. The tubing and tube fitting accessories to be supplied by vendor.
		All above sensors with required cabling to provided
Outputs		One no. port for Connectivity to PC/Laptop for EVC configuration. Communication cable with adaptor for connecting the EVC with laptop shall be supplied by bidder, for each EVC.
		One no.RS 485 port with Intrinsically safe Barrier and required interfacing cables (between barrier & EVC) shall be provided for interfacing with Remote communication like SCADA.
Output measurement		<ul style="list-style-type: none"> a) Un-corrected flow rate in actual cubic meter per hour (ACMH) b) Corrected flow rate c) Temperature d) Pressure e) Alarms output for unit malfunctioning f) Actual volume g) Correction factor h) Compressibility
Isolation		All inputs, outputs and power supply shall be individually isolated
Display		Alphanumeric large character LCD with selectable decimal, Displaying all units, messages, alarm, etc. in English <ul style="list-style-type: none"> i) Time & Date j) Uncorrected flow rate in m^3/hr k) Corrected flow rate in Sm^3/hr l) Uncorrected Totalised Volume in m^3 m) Corrected Totalised Volume in Sm^3 n) Uncorrected Flow yesterday in m^3 o) Corrected Flow yesterday in Sm^3


0	DATASHEET OF ELECTRONIC VOLUME CORRECTOR	 MECON LTD. BANGALORE
Rev.	DISTRICT REGULATORY SKID (DRS)	DS No: MEC/23TS/01/E5/D2/DRS /EVC/0502

		<p>p) Pressure in Kg/cm² q) Temperature in deg C r) PTZ correction factor s) Battery voltage/Balance life of battery t) Pressure out of range u) Temp. out of range v) Flow over range w) Fault in measurement x) Alarms</p>
Power supply		<p>Internal Battery along with mounting hardware, if any Lithium / Alkaline Battery (5 years minimum life) Battery pack should be intrinsically safe and replaceable in Field itself, without memory loss No separate power supply will be provided.</p>
Configuration Setup	:	To be done in factory for all volume corrector fully taking into account the process conditions, sensor & flowmeter's characteristics and calibrations for direct on site operations.
Calculations standard	:	<p>a) Compressibility : AGA 8 (Latest) / User selectable Detailed/ Gross I / Gross II methods (Default : Detailed) b) Volume flow calculations based on AGA7 (Latest)</p>
Approvals	:	W&M approval
Features		Built in diagnostics to detect proper functioning. Data security through password/key-lock facility and volume conversion and configuration to be sealed.
		Parameters and programmed constants shall be stored in EEPROM / flash memory
		Facility for entry and accessing live and stored data through Laptop.
		Shall have to store at least 120 days data (on hourly basis) of 4 parameters with data and time stamping (such as flowing pressure, temperature and corrected flow uncorrected flow
		Shall have to store at least last 35 days cumulative corrected flow on daily basis.
		The stored data above shall be retrievable by using Laptops. Suitable dedicated port shall be available on the volume corrector for portable PC connection. Software required shall be supplied. Shall be compatible to use with SCADA.
		Modbus facility for any third party software with Modbus registers address charging facility
Hazardous area		Certified intrinsically safe for area Furnish copy of the certificate conforming the suitability of the Meter for use in the Hazardous Area Zone 1, Group-IIB, T3.
Site conditions		Temperature 0 – 50°C, Hot, humid, tropical environment.
Enclosure		Explosion proof and IP65, Compatible for mounting in the Hazardous area.
Mounting		Outdoor open to atmosphere
Accuracy of the system		+ / - 0.5 (Vendor shall categorically indicate the system accuracy i.e. overall accuracy considering RPD meter, Pressure sensor & temperature sensor etc.)


Notes:

0	DATASHEET OF ELECTRONIC VOLUME CORRECTOR	 MECON LTD. BANGALORE
Rev.	DISTRICT REGULATORY SKID (DRS)	DS No: MEC/23TS/01/E5/D2/DRS /EVC/0502

1. For each EVC – Windows based Software (with media) of latest version - for retrieving the stored data, programming the volume corrector using Laptop shall be supplied with valid license.
2. 2 sets of Volume corrector documentation including product literature, software/hardware manual, operating manual, maintenance instructions, Certificates etc. shall be supplied.
3. EVC shall be suitable for Custody Transfer of Natural Gas by Directorate of Legal Metrology (India) under provision of OIML or related guidelines
4. EVC shall have Weights & Measures approval. If it is not available with the Vendor, Vendor has to submit an undertaking along with the bid that in the event of any purchase order placed on them, EVC will be supplied along with W&M approval.
5. Following features shall be available in volume corrector: -
 - i) Memory allocations shall be as given below: -
 - a) Flash memory with non-volatile copy of program code.
 - b) Programmable peripheral chip with EEPROM contains boot ladder code.
 - c) SRAM with copy of program code and data/exact logs.
 - d) Flash memory preservation shall be achieved by 5-year data unpowered retention.
 - e) SRAM memory preservation shall be backed by Lithium Cell / Super capacitors.
6. Vendor/Supplier shall configure and update records in Volume Corrector as per technical requirement and data sheet before Final Inspection call. The process parameter and the required measuring units are already specified in Data sheets/ tender documents and it shall be made available in Volume Corrector. All the specified function and features shall be demonstrated during the Final inspection.
7. The EVC shall have a dedicated communication port of RS485 port for interfacing with client's SCADA for remote monitoring & controlling the parameters, remote data configuration and remote data uploading.
8. The EVC shall transfer data to SCADA and shall be possible to read data from the SCADA (by wireless connection). SCADA, wireless connectivity and connection to the SCADA will be provided by Client. Providing necessary support and assistance during integration of the EVC with the SCADA is in tenderer's scope.

0	DATASHEET OF ELECTRONIC VOLUME CORRECTOR	 MECON LTD. BANGALORE
Rev.	DISTRICT REGULATORY SKID (DRS)	DS No: MEC/23TS/01/E5/D2/DRS /EVC/0502

DIFFERENTIAL PRESSURE GAUGE			
GENERAL	1.	Tag No.	'*' = Vendor to specify
	2.	Quantity	As per P&ID
	3.	Area	As per P&ID
	4.	Location	As per P&ID
	5.	Make	As per preferred vendor list
	6.	Model No.	*
	7.	Ordering Code	*
SPECIFICATION	8.	Type	Direct
	9.	Mounting	Local / surface
	10.	Service	Natural Gas
	11.	Case	Weather proof to IP 65
	12.	Case material	Die cast aluminum/SS 316
	13.	Dial size	150 mm
	14.	Dial Color	White dial with black engraving
	15.	Dial material	Aluminium
	16.	Bezel ring	Threaded / Press fit
	17.	Design temperature	65° C
	18.	Design pressure	19 Kg/cm ²
	19.	Unit of measurement	Kg/cm ²
	20.	Range	0 – 2.5 Kg/cm ²
	21.	Accuracy	± 1.5% of FSD or better
	22.	Zero adjustment	External Micrometer pointer
	23.	Over range protection	130% of FSD, required
	24.	Connection	Bottom
	25.	Connection size	½ " NPT (M)
	26.	Blow out disc	Required
	27.		
		MATERIAL	
	28.	Element	SS 316, diaphragm
	29.	Connection	SS 304
	30.	Movement	SS 304
	31.	Window	Shatter proof glass / Toughened glass
	32.	Manifold	5-way, SS-304 with needle valves & drain plug. Needle valve lever shall be of SS 304
	33.	Accessories	All instrument tubing & connectors shall be of SS ½ size
NOTES	1.	'*' = Vendor to specify	
	2.	SS tag plate with tag number and information's shall be fixed on the instrument	
	3.	<u>Documents</u> : Specification with catalogue, GA drawing, Installation / Mounting drawing, test certificates, calibration certificates, Operation & Installation manual.	
	4.	Above data sheet is typical for all the DPGs used in the respective P&IDs. Vendor shall submit the individual data sheet of each DPG	


0	DATASHEET OF DIFFERENTIAL PRESSURE GAUGE	 MECON LTD. BANGALORE
Rev.	DISTRICT REGULATORY SKID (DRS)	DS No: MEC/23TS/01/E5/D2/DRS /DPG/0503

DATASHEET FOR RPD METER


Meter Type	:	Rotary Positive Displacement Meter
Service	:	Natural Gas
Meter type/Size/ Make/model	:	* Vendor to specify
Field Tag No	:	Ref. P&ID.
Maximum Flow/Allowable Pressure drop/Rangeability	:	* Vendor to specify
Cyclic Volume	:	* Vendor to specify
Maximum Operating pressure	:	Ref. P&ID.
Normal Operating Pressure	:	Ref. P&ID.
Working temperature	:	5 Deg C to 50 Deg C (Ambient & Gas Temp.)
Accuracy	:	±2% (Qmin to 0.2 Qmax) ±1% (0.2 Qmax to Qmax)
Maximum Index reading	:	8 digits
Unit	:	Cubic Meter
Casing	:	As per applicable codes, Tamper proof & corrosion resistant Aluminum or Steel suitable for Indoor/outdoor installations
Connection Orientation	:	Multi Position
Meter Internals	:	Non-Corrosive, tested very low noise, frictionless, endurance for minimum 20 years life & external tamper proof. Plastic components not to be used in Meter.
Installation	:	Suitable for Outdoor Installation, Tamper proof, water- weather proof and corrosion resistant for a life period of 20 years.
Ingress Protection	:	IP 65 or Higher
Safety approval	:	ATEX / PESO
ATEX certificate no.	:	* Vendor to specify
Area classification	:	Zone 1, Group IIA / II B, T3
PESO certificate No.	:	* Vendor to specify
End Connection	:	Ref. P&ID. Flanged conforming to ANSI 300/150 ASME B16.5
Flange to flange dimension	:	* Vendor to specify
Approved to	:	EN-12480 or equivalent The meters shall be approved by India Metrological Department
Pulse Output	:	02 nos. of HF Pulse outputs.
Tapping	:	Inbuilt Pressure Tapping & Temperature Tapping
Volume Correction	:	EVC can be either inbuilt with RPD meter or mounted on meter.
Sealing	:	Provision for sealing of pressure sensor with isolation valve (If EVC is not integral)
Reverse flow Restrict	:	Essential. If not inbuilt non-return valve to be supplied.


Notes:

- 1) *- Vendor to specify
- 2) Flow capacity in SCMh is calculated considering Minimum Operating Pressure.
- 3) The meters shall be type approved by weights and measures department and Vendor shall furnish Legal Metrology Certificate issued by Weights & Measures, India along with certified calibration curve of individual meters.
- 4) Bidder to provide Calibration Certificate and Accuracy at atmospheric pressure with air for the following flow rates: Qmin, 0.1 Qmax, 0.2 Qmax, 0.25 Qmax, 0.40 Qmax, 0.70 Qmax and Qmax
- 5) The bidder shall provide necessary restricted orifice suitable for the respective RPD
- 6) Bidder to provide suitable adapter if required to meet the above mentioned end connection requirement.

0	DATASHEET OF ROTARY POSITIVE DISPALCEMENT METER	 MECON LTD. BANGALORE
Rev.	DISTRICT REGULATORY SKID (DRS)	DS No: MEC/23TS/01/E5/D2/DRS/RPD/0501

- 7) Lubricant required for first fill to be supplied.
- 8) Make of the Meter shall be from Approved Vendor List of tender document.
- 9) The selected meter shall be suitable for Custody Transfer.
- 10) For RPD meters to be connected with EVC: The RPD meters shall have two HF Pulsar, which shall be provided on the meter head.
- 11) The Meter shall be indelibly marked with details of Max. Flow, Pressures range, direction of flow, name of the manufacturer, model, unique serial number, Date of Manufacturing etc.
- 12) The Vendor shall submit, along with the offer, the manufacturing standards, Model number, performance curves and approvals of the statutory bodies and technical details of the model offered. Successful Vendor shall submit following documents during Supply of material.
 - a) Dimensional outlet with mounting details with model number, part list and technical literatures.
 - b) Connection by purchaser (piping, Electrical etc.)
 - c) Installation, Operation and Maintenance Instruction Manual.
 - d) Testing and Inspection procedure.
 - e) Original Calibration curve of each RPD meter
 - f) Certificate from statutory bodies
- 13) End Connections shall be provided by Plastic Caps.
- 14) Superior quality Flange nuts and bolts, required mounting accessories etc. are to be supplied
- 15) Qmin & Qmax: *- Vendor to specify

0	DATASHEET OF ROTARY POSITIVE DISPALCEMENT METER	 MECON LTD. BANGALORE
Rev.	DISTRICT REGULATORY SKID (DRS	DS No: MEC/23TS/01/E5/D2/DRS/RPD/0501

LIMIT SWITCHES		
UNIT : Flow-> Liquid-M ³ /hr Gas-SCMH steam-kg/hr Pressure-> kg/cm ² g Temperture-> ⁰ C Level/Length-> mm		
S.No.	DESCRIPTION	TECHNICAL REQUIREMENT
1	TYPE	Snap Action Micro
2	Area class	IEC Zone-1, IIA, IIB, T3
3	Limit Switch & Enclosure	Weather Proof (IP65) and Flame proof (Exd)
4	Conduit	1/2' NPTF (NOTE -3)
5	Rating	1A @ 24 V DC
6	Form	SPDT
7	Quantity	One each for open & close status of SDV (Quantity as per P& ID)
8	Model No.	BY VENDOR
<p>NOTES :</p> <ol style="list-style-type: none"> 1 Vendor to furnish model No. and decoding details of limit Switch accompanied with relevant catalogues (in English) literatures. 2 Hazardous Certificates with model No. shall be furnished along with offer 3 Flying leads are not acceptable. Cable shall be terminated upto JB 		
0	DATA SHEET OF LIMIT SWITCHES	 MECON LTD. BANGALORE
Rev.	METERING REGULATORY SKID (MRS)	DS No: MEC/23TS/01/E5/D2/DRS & MRS/TE/0504

- 1.0 Valve Manufacturer :
 2.0 Valve Size (NB), mm (inch) **Below 2"** : ANSI Rating : **800#** Design Standard : **BS:5351**
 3.0 MECON's Technical Specification No. : --
 4.0 Connecting Pipeline Design Pressure, kg/cm²(g) : Design Temperature, °C : **-29 to 65° C**

5.0 Connecting Pipe Specification

- 5.1 Material : **As per approved P&ID**
 5.2 Diameter (OD), mm (inch) : **As per approved P&ID**
 5.3 Thickness, mm : **As per approved P&ID**

6.0 Valve Construction Design

- 6.1 Bore : Reduced Full
 6.2 End Connections : **SW with extended nipple (200mm)**

- 6.3 Flanges (wherever applicable) : a) RF FF RTJ NA
 b) Serrated Smooth (125 to 200 microns AARH) NA
 6.4 Valve Type : **Floating Ball**

7.0 Valve Material Specification

Part	Specified Material	Material Offered
7.1 Body	ASTM A105	
7.2 Ball(Solid)	13% Cr Steel	
7.3 Body Seat	RPTFE/ DELRIN	
7.4 Gland	13% Cr Steel	
7.5 Stem	13% Cr Steel (No Casting)	
7.6 Body Seal	Grafoil	
7.7 Stem Seal	Grafoil	
7.8 Body Studs/Nuts	ASTM A193 Gr. B7/ A194 Gr. 7	

- 8.0 Corrosion Allowance : **1.5 mm** Service :
 9.0 Location : Above Ground Buried
 10.0 Stem Extension Requirement : Yes No
 11.0 Gear Operator Requirement : Yes No
 12.0 Gas Powered Actuator Requirement : Yes No
 13.0 Fire Resistant Design Requirement : **Type-Test as per Standard API 607/ BS:6755 (Part-II)**

14.0 Valve Testing Requirement

	Test Pressure (min.), kg/cm ² (g)	Minimum Duration, minutes
14.1 Hydrostatic Test Body	210	2
Seat	155	2
14.2 Air Test	7.0	15

- 15.0 Anti-Static Testing Requirement : **As per Standard BS:5351**

16.0 Valve Painting Specification

- 16.1 Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 909.
 16.2 Three coats of paint shall be applied with minimum thickness of 300 micron (Permissible thickness in each coat shall be within 80 to 120 micron).

- 17.0 Lock Open/ Lock Close Requirement : **As indicated in Material Requisition/ P&ID**

Notes:

- Material test certificates and hydrostatic test reports shall be furnished prior to despatch.
- Detailed dimensional drawings showing cross-section with part numbers and materials shall be submitted for Purchaser's approval prior to manufacture of the valves.
- All tests shall be as per BS:6755 (Part-I).
- Valves shall have ball position indicator.
- Stops shall be provided to ensure positive alignment of ball with ports and ensure proper installation of handle.
- Each valve shall be provided with a wrench.
- Valves shall be inspected and approved by Purchaser before despatch.
- Gland packing assembly shall permit repair of gland packing under full line pressure.
- Inspection and Testing shall be as per this specification, BS:6755 (Part-I) and other relevant standards.

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
SECTION: MINERALS & CHEMICALS						MECON LIMITED	
SPECIFICATION AND DATA SHEET FOR BALL VALVES (NB<2")						MECON LIMITED	
APPROVED						DATASHEET NO. : MEC/23TS/01/E5/D2/DRS/BV800-R0	
						REV 0	

- 1.0 Valve Manufacturer :
- 2.0 Valve Size (NB), mm (inch) **50 NB (2") to 200NB (8")** ANSI Rating : **600#** Design Standard : **API 6D**
- 3.0 MECON's Technical Specification No. : **MEC/TS/05/21/002, Rev-1**
- 4.0 Connecting Pipeline Design Pressure, bar : **92 bar** Design Temperature, °C : **-29 to 65° C**

5.0 Connecting Pipe Specification

- 5.1 Material **As per approved P&ID**
- 5.2 Diameter (OD), mm (inch) **As per approved P&ID**
- 5.3 Thickness, mm **As per approved P&ID**

6.0 Valve Construction Design

- 6.1. Bore : Reduced Full
- 6.2. End Connections Flanged
- 6.3. Flanges (wherever applicable) : a) RF FF RT NA
b) Serrated Smooth (125 to 200 microinches AARH) NA
- 6.4 Valve Type : **Trunnion Mounted**

7.0 Valve Material Specification

Part	Specified Material	Material Offered
7.1 Body	ASTM A216 Gr. WCB/ A234 Gr. WPB/ A350 Gr. LF2/ A352 Gr. LCB	
7.2 Ball(Solid)	[(ASTM A216 Gr. WCB/ A234 Gr. WPB/ A395)+75 microns ENP]/AISI 410	
7.3 Body Seat Rings	(AISI 4140 + 75 microns ENP)/ AISI 410	
7.4 Seat Seal	VITON	
7.5 Stem	(AISI 4140 + 75 microns ENP)/ AISI 410	
7.6 Stem Seals	VITON/ PTFE	
7.7 Stud Bolts/ Nuts	ASTM A193 Gr. B7/ A194 Gr. 2H	

- 8.0 Corrosion Allowance : **1.5 mm** Service :
- 9.0 Location : Above Ground Buried
- 10.0 Stem Extension Requirement : Yes No
- 11.0 Gear Operator Requirement : Yes No
- 12.0 Gas Powered Actuator Requirement : Yes No
- 13.0 Fire Resistant Design Requirement **API 6FA**

14.0 Valve Testing Requirement

		Test Pressure (min.), kg/cm ² (g)	Minimum Duration, minutes
14.1 Hydrostatic Test	Body	157	As per API 6D
	Seat	114	As per API 6D
14.2 Air Test		7	As per API 6D


- 15.0 Anti-Static Testing Requirement : **As per Standard API 6D (2002 Ed.)**

16.0 Valve Painting Specification

- 16.1 Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 909.
- 16.2 Three coats of paint shall be applied with minimum thickness of 300 micron (Permissible thickness in each coat shall be within 80 to 120 micron).
- 17.0 Lock Open/ Lock Close Requirement : **As indicated in Material Requisition**

Notes:

- This Valve Data Sheet shall be read in conjunction with MECON's Technical Specification No. MEC/TS/05/21/002, Rev-1
- Inspection and Testing shall be as per attached QAP, this Data Sheet, MECON's T.S., API 6D and other relevant standards.
- Stops shall be provided for positive alignment of ball with ports and ensure proper installation of handle.
- Short pattern valves as per API 6D are not permitted, only long pattern valves are to be supplied.
- Charpy V-notch test for body, ball, body seat rings, stem & studs/nuts shall be conducted as per relevant material code.
- Valve body material shall have a minimum yield strength of 2/3 of connecting pipe material yield strength.
- Ball & stem shall be ENP coated for minimum thickness of 80 microns

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.	
SECTION: MINERALS & CHEMICALS							MECON LIMITED	
REVISIONS								
DSGN								SPECIFICATION AND DATA SHEET FOR BALL VALVES (NB ≥ 2")
DRWN								
APPROVED						SCALE :	REV	
						DATA SHEET NO.MEC/23TS/01/E5/D2/DRS/BV600-R0	0	

- 1.0 Valve Manufacturer :
 2.0 Valve Size (NB), mm (inch) **50 NB (2") to 200 NB (8")** ANSI Rating : **300#** Design Standard : **API 6D**
 3.0 MECON's Technical Specification No. : **MEC/TS/05/21/002, Rev-1** Service
 4.0 Connecting Pipeline Design Pressure, kg/cm²(g) : **49** Design Temperature, °C : **-29 to 65° C**

5.0 **Connecting Pipe Specification :**

- 5.1 Material
 5.2 Diameter (OD), mm
 5.3 Thickness, mm

6.0 **Valve Construction Design**

- 6.1 Bore : Reduced Full
 6.2 End Connections **Flanged**
 6.3 Flanges (wherever applicable) : a) RF FF RTJ NA
 b) Serrated Smooth (125 to 200 microinches AARH) NA
 6.4 Valve Type : **Floating Ball Valve upto 4" and Trunnion Mounted for 6" and above**

7.0 **Valve Material Specification**

Part	Specified Material	Material Offered
7.1 Body	ASTM A 216 Gr. WCC/A 234 Gr. WPC/ASTM A 350 LF2/ A 352 Gr. LCB	
7.2 Ball(Solid)	ASTM A 216 Gr. WCC/A 234 Gr. WPC/ASTM A 350 LF2/ SS 316 with ENP coating*/ AISI 410	
7.3 Body Seat Rings	AISI 4140 + ENP coating*/AISI 410	
7.4 Seat Seal	VITON	
7.5 Stem	AISI 4140 + ENP coating*/AISI 410 (No casting)	
7.6 Stem Seals	VITON/PTFE	
7.7 Stud Bolts/ Nuts	ASTM A 193 Gr. B7/ A194 Gr. 2H	

- 8.0 Corrosion Allowance : **1.5 mm**
 9.0 Location : Above Ground Buried
 10.0 Stem Extension Requirement : Yes No
 11.0 Manual Hydraulic Operated Actuator Requirement : Yes No
 12.0 Gas Powered Actuator Requirement : Yes No
 13.0 Fire Resistant Design Requirement **API 6FA for Trunnion Mounted Ball Valve Design
As per API 607 for Floating Ball Valve Design**

14.0 **Valve Testing Requirement**

	Test Pressure (min.), kg/cm ² (g)	Minimum Duration, minutes
14.1 Hydrostatic Test Body	74	As per API 6D
Seat	56	As per API 6D
14.2 Air Test	7.0	As per API 6D

- 15.0 Anti-Static Testing Requirement : **As per Standard API 6D (2002 Ed.)**


16.0 **Valve Painting Specification**

- 16.1 Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 909.
 16.2 Three coats of paint shall be applied minimum thickness of 300 micron. (Permissible thickness in each coat shall be within 80 to 120 micron.)
 17.0 Lock Open/ Lock Close Requirement : **As indicated in Material Requisition**

Notes:

- This Valve Data Sheet shall be read in conjunction with MECON's Technical Specification No. MEC/TS/05/21/002, Rev-1
- Inspection and Testing shall be as per attached QAP, this Data Sheet, MECON's T.S., API 6D and other relevant standards.
- Stops shall be provided for positive alignment of ball with ports and ensure proper installation of handle.
- Short pattern valves as per API 6D are not permitted, only long pattern valves are to be supplied.
- Charpy V- notch test for body, ball, body seat rings, stem & studs/nuts will be conducted as per relevant material code.

* Ball & stem shall be ENP coated for minimum thickness of 80 microns.

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
SECTION: MINERALS & CHEMICALS							MECON LIMITED
	NAME	DATE	CHKD	DATE	SPECIFICATION AND DATA SHEET FOR BALL VALVES (NB > 2")		
DSGN							
DRWN						SCALE :	REV 0
APPROVED						DS NO. : MEC/23TS/01/E5/D2/DRS /BV300-R0	

- 1.0 Valve Manufacturer :
 2.0 Valve Size (NB), mm (inch) : **50 NB (2") to 200NB (8")** ANSI Rating : **150#** Design Standard : **API 6D**
 3.0 MECON's Technical Specification No. : **MEC/TS/05/21/002, Rev-1**
 4.0 Connecting Pipeline Design Pressure, bar : **19 bar** Design Temperature, °C : **-29 to 65° C**

5.0 **Connecting Pipe Specification**

- 5.1 Material
 5.2 Diameter (OD), mm (inch)
 5.3 Thickness, mm

6.0 **Valve Construction Design**

- 6.1 Bore : Reduced Full
 6.2 End Connections Flanged
 6.3 Flanges (wherever applicable) : a) RF FF RT NA
 b) Serrated Smooth (125 to 200 microns AARH) NA
 6.4 Valve Type : **Floating upto 6" and Trunnion Mounted 8" and above**

7.0 **Valve Material Specification**

Part	Specified Material	Material Offered
7.1 Body	ASTM A216 Gr. WCB/ A234 Gr. WPB/ A350 Gr. LF2/ A352 Gr. LCB	
7.2 Ball(Solid)	[(ASTM A216 Gr. WCB/ A234 Gr. WPB/ A395)+75 microns ENP]/AISI 410	
7.3 Body Seat Rings	(AISI 4140 + 75 microns ENP)/ AISI 410	
7.4 Seat Seal	VITON	
7.5 Stem	(AISI 4140 + 75 microns ENP)/ AISI 410	
7.6 Stem Seals	VITON/ PTFE	
7.7 Stud Bolts/ Nuts	ASTM A193 Gr. B7/ A194 Gr. 2H	

- 8.0 Corrosion Allowance : **1.5 mm** Service :
 9.0 Location : Above Ground Buried
 10.0 Stem Extension Requirement : Yes No
 11.0 Gear Operator Requirement : Yes No
 12.0 Gas Powered Actuator Requirement : Yes No
 13.0 Fire Resistant Design Requirement : **API 6FA for Trunion Mounted Ball Valve Design**
As per API 607 for Floating Ball Valve Design

14.0 **Valve Testing Requirement**

	Test Pressure (min.), kg/cm ² (g)	Minimum Duration, minutes
14.1 Hydrostatic Test Body	32	As per API 6D
Seat	23	As per API 6D
14.2 Air Test	7	As per API 6D

- 15.0 Anti-Static Testing Requirement : **As per Standard API 6D (2002 Ed.)**


16.0 **Valve Painting Specification**

- 16.1 Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 909.
 16.2 Three coats of paint shall be applied with minimum thickness of 300 micron (Permissible thickness in each coat shall be within 80 to 120 micron).

- 17.0 Lock Open/ Lock Close Requirement : **As indicated in Material Requisition/ P&ID**

Notes:

- This Valve Data Sheet shall be read in conjunction with MECON's Technical Specification No. MEC/TS/05/21/002, Rev-1
- Inspection and Testing shall be as per attached QAP, this Data Sheet, MECON's T.S., API 6D and other relevant standards.
- Stops shall be provided for positive alignment of ball with ports and ensure proper installation of handle.
- Short pattern valves as per API 6D are not permitted, only long pattern valves are to be supplied.
- Charpy V- notch test for body, ball, body seat rings, stem & studs/nuts will be conducted as per relevant material code.

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
SECTION: MINERALS & CHEMICALS							MECON LIMITED
SPECIFICATION AND DATA SHEET FOR BALL VALVES (NB > 2")							
DSGN							
DRWN							
APPROVED						DATA SHEET NO.:MEC/23TS/01/E5/D2/DRS/BV150-R0	REV 0

DATA SHEET FOR CHECK VALVE

ANNEXURE-I

- 1.0 Valve Manufacturer :
- 2.0 Service :
- 3.0 Valve Size (NB), mm (inch) : ANSI Rating : **800#** Design Standard : **API 6D**
- 4.0 MECON's Technical Specification No. : **Refer Technical Notes For Mechanical Items**
- 5.0 Connecting Pipeline Design Pressure, kg/cm²(g) : **N.A** Design Temperature, °C : **-29 to 65° C**

- 6.0 **Connecting Pipe Specification** : **N.A.**
- 6.1 Material :
- 6.2 Diameter (OD), mm (inch) :
- 6.3 Thickness, mm :

7.0 Valve Construction Design

- 7.1 Type :
- 7.2 End Connections :
 - Flanged both ends
 - Butt Weld both ends
 - Flanged one end, butt weld other end
 - Socket Weld as per ASME B 16.11

- 7.3 Flanges (wherever applicable) :
 - a) RF FF RTJ NA
 - b) Serrated Smooth (125 to 200 microinches AARH) NA

8.0 Valve Material Specification

Part	Specified Material	Material Offered (Equivalent or Superior)
8.1 Body	ASTM A 105	
8.2 Cover	ASTM A 105	
8.3 Disc/ Plates	(ASTM A 216 Gr. WCB + 13% Cr Steel Facing) / 13% Cr Steel (Stellited)	
8.4 Body Seat Rings (See Note-3)	ASTM A 216 Gr. WCB+13% Cr Steel Facing (Stellited)	
8.5 Disc Hinge	ASTM A 216 Gr. WCB	
8.6 Hinge Pin	13% Cr Steel (No Casting)	
8.7 Cover Stud Bolts	ASTM A 193 Gr. B7	
8.8 Nuts	ASTM A 194 Gr. 2H	
8.9 Cover Gasket	SS 304/316 Spiral Wound with C.A. Filler	
8.1 Spring	Inconel X-750	

- 9.0 Corrosion Allowance : **1.5 mm**
- 10.0 Location : Above Ground Buried
- 11.0 Stem Extension Requirement : **N.A.**
- 12.0 Gear Operator Requirement : **N.A.**
- 13.0 Gas Powered Actuator Requirement : **N.A.**
- 14.0 Fire Resistant Design Requirement : **N.A.**

15.0 Valve Testing Requirement


	Test Pressure (min.), kg/cm2(g)	Minimum Duration, minutes
15.1 Hydrostatic Test		
Body	210	API 6D
Seat	155	API 6D

16.0 Valve Painting Specification

- 16.1 Suitable for Environment Type :
- 16.2 Manufacturer's Painting Spec. No. :
- 17.0 Lock Open/ Lock Close Requirement : **N.A.**

Notes:

1. This Valve Data Sheet shall be read in conjunction with MECON's Technical Notes for Mechanical items
2. Inspection and Testing shall be as per this Data Sheet, MECON's Technical Notes for Mechanical items, BS 6755 (Part-1) and other relevant standards.
3. Seats shall be non-renewable integral type.
4. 5% of valves shall undergo ultrasonic examination.

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
SECTION MINERALS & CHEMICALS							MECON LIMITED
DSGN							
DRWN							
APPROVED						SCALE :	REV
						DATA SHEET NO.:MEC/23TS/01/E5/D2/DRS/CV800, R0	0

SPECIFICATION AND DATA SHEET FOR CHECK VALVES (NB < 2")

- 1.0 Valve Manufacturer :
- 2.0 Valve Size (NB), mm (inch) : ANSI Rating : **600#** Design Standard : **API 6D**
- 3.0 MECON's Technical Specification No. : **Refer Technical Notes For Mechanical Items**
- 4.0 Connecting Pipeline Design Pressure, kg/cm²(g) : **92** Design Temperature, °C : **-29 to 65**
- 5.0 **Connecting Pipe Specification** : **NA**
- 5.1 Material :
- 5.2 Diameter (OD), mm (inch) :
- 5.3 Thickness, mm :
- 6.0 **Valve Construction Design**
- 6.1 Port : Full Regular
- 6.2 End Connections : **Flanged both ends** **Flanged (as per ASME B16.5)**
: **Butt Weld both ends**
: **Flanged one end, butt weld other end**
- 6.3 Flanges (wherever applicable) : a) RF FF RTJ NA
b) Serrated Smooth (125 to 200 microinches AARH) NA
- 6.4 Valve Type: Swing/Dual Plate.

7.0 **Valve Material Specification**

Part	Specified Material	Material Offered (Equivalent or Superior)
7.1 Body	ASTM A 216 Gr. WCB	
7.2 Cover	ASTM A 216 Gr. WCB	
7.3 Disc/ Plates	(ASTM A 216 Gr. WCB + 13% Cr Steel Facing) / 13% Cr Steel	
7.4 Body Seat Rings (See Note-3)	ASTM A 216 Gr. WCB + 13% Cr Steel Facing	
7.5 Disc Hinge	ASTM A 216 Gr. WCB	
7.6 Hinge Pin	13% Cr Steel (No Casting)	
7.7 Cover Stud Bolts	ASTM A 193 Gr. B7	
7.8 Nuts	ASTM A 194 Gr. 2H	
7.9 Cover Gasket	SS 304 Spiral Wound with C.A. Filler	
7.10 Spring	Inconel X-750	

- 8.0 Corrosion Allowance : **1.5 mm** Service :
- 9.0 Location : Above Ground Buried
- 10.0 Stem Extension Requirement : **N.A.**
- 11.0 Gear Operator Requirement : **N.A.**
- 12.0 Gas Powered Actuator Requirement : **N.A.**
- 13.0 Fire Resistant Design Requirement : **N.A.**

14.0 **Valve Testing Requirement**


	Test Pressure (min.), kg/cm ² (g)	Minimum Duration, minutes
14.1 Hydrostatic Test		
Body	157	API 6D
Seat	114	API 6D

15.0 **Valve Painting Specification**

- 15.1 Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 909.
- 15.2 Three coats of paint shall be applied with minimum thickness of 300 micron. (Permissible thickness in each coat shall be within 80 to 120 micron.)
- 16.0 Lock Open/ Lock Close Requirement : **N.A.**

Notes:

- This Valve Data Sheet shall be read in conjunction with MECON's Technical Notes for Mechanical items.
- Inspection and Testing shall be as per this Data Sheet, MECON's T.S., API 6D and other relevant standards.
- Seats shall be non-renewable integral type.
- Charpy V- notch test for body, ball, body seat rings, stem & studs/nuts will be conducted as per relevant material code or as per clause 3.4 of TS MEC/TS/05/21/004, Rev2as applicable..

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
SECTION MINERALS & CHEMICALS						 MECON LIMITED	
DSGN							
DRWN							
APPROVED						SCALE :	REV
						DATA SHEET NO.:MEC/23TS/01/E5/D2/DRS/CV600, R0	0

- 1.0 Valve Manufacturer :
- 2.0 Valve Size (NB), mm (inch) : ANSI Rating : **300#** Design Standard : **API 6D**
- 3.0 MECON's Technical Specification No. : **Refer Technical Notes For Mechanical Items**
- 4.0 Connecting Pipeline Design Pressure, kg/cm²(g) : **49** Design Temperature, °C : **-29 to 65° C**
- 5.0 **Connecting Pipe Specification** : **NA**
- 5.1 Material :
- 5.2 Diameter (OD), mm (inch) :
- 5.3 Thickness, mm :
- 6.0 **Valve Construction Design**
- 6.1 Port : Full Regular
- 6.2 End Connections : **Flanged both ends** **Flanged (as per ASME B16.5)**
: **Butt Weld both ends**
: **Flanged one end, butt weld other end**
- 6.3 Flanges (wherever applicable) : a) RF FF RTJ NA
b) Serrated Smooth (125 to 200 microinches AARH) NA
- 6.4 Valve Type: Swing/Dual Plate.
- 7.0 **Valve Material Specification**

Part	Specified Material	Material Offered (Equivalent or Superior)
7.1 Body	ASTM A 216 Gr. WCB	
7.2 Cover	ASTM A 216 Gr. WCB	
7.3 Disc/ Plates	(ASTM A 216 Gr. WCB + 13% Cr Steel Facing) / 13% Cr Steel	
7.4 Body Seat Rings (See Note-3)	ASTM A 216 Gr. WCB + 13% Cr Steel Facing	
7.5 Disc Hinge	ASTM A 216 Gr. WCB	
7.6 Hinge Pin	13% Cr Steel (No Casting)	
7.7 Cover Stud Bolts	ASTM A 193 Gr. B7	
7.8 Nuts	ASTM A 194 Gr. 2H	
7.9 Cover Gasket	SS 304 Spiral Wound with C.A. Filler	
7.10 Spring	Inconel X-750	

- 8.0 Corrosion Allowance : **1.5 mm** Service :
- 9.0 Location : Above Ground Buried
- 10.0 Stem Extension Requirement : **N.A.**
- 11.0 Gear Operator Requirement : **N.A.**
- 12.0 Gas Powered Actuator Requirement : **N.A.**
- 13.0 Fire Resistant Design Requirement : **N.A.**

14.0 **Valve Testing Requirement**


	Test Pressure (min.), kg/cm ² (g)	Minimum Duration, minutes
14.1 Hydrostatic Test		
Body	74	API 6D
Seat	56	API 6D

15.0 **Valve Painting Specification**

- 15.1 Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 909.
- 15.2 Three coats of paint shall be applied with minimum thickness of 300 micron. (Permissible thickness in each coat shall be within 80 to 120 micron.)
- 16.0 Lock Open/ Lock Close Requirement : **N.A.**

Notes:

- This Valve Data Sheet shall be read in conjunction with MECON's Technical Notes for Mechanical items.
- Inspection and Testing shall be as per this Data Sheet, MECON's T.S., API 6D and other relevant standards.
- Seats shall be non-renewable integral type.
- Charpy V- notch test for body, ball, body seat rings, stem & studs/nuts will be conducted as per relevant material code or as per clause 3.4 of TS MEC/TS/05/21/004, Rev2as applicable..

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
SECTION MINERALS & CHEMICALS					 MECON LIMITED		
SPECIFICATION AND DATA SHEET FOR CHECK VALVES (NB > 2")							
NAME	DATE	CHKD	DATE				
DSGN						SCALE :	
DRWN						DATA SHEET NO.:MEC/23RT/01/E5/D2/DRS /CV300, R0	
APPROVED						REV	0

DATA SHEET FOR CHECK VALVE

ANNEXURE-I

1.0 Valve Manufacturer :
 2.0 Service :
 3.0 Valve Size (NB), mm (inch) : ANSI Rating : **150#** Design Standard : **API 6D/ BS:1868/API 594**
 4.0 MECON's Technical Specification No. : **Refer Technical Notes For Mechanical Items**
 5.0 Connecting Pipeline Design Pressure, kg/cm²(g) : **19** Design Temperature, °C : **-29 to 65**

6.0 **Connecting Pipe Specification** : **N.A.**
 6.1 Material :
 6.2 Diameter (OD), mm (inch) :
 6.3 Thickness, mm :

7.0 **Valve Construction Design**
 7.1 Type :

7.2 End Connections : **Flanged both ends** **Flanged as per ASME B 16.5**
 : **Butt Weld both ends**
 : **Flanged one end, butt weld other end**
 : **Socket Weld as per ASME B 16.11**

7.3 Flanges (wherever applicable) : a) RF FF RTJ NA
 b) Serrated Smooth (125 to 200 microinches AARH) NA

8.0 Valve Material Specification

Part	Specified Material	Material Offered (Equivalent or Superior)
8.1 Body	ASTM A 216 Gr.WCB	
8.2 Cover	ASTM A 216 Gr.WCB	
8.3 Disc/ Plates	(ASTM A 216 Gr. WCB + 13% Cr Steel Facing) / 13% Cr Steel (Stellited)	
8.4 Body Seat Rings (See Note-3)	ASTM A 216 Gr. WCB+13% Cr Steel Facing (Stellited)	
8.5 Disc Hinge	ASTM A 216 Gr. WCB/ A 515 Gr. 70/ 13% Cr Steel	
8.6 Hinge Pin	13% Cr Steel (No Casting)	
8.7 Cover Stud Bolts	ASTM A 193 Gr. B7	
8.8 Nuts	ASTM A 194 Gr. 2H	
8.9 Cover Gasket	SS 304/316 Spiral Wound with C.A. Filler	
8.1 Spring	Inconel X-750	

9.0 Corrosion Allowance : **1.5 mm**
 10.0 Location : Above Ground Buried
 11.0 Stem Extension Requirement : **N.A.**
 12.0 Gear Operator Requirement : **N.A.**
 13.0 Gas Powered Actuator Requirement : **N.A.**
 14.0 Fire Resistant Design Requirement : **N.A.**

15.0 Valve Testing Requirement


	Test Pressure (min.), kg/cm ² (g)	Minimum Duration, minutes
15.1 Hydrostatic Test		
Body	32	API 6D
Seat	23	API 6D

16.0 Valve Painting Specification

16.1 Suitable for Environment Type :
 16.2 Manufacturer's Painting Spec. No. :
 17.0 Lock Open/ Lock Close Requirement : **N.A.**

Notes:

- This Valve Data Sheet shall be read in conjunction with MECON's Technical Notes for Mechanical items.
- Inspection and Testing shall be as per this Data Sheet, MECON's Technical Notes for Mechanical items, API 6D, BS 6755 (Part-1) and other relevant standards.
- Seats shall be non-renewable integral type.
- 5% of valves shall undergo radiographic examination.

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
SECTION MINERALS & CHEMICALS						 MECON LIMITED	
REVISIONS							
DSGN							
DRWN							
<p align="center">SPECIFICATION AND DATA SHEET FOR CHECK VALVES (NB > 2")</p>						SCALE :	REV
APPROVED						DATA SHEET NO.:MEC/23TS/01/E5/D2/DRS /CV150, R0	0

DATA SHEET FOR GLOBE VALVES

ANNEXURE-I


1. Valve Manufacturer : _____
2. Size : _____ Rating : **ANSI 800#** Design Standard : **BS:1873**
3. Purchaser's Specification : **Refer Technical notes for Gate & Globe Valves**
4. Design Pressure : -- Design Temperature : **-29°C to + 65°C**
5. Corrosion Allowance : **1.5mm** Service : **Natural Gas**
6. End Connections : Flanged both ends as per ASME B 16.5
 Butt Weld both ends
 Flanged one end butt weld other end
7. Flanges (where applicable) : a) RF FF RTJ
 b) Serrated Smooth (125 to 200 AARH)
8. Pipe Specification : **N.A**
9. Valve Material Specification (or Equivalent/ Superior) : _____ Material Offered
- a) Body : **ASTM A216 Gr. WCB/ A234 Gr. WPB**
- b) Bonnet (Bolted) : **ASTM A216 Gr. WCB/ A234 Gr. WPB**
- c) Stem (Rising) : **SS 304 (No casting)** :
- b) Disc(Loose Plug/Ball Type) : **SS 304 with ENP coating*** :
- e) Body Seat Ring : **SS 304** :
- f) Stem Packing (Renewable : Graphited Braided Asbestos with sacrificial :
 with valve open on stream) inhibitor & Inconel wire reinforcement
- g) Hand Wheel (Rising) : Malleable Iron/ Cast Steel/ Fab. Steel :
- h) Bonnet Bolts : ASTM A193 Gr.B7 :
- i) Bonnet Nuts : ASTM A194 Gr. 2H :
- j) Bonnet Gasket : Spiral Wound SS 316 + CA Filler :
10. Hydrostatic Test Pressure
- a) Body : 157 kg/cm²(g)
- b) Seat : 114 kg/cm²(g)
11. Test Pressure with Air : 7.0 kg/cm²(g)

Notes:

- Testing shall be as per BS:6755 (Part-I)
- Bidder shall clearly write all/ any deviation against each part/ material of valve in the space provided for . Wherever bidder agrees with MECON's data sheet, bidder shall clearly indicate "agreed".
- Charpy V- notch test for body, ball, gland, stem & studs/ nuts will be conducted as the above material code i.e; at -29°C on three samples having average value of 35J and minimum value shall be 28J.
 * Minimum thickness of ENP coating shall be 80 microns.

Painting Specifications:

- Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 909.
- Three coats of paint shall be applied with minimum thickness of 300 micron. (Permissible thickness in each coat shall be within 80 to 120 micron.)

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
SECTION: MINERALS & CHEMICALS							MECON LIMITED
	NAME	DATE	CHKD	DATE			
DSGN							
DRWN							
APPROVED						SCALE :	REV
						DATA SHEET NO. MEC/23TS/01/E5/D2/DRS /PV800, REV-0	0

**SPECIFICATION AND
DATA SHEET FOR GLOBE VALVES**

DATA SHEET FOR GLOBE VALVES

ANNEXURE-I


1. Valve Manufacturer : _____
2. Size : _____ Rating : **ANSI 600#** Design Standard : **BS:1873**
3. Purchaser's Specification : **Refer Technical notes for Globe Valves**
4. Design Pressure : **92 kg/cm²(g)** Design Temperature : **-29°C to + 65°C**
5. Corrosion Allowance : **1.5mm** Service : **Natural Gas**
6. End Connections : Flanged both ends as per ASME B 16.5
 Butt Weld both ends
 Flanged one end butt weld other end
7. Flanges (where applicable) : a) RF FF RTJ
 b) Serrated Smooth (125 to 200 AARH)
8. Pipe Specification : **N.A**
9. Valve Material Specification (or Equivalent/ Superior) : _____ Material Offered
 a) Body : **ASTM A216 Gr. WCB/ A234 Gr. WPB**
 b) Bonnet (Bolted) : **ASTM A216 Gr. WCB/ A234 Gr. WPB**
 c) Stem (Rising) : **SS 304 (No casting)** : _____
 b) Disc(Loose Plug/Ball Type) : **SS 304 with ENP coating*** : _____
 e) Body Seat Ring : **SS 304** : _____
 f) Stem Packing (Renewable with valve open on stream) : Graphited Braided Asbestos with sacrificial inhibitor & Inconel wire reinforcement : _____
 g) Hand Wheel (Rising) : Malleable Iron/ Cast Steel/ Fab. Steel : _____
 h) Bonnet Bolts : ASTM A193 Gr.B7 : _____
 i) Bonnet Nuts : ASTM A194 Gr. 2H : _____
 j) Bonnet Gasket : Spiral Wound SS 316 + CA Filler : _____
10. Hydrostatic Test Pressure
 a) Body : 157 kg/cm²(g)
 b) Seat : 114 kg/cm²(g)
11. Test Pressure with Air : 7.0 kg/cm²(g)

Notes:

1. Testing shall be as per BS:6755 (Part-I)
2. Bidder shall clearly write all/ any deviation against each part/ material of valve in the space provided for . Wherever bidder agrees with MECON's data sheet, bidder shall clearly indicate "agreed".
3. Charpy V- notch test for body, ball, gland, stem & studs/ nuts will be conducted as the above material code i.e; at -29°C on three samples having average value of 35J and minimum value shall be 28J.
 * Minimum thickness of ENP coating shall be 80 microns.

Painting Specifications:

1. Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 909.
2. Three coats of paint shall be applied with minimum thickness of 300 micron. (Permissible thickness in each coat shall be within 80 to 120 micron.)

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD
SECTION: MINERALS & CHEMICALS					
	NAME	DATE	CHKD	DATE	REFERENCES
DSGN					 MECON LIMITED
DRWN					
SPECIFICATION AND DATA SHEET FOR GLOBE VALVES					SCALE :
APPROVED					DATA SHEET NO. MEC/23TS/01/E5/D2/DRS/PV600, REV-0
					REV 0

DATA SHEET FOR GLOBE VALVES

ANNEXURE-I


- 1. Valve Manufacturer : _____
- 2. Size : _____ Rating : **ANSI 300#** Design Standard : **BS:1873**
- 3. Purchaser's Specification : **Refer Technical notes for Globe Valves**
- 4. Design Pressure : **46 kg/cm²(g)** Design Temperature : **-29°C to + 65°C**
- 5. Corrosion Allowance : **1.5mm** Service : **Natural Gas**
- 6. End Connections : Flanged both ends as per ASME B 16.5
 Butt Weld both ends
 Flanged one end butt weld other end
- 7. Flanges (where applicable) : a) RF FF RTJ
 b) Serrated Smooth (125 to 200 AARH)
- 8. Pipe Specification : **N.A**
- 9. Valve Material Specification (or Equivalent/ Superior) : _____ Material Offered
 a) Body : **ASTM A216 Gr. WCB/ A234 Gr. WPB**
 b) Bonnet (Bolted) : **ASTM A216 Gr. WCB/ A234 Gr. WPB**
 c) Stem (Rising) : **SS 304 (No casting)** : _____
 b) Disc(Loose Plug/Ball Type) : **SS 304 with ENP coating*** : _____
 e) Body Seat Ring : **SS 304** : _____
 f) Stem Packing (Renewable : Graphited Braided Asbestos with sacrificial : _____
 with valve open on stream) inhibitor & Inconel wire reinforcement
 g) Hand Wheel (Rising) : Malleable Iron/ Cast Steel/ Fab. Steel : _____
 h) Bonnet Bolts : ASTM A193 Gr.B7 : _____
 i) Bonnet Nuts : ASTM A194 Gr. 2H : _____
 j) Bonnet Gasket : Spiral Wound SS 316 + CA Filler : _____
- 10. Hydrostatic Test Pressure
 a) Body : 78 kg/cm²(g)
 b) Seat : 57 kg/cm²(g)
- 11. Test Pressure with Air : 7.0 kg/cm²(g)

Notes:

- 1 Testing shall be as per BS:6755 (Part-I)
- 2 Bidder shall clearly write all/ any deviation against each part/ material of valve in the space provided for .
 Wherever bidder agrees with MECON's data sheet, bidder shall clearly indicate "agreed".
- 3 Charpy V- notch test for body, ball, gland, stem & studs/ nuts will be conducted as the above material code i.e; at -29°C on three samples having average value of 35J and minimum value shall be 28J.
 * Minimum thickness of ENP coating shall be 80 microns.

Painting Specifications:

- 1 Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 909.
- 2 Three coats of paint shall be applied with minimum thickness of 300 micron. (Permissible thickness in each coat shall be within 80 to 120 micron.)

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD		
SECTION: MINERALS & CHEMICALS							
	NAME	DATE	CHKD	DATE			
DSGN							
DRWN							
APPROVED			SPECIFICATION AND DATA SHEET FOR GLOBE VALVES		DRG. NO. MECON LIMITED		
						SCALE :	REV 0
						DATA SHEET NO. MEC/23TS/01/E5/D2/DRS/GLV300, REV-0	

DATA SHEET FOR GLOBE VALVES

ANNEXURE-I


1. Valve Manufacturer : _____
2. Size : _____ Rating : **ANSI 150#** Design Standard : **BS:1873**
3. Purchaser's Specification : **Refer Technical notes for Globe Valves**
4. Design Pressure : **19 kg/cm²(g)** Design Temperature : **-29°C to + 65°C**
5. Corrosion Allowance : **1.5mm** Service : **Natural Gas**
6. End Connections : Flanged both ends as per ASME B 16.5
 Butt Weld both ends
 Flanged one end butt weld other end
7. Flanges (where applicable) : a) RF FF RTJ
 b) Serrated Smooth (125 to 200 AARH)
8. Pipe Specification : **N.A**
9. Valve Material Specification (or Equivalent/ Superior) : _____ Material Offered
 - a) Body : **ASTM A216 Gr. WCB/ A234 Gr. WPB**
 - b) Bonnet (Bolted) : **ASTM A216 Gr. WCB/ A234 Gr. WPB**
 - c) Stem (Rising) : **SS 304 (No casting)** :
 - b) Disc(Loose Plug/Ball Type) : **SS 304 with ENP coating*** :
 - e) Body Seat Ring : **SS 304** :
 - f) Stem Packing (Renewable with valve open on stream) : Graphited Braided Asbestos with sacrificial inhibitor & Inconel wire reinforcement
 - g) Hand Wheel (Rising) : Malleable Iron/ Cast Steel/ Fab. Steel :
 - h) Bonnet Bolts : ASTM A193 Gr.B7 :
 - i) Bonnet Nuts : ASTM A194 Gr. 2H :
 - j) Bonnet Gasket : Spiral Wound SS 316 + CA Filler :
10. Hydrostatic Test Pressure
 - a) Body : 32 kg/cm²(g)
 - b) Seat : 23 kg/cm²(g)
11. Test Pressure with Air : 7.0 kg/cm²(g)

Notes:

- 1 Testing shall be as per BS:6755 (Part-I)
- 2 Bidder shall clearly write all/ any deviation against each part/ material of valve in the space provided for .
Wherever bidder agrees with MECON's data sheet, bidder shall clearly indicate "agreed".
- 3 Charpy V- notch test for body, ball, gland, stem & studs/ nuts will be conducted as the above material code i.e; at -29°C on three samples having average value of 35J and minimum value shall be 28J.
* Minimum thickness of ENP coating shall be 80 microns.

Painting Specifications:

- 1 Surface preparation by Short Blasting as per grade SA 2 1/2, Swedish Standard SIS-055 909.
- 2 Three coats of paint shall be applied with minimum thickness of 300 micron. (Permissible thickness in each coat shall be within 80 to 120 micron.)

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD
SECTION: MINERALS & CHEMICALS					
	NAME	DATE	CHKD	DATE	
DSGN					
DRWN					
APPROVED			SPECIFICATION AND DATA SHEET FOR GLOBE VALVES		DRG. NO. MECON LIMITED
			DATA SHEET NO. MEC/23TS/01/E5/D2/DRS/GLV150, REV-0		

1.0 Valve Manufacturer :
 2.0 Valve Size (NB), mm (inch) : ANSI Rating : **600#** Design Standard : **API 6D**
 3.0 MECON's Technical Specification No. : **MEC/TS/05/62/003, Rev-2**
 4.0 Connecting Pipeline Design Pressure, kg/cm²(g) **92** Design Temperature, °C : **-29 TO 65**

5.0 Connecting Pipe Specification

5.1 Material
 5.2 Diameter (OD), mm (inch)
 5.3 Thickness, mm

6.0 Valve Construction Design

6.1 Pattern : Short Regular Venturi
 6.2 End Connections : **Flanged both ends** But Weld (as per ASME B16.25)
 : **Butt Weld both ends**
 : **Flanged one end, butt weld other end**
 6.3 Flanges (wherever applicable) : a) RF FF RTJ NA
 b) Serrated Smooth (125 to 200 microinches AARH) NA

7.0 Valve Material Specification

Part	Material
7.1 Body	ASTM A216 Gr. WCC/A350 LF2/A352 LCB
7.2 Plug	ASTM A216 Gr. WCC/A350 LF2/A352 LCB + 75 microns ENP
7.3 Cover	ASTM A216 Gr. WCC/A350 LF2/A352 LCB
7.4 Stem	AISI 4140 + 75 microns ENP
7.5 Stud Bolts/ Nuts	ASTM A193 Gr. B7/ A194 Gr. 2H

8.0 Corrosion Allowance : **1.5 mm** Service :
 9.0 Location : Above Ground Buried
 10.0 Stem Extension Requirement : Yes No
 11.0 Gear Operator Requirement : Yes No
 12.0 Gas Powered Actuator Requirement : Yes No
 13.0 Fire Resistant Design Requirement : **Type-Test as per Standard API 6FA/ BS:6755 (Part-II)**

14.0 Valve Testing Requirement


	Test Pressure (min.), kg/cm ² (g)	Minimum Duration, minutes
14.1 Hydrostatic Test Body	157	As per API 6D
Seat	114	As per API 6D
14.2 Air Test	7	As per API 6D

15.0 Valve Painting Specification

15.1 Suitable for Environment Type :
 15.2 Manufacturer's Painting Spec. No. : **Manufacturer to furnish**
 16.0 Lock Open/ Lock Close Requirement : **As indicated in Material Requisition**

Notes:

- This Valve Data Sheet shall be read in conjunction with MECON's Technical Specification No. MEC/TS/05/62/003, Rev-2
- Inspection and Testing shall be as per attached QAP, this Data Sheet, MECON's T.S., API 6D and other relevant standards.
- Stops shall be provided for positive alignment of plug with ports and ensure proper installation of handle.
- Charpy V- notch test for body, ball, body seat rings, stem & studs/nuts shall be conducted at -29deg C on three samples having average value of 27 J & minimum value of shall be 20 J

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
SECTION: MINERALS & CHEMICALS							MECON LIMITED
SPECIFICATION AND DATA SHEET FOR PLUG VALVES (NB > 2")							
DSGN							
DRWN							
APPROVED						SCALE : DATA SHEET NO.:MEC/23TS/01/E5/D2/DRS/PV600, REV-0	REV 0

1.0 Valve Manufacturer :
 2.0 Valve Size (NB), mm (inch) : ANSI Rating : **300#** Design Standard : **API 6D**
 3.0 MECON's Technical Specification No. : **MEC/TS/05/62/003, Rev-2**
 4.0 Connecting Pipeline Design Pressure, kg/cm²(g) : **49** Design Temperature, °C : **-29 to 65**

5.0 Connecting Pipe Specification

5.1 Material
 5.2 Diameter (OD), mm (inch)
 5.3 Thickness, mm

6.0 Valve Construction Design

6.1. Pattern : Short Regular Venturi
 6.2. End Connections : **Flanged both ends** But Weld (as per ASME B16.25)
 : **Butt Weld both ends**
 : **Flanged one end, butt weld other end**
 6.3. Flanges (wherever applicable) : a) RF FF RTJ NA
 b) Serrated Smooth (125 to 200 microinches AARH) NA

7.0 Valve Material Specification

Part	Material
7.1 Body	ASTM A216 Gr. WCC/A350 LF2/A352 LCB
7.2 Plug	ASTM A216 Gr. WCC/A350 LF2/A352 LCB + 75 microns ENP
7.3 Cover	ASTM A216 Gr. WCC/A350 LF2/A352 LCB
7.4 Stem	AISI 4140 + 75 microns ENP
7.5 Stud Bolts/ Nuts	ASTM A193 Gr. B7/ A194 Gr. 2H

8.0 Corrosion Allowance : **1.5 mm** Service :
 9.0 Location : Above Ground Buried
 10.0 Stem Extension Requirement : Yes No
 11.0 Gear Operator Requirement : Yes No
 12.0 Gas Powered Actuator Requirement : Yes No
 13.0 Fire Resistant Design Requirement : **Type-Test as per Standard API 6FA/ BS:6755 (Part-II)**

14.0 Valve Testing Requirement


	Test Pressure (min.), kg/cm2(g)	Minimum Duration, minutes
14.1 Hydrostatic Test	Body	74
	Seat	56
14.2 Air Test	7.0	As per API 6D

15.0 Valve Painting Specification

15.1 Suitable for Environment Type :
 15.2 Manufacturer's Painting Spec. No. : **Manufacturer to furnish**
 16.0 Lock Open/ Lock Close Requirement : **As indicated in Material Requisition**

Notes:

1. This Valve Data Sheet shall be read in conjunction with MECON's Technical Specification No. MEC/TS/05/62/003, Rev-2
2. Inspection and Testing shall be as per attached QAP, this Data Sheet, MECON's T.S., API 6D and other relevant standards.
3. Stops shall be provided for positive alignment of plug with ports and ensure proper installation of handle.
4. Charpy V- notch test for body, ball, body seat rings, stem & studs/nuts shall be conducted at -29deg C on three samples having average value of 27 J & minimum value of shall be 20 J

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
SECTION: MINERALS & CHEMICALS							MECON LIMITED
REVISIONS							
NAME	DATE	CHKD	DATE	SPECIFICATION AND DATA SHEET FOR PLUG VALVES (NB ≥ 2")			
DSGN						SCALE :	REV
DRWN						DATA SHEET NO.:MEC/23TS/01/E5/D2/DRS/PV300, REV-0	0
APPROVED							

- 1.0 Valve Manufacturer :
 2.0 Valve Size (NB), mm (inch) : ANSI Rating : **150#** Design Standard : **API 6D**
 3.0 MECON's Technical Specification No. : **MEC/TS/05/62/003, Rev-2**
 4.0 Connecting Pipeline Design Pressure, kg/cm²(g) : **19** Design Temperature, °C : **-29 TO 65 °C**

5.0 Connecting Pipe Specification

- 5.1 Material
 5.2 Diameter (OD), mm (inch)
 5.3 Thickness, mm

6.0 Valve Construction Design

- 6.1. Pattern : Short Regular Venturi
 6.2. End Connections : **Flanged both ends** Butt Weld (as per ASME B16.25)
 : **Butt Weld both ends**
 : **Flanged one end, butt weld other end**
 6.3. Flanges (wherever applicable) : a) RF FF RTJ NA
 b) Serrated Smooth (125 to 200 microinches AARH) NA

7.0 Valve Material Specification

Part	Material
7.1 Body	ASTM A216 Gr. WCB
7.2 Plug	ASTM A216 Gr. WCB + 75 microns ENP
7.3 Cover	ASTM A216 Gr. WCB/ ASTM A516 Gr. 70
7.4 Stem	AISI 4140 + 75 microns ENP
7.5 Stud Bolts/ Nuts	ASTM A193 Gr. B7/ A194 Gr. 2H

- 8.0 Corrosion Allowance : **1.5 mm** Service :
 9.0 Location : Above Ground Buried
 10.0 Stem Extension Requirement : Yes No
 11.0 Gear Operator Requirement : Yes No
 12.0 Gas Powered Actuator Requirement : Yes No
 13.0 Fire Resistant Design Requirement : **Type-Test as per Standard API 6FA/ BS:6755 (Part-II)**

14.0 Valve Testing Requirement


	Test Pressure (min.), kg/cm2(g)	Minimum Duration, minutes
14.1 Hydrostatic Test	Body	32
	Seat	23
14.2 Air Test	7	As per API 6D

15.0 Valve Painting Specification

- 15.1 Suitable for Environment Type :
 15.2 Manufacturer's Painting Spec. No. : **Manufacturer to furnish**
 16.0 Lock Open/ Lock Close Requirement : **As indicated in Material Requisition**

Notes:

1. This Valve Data Sheet shall be read in conjunction with MECON's Technical Specification No. MEC/TS/05/62/003, Rev2
2. Inspection and Testing shall be as per attached QAP, this Data Sheet, MECON's T.S., API 6D and other relevant standards.
3. Stops shall be provided for positive alignment of plug with ports and ensure proper installation of handle.
4. Charpy V- notch test for body, ball, body seat rings, stem & studs/nuts shall be conducted at -29deg C on three samples having average value of 27 J & minimum value of shall be 20 J

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
REVISIONS						REFERENCES	
SECTION MINERALS & CHEMICALS						MECON LIMITED	
	NAME	DATE	CHKD	DATE	 SPECIFICATION AND DATA SHEET FOR PLUG VALVES (NB > 2")		
DSGN							
DRWN					SCALE :		REV
APPROVED						DATA SHEET NO.:MEC/23TS/01/E5/D2/DRS/PV150, REV-0	
						0	


PRESSURE SAFETY AND RELIEF VALVES

UNITS : Flow > Liquid - m³/hr , Gas-Sm³/day, Steam - kg/hr. Pressure -> kg/cm²g, Temperature-°C, Level/ Length-> mm

General	01	Tag No.	PSV-**	CRV-**				
	02	Line No./ Size	**	**				
	03	Vessel Protected	Cartridge Filter	-				
	04	Quantity & Size	** (Note 7)	** (Note 7)				
	05	Safety/ Relief	Safety Relief	CREEP RELIEF				
Valve	06	Vendor	†	†				
	07	Type	Standard	Standard				
	08	Full Nozzle Full Lift Mod. Nozzle	Full Nozzle Full Lift	Full Nozzle Full Lift				
	09	Bonnet Type	Closed	Closed				
	10	Conv./ Bellows/ Pilot Operated	Conventional	Conventional				
	11	Inlet Conn. : Size & Rating	†	†				
	12	Inlet Conn. : Facing & Finish	RF, †	RF, †				
	13	Outlet Conn. : Size & Rating	†	†				
	14	Outlet Conn. : Facing & Finish	RF, †	RF, †				
	15	Cap Over Adj. Bolt :	Required	Required				
Material	16	Screwed / Bolted	Bolted	Bolted				
	17	Lifting Gear - Type	-	-				
	18	Test Gag	Required	Required				
	19	Body and Bonnet	ASTM A216 Gr. WCB	ASTM A216 Gr. WCB				
	20	Nozzle and Disc	SS 316	SS 316				
Options	21	Spring	SS 316/Ni-Cd	SS 316/Ni-Cd				
	22	Bellows						
	23							
	24							
Basis	25	Resilient Seat Seal	†	†				
	26							
	27							
Service Conditions	28	Code	API 520 & 526	API 520 & 526				
	29	Basis of Selection	Vessel Under Ext. Fire	CREEP RELIEF				
Orifice	30							
	31	Fluid and State	Natural Gas Vapour	Natural Gas Vapour				
	32	Corrosive Constituent/ Corr. Allow.	CO ₂ (0.27%)(max.)/ 2 mm	CO ₂ (0.27%)(max.)/ 2 mm				
	33	Required Flow Capacity MMSCMD	**	**	1% OF MAX.FLOW CAPACITY			
	34	Mol. Wgt. S.G. at Rel. Temp.	#	#				
	35	Oper. Pressure, kg/cm ² g	**	**				
	36	Oper. Temp.°C Rel. Temp.°C	5 - 45	65	5 - 45	65		
	37	Valve Discharges to	Atm.	Atm.				
	38	Back Press. Const. Or Variable	Atm.	Constant	Atm.	Constant		
	39	Set Pressure, kg/cm ² g	49	10				
	40	Cold Bench Test Pressure	†	†				
	41	% Over Pressure % Blow Down	20	†	10	†		
	42	Cp/Cv Compressibility Factor	#	#	#	#		
	43	Viscosity at Rel. Temp. (cP)	#	#				
	44	Vess. : Wall Temp.,°C \$ Surf. Area-m ²	593	†	-	-		
45								
46	Calculated Area-inch ²	†	†					
47	Sel. Area-inch ² Orifice Design	†	†	†	†			
48	No. of Valves Req'd. for capacity	†	†					
49	Total Area-inch ²	†	†					
50	Actual Flow Capacity, SCFM	-	†					
51	Relief Load	†	-					
52	Model No.	†	†					
53	Radiography	Req'd. (100%)	Req'd. (100%)					
54	IBR Certification	Not Required	Not Required					

Notes:

- † VENDOR TO SPECIFY/ CONFIRM,*** As per P& ID, #Refer Annexure -II
- VENDOR SHALL FURNISH SIZING CALCULATIONS TO SUPPORT OF THIS VALVE SELECTION.
- VALVES SHALL BE 100% RADIOGRAPHED
- VENDOR TO CONSIDER COEFFICIENT OF DISCHARGE DERATED BY A FACTOR OF 0.9 AS PER ASME-VIII
- FOR SAFETY VALVE SIZING, FURNISH CERTIFIED CAPACITIES AS PER API-520.
- PSVs & CRVs SHALL BE SUPPLIED WITH INLET & OUTLET COMPANION FLANGES.
- VENDOR TO CONSIDER HYDRO-TEST PRESSURE 1.5 TIMES OF DESIGN PRESSURE
- DESIGNATION, NO. & RATING OF PSVs & CRVs SHALL BE DECIDED DURING DETAILED ENGINEERING.

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
SECTION : MINERALS & CHEMICALS							MECON LIMITED
REVISIONS							
DSGN	NAME	DATE	CHKD	DATE			
DRWN							
APPROVED						SCALE :	REV
						DATA SHEET NO. : MEC/23TS/01/E5/D2/DRS/PSVCRV, REV-0	0

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**CITY GAS DISTRIBUTION PROJECT AT
EAST & WEST GADAVARI DISTRICTS**

Supply of District Regulatory Skid (DRS)
Bid Document No.: MEC/23TS/01/ 1 /S2/DRS/SU/0003




ANNEXURE - II

DATA SHEET FOR CARTRIDGE FILTER

- 1.0 Tag No. : CF- ****
- 2.0 QUANTITY :** As per P&ID
- 3.0 VENDOR :** †
- 4.0 OPERATING CONDITIONS :**
- 4.1 ITEM : CARTRIDGE FILTER** TYPE : HORIZONTAL/VERTICAL
- 4.2 FLUID HANDLED : NATURAL GAS** FLOW RATE (SCMH) : **
- 4.3 MOLECULAR WEIGHT : #** FLUID VISC, CENTI-POISE : 0.012 - 0.013
- 4.4 Cp/Cv : #** COMPRESSIBILITY FACTOR : #
- 4.5 INLET SIZE : **** OUTLET SIZE : **
- 4.6 OPER. PR. KG/CM2(G) : **** OPER. TEMP., °C : 40
- 4.7 PARTICLE/ MESH SIZE, MICRON < 5MICRON** FILTRATION EFF. % : 98
- 4.8 PR. DROP KG/CM², CLEAN/ DIRTY : 0.2/ 0.5** DUST CONC : 0 - 0.1 mg/SM³ OF GAS
- 4.9 CORROSION ALLOWANCE, MM : 3.0** CORROSIVE/ TOXIC COMPONENT : CO₂ - 0.27%
- 5.0 MATERIAL OF CONSTRUCTION**
- 5.1 SHELL : SA-515/ SA-516 Gr. 70 (SEE NOTE-3, 7)** SHELL FLANGE : SA-105
- 5.2 HEAD :** † HEAD FLANGE : SA-105
- 5.3 BOTTOM : SA 515/ SA-516 Gr. 70 (SEE NOTE-3, 7)** PERFORATED SHEET : SS 304
- 5.4 NOZZLES : SA106 Gr.B** NOZZLE FLANGES : SA-105 (SEE NOTE-3)
- 5.5 GASKET : SS-304, SPIRAL WOUND - CA FILLED** FASTENER : SA-193 Gr. B7, SA-194 Gr. 2H
- 'O' RING : BUNA-N SUPPORT : A283 Gr. C/ IS:2062
- 5.6 FILTER ELEMENT : FIBER GLASS MEDIA TO SUIT GAS QUALITY AS ENCLOSED WITH TENDER DOCUMENT**
- 5.7 VENT VALVE: **** DRAIN VALVE: AS PER P&ID
- 6.0 DESIGN AND CONSTRUCTION**
- 6.1 DESIGN CODE : ASME SEC-VIII DIV-1 (LATEST EDITION)**
- 6.2 DESIGN PR. KG/CM2(G) : 49** DESIGN TEMP., °C : 0 - 65
- 6.3 NO. OF CARTRIDGE : † (NOTE-2)** O.D. X LENGTH, : † (NOTE-2, 8)
- 6.4 MAKE OF ELEMENT : AS PER VENDOR LIST IN MECON T.S.** FILTER PR. DROP, KG/CM² : † (NOTE-2)
- 6.5 FIXING DETAIL : NUTS & BOLTS**
- 6.6 FLANGE RATING : ANSI 300#** FLANGE FINISH : SMOOTH
- 6.7 FLANGE TYPE : WNRF** CONNECTION FOR PSV : AS PER P&ID DPT SIZE : AS PER P&ID
- 6.8 VENT SIZE :AS PER P&ID DRAIN SIZE :AS PER P&ID** UC SIZE : NR DPG SIZE: AS PER P&ID
- 6.9 HEAD CONNECTION : WITH QEC FOR FILTER SHELL DIAMTER 12" AND ABOVE**
- 6.10 QEC REQUIRED : YES** NO MAKES :a) PEERLESS,b)GRINELL,c) PECO,d) SIIRTEC,e) YALE (R&M ENERGY SYSTEM),f)G.D.ENGINEERING,g)TDW,h) MULTITEX
- 7.0 OVERALL DIMENSION**
- 7.1 OVERALL LENGTH, CM : †**
- 7.2 OVERALL HEIGHT, CM : †** SHELL DIA : †
- 7.3 EMPTY WEIGHT, KGS : †** OPERATING WT., KGS : †
- 8.0 ACCESSORIES**
- 8.1 DAVIT DETAIL : YES**
- 9.0 PAINTING : SUITABLE TO CORROSIVE MARINE ENVIRONMENT REF. T.S.**
- 10.0 INSPECTION & TESTING : AS PER T.S.**

NOTE:

- 1 † VENDOR TO SPECIFY, ** As per P& ID, #Refer Annexure -II
- 2 SUCCESSFUL BIDDER SHALL SUBMIT MECHANICAL DESIGN CALCULATIONS AS WELL AS PROCESS CALCULATION OF CARTRIDGE ELEMENT (INCLUDING RELEVANT GRAPH, CATALOGUE ETC.) FOR MECON'S APPROVAL. HOWEVER BIDDER SHALL SUBMIT SAMPLE CALCULATIONS (FOR CARTRIDGE ELEMENT SZING & PRESSURE DROP ACROSS THE FILTER) ALONG WITH OFFER.
- 3 VENDOR TO SELECT/ CONFIRM THE MATERIAL CONSIDERING 0°C To 65°C TEMPERATURE. A CHARPY V-NOTCH TEST SHALL BE CONDUCTED ON 3 SAMPLE HAVING ENERGY VALUE OF 27 J AVERAGE AND MIN. 22 J AT 0°C.
- 4 FILTER ELEMENT MUST WITHSTAND DIFFERENTIAL PRESSURE OF 1.0 KG/CM2G WITHOUT CRACKING & FAILURE .
- 5 200% GASKET , 100% FASTNER & ONE SET OF FILTER ELEMENTS AS SPARE FOR EACH FILTER .
- 6 FREQUENCY OF CLEANING SHALL BE AFTER MIN. 60 DAYS OF OPERATION.
- 7 THICKNESS CALCULATIONS FOR SHELL & BOTTOM TO BE SUBMITTED BY SUCCESSFUL BIDDER FOR APPROVAL.
- 8 THE SURFACE AREA OF THE CARTRIDGE FILTER SHALL BE MIN. 8 TIMES THE CROSS SECTIONAL AREA OF THE INLET NOZZLE.

REV. NO.	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
SECTION : MINERALS & CHEMICALS							MECON LIMITED BANGALORE
DSGN							
DRWN							
APPROVED							
						DATA SHEET NO.:MEC/23TS/01/E5/D2/DRS/CF, REV-0	0

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GAS COMPOSITION PARAMETERS

The gas composition for City Gas Distribution Network is as shown below:

Component	Average Gas Composition (Mol%)	Design case
	Feb'18	
Methane (mol%)	89.11	
Ethane (mol%)	3.12	
Propane (mol%)	2.55	
i-Butane (mol%)	0.6	
n-Butane (mol%)	0.77	
i-Pentane (mol%)	0.23	
n-Pentane (mol%)	0.21	
Hexanes	0.51	
Nitrogen (mol%)	0.323	
Carbon daixoide	2.57	
Heat value (inferior) (Kcal/Sm3)	8946	
Heat value (superior) (Kcal/Sm3)	9897	

Notes:

- O2 not more than 0.5% mole. Total non hydrocarbon not more than 2.0%
- Total S including H2S not more than 10 ppm by weight
- H2S not more than 4 ppm by volume.
- Moisture content in the range 112 to 114 kg/MMSCM
- Temp of gas shall be 20 to 40 ° C

0	GAS COMPOSITION PARAMETERS	 MECON LTD. BANGALORE
Rev.	DISTRICT REGULATORY SKID (DRS)	DS No: MEC/23TS/01/E5/D2//DRS /TE/0528



**CITY GAS DISTRIBUTION PROJECT AT
EAST & WEST GADAVARI DISTRICTS**

Supply of District Regulatory Skid (DRS)

Bid Document No.: MEC/23TS/01/51 /S2/DRS/SU/0003



ANNEXURE - III

DISTRICT REGULATORY SKID (DRS)

1000 SCM_H (G-160)/1500 SCM_H (G-250)/2500 SCM_H (G-400) /5000 SCM_H (G-1000)

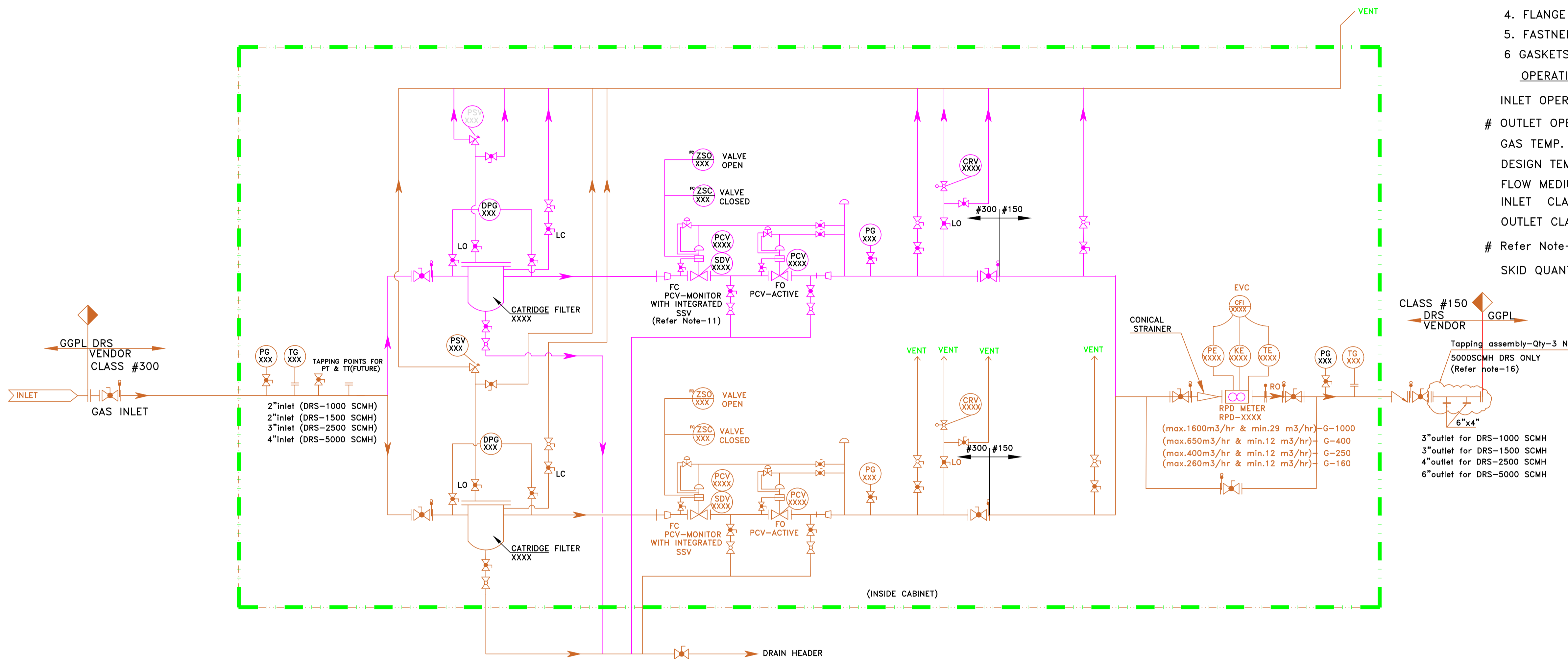
MATERIAL OF CONSTRUCTIONS:-(DRS)

1. BASE FRAME = IS: 2062, GR.B
2. PIPE = ASTM A 106, GR-B
3. FITTINGS = ASTM A 234, GR WPB
4. FLANGE = ASTM A 105 N
5. FASTNERS = ASTM A 193 GR-7/194 GR 2H
6. GASKETS = SPW SS304+GRA FILLED

OPERATING CONDITIONS:

- INLET OPERATING/DESIGN PRESSURE = 14-49 KG/SQ.CM (G)
 # OUTLET OPERATING/DESIGN PRESSURE = MAX. 4.0 KG/SQ.CM (G)
 GAS TEMP. = 30°C
 DESIGN TEMP. = MIN. -29°C AND Max. +65°C
 FLOW MEDIUM = NATURAL GAS
 INLET CLASS = # 300
 OUTLET CLASS = # 150
 # Refer Note-12

- SKID QUANTITY: 1000 SCM_H - 05 NOS.
 1500 SCM_H - 03 NOS.
 2500 SCM_H - 04 NOS.
 5000 SCM_H - 03 NOS.



NOTES:-

1. ALL VENTS SHALL BE LOCATED AT A MIN. HEIGHT OF 3M ABOVE THE HIGHEST WORKING PLATFORM.
2. ALL VENTS SHALL BE PROVIDED WITH FLAP CAPS & FLAME ARRESTOR.
3. FLOW MEASUREMENT SHALL BE RPD METER (WITH SUITABLE RESTRICTED ORIFICE AS REQUIRED) .RPD METER INLET, OUTLET SIZE SHALL BE SAME AS PIPE LINE SIZE. HOWEVER, DURING DETAILED ENGINEERING AS PER SIZING CALCULATION IF RPD METER SIZE IS HIGHER THAN THE PIPE LINE SIZE NECESSARY EXPANDER/REDUCER & ASSOCIATED PIPING AS REQUIRED FOR THE METER SHALL BE CONSIDERED.
4. PSV/CRV SHALL BE DESIGNED FOR FIRE CASE.
5. EACH VENT AND DRAIN LINE SHALL BE PROVIDED WITH A BALL VALVE & A GLOBE VALVE.
6. MRS SHALL BE SUPPLIED INSIDE A CABINET. CABINET SHALL BE OF SPRAY COATED. INLET AND OUTLET FLANGES SHALL BE INSIDE THE CABINET. LOUVERS SHALL BE PROVIDED.
7. DESIGNATION, No., DESIGN CLASS OF PSVs/CRVs TO BE DECIDED DURING DETAILED ENGINEERING.
8. CARTRIDGE ELEMENT SHALL BE SUITABLE FOR DRY GAS.
9. SIZES INDICATED FOR PIPES/VALVES/ FLOWMETERS/EQUIPMENTS ARE MINIMUM INDICATIVE ONLY . BIDDER TO SELECT PIPES/VALVES/ FLOWMETERS/EQUIPMENTS SIZES AS PER SIZING CALCULATION FOR THE RATED CONDITIONS. SUITABLE REDUCER/ EXPANDER & PIPING COMPONENTS SHALL BE PROVIDED AS PER SIZING CALCULATIONS REQUIRED.
10. VELOCITY: a) BEFORE FILTRATION VELOCITY SHALL BE 20M/SEC MAXIMUM.
b) AFTER FILTRATION VELOCITY SHALL BE 30 M/SEC MAXIMUM.
11. MONITOR AND SSV SHALL BE INTEGRAL TYPE ONLY.
12. PCV SHALL BE DESIGNED FOR OUTLET PRESSURE RANGE FROM 1.0 TO 6.0 BAR(G)
13. JUNCTION BOX TO BE MOUNTED AT SUITABLE LOCATION ON THE ENCLOSURE CABINET.
14. CABINET DOORS SHALL BE SLIDING TYPE/FOLDABLE TYPE
15. SET POINT FOR PSV LOCATED ON CARTRIDGE FILTER IS 49KG/SQ.CM(G)
16. TAPPING ASSEMBLY CONSISTING OF PIPE(6"), UNEQUAL TEE(6"x 4"), FLANGES AND BLANK FLANGES (6"AND 4") SHALL BE SUPPLIED IN ASSEMBLED CONDITION AND SUPPLIED AS LOOSE ITEM FOR INSTALLATION OF THE SAME AT SITE.

LEGEND:-

- GLOBE VALVE (GLV)
- BALL VALVE (BV)
- PRESSURE SAFETY VALVE
- CARTRIDGE FILTER
- PRESSURE CONTROL VALVE (PCV -GLOBE TYPE)
- NON RETURN VALVE (NRV)
- RPD METER
- CREEP RELIEF VALVE

- CF CARTRIDGE FILTER
- SDV SLAM SHUT OFF VALVE
- PCV PRESSURE CONTROL VALVE (MONITOR/ACTIVE)
- PSV PRESSURE SAFETY VALVE
- FA FLAME ARRESTOR
- CRV CREEP RELIEF VALVE
- ST CONICAL STRAINER
- LC NORMALLY LOCK CLOSE.
- LO NORMALLY LOCK OPEN.
- PG PRESSURE GAUGE
- TG TEMPERATURE GAUGE
- DPG DIFF. PRESSURE GAUGE
- FC FAIL TO CLOSE
- FO FAIL TO OPEN
- ↑ SPECTACLE BLIND
- ZSC CLOSE POSITION FEEDBACK
- ZSO OPEN POSITION FEEDBACK
- FB FULL BORE
- EVC - ELECTRONIC VOLUME CORRECTOR
- PE - PRESSURE SENSOR
- TE - TEMPERATURE SENSOR
- KE - PULSE SENSOR

CLIENT		GODAVARI GAS PVT LIMITED	
ENGINEERING CONSULTANT		मेकॉन लिमिटेड MECON LIMITED	
SECTION	I & P C	M & C	CITY GAS DISTRIBUTION EAST & WEST GODAVARI
LOCATION	BANGALORE	BANGALORE	
DESIGNED	MCH		DISTRICT REGULATORY SKID (DRS) 1000, 1500, 2500 & 5000 SCM _H
DRAWN	MCH		
CHECKED & VERIFIED	HA		
APPROVED			SCALE : NTS SHEET 1 OF 1
DATED: 26.06.2018	(DGM-I&PC)	(DGM-M&C)	DRG. NO: MEC/23TS/01/ES/02/DRS/TE/0001

REV.	DATE	ZONE	DESCRIPTION	BY	VERIFIED

REV.No.	DATE	ZONE	DESCRIPTION	BY	VERIFIED

REFERENCES
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**CITY GAS DISTRIBUTION PROJECT AT
EAST & WEST GADAVARI DISTRICTS**

Supply of District Regulatory Skid (DRS)

Bid Document No.: MEC/23TS/01/ 1/S2/DRS/SU/0003



ANNEXURE - IV

LIST OF VENDORS FOR BOUGHT-OUT ITEMS

I) PRESSURE REGULATOR AND SLAM SHUT VALVE

1. M/s Pietro Fiorentini S.P.A. (Italy)
2. M/s Emerson Process Management (Fisher / Tartarini)
3. M/s RMG-Regel Messtechnik/Bryan Donkin(Germany)
4. M/s Nirmal Industrial Controls (India) – for maximum 300# and size ϕ 8"
5. M/s Gortter Controls (Netherlands)
6. M/s Dresser
7. M/s Mokveld Valves BV (Netherlands)
8. M/s Schlumberger (USA)
9. M/s Instromet International NV
10. M/s Emerson Process Mgmt asia Pacific Pte Ltd
11. M/s ESME Valves Ltd
12. M/s Kaye & Macdonald Inc.
13. M/s Nuovo Pignone SPA (Italy) (GE Oil Co.)
14. M/s Richards Industries (Formerly Treloar)
15. M/s Samson AG Mess-und Regeltechnik
16. M/s Tormene Gas Technology

II) RPD METER

1. M/s Elster.
2. M/s. Itron
3. M/s. ElsterInstromet.
4. M/s UGI Meter.
5. M/s Smithmeter.
6. M/s Dresser (GE)
7. M/s American Meter.
8. M/s Romet, Canada
9. M/s Actaris
10. M/s RMG (Germany)
11. M/s FMG
12. M/s Raychem RPG(Upto G-160)

III) CONTROL AND SIGNAL CABLES

1. M/s ASSOCIATED CABLES
2. M/s ASSOCIATED FLEXIBLES
3. M/s DELTON Cables Ltd, India
4. M/s BROOK
5. M/s KEI Industries Ltd INDIA
6. M/s Suyog Electricals Ltd, India
7. M/s Thermo Cables Ltd
8. M/s Udey Pyrocables Pvt Ltd, India
9. M/s UNIVERSAL Cables Ltd, India

10. CMI Limited
11. Cords Cable Industries Ltd, India
12. Elkay Telelinks (P) Ltd., India
13. M/s Goyolene Fibres (I) Pvt Ltd, India
14. M/s NICCO Corporation Ltd, India
15. M/s Paramount Communications Ltd, India
16. M/s Polycab Wires Pvt Ltd, India

IV) CARTRIDGE FILTER

- 1) M/s Grand Prix Fab (Pvt.) Ltd. (New Delhi)
- 2) M/s Multitex Filtration Engineers Ltd. (New Delhi)
- 3) M/s Perry Equipment Corp. (USA)
- 4) M/s Siirtec NIGI SPA (Italy)
- 5) M/s Axsia Howmar Ltd. (UK)
- 6) M/s Faudi Filters Systems GmbH (Germany)
- 7) M/s Filtan Filter Anlagenbau GmbH (Germany)
- 8) M/s Plenty Filters (UK)
- 9) M/s Forain S.r.l. (Italy)
- 10) M/s Ravi Techno Systems (Mumbai)
- 11) M/s Gujarat Otofilt (Ahmedabad)
- 12) M/s Nirmal Industrial Controls (India)
- 13) M/s Flash Point
- 14) M/s Fil Sep Equipments Pvt. Ltd.
- 15) M/s Chemtrols Industries Ltd.
- 16) M/s Emerson Filters

V) BALL VALVES

- 1) M/s Hopkinsons Limited (UK)
- 2) M/s O.M.S. Saleri (Italy)
- 3) M/s Pibi Viesse SPA (Italy)
- 4) M/s Nuovo Pignone (Italy)
- 5) M/s Perar SPA (Italy)
- 6) M/s Larsen & Toubro Ltd. (Audco India Limited, Chennai)
- 7) M/s Microfinish Valves Ltd. (Hubli)
- 8) M/s Pietro Fiorentini (Italy)
- 9) M/s Raimondi Valve S.P.A. (Italy)
- 10) M/s Virgo Engineers (Pune)
- 11) M/s Flow Chem
- 12) Petro valves

VI) PLUG VALVES

- 1) Breda Energia Sesto Industria Spa, Italy
- 2) Fisher Xomox Sanmar India Ltd., New Delhi
- 3) Larsen & Toubro Ltd. (Audco India Limited, Chennai)
- 4) Nordstrom Flowserve Valves Inc., USA

- 5) SerckAudco Valves, UK

VII) GLOBE VALVE

- 1) M/s BDK(New Delhi)
- 2) M/s Datre Corporation(Kolkota)
- 3) M/s L & T, New Delhi
- 4) M/s Neco Schubert &Salzer Ltd.(New Delhi)
- 5) M/s Niton valve (Mumbai)
- 6) M/s Ornate valves(Mumbai)
- 7) M/s Panchvati valves(Mumbai)

VIII) CHECK VALVES

- 1) M/s Malbranque (France)
- 2) M/s Mannesmann Demag (Germany)
- 3) M/s Petrol Valve (Italy)
- 4) M/s True Flow Rona (Belgium)
- 5) M/s AV Valves Ltd., Agra
- 6) M/s BDK Engineering India Ltd. Hubli, Karnataka
- 7) M/s Neco Schubert &Salzer Ltd. New Delhi
- 8) M/s BHEL, OFE & OE Group New Delhi
- 9) M/s Precision Engg. Co., Mumbai
- 10) M/s Leader Valves Ltd., Jalandhar
- 11) M/s Niton Valves Industries (P) Ltd., Mumbai
- 12) M/s Larsen & Toubro Ltd. (Audco India Limited, Chennai)
- 13) M/s Aksons& Mechanical Enterprises, Mumbai
- 14) M/s Datre Corporation Ltd., Calcutta
- 15) M/s Advance Valves Pvt. Ltd., Noida

IX) PRESSURE SAFETY/RELIEF VALVES

- 1) M/s Keystone Valves (India) Pvt. Ltd. (Baroda)
- 2) M/s Sebim Sarasin Valves India (P) Ltd
- 3) M/s Tyco Sanmar Ltd. (New Delhi)
- 4) M/s Parcol SPA, Italy
- 5) M/s Tai Milano SPA, Italy
- 6) M/s Emerson Process, Singapore
- 7) M/s Instrumentation Ltd., Palghat
- 8) M/s Finger Lesser

X) PRESSURE, DIFF PRESSURE & TEMPERATURE TRANSMITTER

1. M/s Emerson Rosemount
2. M/s Yokogawa
3. M/s Fuji
4. M/s Honeywell
5. M/s Siemens
6. M/s. ABB

XI) PRESSURE GAUGES, D. P. GAUGES & TEMPERATURES GAUGES

1. M/s AN Instruments Pvt. Ltd., New Delhi
2. M/s General Instruments Ltd., Mumbai
3. M/s WIKA
4. M/s Forbes Marshall
5. M/s Hirelkar
6. M/s Baumer
7. Badotherm Process Instruments B.V.
8. British Rototherm Co Ltd
9. Budenberg Gauge Co Ltd
10. Dresser Inc
11. H. Guru Instruments (South India) Pvt Ltd
12. Manometer (India) Pvt Ltd
13. Nagano Keiki Seisakusho Ltd
14. Waaree Instruments Ltd
15. Walchandnagar Industries Ltd (Tiwac Divn)
16. Ashcroft India Pvt Ltd
17. ALTOP

XII) SS VALVES, SS TUBE & SS TUBE FITTINGS

1. M/s Swagelok (USA)
2. M/s Parker (USA)
3. M/s Sandvik, Sweden
4. M/s Ratnamani(SS tubes)
5. M/s Steamline Industries (SS tubes)
6. M/s HOKE (USA)

XIII) JUNCTION BOXES AND CABLES GLANDS

1. M/s EX-PROTECTA
2. M/s FLAMEPROOF CONTROL GEARS
3. M/s BALIGA
4. M/s FLEXPLO ELECTRICAL
5. M/s. Sudhir Switchgears Pvt Ltd, India

XIV) BARRIERS

1. M/s MTL
2. M/s P&F
3. M/s Phoenix



**CITY GAS DISTRIBUTION PROJECT AT
EAST & WEST GADAVARI DISTRICTS**


Supply of District Regulatory Skid (DRS)

Bid Document No.: MEC/23TS/01/ 1/S2/DRS/SU/0003



ANNEXURE - V


ANNEXURE-V

	CONTRACTOR		QUALITY ASSURANCE PLAN FOR INSTRUMENTATION EQUIPMENT	PACKAGE NAME	District Regulatory Skid (DRS)
	ORDER NO. & DATE				
	SUB-CONTRACTOR	—			
	ORDER NO. & DATE	—			

<p>INSTRUCTIONS FOR FILLING UP :</p> <ol style="list-style-type: none"> QAP shall be submitted for each of the equipment separately with break up of assembly/sub-assembly & part/component or for group of equipment having same specification. Use numerical codes as indicated for extent of inspection & tests and submission of test certificates & documents. Additional codes & description for extent of inspection & tests may be added as applicable for the plant and equipment Separate identification number with quantity for equipment shall be indicated wherever equipment having same specifications belonging to different facilities are grouped together. Weight in tonnes (T) must be indicated under column 5 for each item. Estimated weights may be indicated wherever actual weights are not available. ** To be specified. <p>ABBREVIATIONS USED :</p> <p>CONTR : CONTRACTOR</p> <p>MFR : MANUFACTURER</p>	<p>CODES FOR EXTENT OF INSPECTION, TESTS, TEST CERTIFICATES & DOCUMENTS:</p> <table style="width:100%; border-collapse: collapse;"> <tr> <td style="width:25%;">Code</td> <td style="width:25%;">Description</td> <td style="width:25%;">Code</td> <td style="width:25%;">Description</td> <td style="width:25%;">Code</td> <td style="width:25%;">Description</td> <td style="width:25%;"></td> <td style="width:25%;"></td> </tr> <tr> <td>1.</td><td>Visual</td> <td>12.</td><td>Routine test as per relevant IS other standard</td> <td>23.</td><td>Short time rating</td> <td></td><td>D1. Approved GA drawings</td> </tr> <tr> <td>2.</td><td>Dimensional</td> <td>13.</td><td>Type test as per relevant IS/ other standard</td> <td>24.</td><td>Operational & functional check</td> <td></td><td>D2. Approved single line/ schematic diagram</td> </tr> <tr> <td>3.</td><td>Fitment & Alignment</td> <td>14.</td><td>Impulse Test</td> <td>25.</td><td>Over Speed Test</td> <td></td><td>D3. Approved data sheet</td> </tr> <tr> <td>4.</td><td>Physical Test (Sample) certificates</td> <td>15.</td><td>Partial Discharge Test</td> <td>26.</td><td>Flame Proof Test</td> <td></td><td></td> </tr> <tr> <td>5.</td><td>Chemical Test (Sample)</td> <td>16.</td><td>Heat run risc test/tempr.</td> <td>27.</td><td>Clearance and creepage Distance</td> <td></td><td>D4. Approved bill of materials</td> </tr> <tr> <td>6.</td><td>Ultrasonic Test</td> <td>17.</td><td>Enclosure Protection Test</td> <td>28.</td><td>Acceptance Test</td> <td></td><td>D5. Unpriced P.O. copy</td> </tr> <tr> <td>7.</td><td>Magnetic Particle Test (MPT)</td> <td>18.</td><td>Calibration</td> <td></td><td></td> <td></td><td>D6. Calibration Certificate of all measuring instruments</td> </tr> <tr> <td>8.</td><td>Radiography Test</td> <td>19.</td><td>Noise & Vibration</td> <td></td><td></td> <td></td><td></td> </tr> <tr> <td>9.</td><td>Dye Penetration Test</td> <td>20.</td><td>Test certificates for bought out components</td> <td></td><td></td> <td></td><td></td> </tr> <tr> <td>10.</td><td>Measurement of IR Value a) Before HV Test b) After HV Test</td> <td>21.</td><td>Tank Pressure Test</td> <td></td><td></td> <td></td><td></td> </tr> <tr> <td>11.</td><td>High Voltage test/Dielectric test</td> <td>22.</td><td>Paint shade verification</td> <td></td><td></td> <td></td><td></td> </tr> </table>	Code	Description	Code	Description	Code	Description			1.	Visual	12.	Routine test as per relevant IS other standard	23.	Short time rating		D1. Approved GA drawings	2.	Dimensional	13.	Type test as per relevant IS/ other standard	24.	Operational & functional check		D2. Approved single line/ schematic diagram	3.	Fitment & Alignment	14.	Impulse Test	25.	Over Speed Test		D3. Approved data sheet	4.	Physical Test (Sample) certificates	15.	Partial Discharge Test	26.	Flame Proof Test			5.	Chemical Test (Sample)	16.	Heat run risc test/tempr.	27.	Clearance and creepage Distance		D4. Approved bill of materials	6.	Ultrasonic Test	17.	Enclosure Protection Test	28.	Acceptance Test		D5. Unpriced P.O. copy	7.	Magnetic Particle Test (MPT)	18.	Calibration				D6. Calibration Certificate of all measuring instruments	8.	Radiography Test	19.	Noise & Vibration					9.	Dye Penetration Test	20.	Test certificates for bought out components					10.	Measurement of IR Value a) Before HV Test b) After HV Test	21.	Tank Pressure Test					11.	High Voltage test/Dielectric test	22.	Paint shade verification				
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EQUIPMENT DETAILS							INSPECTION AND TESTS						Test Certificates & documents to be submitted to MECON	Acceptance Criteria Standards /IS/ BS/ASME/ Norms and Documents	REMARKS/ SAMPLING PLAN
Sl. No.	Description Of item	Identificatuin No.	Quantity		Manufacturer's Name and Address	Expected schedule of Final Inspection	Raw Material and inprocess stage inspection			Final Inspection/Test by					
			No/M	T			MFR	CONTR	MECON/ GGL	MFR	CONT R	MECON/ GGL			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
01	LIMIT SWITCHES														
02	PRESSURE GAUGES & DPG														
03	TEMPERATURE GAUGES														
04	ELECTRONIC VOLUME CORRECTOR														
05	ROTARY DISPLACEMENT METER														

Qty as per MR /PO and P&Id requirement.		QAP No.: (To be allotted by Mecon)	
For MECON (Stamp & Signature)	<div style="border: 1px solid black; width: 100px; height: 60px; margin: 0 auto;"></div>	for CONTRACTOR/ SUB-CONTRACTOR	<div style="border: 1px solid black; width: 100px; height: 60px; margin: 0 auto;"></div>
		(Stamp & Signature)	
SHEET 1 of 1			REV. 0

	CONTRACTOR		QUALITY ASSURANCE PLAN FOR STRUCTURAL AND MECHANICAL EQUIPMENT	PACKAGE NO. :	
	ORDER NO. & DATE			PACKAGE NAME :	District Regulatory Skid (DRS) & COMMERCIAL REGULATOR AND RPD METERS
	SUB-CONTRACTOR				
	ORDER NO. & DATE				

INSTRUCTIONS FOR FILLING UP :

1. QAP shall be submitted for each of the equipment separately with break up of assembly/sub-assembly & part/component or for group of equipment having same specification.
2. Use numerical codes as indicated for extent of inspection & tests and submission of test certificates & documents. Additional codes & description for extent of inspection & tests may be added as applicable for the plant and equipment
3. Separate identification number with quantity for equipment shall be indicated wherever equipment having same specifications belonging to different facilities are grouped together.
4. Weight in kilograms must be indicated under Column-5 for each item. Estimated weights may be indicated wherever actual weights are not available.

CODES FOR EXTENT OF INSPECTION, TESTS, TEST CERTIFICATES & DOCUMENTS :

<p><i>Code Description</i></p> <ol style="list-style-type: none"> 1. Visual 2. Dimensional 3. Fitment & Alignment 4. Physical Test (Sample) 5. Chemical Test (Sample) 6. Ultrasonic Test 7. Magnetic Particle Test (MPI) 8. Radiography Test 9. Dye Penetration Test 10. Metallographic Exam. 11. Welder's Qualification & Weld Procedure Test 12. Approval of Test and Repair Procedure 13. Heat Treatment 14. Pressure Test 15. Leakage Test 16. Balancing 17. Vibration Test 	<p><i>Code Description</i></p> <ol style="list-style-type: none"> 18. Amplitude Test 19. Sponge Test 20. Dust/ Water Ingress Test 21. Friction Factor Test 22. Adhesion Test 23. Performance Test/Characteristic Curve 24. No Load/ Free Running Test 25. Load/ Overload Test 26. Measurement of Speeds 27. Acoustical Test 28. Geometrical Accuracy 29. Repeatability and Positioning Accuracy 30. Proving Test 31. Surface Preparation 32. Manufacturer's Test Certificates for bought-out items 33. IBR/ Other Statutory agencies compliance certificate 	<p><i>Code Description</i></p> <ol style="list-style-type: none"> 34. Internal Inspection Report by Contractor 35. Hardness Test 36. Spark Test for Lining 37. Calibration 38. Safety Device Test 39. Ease of Maintenance 40. Fire Test (Type Test) 41. Charpy V-Notch Test 42. Operational Torque Test 43. ENP (Electroless Nickel Plating) Execution 44. Painting 45. Anti-Static Test 46. Hydrostatic Double Block & Bleed Test 47. Functional Test † 48. Pneumatic Double Block & Bleed Test 	<p><i>Code DOCUMENTS:</i></p> <ol style="list-style-type: none"> D1. Approved GA drawings D2. Information and other drgs released for mfg. D3. Relevant catalogues D4. Bill of matl./Item no./ Identification D5. Matchmarks details D6. Line/ Layout diagram D7. Approved erection procedures D8. Unpriced sub P.O. with specification and amendments, if any D9. Calibration Certificate of all measuring instruments and gauges D10. X-Ray Reports
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ABBREVIATIONS USED :

CONTR : CONTRACTOR
MFR : MANUFACTURER
P : PERFORM
R : REVIEW
W : WITNESS

KEY TO SYMBOLS :


* : MFR/ CONTRACTOR - AS APPLICABLE
** : TEST TO BE PERFORMED, IF APPLICABLE
† : FUNCTIONAL TEST INCLUDES : (1) COLD BENCH SET PRESSURE TEST (2) SEAT LEAKAGE TEST AND (3) VALVE LIFT TEST.

EQUIPMENT DETAILS							INSPECTION AND TESTS						Test Certificates & Documents to be submitted to MECON	Acceptance Criteria Standards/ IS/ BS/ ASME/ Norms and Documents	REMARKS/ SAMPLING PLAN
Sl. No.	Description (with equipment heading, place of use and brief specifications)	Identification No. (MR Item No.)	Quantity No./M	Unit Weight (Kg)	Manufacturer's Name and Address	Expected Schedule of Final Inspn.	Raw Material and In-Process Stage Inspection			Final Inspection/ Test by					
							MFR	CONTR	MECON	MFR	CONTR	MECON			
1		3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.0	Pressure Safety Valves														

For MECON (Stamp & Signature) 	For CONTRACTOR/ SUB-CONTRACTOR (Stamp & Signature) 	QAP No. to be allotted by MECON SHEET 1 OF 1	REV 0
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CONTRACTOR		QUALITY ASSURANCE PLAN FOR					PACKAGE NO. : -																																																																																																																																																				
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8.	Radiography Test	25.	Load/ Overload Test	41.	Charpy V-Notch Test	D8.	Unpriced sub P.O. with specification and amendments, if any																																																																																																																																																				
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11.	Welder's Qualification & Weld Procedure Test	28.	Geometrical Accuracy	44.	Painting																																																																																																																																																						
12.	Approval of Test and Repair Procedure	29.	Repeatability and Positioning Accuracy	45.	Anti-Static Test																																																																																																																																																						
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	CONTRACTOR		QUALITY ASSURANCE PLAN FOR STRUCTURAL AND MECHANICAL EQUIPMENT	PACKAGE NO. :	
	ORDER NO. & DATE			PACKAGE NAME :	District Regulatory Skid (DRS) , COMMERCIAL REGULATOR AND RPD METERS
	SUB-CONTRACTOR				
	ORDER NO. & DATE				

INSTRUCTIONS FOR FILLING UP :

1. QAP shall be submitted for each of the equipment separately with break up of assembly/sub-assembly & part/component or for group of equipment having same specification.
2. Use numerical codes as indicated for extent of inspection & tests and submission of test certificates & documents. Additional codes & description for extent of inspection & tests may be added as applicable for the plant and equipment
3. Separate identification number with quantity for equipment shall be indicated wherever equipment having same specifications belonging to different facilities are grouped together.
4. Weight in kilograms must be indicated under Column-5 for each item. Estimated weights may be indicated wherever actual weights are not available.

CODES FOR EXTENT OF INSPECTION, TESTS, TEST CERTIFICATES & DOCUMENTS :

Code	Description	Code	Description	Code	Description	Code	DOCUMENTS:
1.	Visual	18.	Amplitude Test	34.	Internal Inspection Report by Contractor	D1.	Approved GA drawings
2.	Dimensional	19.	Sponge Test	35.	Hardness Test	D2.	Information and other reference drg/ stamped drgs released for mfg.
3.	Fitment & Alignment	20.	Dust/ Water Ingress Test	36.	Spark Test for Lining	D3.	Relevant catalogues
4.	Physical Test (Sample)	21.	Friction Factor Test	37.	Calibration	D4.	Bill of matl./Item no./ Identification
5.	Chemical Test (Sample)	22.	Adhesion Test	38.	Safety Device Test	D5.	Matchmarks details
6.	Ultrasonic Test	23.	Performance Test/Characteristic Curve	39.	Ease of Maintenance	D6.	Line/ Layout diagram
7.	Magnetic Particle Test (MPI)	24.	No Load/ Free Running Test	40.	Fire Test (Type Test)	D7.	Approved erection procedures
8.	Radiography Test	25.	Load/ Overload Test	41.	Charpy V-Notch Test	D8.	Unpriced sub P.O. with specification and amendments, if any
9.	Dye Penetration Test	26.	Measurement of Speeds	42.	Operational Torque Test	D9.	Calibration Certificate of all measuring instruments and gauges
10.	Metallographic Exam.	27.	Accoustical Test	43.	ENP (Electroless Nickel Plating) Execution	D10.	X-Ray Reports
11.	Welder's Qualification & Weld Procedure Test	28.	Geometrical Accuracy	44.	Painting		
12.	Approval of Test and Repair Procedure	29.	Repeatability and Positioning Accuracy	45.	Anti-Static Test		
13.	Heat Treatment	30.	Proving Test	46.	Hydrostatic Double Block & Bleed Test		
14.	Pressure Test	31.	Surface Preparation	47.	Functional Test †		
15.	Leakage Test	32.	Manufacturer's Test Certificates for bought-out items	48.	Pneumatic Double Block & Bleed Test		
16.	Balancing	33.	IBR/ Other Statutory agencies compliance certificate				
17.	Vibration Test						

ABBREVIATIONS USED :


CONTR : CONTRACTOR
MFR : MANUFACTURER
P : PERFORM
R : REVIEW
W : WITNESS

KEY TO SYMBOLS :

* : MFR/ CONTRACTOR - AS APPLICABLE
** : TEST TO BE PERFORMED, IF APPLICABLE
† : FUNCTIONAL TEST INCLUDES : (1) COLD BENCH SET PRESSURE TEST (2) SEAT LEAKAGE TEST AND (3) VALVE LIFT TEST.

EQUIPMENT DETAILS						INSPECTION AND TESTS						Test Certificates & Documents to be submitted to MECON	Acceptance Criteria Standards/ IS/ BS/ ASME/ Norms and Documents	REMARKS/ SAMPLING PLAN	
Sl. No.	Description (with equipment heading, place of use and brief specifications)	Identification No. (MR Item No.)	Quantity No./M	Unit Weight (Kg)	Manufacturer's Name and Address	Expected Schedule of Final Inspn.	Raw Material and In-Process Stage Inspection			Final Inspection/ Test by					
							MFR	CONTR	MECON	MFR	CONTR				MECON
1		3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.0	Creep Relief Valve														

For MECON (Stamp & Signature) 	For CONTRACTOR/ SUB-CONTRACTOR (Stamp & Signature) 	QAP No. to be allotted by MECON	REV 0
		SHEET 1 OF 1	

	CONTRACTOR		QUALITY ASSURANCE PLAN FOR STRUCTURAL AND MECHANICAL EQUIPMENT	PACKAGE NO.	-
	ORDER NO. & DATE			PACKAGE NAME	District Regulatory Skid (DRS) & COMMERCIAL REGULATOR AND RPD METERS
	SUB-CONTRACTOR				
	ORDER NO. & DATE				

INSTRUCTIONS FOR FILLING UP :

1. QAP shall be submitted for each of the equipment separately with break up of assembly/sub-assembly & part/component or for group of equipment having same specification.
2. Use numerical codes as indicated for extent of inspection & tests and submission of test certificates & documents. Additional codes & description for extent of inspection & tests may be added as applicable for the plant and equipment
3. Separate identification number with quantity for equipment shall be indicated wherever equipment having same specifications belonging to different facilities are grouped together.
4. Weight in kilograms must be indicated under Column-5 for each item. Estimated weights may be indicated wherever actual weights are not available.

CODES FOR EXTENT OF INSPECTION, TESTS, TEST CERTIFICATES & DOCUMENTS :

<p><i>Code Description</i></p> <ol style="list-style-type: none"> 1. Visual 2. Dimensional 3. Fitment & Alignment 4. Physical Test (Sample) 5. Chemical Test (Sample) 6. Ultrasonic Test 7. Magnetic Particle Test (MPI) 8. Radiography Test 9. Dye Penetration Test 10. Metallographic Exam. 11. Welder's Qualification & Weld Procedure Test 12. Approval of Test and Repair Procedure 13. Heat Treatment 14. Pressure Test 15. Leakage Test 16. Balancing 17. Vibration Test 	<p><i>Code Description</i></p> <ol style="list-style-type: none"> 18. Amplitude Test 19. Sponge Test 20. Dust/ Water Ingress Test 21. Friction Factor Test 22. Adhesion Test 23. Performance Test/Characteristic Curve 24. No Load/ Free Running Test 25. Load/ Overload Test 26. Measurement of Speeds 27. Accoustical Test 28. Geometrical Accuracy 29. Repeatability and Positioning Accuracy 30. Proving Test 31. Surface Preparation 32. Manufacturer's Test Certificates for bought-out items 33. IBR/ Other Statutory agencies compliance certificate 	<p><i>Code Description</i></p> <ol style="list-style-type: none"> 34. Internal Inspection Report by Contractor 35. Hardness Test 36. Spark Test for Lining 37. Calibration 38. Safety Device Test 39. Ease of Maintenance 40. Fire Test (Type Test) 41. Charpy V-Notch Test 42. Operational Torque Test 43. ENP (Electroless Nickel Plating) Execution 44. Painting 45. Anti-Static Test 46. Hydrostatic Double Block & Bleed Test 47. Functional Test 48. Pneumatic Double Block & Bleed Test 	<p><i>Code DOCUMENTS:</i></p> <ol style="list-style-type: none"> D1. Approved GA drawings D2. Information and other reference drg/ stamped drgs released for mfg. D3. Relevant catalogues D4. Bill of matl./Item no./ Identification D5. Matchmarks details D6. Line/ Layout diagram D7. Approved erection procedures D8. Unpriced sub P.O. with specification and amendments, if any D9. Calibration Certificate of all measuring instruments and gauges D10. X-Ray Reports
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ABBREVIATIONS USED :

CONTR : CONTRACTOR
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R : REVIEW
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KEY TO SYMBOLS :

* : MFR/ CONTRACTOR - AS APPLICABLE
** : TEST TO BE PERFORMED, IF APPLICABLE

EQUIPMENT DETAILS							INSPECTION AND TESTS						Test Certificates & Documents to be submitted to MECON	Acceptance Criteria Standards/ IS/ BS/ ASME/ Norms and Documents	REMARKS/ SAMPLING PLAN
Sl. No.	Description (with equipment heading, place of use and brief specifications)	Identification No. (MR Item No.)	Quantity No./M	Unit Weight (Kg)	Manufacturer's Name and Address	Expected Schedule of Final Inspn.	Raw Material and In-Process Stage Inspection			Final Inspection/ Test by					
							MFR	CONTR	MECON	MFR	CONTR	MECON			
1		3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.0	Check Valves														

For MECON (Stamp & Signature)	For CONTRACTOR/ SUB-CONTRACTOR (Stamp & Signature)	QAP No. to be allotted by MECON
		REV-0
		SHEET 1 OF 1

*** To be field by party as per index above & approved by MECON**



CONTRACTOR	
ORDER NO. & DATE	
SUB-CONTRACTOR	
ORDER NO. & DATE	

**QUALITY ASSURANCE PLAN
FOR
STRUCTURAL AND MECHANICAL
EQUIPMENT**

PACKAGE NO. :	-
PACKAGE NAME :	District Regulatory Skid (DRS), COMMERCIAL REGULATOR AND RPD METERS

INSTRUCTIONS FOR FILLING UP :

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<i>Code Description</i>	<i>Code Description</i>	<i>Code Description</i>	<i>Code DOCUMENTS:</i>
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4. Physical Test (Sample)	21. Friction Factor Test	36. Spark Test for Lining	D4. Bill of matl./Item no./ Identification
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6. Ultrasonic Test	23. Performance Test/Characteristic Curve	38. Safety Device Test	D6. Line/ Layout diagram
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8. Radiography Test	25. Load/ Overload Test	40. Fire Test (Type Test)	D8. Unpriced sub P.O. with specification and amendments, if any
9. Dye Penetration Test	26. Measurement of Speeds	41. Charpy V-Notch Test	D9. Calibration Certificate of all measuring instruments and gauges
10. Metallographic Exam.	27. Accoustical Test	42. Operational Torque Test	D10. X-Ray Reports
11. Welder's Qualification & Weld Procedure Test	28. Geometrical Accuracy	43. ENP (Electroless Nickel Plating) Execution	
12. Approval of Test and Repair Procedure	29. Repeatability and Positioning Accuracy	44. Painting	
13. Heat Treatment	30. Proving Test	45. Anti-Static Test	
14. Pressure Test	31. Surface Preparation	46. Hydrostatic Double Block & Bleed Test	
15. Leakage Test	32. Manufacturer's Test Certificates for bought-out items	47. Functional Test	
16. Balancing	33. IBR/ Other Statutory agencies compliance certificate	48. Pneumatic Double Block & Bleed Test	
17. Vibration Test			

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EQUIPMENT DETAILS

INSPECTION AND TESTS

Sl. No.	Description (with equipment heading, place of use and brief specifications)	Identification No. (MR Item No.)	Quantity No./M	Unit Weight (Kg)	Manufacturer's Name and Address	Expected Schedule of Final Inspn.	INSPECTION AND TESTS						Test Certificates & Documents to be submitted to MECON	Acceptance Criteria Standards/ IS/ BS/ ASME/ Norms and Documents	REMARKS/ SAMPLING PLAN
							Raw Material and In-Process Stage Inspection			Final Inspection/ Test by					
							MFR	CONTR	MECON	MFR	CONTR	MECON			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.0	Cartridge Filters														

For MECON (Stamp & Signature)




For CONTRACTOR/ SUB-CONTRACTOR (Stamp & Signature)



QAP NO. TO BE ALLOTTED BY MECON

SHEET 1 OF 1

REV
0

	CONTRACTOR		QUALITY ASSURANCE PLAN FOR STRUCTURAL AND MECHANICAL EQUIPMENT	PACKAGE NO. : -
	ORDER NO. & DATE			PACKAGE NAME : District Regulatory Skid (DRS) , COMMERCIAL REGULATOR AND RPD
	SUB-CONTRACTOR			METERS
	ORDER NO. & DATE			

INSTRUCTIONS FOR FILLING UP :

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CODES FOR EXTENT OF INSPECTION, TESTS, TEST CERTIFICATES & DOCUMENTS :

<p><i>Code Description</i></p> <ol style="list-style-type: none"> Visual Dimensional Fitment & Alignment Physical Test (Sample) Chemical Test (Sample) Ultrasonic Test Magnetic Particle Test (MPI) Radiography Test Dye Penetration Test Metallographic Exam. Welder's Qualification & Weld Procedure Test Approval of Test and Repair Procedure Heat Treatment Pressure Test Leakage Test Balancing Vibration Test 	<p><i>Code Description</i></p> <ol style="list-style-type: none"> Amplitude Test Sponge Test Dust/ Water Ingress Test Friction Factor Test Adhesion Test Performance Test/Characteristic Curve No Load/ Free Running Test Load/ Overload Test Measurement of Speeds Accoustical Test Geometrical Accuracy Repeatability and Positioning Accuracy Proving Test Surface Preparation Manufacturer's Test Certificates for bought-out items IBR/ Other Statutory agencies compliance certificate 	<p><i>Code Description</i></p> <ol style="list-style-type: none"> Internal Inspection Report by Contractor Hardness Test Spark Test for Lining Calibration Safety Device Test Ease of Maintenance Fire Test (Type Test) Charpy V-Notch Test Operational Torque Test ENP (Electroless Nickel Plating) Execution Painting Anti-Static Test Hydrostatic Double Block & Bleed Test Functional Test Pneumatic Double Block & Bleed Test 	<p><i>Code DOCUMENTS:</i></p> <ol style="list-style-type: none"> Approved GA drawings Information and other reference drg/ stamped drgs released for mfg. Relevant catalogues Bill of matl./Item no./ Identification Matchmarks details Line/ Layout diagram Approved erection procedures Unpriced sub P.O. with specification and amendments, if any Calibration Certificate of all measuring instruments and gauges X-Ray Reports
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CONTR : CONTRACTOR	* : MFR/ CONTRACTOR - AS APPLICABLE
MFR : MANUFACTURER	** : TEST TO BE PERFORMED, IF APPLICABLE
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EQUIPMENT DETAILS					INSPECTION AND TESTS						Test Certificates & Documents to be submitted to MECON	Acceptance Criteria Standards/ IS/ BS/ ASME/ Norms and Documents	REMARKS/ SAMPLING PLAN		
Sl. No.	Description (with equipment heading, place of use and brief specifications)	Identification No. (MR Item No.)	Quantity No./M	Unit Weight (Kg)	Manufacturer's Name and Address	Expected Schedule of Final Inspn.	Raw Material and In-Process Stage Inspection			Final Inspection/ Test by					
							MFR	CONTR	MECON	MFR				CONTR	MECON
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.0	Ball Valves														

For MECON (Stamp & Signature) 	For CONTRACTOR/ SUB-CONTRACTOR (Stamp & Signature) 	QAP No. to be allotted by MECON SHEET 1 OF 1	REV 0
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**CITY GAS DISTRIBUTION PROJECT AT
EAST & WEST GADAVARI DISTRICTS**

Supply of District Regulatory Skid (DRS)

Bid Document No.: MEC/23TS/01/ 1/S2/DRS/SU/0003



ANNEXURE - VI

**FAT PROCEDURE / FAT MANUAL
For SKIDS**

(To be filled by the Bidder for Factory Acceptance Test at Bidder's works)



MECON LIMITED
BANGALORE - 560004


MECON LIMITED BANGALORE	FAT PROCEDURE / FAT MANUAL For SKIDS		
INSTRUMENTATION SECTION	Doc. No. : MEC/23TS/01/E5/D2/DRS/TE/0533		
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Scope
Reference Documents
Orientation of Witnesses
Test Certificates
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2. VISUAL INSPECTION

Skid Review
Test Certificates

3. FACTORY ACCEPTANCE TEST


Hydrostatic Test
Pneumatic Leak Test
Functional test of SSV, PCV, CRV, RPD, EVC

4. SPARES

5. PAINTING

6. DOCUMENTS REVIEW

7. ANNEXURES

MECON LIMITED BANGALORE	FAT PROCEDURE / FAT MANUAL For SKIDS		
INSTRUMENTATION SECTION	Doc. No. : MEC/23TS/01/E5/D2/DRS/TE/0533		
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1. PREFACE

Introduction:

This document defines procedure for Factory acceptance Test (FAT) to be carried out for Skid(s). The purpose of carrying out FAT is to check functionality of the entire natural Gas Pressure regulation Skid with respect to agreed technical documents.

NOTE: All the tests, inspection, checking, data-configuration etc shall be conducted as per FAT procedure by the vendor and the same shall be submitted to Mecon for review before calling for witnessing FAT by GGL/MECON. The records / test reports/ calibration reports/ certificates and other relevant document should be prepared / obtained by the vendor and sent to Mecon for review before calling for FAT.

Scope.

The FAT will confirm the compliance of RPD Meter based Skid with the project specifications. The purpose of FAT is to check the performance of each component as well as entire skid. Upon completion of the test described in the following procedures, the system will be considered to be ready to be dispatched to the site. All the physical & functional tests are described in the remaining sections. When each functional test has been completed, Customer representative will indicate acceptance of the tests by signing the test certificates.

All the equipments / instruments/ items shall be installed (as far as possible) for demonstration during FAT. In case some of the items can not be erected/ installed during FAT, list of such item along with the reason for not installing the same shall be provided before start of FAT. FAT shall not be conducted before our approval of such list. In case difference in calculated values (calculated by different Instruments) is observed for any parameter, the list of such parameters along with values and suitable reason for such deviation to be submitted to us in advance for our review. In case deviation is observed in the parameter-values displayed by various components, the same shall be recorded and may result in to rejection of FAT.


All connectivity/ its simulation mentioned elsewhere in tender (like Laptop, RPDM, EVC etc) shall be established and demonstrated during FAT. Non-compliance to any of these shall result in rejection of skid. The solar panel shall be connected for power supply to the skid equipments.

Reference Documents:

Design Documents of Skid

Document No.

- 1 P & ID for Skid Drawing No. -----
- 2 GA Drawing for Skid Drawing No. -----
- 3 Base frame and Foundation Drawing No. -----
- 4 Base frame Calculation Doc. No. -----
- 5 Quality assurance plan - Mechanical Items Doc. No. -----
- 6 Quality assurance plan – Instrumentation Equipment Doc. No. -----

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7 Material Test certificate, Radiography test report, Hydro-test certificate _____

Datasheet / Drawing of Equipments:

1. Flow straighteners – Drawing No. _____
2. Pressure Gauge – Data sheet No. _____, Calibration Report
3. Temperature Gauge – Date sheet No. _____, Calibration Report
4. Pressure Control Valve (Regulator) – Data Sheet No. . _____
5. Slam Shut of Valve– Calculation, GA Drawing No. _____
6. Pressure safety Valve – Data Sheet No. _____, Calibration Report
7. Ball Valves ----- make - Drawing No. _____
8. Plug Valves - Drawing No. _____
9. Check Valves - Drawing No. _____
10. Cartridge Filter – Design data Doc. No. _____
11. EVC – Data Sheet No. _____, Calibration Report-Meter pressure & temperature inputs, test certificates
12. RPD Meter – Data Sheet No. _____, Calibration Report, W&M type approval

Orientation of Witnesses:

All representatives shall be briefed on details/ description/ operating principles of the RPDM Based Skid for this project before commencing the FAT.

Test Certificates:

Upon completion of the tests mentioned in this document, Test Certificates should be filled with the results and signed / stamped by all the parties.


Action List:

Any discrepancies noted during the functional tests shall be defined, recorded and summarized in the Action List Form. Once proper action has been taken on those points, this Action List shall be signed / stamped by Customer duly filled with the results.

2. VISUAL INSPECTION OF SKID.

2.1 Skid Review:

The Skid will be inspected for installation of all the components as per approved P & ID and approved G.A. Drawing. Dimensional Checking shall be done as per approved G.A. Drawing. Skid will also be inspected for correctness of installed Equipments/ instruments and approachability for maintenance. The Skid will be inspected for proper support with rubber pads / clamps for the major equipments/ Instruments and pipes.

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2.2 Test Certificate for Visual Inspection:

Upon completion of the visual inspection described in this section, the test certificate for Visual Inspection of skid should be dully filled and signed by both parties.

3. FACTORY ACCEPTANCE TEST:

3.1 Hydrostatic Test (if not performed earlier)


1. Complete skid shall be offered for hydrostatic test.
2. Non Corrosive water shall be used for hydro testing at ambient temperature.
3. During the hydro test Flow meter, SSV, PCV & filter cartridges / elements shall not be installed with pipeline as internals will get damaged in contact with water.
4. All valves shall be kept at open position.
5. Either inlet or outlet pipe shall be closed with blind flange and the other side will be connected with water line (hose pipe) to fill up water in side the skid.
6. After filling water, the skid shall be pressurized to _____ kg/cm² from outlet of skid to PCV outlet and then pressurized to _____ kg/cm² from inlet of skid to inlet of PCV.
7. Maintain this pressure for four to six hours.
8. Pressure should not exceed hoop stress of the line pipe at any given moment of time.
9. No leakage is allowed through any joints and shell.
10. Record pressure and temperature reading at 30 minutes interval.

3.2 Pneumatic Test

1. After completion of hydro-test, drain out water from the skids.
2. Pass the air through the entire skid for some time to dry out the pipeline.
3. Assemble the Flow meter, SSV, PCV and impulse tubes in pipe line.
4. Keep all valves open and close either inlet or outlet side pipe with blind flange.
5. Pressurize the entire skid by air/ nitrogen up to 7 kg/cm² and hold for one hour.
6. No leakage/ drop in pressure is allowed.
7. Check the leakage using soap water.

3.3 Functional test of SSV, PCV, CRV, RPD, EVC, FC

1. Set point of PCV– set the required pressure of PCV as per approved data sheet/approved P&ID by Pilot adjusting screw.
2. Set point of SSV - Increase the PCV pressure to cross the set point of SSV. The SSV should trip at set pressure value as per approved data sheet/ approved P&ID. Record the Over Pressure Shut off value during test.
3. SSV's Limit switch feed back (contact) signal to be checked with Multimeter.
4. Set point of CRV: Set pressure as per approved data sheet/approved P&ID of CRV to be demonstrated. Sealing to be done after setting.

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5. RPD: Functioning of RPD with EVC to be demonstrated.
6. Test report/ record for Set pressure of PCV/ SSV shall be reviewed during FAT.

3.4 EVC Test Procedure :

Loop check all the connection. Battery operated EVC to be checked and check flow correction performed during the pneumatic test. Calibration to be done, if required.

Validation of EVC to be demonstrated. EVC to be simulated with external Pulse generator.

Functional check of the RPD meter to be carried during the pneumatic test and the corresponding readings in the EVC shall be checked.

4.0 Spares:

List to be prepared as per P.O. terms/ tender documents for all the mandatory spares, commissioning spares, cables, and materials required for erection. All the spares shall be verified by GGL/MECON representative during FAT test. All spares shall be identified with proper tags. Foundation bolt and mating flanges shall be checked during FAT.

5.0 Painting:

The painting shall be carried after cleaning the surface by sand blasting to remove all mill scale, rust, rust scale, paint, oil or foreign particles etc. and maintain the surface finishing as Sa 2 ½ .

Primer Coat – Zinc rich epoxy primer of thickness of 75 Micron (DFT).

Interim coat – Polyamide epoxy of thickness 125 Micron (DFT)

Finished Coat – Polyurethane of thickness 75 Micron (DFT).

Total Thickness – 275 Micron (DFT)

The colour code of pipelines – Golden Yellow

Other colours as per approved colour scheme.


6.0 Documents Review:

After completion of all tests, Documents like material test certificates, Radiography test, Hydro-test, calibration/ test reports etc. for Ball valves/ Plug valves/ CRV/ NRV/ PSV/ Filters, pipes, fittings, Tee/ elbow/ weld joints, shall be reviewed to check the compliance with the tender specifications and approved QAP for the equipments / instruments.

7.0 Annexure to FAT Manual:

Apart from FAT procedure, FAT Manual shall have Annexure which shall include the following:


- a) List of all the loose items with details to be provided by vendor (like Mandatory Spares, commissioning spares, Consumables, Parts of skids, mating flanges, Gaskets, materials required for installation of skid, Connecting cable for laptop & EVC, Earthing strips, Cable Trays, cable glands, plugs, blind flanges, lugs, ferrules, earthing Cables, Mounting Accessories, any other hardware required for establishing various connectivity mentioned

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elsewhere, Software etc.) to be enclosed as Annexure in the FAT Manual for our review/ approval. The items mentioned in the list (Annexure) shall be demonstrated during FAT.

- b) List of all the reports (like calibration reports for various Instruments, test reports for all the equipments, CCOE certificates etc.), with details like Report no., date, description etc shall also be prepared as Annexure of FAT manual. The same shall also be reviewed during FAT

Any discrepancy observed during FAT shall be recorded/ noted in the Action list. Issue of Inspection Release note/ Dispatch clearance shall be subject to compliance of all the FAT Check-list points/ Action list.

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TEST CERTIFICATE

VISUAL INSEPCION

Project : -----

Client : -----


P.O. No : ----- **Dtd.** -----

Sr. No	POINT INSPECTED	RESULTS FOUND OK
1	Skid checked as per P & ID and GA Drawing	YES / NO
2	Process parameter in Name Plate	YES / NO
3	Lifting hook	YES / NO
4	Copper jumper for all flanges	YES / NO
5	Earthing Connection at base frame	YES / NO
6	Insulation for Metering system	YES / NO
7	Instrumentation cable connection, cable dressing and JB mounting installation etc. as per wiring diagram.	YES / NO
8	Identification Tags for cable and all Instruments	YES / NO
9	Painting colour of pipe line (golden Yellow)	YES / NO
10	Spares as per P.O. requirement	YES / NO
11	Foundation bolt and Matting flanges	YES / NO
12	Support for all the equipments/ Instruments, Pipe, Trays	YES / NO
13	Adequacy of approach for operation & maintenance purpose	YES / NO
14	Approachability to EVC & instrument	YES / NO

Company Representative

Client/MECON representative

Date:

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TEST CERTIFICATE

HYDROTEST OF SKID

Project : -----

Client : -----

P.O. No : ----- **Dtd.** -----

Test Pressure : 1) _____ Kg/cm² (g) up to PCV,
2) _____ Kg/cm² (g) after PCV

Test Media : Water
Duration : Minimum 240 minutes

Sr. No.	TIME	Pressure before PCV	Pressure after PCV
1			
2			
3			
4			
5			
6			
7			
8			

POINT INSPECTED

RESULT FOUND OK

- a) Leak test at flange joints and other connections
up to PCV
- b) Leak test at flange joints and other connections
after PCV


YES / NO

YES / NO

Company Representative

Client/MECON representative

Date:

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TEST CERTIFICATE

PNEUMATIC TEST OF SKID

Project : -----

Client : -----

P.O. No : ----- **Dtd.** -----

Test Pressure : 7.0 Kg/cm2(g)
 Test Media : Air / Nitrogen Gas
 Duration : 60 minutes

POINT INSPECTED

Leak test at flange joints and other connections


RESULT FOUND OK

YES / NO

Company Representative

Client/MECON representative

Date:

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TEST CERTIFICATE

DIMENSIONAL INSPECTION

Project : -----

Client : -----


P.O. No : ----- **Dtd.** -----

Sr. No	Parameters Requirement	Result Found
1.	Base Frame Dimension as per approved foundation drawing	YES / NO
2.	Height of inlet pipe from base in mm _____	YES / NO
3.	Height of Outlet pipe from base in mm _____	YES / NO
4.	Painting thickness of pipe line as per approved Specifications: 275 microns (DFT)	YES / NO
5.	Height of EVC mounting from base	YES / NO

Company Representative

Client/MECON representative

Date:

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FAT CHECK LIST

PRESSURE REGULATION SYSTEM

Project : -----

Client : -----


P.O. No : ----- **Dtd.** -----

SR. No.	ITEM	CHECKED		REMARKS
1.	Set Point of Stream-1 Active PCV ___ Bar(g)	<input type="radio"/> Accepted	<input type="radio"/> Rejected	
2.	Set Point of Stream-1 Monitor PCV ___ Bar(g) Active Pilot.	<input type="radio"/> Accepted	<input type="radio"/> Rejected	
3.	Set Point of Stream-1 SSV ___ Bar(g)	<input type="radio"/> Accepted	<input type="radio"/> Rejected	
4.	Set Point of Stream-1 CRV ___ Bar(g)	<input type="radio"/> Accepted	<input type="radio"/> Rejected	
5.	Set Point of Stream-2 Active PCV ___ Bar(g)	<input type="radio"/> Accepted	<input type="radio"/> Rejected	
6.	Set Point of Stream-2 Monitor PCV ___ Bar(g).	<input type="radio"/> Accepted	<input type="radio"/> Rejected	
7.	Set Point of Stream-2 SSV ___ Bar(g)	<input type="radio"/> Accepted	<input type="radio"/> Rejected	
8.	Set Point of Stream-2 CRV ___ Bar(g)	<input type="radio"/> Accepted	<input type="radio"/> Rejected	

Company Representative

Client/MECON representative

Date:

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FAT CHECK LIST

FIELD INSTRUMENT

Project : -----

Client : -----


P.O. No : ----- **Dtd.** -----

SR. No.	ITEM DESCRIPTION	CHECKED		REMARKS
1.	Inlet Pressure Gauge	<input type="radio"/> Accepted	<input type="radio"/> Rejected	
2.	Inlet Temp. Gauge	<input type="radio"/> Accepted	<input type="radio"/> Rejected	
3.	Metering Temperature Stream	<input type="radio"/> Accepted	<input type="radio"/> Rejected	
5.	Metering Pressure Transmitter Stream1	<input type="radio"/> Accepted	<input type="radio"/> Rejected	
7.	Differential Pressure Gauge across filter - Stream 1	<input type="radio"/> Accepted	<input type="radio"/> Rejected	
8.	Differential Pressure Gauge across filter - Stream 2	<input type="radio"/> Accepted	<input type="radio"/> Rejected	

Company Representative

Client/MECON representative

Date:

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FAT CHECK LIST

ELECTRONIC VOLUME CORRECTOR

Project : -----

Client : -----


P.O. No : ----- **Dtd.** -----

SR. No.	ITEM DESCRIPTION	SIGNAL IN EVC CHECKED		REMARKS
1.	Metering Pressure	<input type="radio"/> Correct	<input type="radio"/> Incorrect	
2.	Metering Temperature	<input type="radio"/> Correct	<input type="radio"/> Incorrect	
4.	Flow readings	<input type="radio"/> Correct	<input type="radio"/> Incorrect	
5.	Modbus Mapping Data	<input type="radio"/> Correct	<input type="radio"/> Incorrect	
6.	EVC parameters configured as per specification	<input type="radio"/> Correct	<input type="radio"/> Incorrect	
7.	EVC parameters display as per specification	<input type="radio"/> Correct	<input type="radio"/> Incorrect	
8.	Flow validation as per AGA-8 & based on AGA-7 detail method	<input type="radio"/> Correct	<input type="radio"/> Incorrect	
9.	Weights & Measure Approval	<input type="radio"/> Available	<input type="radio"/> Not-Available	
10.	PESO/CCOE & ATEX/CMRI certificate	<input type="radio"/> Available	<input type="radio"/> Not-Available	

Company Representative

Client/MECON representative

Date:

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FAT CHECK LIST

RPD METER

Project : -----

Client : -----


P.O. No : ----- **Dtd.** -----

SR. No.	ITEM DESCRIPTION	CHECKED		REMARKS
1.	Visual Check	<input type="checkbox"/> OK	<input type="checkbox"/> Not-OK	
2.	Meter Accessibility	<input type="checkbox"/> OK	<input type="checkbox"/> Not-OK	
3.	Alignment of counter for reading	<input type="checkbox"/> OK	<input type="checkbox"/> Not-OK	
4.	Functional of flow meter during pneumatic test	<input type="checkbox"/> OK	<input type="checkbox"/> Not-OK	
5.	Reading of flow meter on EVC	<input type="checkbox"/> OK	<input type="checkbox"/> Not-OK	
6.	Calibration Report	<input type="checkbox"/> OK	<input type="checkbox"/> Not-OK	
7.	Weights & Measure Approval	<input type="checkbox"/> Available	<input type="checkbox"/> Not-Available	
8.	PESO/CCOE & ATEX/CMRI certificate	<input type="checkbox"/> Available	<input type="checkbox"/> Not-Available	

Company Representative

Client/MECON representative

Date:

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FAT CHECK LIST


CHECK-LIST

Project : -----
Client : -----
P.O. No : ----- **Dtd.** -----

SR. No.	ITEM DESCRIPTION	RESULTS FOUND OK
1.	Installation of all the equipment in the skid as per approved makes, model, size, rating	YES / NO
2.	Installation of all the equipment / components (including metering system, EVC etc.) as per approved makes, model, size/rating.	YES / NO
3.	Dimensional inspection, size/dimension of skid, straight length of meter tube, location of thermowell, height, etc.	YES / NO
4.	Painting quality, size/dimension/operability of control panel	YES / NO
5.	Tapping point with thermowell installed for RTD connection	YES / NO
6.	Tapping point with isolation valve installed for pressure transmitter connection	YES / NO
7.	Functionality of SSV, PRV, CRV, etc.	YES / NO
8.	Pneumatic leak check of all skid	YES / NO
9.	Functionality of flow meter after flowing air/nitrogen	YES / NO
10.	Configuration of EVC	YES / NO
11.	Validation of EVC	
12.	Location of EVC, Enclosure, Cable tag & dressing	YES / NO
13.	Configuration & functionality of metering supervisory system	YES / NO
14.	Laptop connectivity	YES / NO
15.	Functionality of EVC	YES / NO
16.	Availability of adequate platforms, approach as per GAD	YES / NO
17.	Review of test reports, calibration reports for instruments, CCOE/ATEX or equivalent approval of field instruments.	YES / NO
17.	Review of (i) TC reports, documents for all mechanical items like valves, meter, pipes & flanges (ii) Radiography, vendor qualification (iii) JBS	YES / NO
18.	Supports with pads and clamps for valves, pipes PSV outlet, skid vents, impulse tubing, etc. & copper jumper for all flanges	YES / NO
19.	Checking of cables, cable glands, cable support, Stream identification, flange jumpers,	YES / NO
20.	Checking of loose items and Spares	YES / NO

Company Representative
Date:

Client/MECON representative

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FAT CHECK LIST

ACTION LIST

Project : -----

Client : -----

P.O. No : ----- **Dtd.** -----


Type of Skid :

Sr. No.	Description	Action By
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		

Company Representative

Client/MECON representative

Date:

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FAT CHECK LIST

REVIEW OF DOCUMENTS

Project : -----

Client : -----

P.O. No : ----- **Dtd.** -----

SR. No.	DOCUMENTS REVIEWED	CHECKED	REMARKS
1.	Radiography Test for all items of skid (as per List prepared by vendor and attached as Annexure)	YES / NO	
2.	Dye Penetration Test for all items of skid (as per List prepared by vendor and attached as Annexure)	YES / NO	
3.	Test Certificate (for Filtration system, Slam Shut valves, Pressure Regulator (PCV), PSV, CRV, NRV, Flow profiler, Flow meter, Isolation Ball Valves, Plug valves, PG, DPG, Thermo-well, TG, JBs, Pipe spools etc.)	YES / NO	
3.	Hydro test for all items of skid (as per List prepared by vendor and attached as Annexure)	YES / NO	
4.	Material test Report for all items of skid (as per List prepared by vendor and attached as Annexure)	YES / NO	
5.	Certification as per 3.1 for all Pressure Equipments (as per List prepared by vendor and attached as Annexure)	YES / NO	
6.	Calibration Report for PSV, CRV and Test report for SSV, PCV.	YES / NO	
7.	Calibration reports for Analog inputs of EVC, Weights & Measures type approval (If required)	YES / NO	
8.	RPD meter calibration reports with traceability, Weights & Measures type approval	YES / NO	
9.	Welding Procedure Specification, Welder qualification.	YES / NO	
10.	Compliance Certification for Painting of skid including all items (Filtration system, PRS, Valves, PSVs, CRVs etc)	YES / NO	
11	Material Correlation Chart & Welding Joints Correlation Chart	YES / NO	
12	Software CD & License for EVC	YES / NO	

Company Representative

Client/MECON representative

Date:



**CITY GAS DISTRIBUTION PROJECT AT
EAST & WEST GADAVARI DISTRICTS
Supply of District Regulatory Skid (DRS)
Bid Document No.: MEC/23TS/01/ 1/S2/DRS/SU/0003**



ANNEXURE - VIII

Standard Specifications


- | | | |
|-----|---|-------------------------|
| 1. | Technical specification of Cartridge Filter | MEC/TS/05/62/017, Rev-1 |
| 2. | Specification of Assorted Pipe | MEC/TS/05/62/59A, Rev-0 |
| 3. | Technical Specification of Pressure Safety Valve | MEC/TS/05/62/056, Rev-1 |
| 4. | Specification for Seamless Fittings & Flanges up to 400 mm (16") NB | MEC/TS/05/21/025, Rev-0 |
| 5. | Specification for Gaskets, Nuts and Bolts | MEC/S/05/21/19, Rev-0 |
| 6. | Specification for Piping, Fabrication and Erection | MEC/S/05/21/06, Rev-0 |
| 7. | Specification for Vents, Drains and Wells, Pressure tapping | MEC/S/05/21/15, Rev-0 |
| 8. | Specification for Flushing and Testing | MEC/S/05/21/11, Rev-0 |
| 9. | Technical Specification for Ball Valve | MEC/TS/05/21/002, Rev-0 |
| 10. | Technical Specification for Plug Valve | MEC/TS/05/62/003, Rev-2 |
| 11. | Specification For Shop & Field Painting | MEC/S/05/21/07, Rev-0 |
| 12. | Specification for Installation of Instruments | MEC/S/05/26/01, Rev-0 |
| 13. | Specification for Instrument Tubing | MEC/S/05/26/02, Rev-0 |
| 14. | Specification for Inlet, Outlet Sections and Flow Straightner | MEC/S/05/26/03, Rev-0 |
| 15. | Specification for Instrument Tube Fittings | MEC/S/05/26/04, Rev-0 |
| 16. | Specification for Instrument Valves and Manifolds | MEC/S/05/26/05, Rev-0 |
| 17. | Specification for Junction Boxes and Cable Glands | MEC/S/05/26/06, Rev-0 |
| 18. | Specification for Signal Cable | MEC/S/05/26/07, Rev-0 |
| 19. | General Technical Specification for Instrumentation | MEC/S/05/26/08, Rev-0 |
| 20. | Specification for Cabling | MEC/S/05/E5/21, Rev-0 |
| 21. | Specification for Earthing | MEC/S/05/26/23 A, Rev-0 |

TECHNICAL SPECIFICATION
FOR
CARTRIDGE FILTER & ACCESSORIES
(Dry Gas Filters)

SPECIFICATION NO. : MEC/TS/05/62/017, Rev-1




MECON LIMITED
DELHI - 110 092

MECON LIMITED REGD. OFF RANCHI	PROCESS & PIPING DESIGN SECTION NEW DELHI	STANDARD SPECIFICATION CARTRIDGE FILTER	
TECHNICAL SPECIFICATION NO. : MEC/TS/05/62/017		REV-1	Page 1 of 10

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11.0	INFORMATION/ DOCUMENTS/ DRAWINGS TO BE SUBMITTED BY SUCCESSFUL VENDOR	9
12.0	ORDER OF PRECEDENCE	10

PREPARED BY	CHECKED BY	APPROVED BY

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1.0 **GENERAL**

1.1 This specification outlines the minimum requirements under which the manufacturer shall design, manufacture, test and supply Cartridge Filter for separating solid contaminants from the gas stream.

2.0 **SCOPE OF SUPPLY**


2.1 The vendor's scope of supply shall be Cartridge Filter alongwith accessories complete in all respects as per data sheet enclosed. The detailed scope of work is as follows :

The filters shall comprise of the following :

- Filter vessel alongwith necessary filtering cartridge.
- Necessary nozzles, companion flanges, blind flanges (with nuts, bolts, gaskets etc.) on the filter vessel as specified in the data sheets.
- Cartridge supporting arrangement inside the vessel.
- Quick opening closure for maintenance and filter element replacement.
- Instruments, viz PSV as per Instrumentation inputs.
- Necessary supports for filter vessel.
- Cleats for platforms and ladders.
- Foundation bolts & base plate for embedding/ grouting into civil foundation.
- Documents clause 10, 11 & elsewhere in spec.
- Spare parts for two years normal operation.

3.0 **SCOPE OF SERVICES**

- Engineering, design and manufacturing.

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- Procurement of raw materials etc. from sub-vendors.
- Preparation and submission of documentation for design approval by purchaser/ consultant.
- Inspection and testing as per T.S.
- Surface preparation, protective coating and painting as per T.S.
- Packaging for transportation to site and supply.

4.0 **DESIGN**

4.1 Following codes & standards (latest edition) shall be followed for design, manufacture, testing etc. of the equipment.


ASME Sec-VIII Div-1	:	Boiler and Pressure Vessel Code
ASME Sec-IX	:	Welding and Brazing Qualifications
ASME Sec-II & ASTM	:	Material Specifications
ANSI B16.5	:	Pipe Flanges & Pipe Fittings
ANSI B16.1	:	Forged Steel Fittings Socket Welded & Threaded
ASME B16.47	:	Large Diameter Steel Flanges
ANSI B36.10	:	Welding & Seamless Wrought Steel Pipe.

4.2 For purpose of material selection national code of the country of origin shall also be acceptable provided the vendor specifically establishes, to the satisfaction of the purchaser, the equivalence or superiority of the proposed material with respect to those specified.


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5.0 **TECHNICAL REQUIREMENTS**

- 5.1 The cartridge shall be of PECO/ PALL/ FILTERITE/ VELCON/ FACET/ BURGESS MANNING make. For porous metal cartridge, FUJI/ PALL/ PORAL/ MOTT are acceptable.
- 5.2 Filter elements must withstand a pressure of 1.0 kg/cm²(g) without breaking or failure.
- 5.3 At least 300mm space from bottom tangent line to be provided.
- 5.4 Filtering efficiency shall be as per enclosed data sheet.
- 5.5 Particle size shall be as indicated in the data sheets.
- 5.6 The end closure to be high pressure quick release type interlock to open only when vessel is completely depressurised. The Quick Opening Closure shall be one of the following makes only : a) Peerless, b) Grinell, c) Peco, d) Siirtec, e) Huber Yale, f) G.D. Engineering.
- 5.7 Filter element should be suitable for specified mole% of CO₂.
- 5.8 Core of filter element shall be of SS material.
- 5.9 A davit/ hinged arrangement shall be provided for the closure for convenient handling. The closure shall have perfect sealing arrangement to prevent leakage.
- 5.10 The equipment shall be of the type as mentioned in the data sheets and shall meet the duty requirements and performance parameters as mentioned therein.
- 5.11 Vendor shall submit calculations for sizing of the equipment together with all supporting documents/ catalogues/ nomographs etc. with the bid. The type, model and number of cartridge shall be selected based on allowable pressure drop and supplier's recommendation. The total internal cross sectional area of mounted cartridge shall not be less than inlet nozzle area for inlet size upto 150 NB. The calculation for the selected number of cartridge shall be furnished, alongwith the bid.

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- 5.12 Suitable baffle plates shall be provided in the vessels for proper fluid flow distribution. Vessel diameter shall be minimum twice the diameter of inlet nozzle. All internal nuts and bolts shall be of stainless steel irrespective of material of construction of vessel.
- 5.13 All nozzles/ pipes on the vessel shall be of seamless construction. All nozzle less than or equal to 50 NB size shall be provided with 2 Nos., 6mm thick stiffeners at 90 degrees to each other. All nozzles above 80 NB size, shall be provided with reinforcement pads.
- 5.14 All flanges shall be WNRF except DPT connection which is to be socket welded.
- 5.15 Dimensions of flanges including shell flanges, blind head cover flanges, nozzle flanges and blind flanges shall be as per ANSI B16.5. Larger flanges shall be as per ANSI B16.47.
- 5.16 Pressure parts joined by butt welds shall be with full penetration welds. Where both sides welding is not accessible, root run by tungsten inert gas process or backing strip, shall be used to ensure full penetration. Backing strip if used, shall be removed after welding.
- 5.17 Vessels shall be post weld heat treated, whenever it is required due to service requirement or due to code requirements. Vessels shall be post weld heat treated as a complete unit and no welding shall be permitted after the post weld heat treatment is completed.
- 5.18 For vessels in stainless steel construction, lower allowable stress values shall be considered as per ASME Code for their design.
- 5.19 Filter vessel shall be provided with lifting and earthing lugs. Fire proofing and insulation supports shall be provided if indicated in data sheet.
- 6.0 **INSPECTION AND TESTING**
- 6.1 Equipment shall be subjected to stagewise expediting, inspection and testing at vendor's/ sub-vendor's works by purchaser/ its authorised inspection agency. Vendor shall submit Quality Assurance (QA) procedures before commencement of fabrication. Approved QA procedures shall form the basis for equipment inspection.

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6.2 Testing at vendor's works shall include but not limited to the following:

- Non destructive tests such as radiography, dye penetration tests.
- Hydrostatic test at 150% of design pressure for the vessel.
- Any other tests as per data sheets/ standards/ codes.

6.3 Any or all the tests, at purchaser's option, shall be witnessed by purchaser/ its authorised inspection agency. However, such inspection shall be regarded as check-up and in no way absolve the vendor of this responsibility.

6.4 Extent of radiography shall be 100%.

7.0 **PROTECTION AND PAINTING**

7.1 All exposed carbon steel parts to be painted shall be thoroughly cleaned from inside and outside to remove scale, rust, dirt and other foreign materials by wire brushing and sand blasting as applicable. Minimum acceptable standard in case of power tool cleaning shall be St. 3 and incase of blast cleaning shall be Sa 2½ as per Swedish Standard SIS 0055900.


7.2 Non-ferrous materials, austenitic stainless steels, plastic or plastic coated materials, insulated surfaces of equipment and pre-painted items shall not be painted.

7.3 Stainless steel surfaces both inside and outside shall be pickled and passivated.


7.4 Machined and bearing surfaces shall be protected with varnish or thick coat of grease.

7.5 Depending on the environment, following primer and finish coats shall be applied.


	<u>Environment</u>	<u>Description</u>
i)	Normal Industrial	Surface Preparation : Sa 2½ Primer : 2 coats of Redoxide zinc chromate each 25 microns (min.) thick.

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	Finish Coat	: 2 coats of synthetic enamel, each 25 microns (min.) thick.
ii) Corrosive Industrial	Surface Preparation	: Sa 2½ Primer : 2 coats of Epoxy zinc chromate each 35 microns (min.) thick.
iii) Coastal and Marine	Surface Preparation	: Sa 2½ Primer : 2 coats of high build Chlorinated Rubber zinc phosphate, each 50 microns (min.) thick.
iv) All Environment (temp. 80-400°C)	Surface Preparation	: Sa 2½ Finish : 2 coats of chlorinated rubber paint, each 35 microns (min.) thick. Finish : 2 coats of heat resistant aluminium paint suitable for specified temp. each 20 μ thick. (All values refer to dry film thickness).
7.6	The colour of finish coat shall be intimated to vendor after placement of order.	
8.0	<u>PACKAGING AND IDENTIFICATION</u>	
8.1	All packaging shall be done in such a manner as to reduce the volume. The equipment shall be dismantled into major components suitable for shipment and shall be properly packed to provide adequate protection during shipment. All assemblies shall be properly match marked for site erection.	

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8.2	Attachments, spares parts of the equipment and small items shall be packed separately in wooden-cases. Each item shall be appropriately tagged with identification of main equipment, its denomination and reference number of the respective assembly drawing.
8.3	Detailed packing list in water-proof envelope shall be inserted in the package together with equipment.
8.4	Each equipment shall have an identification plate giving salient equipment data, make, year of manufacture, equipment number, name of manufacturer etc.
9.0	<u>SPARE PARTS</u>
9.1	Vendor shall submit his recommended list of spare parts with recommended quantities and <u>itemised prices</u> for first two years of operation of the equipment. Proper coding and referencing of spare parts shall be done so that later identification with appropriate equipment will be facilitated.
9.2	Recommended spares and their quantities should take into account related factors of equipment reliability, effect of equipment downtime upon production or safety, cost of parts and availability of vendor's service facilities around proposed location of equipment.
9.3	Vendor shall also submit a list of recommended commissioning spares with quantities and the itemised prices.
10.0	<u>INFORMATIONS/ DOCUMENTS/ DRAWINGS TO BE SUBMITTED WITH THE OFFER</u>
	Contractor shall submit with the offer four copies each of the following:
10.1	Manufacturer's complete descriptive and illustrative catalogue/ literature.
10.2	The completion schedule activity wise.
10.3	In case of failure to submit the documents listed above, the offer may be rejected.

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11.0 INFORMATION/ DOCUMENTS/ DRAWINGS TO BE SUBMITTED BY SUCCESSFUL VENDOR

Successful vendor shall submit six copies unless noted otherwise, each of the following :

- 11.1 Inspection & test reports for all mandatory tests as per the applicable code. Test reports for any supplementary tests, in nicely bound volumes.
- 11.2 Material test certificates (physical) property, chemical composition, make, heat treatment report etc.) as applicable for items in nicely bound volumes.
- 11.3 Statutory test certificates, as applicable.
- 11.4 Filled in QAP for Owner's/ Consultants approval. These QAP's shall be submitted in four copies.
- 11.5 WPS & PQR, as required.
- 11.6 Within two(2) weeks of placement of order, the detailed fabrication drawings alongwith mechanical design calculations for Owner's/ Consultants approval. These drawings shall be submitted in four copies.
- 11.7 Detailed completion schedule activity wise, within one week of placement of order.
- 11.8 Weekly & fortnightly progress reports for all activities including procurement.
- 11.9 Purchase orders of bought out items soon after placement of order.
- 11.10 Manufacturer's drawings for bought out items, in 4 copies, for Owner's/ Consultant approval within 4 weeks.
- 11.11 Manufacturer related information for design of civil foundation & other matching items within 6 weeks of LOI.

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11.12 All approved drawings/ documents as well as inspection and test reports for Owner's/ Consultants reference/ record in nicely category wise bound volumes separately.

Note: All drawings, instructions, catalogues, etc. shall be in English language and all dimensions shall be metric units.

12.0 **ORDER OF PRECEDENCE**

The following order of precedence shall govern in interpretation of various requirements and data :

- Data Sheets
- This Specification
- Codes & Standards
- Vendors Standards

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C O N T E N T S

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2.0	IBR PIPES	4
3.0	HYDROSTATIC TEST	5
4.0	MARKING & DESPATCH	5
ANNEXURE-I :	HYDROSTATIC TEST	7

Prepared By :	Checked By :	Approved By :
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PROCESS & PIPING DESIGN SECTION
MECON LIMITED
DELHI 110 092



मेकॉन

TECHNICAL SPECIFICATION
FOR
ASSORTED PIPES

SPECIFICATION NO. : MEC/TS/05/62/59A, R-0

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1.0 **GENERAL**

1.1 All pipes and their dimensions, tolerances, chemical composition, physical properties, heat treatment, hydrotest and other testing and marking requirements shall conform to the latest codes and standards specified in the Material Requisition (MR). Deviation(s), if any, shall be clearly highlighted in the offer.

1.2 **Testing**

1.2.1 Test reports shall be supplied for all mandatory tests as per the applicable material specifications. Test reports shall also be furnished for any supplementary tests as specified in the MR & Clauses 1.10 & 1.11.

1.2.2 Material test certificates (physical property, chemical composition & treatment report) shall also be furnished for the pipes supplied.

1.3 **Manufacturing Processes**


1.3.1 Steel made by Acid Bessemer Process shall not be acceptable.

1.3.2 All longitudinally welded pipes other than IS:3589 should employ automatic welding.

1.4 Pipe shall be supplied in single or double random length of 4 to 7 and 7 to 14 meters, respectively.

1.5 a) Seamless and E.R.W. pipes shall not have any circumferential seam joint in a random length. However, in case of E.F.S.W. pipe, in one random length one welded circumferential seam of same quality as longitudinal weld is permitted. This weld shall be at least 2.5 m from either end. The longitudinal seams of the two portions shall be staggered by 90°. Single random length in such cases shall be 5 to 7m.

b) Unless otherwise mentioned in the respective material code, E.F.S.W. pipes < 36" shall not have more than one longitudinal seam joint and E.F.S.W. pipes ≥ 36" shall not have more than two longitudinal seam joints.

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- 1.6 Pipe with screwed ends shall have NPT external taper pipe threads conforming to ASME/ ANSI B1.20.1 upto 1.5" NB & IS:554 for 2" to 6" NB.
- 1.7 Pipe with bevelled ends shall be in accordance with ASME B16.25. Weld contours shall be as follows:

Material	Wall Thickness	Weld Contour
Carbon Steel (Except Low Temp. Carbon Steel)	Upto 22mm	Figure 2 Type A
	> 22mm	Figure 3 Type A
Alloy Steel Stainless Steel & Low Temp. Carbon Steel	Upto 10 mm	Figure 4
	>10 mm & Upto 25 mm	Figure 5 Type A
	> 25 mm	Figure 6 Type A

- 1.8 Gavanished pipes shall be coated with zinc by hot dip process conforming to IS:4736/ ASTM A 153.
- 1.9 All austenitic stainless steel pipes shall be supplied in solution annealed condition.
- 1.10 **I.G.C. Test for Stainless Steels**


- 1.10.1 For all austenitic stainless steel pipes, intergranular corrosion test shall have to be conducted as per following:

ASTM A262 practice " B " with acceptance criteria of "60 mils/ year (max.)"

OR

ASTM 262 practice " E" with acceptance criteria of " No cracks as observed from 20X magnification" & "Microscopic structure to be observed from 250X magnification".

- 1.10.2 When specifically asked for in MR for high temperature application of some grades of austenitic stainless steel (eg.SS 309, 310, 316, 316H etc.), ASTM A262 practice "C" with acceptance criteria of "15 mils/ year (max.)" shall have to be conducted.
- 1.10.3 For the IGC test as described in 1.10.1 & 1.10.2, two sets of samples shall be drawn from each solution annealing lot; one set corresponding to highest carbon content and the other corresponding to the highest pipe

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thickness. When testing in is conducted as per Practice "E", photograph of microscopic structure shall be submitted for record.

- 1.11 All welded pipes indicated as 'CRYO' & 'LT' in MR shall be impact tested per requirement and acceptance criteria of ASME B31.3. The impact test temperature shall be -196° C & -45° C for stainless steel and carbon steel, respectively, unless specifically mentioned otherwise in MR.
- 1.12 Pipes under 'NACE' category shall meet the requirements given in MR-01-75.
- 1.13 Specified heat treatment for carbon steel & alloy steel and solution annealing for stainless steel pipes shall be carried out after weld repairs. Number of weld repairs at the same spot shall be restricted to maximum two by approved repair procedure.
- 1.14 For black or galvanised pipes to IS:1239, the minimum percentage of elongation shall be 20%.

2.0 **IBR PIPES**


2.1 **IBR Documentation**

- 2.1.1 Pipes under purview of IBR shall be accompanied with IBR certificate original in Form IIIA, duly approved and countersigned by IBR authority/ local authority empowered by the Central Boiler Board of India. Photocopy of the original certificate duly attested by the local boiler inspector where the supplier is located is the minimum requirement for acceptance.
- 2.1.2 For materials 1 ¼ Cr- ½ Mo (ASTM A335 Gr. P11/ A691 Gr. 1 ¼ Cr) & 2 ¼ Cr-1Mo (ASTM A335 Gr.P22/ A691 Gr. 2 ¼ Cr.), from III-A approved by IBR shall include the tabulation of E_t , S_c & S_r values for the entire temperature range given below. E_t , S_c & S_r values shall be such that throughout the temperature range

$$\begin{aligned} E_t / 1.5 & \geq \\ S_r / 1.5 & \geq S_a \\ S_c & \geq \end{aligned}$$

where,

- S_A : Allowable stress at the working metal temperature.
 E_t : Yield point (0.2% proof stress at the working metal temperature).

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- S_c : The average stress to produce elongation of 1% (creep) in 1,00,000 hrs at the working metal temperature.
- S_r : The average stress to produce rupture in 1,00,000 hrs. at the working metal temperature and in no case more than 1.33 times the lowest stress to produce rupture at this temperature.

S_A (psi)	Temperature (°F)											
	500	600	650	700	750	800	850	900	950	1000	1050	1100
A335 Gr. P11	17200	16700	16200	15600	15200	15000	14500	12800	9300	6300	4200	2800
A 691 Gr. 1½ Cr	18900	18300	18000	17600	17300	16800	16300	15000	9900	6300	4200	2800
A335 Gr. P2/ A691 Gr. 2 ¼ Cr	17900	17900	17900	17900	17900	17800	14500	12800	10800	7800	5100	3200

Note: S_A values given above are as per ASME B31.3-1999. Values shall be as per the latest edition prevailing.

2.2 For carbon steel pipes under IBR, the chemical composition shall conform to the following;

- Carbon (max.) : 0.25%
- Others (S, P, Mn) : As prescribed in IBR regulation.

The chemical composition as indicated in this clause is not applicable for pipes other than IBR services.

3.0 HYDROSTATIC TEST


Refer Annexure – I.

4.0 MARKING AND DESPATCH


4.1 All pipes shall be marked in accordance with the applicable codes, standards and specifications. In addition, the purchase order number, the item code & special conditions like "IBR", "CRYO", "NACE", etc., shall also be marked.

4.2 Pipes under "IBR", "CRYO", & "NACE" shall be painted in red stripes, light purple brown stripes & canary yellow stripes, respectively, longitudinally throughout the length for easy identification.

4.3 Paint or ink for marking shall not contain any harmful metal or metallic salts such as zinc, lead or copper which cause corrosive attack on heating.

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- 4.4 Pipes shall be dry, clean and free from moisture, dirt and loose foreign materials of any kind.
- 4.5 Pipes shall be protected from rust, corrosion and mechanical damage during transportation, shipment and storage.
- 4.6 Rust preventive used on machined surfaces to be welded shall be easily removable with a petroleum solvent and the same shall not be harmful to welding.
- 4.7 Both ends of the pipe shall be protected with the following material:
- | | | |
|--------------|---|-------------------------------|
| Plain end | : | Plastic cap |
| Bevel end | : | Wood, Metal or Plastic cover |
| Threaded end | : | Metal or Plastic threaded cap |
- 4.8 End protectors to be used on bevelled ends shall be securely and tightly attached with belt or wire.
- 4.9 Steel end protectors to be used on galvanised pipes shall be galvanised.

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ANNEXURE-I

3.0 HYDROSTATIC TEST

3.1 All pipes shall be hydrostatically tested.

3.2 The mill test pressure shall be as follows:

3.2.1 **Seamless, E.R.W. & Spiral Welded**

a) **Carbon Steel**

Material Standard	Test Pressure Standard
ASTM A 106 Gr. B	ASTM A 530
API 5L Gr. B, Seamless	API 5L
API 5L, E.R.W.	API 5L
API 5L, Spiral	API 5L
ASTM A333 Gr.3 & 6, Seamless	ASTM A 530
ASTM A 333 Gr. 3 & 6, E.R.W.	ASTM A 530

b) **Seamless Alloy Steel**


Material Standard	Test Pressure Standard
ASTM A335 GR.P1, P12, P11, P22, P5, P9	ASTM A 530
ASTM A268 TP 405, TP410	ASTM A530

c) **Seamless Stainless Steel**

Material Standard	Test Pressure Standard
ASTM A312 Gr.TP304, 304L, 304H, 316, 316L, 316H, 321, 347	ASTM A 530

d) **Seamless Nickel Alloy**

Material Standard	Test Pressure Standard
ASTM B161 UNS No.2200	ASTM B161
ASTM B165 UNS No.4400	ASTM B165
ASTM B167 UNS No.6600	ASTM B167
ASTM B407 UNS No.8800	ASTM B407

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e) Welded Nickel Alloy

Material Standard	Test Pressure Standard
ASTM B725 UNS No.2200, 4400	ASTM B725
ASTM B517 UNS No.6600	ASTM B517
ASTM B514 UNS No.8800	ASTM B514

3.2.2 Electric Fusion Welded

a) Carbon Steel & Alloy Steel E.FS.W. (16" & above)

Material Standard	Test Pressure Standard
API 5L Gr.B ASTM A 671 Gr.CC65, 70 (Cl.32) ASTM A 672 Gr.C60, 65, 70 (Cl.12,22) ASTM A 671 Gr.CF60, 65, 66, 70 (Cl.32) ASTM A 691 Gr. ½ Cr, 1Cr, 1 ¼Cr, 2 ¼Cr, 5Cr, 9Cr (Cl.42)	P=2ST/ D S=90% of SMYS (except for API 5L Gr.B) S=85% of SMYS for API 5L Gr.B T=Nominal Wall Thickness D=O.D. of Pipe


b) Stainless Steel E.FS.W. (2" to 6")

The hydrostatic test pressure in kg/ cm² for the following materials shall be as given below:

Material Gr.1: ASTM A312 TP304/ 304H/ 316/ 316H/ 321/ 347 welded

Material Gr.2: ASTM A312 TP 304L/ 316L welded

Size	Pipe Schedule: S10		Pipe Schedule : S40		Pipe Schedule : S80	
	Material Gr.1	Material Gr.2	Material Gr.1	Material Gr.2	Material Gr.1	Material Gr.2
2"	100	80	155	130	230	190
3"	80	60	155	130	230	190
4"	80	50	155	130	230	190
6"	65	35	90	75	155	130

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c) Stainless Steel E.FS.W. (8" and above).


Material Standard	Test Pressure Standard
ASTM A358 TP 304L, 304, 304H, 316L, 316, 316H, 321, 347 (Classes 1, 3 & 4)	P = 2ST/D S = 85% of SMYS T = Nominal Wall Thickness D = O.D. of Pipe
ASTM A358 TP 304L, 304, 304H, 316L, 316, 316H, 321, 347 (Classes 2 & 5)	P = 2ST/D S = 72% of SMYS T = Nominal Wall Thickness D = O.D. of Pipe

3.2.3 Carbon Steel Pipes to IS Standards

Material Standard	Test Pressure Standard
IS :1239	IS :1239
IS :3589	IS :3589

VALVES

TYPE	SIZE	RATING	ENDS	MANUF. STD.	BODY MATERIAL	TRIM MATERIAL	SPECIAL REQUIREMENT
BALL	BELOW 2"	800 #	SW	BS 5351	A 105	SEAT - RPTFE	3000, B-16.11
	2" TO 24"	300 #	RF	API 6D	A 216 GR WCC/A 234 GR WPC	AISI4140+0.003" ENP/AISI410	125 AARH, B-16.5
	2" TO 24"	300 #	BW	API 6D	A 216 GR WCC/A 234 GR WPC	AISI4140+0.003" ENP/AISI410	B-16.25
PLUG	BELOW 2"	800 #	SW	BS 5353	A 105	PLUG A-105+0.003" ENP	3000, B-16.11
	2" TO 24"	300 #	RF	API 6D	A 216 GR WCB.	PLUG A-216 Gr.WCB+0.003" ENP	125 AARH, B-16.5
	2" TO 24"	300 #	BW	API 6D	A 216 GR WCB.	PLUG A-216 Gr.WCB+0.003" ENP	B-16.25
CHECK	BELOW 2"	800 #	SW	BS 5352	A 105	TRIM-STELLITED	3000, B-16.11
	2" TO 24"	300 #	RF	API 6D	A 216 GR WCB.	TRIM-STELLITED+13% CR STEEL	125 AARH, B-16.5
GLOBE	BELOW 2"	800 #	SW	BS 5352	A 105	TRIM-STELLITED, STEM-13 % CR STEEL/AISI410	3000, B-16.11
	2" TO 12"	300 #	RF	BS 1873	A 216 GR WCB.	13% CR OVERLAY	125 AARH, B-16.5
GATE	BELOW 2"	800 #	SW	API 602	A 105	TRIM-STELLITED, STEM-13 % CR STEEL/AISI410	3000, B-16.11
	2" TO 24"	300 #	RF	API 6D	A 216 GR WCB.	13% CR OVERLAY	125 AARH, B-16.5

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
SECTION: OIL & GAS			GODAVARI GAS PVT LTD				मेकॉन लिमिटेड MECON LIMITED
DSCN	NAME	DATE	CHKD	DATE	CITY GAS DISTRIBUTION NETWORK		SCALE : N.T.S. (SH. 3 OF 3)
DRWN	P.S.		S.K.		PIPING MATERIAL SPECIFICATIONS 300# (B1A)		APPENDIX-III
APPROVED	A.K.SARKAR						REV 0

PIPELINE/PIPING DESIGN CODE		ASME B 31.8 / OISD 226				DESIGN FACTOR - 0.5										
ITEM	NOMINAL DIAMETER (INCHES)	0.50	0.75	1.00	1.50	2.00	3.00	4.00	6.00	8.00	10.0	12.0	14.0	16.0	18.0	20.0
	WALL THICKNESS (MM/SCH)	S160	S160	XS	XS	STD	S40	S40	S40	S40	STD	S40	S40	S40	S40	15.9
PIPE	MATERIAL	ASTM A106 GR.B				ASTM A106 GR.B (CHARPY)				API 5L GR.B PSL2						
	DIMENSION STD.	B36.10				API 5L										
	METHOD OF MANUFACTURE, ENDS	SEAMLESS PE				SEAMLESS BE				BE SAW						
FLANGE	MATERIAL AND GRADE	ASTM A 105				ASTM A 105 (CHARPY)										
	TYPE, FLANGE FACING	SW. RF 125AARH				WN. THICKNESS TO MATCH PIPE THICKNESS, RF 125AARH										
	DIMENSION STD.	B16.5														
BLIND FLANGE	MATERIAL AND GRADE	ASTM A 105				ASTM A 105 (CHARPY)										
	FLANGE FACING	RF 125AARH														
	DIMENSION STD.	B16.5														
BLANK	MATERIAL AND GRADE	ASTM A 105				ASTM A 105 (CHARPY)										
	FLANGE FACING	FF 125AARH														
	DIMENSION STD.	B16.4B														
	TYPE	FIG.8 FLANGE				SPACER & BLIND										
BOLTING	STUD BOLTS (FULLY THREADED)	A 193 GR B7, B-18.2														
	NUTS (HEAVY HEXAGONAL)	A 194 GR 2H, B-18.2														
GASKET	TYPE, MATERIAL AND Dmn. STD.	SPIRAL 300#, SP.WND SS316+CAF, B-16.20-ANSI B16.5,														
ELBOW-90 ELBOW-45	MATERIAL	ASTM A 105				ASTM A 234 GR.WPB (CHARPY)										
	END DETAIL	SW,6000#				BW, 1.5D										
	DIMENSION STD.	B-16.11				B-16.9										
T-EQUAL T-RED	MATERIAL	ASTM A 105				ASTM A 234 GR.WPB (CHARPY)										
	END DETAIL	SW,6000#				BW, THICKNESS TO MATCH PIPE THICKNESS										
	DIMENSION STD.	B-16.11				B-16.9										
CAP	MATERIAL	ASTM A 105				ASTM A 234 GR.WPB (CHARPY)										
	END DETAIL	SCRF6000#				BW, THICKNESS TO MATCH PIPE THICKNESS										
	DIMENSION STD.	B-16.11				B-16.9										
FITTING	MATERIAL	ASTM A 105				ASTM A 234 GR.WPB (CHARPY)										
	END DETAIL	SW,6000#				BW, THICKNESS TO MATCH PIPE THICKNESS										
	DIMENSION STD.	B-16.11				B-16.9										
	TYPE	COUPLING FULL, HALF LH., RED.				RED. CON. RED. ECC.										
O'LET	MATERIAL	ASTM A 105				ASTM A 105 (CHARPY)										
	END DETAIL	SW,6000#				BW										
	DIMENSION STD.	MSS-SP97				MSS-SP97										
	TYPE	SOCKOLET				WELDOLET										

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
SECTION: OIL & GAS			GODAVARI GAS PVT LTD			मेकॉन लिमिटेड	
DSCN	NAME	DATE	CHKD	DATE	CITY GAS DISTRIBUTION NETWORK		
DRWN	P.S.		S.K.		MECON LIMITED		
APPROVED	A.K.SARKAR		PIPING MATERIAL SPECIFICATIONS 300# (B1A)			SCALE : N.T.S.	(SH. 2 OF 3)
APPENDIX-III							REV 0



ANSI CLASS: 300	CORROSION ALLOWANCE: 1.5 MM	TEMP °C	-29.0	38.0	50	100	150	200
SERVICE : NATURAL GAS		PRESS. KG/CM ²	52.1	52.1	51.10	47.52	45.98	44.60
BASE MATERIAL: CARBON STEEL (MATERIAL GROUP 1.1)								

NOTES:-

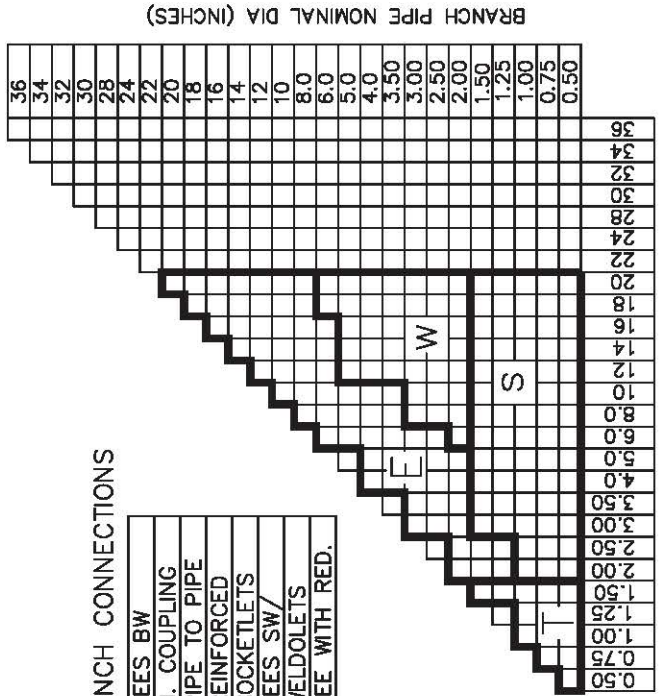
- ALL VENTS & DRAIN SHALL BE PROVIDED WITH PLUG VALVE UNLESS MENTIONED OTHERWISE IN P&IDs.
- FITTINGS SHALL BE OF SEAMLESS CONSTRUCTION UP TO 16" AND SHALL BE OF WELDED CONSTRUCTION 18" AND ABOVE.
- WALL THICKNESS FOR LINEPIPE USED IN VARIOUS SECTIONS SHALL BE AS PER TABLE-1 OF PMS.
- BALL VALVE TO BE USED IN MAINLINE SHALL HAVE BUTT WELDED ENDS EXCEPT FOR THE VALVES USED FOR HOT TAPPING WHICH SHALL BE ONE SIDE BUTT WELDED AND OTHER SIDE FLANGED.
- PROCUREMENT OF MATERIALS SHALL BE AS PER DETAILED RELEVANT SPECIFICATIONS.
- DESIGN PRESSURE & TEMP. FOR PIPELINE AND RELATED FACILITIES ARE 49 BAR (49.97 Kg/cm²g) & (-29° TO +65°C) RESPECTIVELY.
- PRESSURE-TEMPERATURE RATING INDICATED ARE FOR FLANGES ONLY IN ACCORDANCE WITH ANSI B 16.5
- FOR VALVES, STEELPIPE AND ASSOCIATED STEEL COMPONENTS OF 2" AND LARGER NOTCH TOUGHNESS PROPERTIES SHALL BE AS SPECIFIED IN RELEVANT SPECIFICATIONS/CODES, MECON'S STANDARD TECHNICAL SPECIFICATIONS AND DATA SHEETS ETC.
- AT STATIONS, BRANCH CONNECTIONS SHALL BE AS PER BRANCH CONNECTION TABLE BELOW
- ALL BUTT WELDS SHALL BE 100% RADIOGRAPHED.
- 100% OF SOCKET WELD SHALL BE SUBJECTED TO MPI/DPT.
- PRESSURE-TEMPERATURE RATING OF VALVE BODY SHALL BE AS PER API 6D.
- PIPELINE DESIGN CODE - ASME B 31.8 & OISD 226.
- FOR PIPELINE SPECIALITY ITEMS (SCRAPPER TRAP, FLOW TEE, LJ, LR BENDS ETC.) AND THEIR MATERIAL DESCRIPTIONS REFER DATA SHEET OF RESPECTIVE ITEMS.

STATION PIPING MATERIAL SPECIFICATION

ITEM	SIZE	DESCRIPTION
MAINTENANCE JOINTS	ALL	FLGD., BUT TO BE KEPT MINIMUM
PIPE JOINTS	1.5" & BELOW	SOCKET WELD
	2" & ABOVE	BUTT WELDED
DRAINS	ON LINES ≤ 1.5"	3/4", AS PER MEC/SD/05/21/15/03
	ON LINES ≥ 2"	3/4" OR AS PER P&ID, MEC/SD/05/21/15/01
VENTS	ON LINES ≤ 1.5"	3/4", AS PER MEC/SD/05/21/15/03
	ON LINES ≥ 2"	3/4" OR AS PER P&ID, MEC/SD/05/21/15/01
TEMP. CONN.	1.5"	FLGD. INSTL. AS PER MEC/SD/05/21/15/02
PRESS CONN.	3/4"	SCH. 160 NIPPLE WITH BALL VALVE TO SPEC. INSTALLATION AS PER MEC/SD/05/21/15/05

BRANCH CONNECTIONS

E	TEES BW
H	H. COUPLING
P	PIPE TO PIPE
R	REINFORCED
S	SOCKETLETS
T	TEES SW/
W	WELDOLETS
D	TEE WITH RED.



BRANCH PIPE NOMINAL DIA (INCHES)

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
SECTION: OIL & GAS			GODAVARI GAS PVT LTD			मेकॉन लिमिटेड	
DSCN	NAME	DATE	CHKD	DATE	CITY GAS DISTRIBUTION NETWORK		
DRWN	P.S.		S.K.		MECON LIMITED		
APPROVED	A.K.SARKAR		PIPING MATERIAL SPECIFICATIONS 300# (B1A)			SCALE : N.T.S.	(SH. 1 OF 3)
						APPENDIX-III	REV 0



ANSI CLASS: 150 #	CORROSION ALLOWANCE: 1.5 MM	TEMP °C	-29	38.0	50	100	150	200
SERVICE : NATURAL GAS		PRESS. KG/CM ² g	19.98	19.98	19.57	18.05	16.11	14.07
BASE MATERIAL: CARBON STEEL (MATERIAL GROUP 1.1)								

NOTES:-

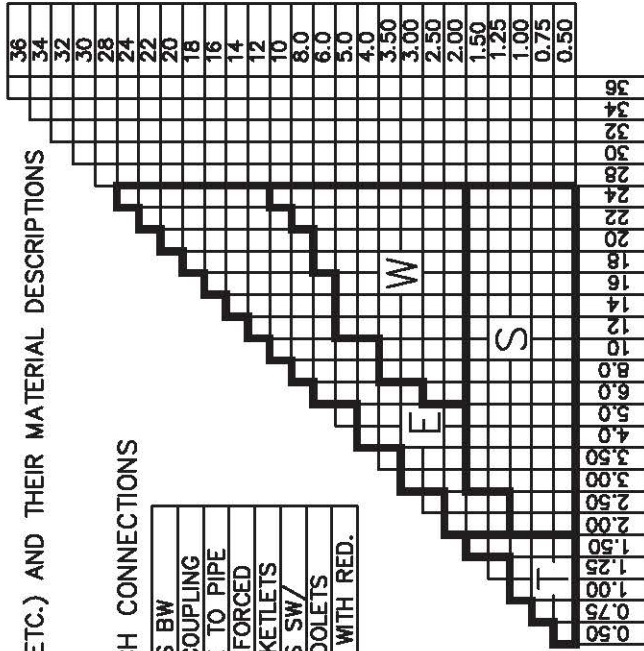
1. ALL VENTS & DRAIN SHALL BE PROVIDED WITH PLUG VALVE UNLESS MENTIONED OTHERWISE IN P&IDs.
2. FITTINGS SHALL BE OF SEAMLESS CONSTRUCTION UP TO 16" AND SHALL BE OF WELDED CONSTRUCTION 18" AND ABOVE.
3. WALL THICKNESS FOR LINEPIPE USED IN VARIOUS SECTIONS SHALL BE AS PER TABLE-1 OF PMS.
4. BALL VALVE TO BE USED IN MAINLINE SHALL HAVE BUTT WELDED ENDS EXCEPT FOR THE VALVES USED FOR HOT TAPPING WHICH SHALL BE ONE SIDE BUTT WELDED AND OTHER SIDE FLANGED.
5. PROCUREMENT OF MATERIALS SHALL BE AS PER DETAILED RELEVANT SPECIFICATIONS.
6. DESIGN PRESSURE & TEMP. FOR PIPELINE AND RELATED FACILITIES ARE 19 Kg/Cm²g & (-29° TO +65°C) RESPECTIVELY.
7. PRESSURE-TEMPERATURE RATING INDICATED ARE FOR FLANGES ONLY IN ACCORDANCE WITH ANSI B 16.5
8. FOR VALVES, STEELPIPE AND ASSOCIATED STEEL COMPONENTS OF 2" AND LARGER NOTCH TOUGHNESS PROPERTIES SHALL BE AS SPECIFIED IN RELEVANT SPECIFICATIONS/CODES, MECON'S STANDARD TECHNICAL SPECIFICATIONS AND DATA SHEETS ETC.
9. AT STATIONS, BRANCH CONNECTIONS SHALL BE AS PER BRANCH CONNECTION TABLE BELOW
10. ALL BUTT WELDS SHALL BE 100% RADIOGRAPHED.
11. 100% OF SOCKET WELD SHALL BE SUBJECTED TO MPI/DPT.
12. PRESSURE-TEMPERATURE RATING OF VALVE BODY SHALL BE AS PER API 6D.
13. PIPELINE DESIGN CODE - ASME B 31.8 & OISD 226.
14. FOR PIPELINE SPECIALITY ITEMS (SCRAPPER TRAP, BARRED TEE, I, LR BENDS ETC.) AND THEIR MATERIAL DESCRIPTIONS REFER DATA SHEET OF RESPECTIVE ITEMS.

STATION PIPING MATERIAL SPECIFICATION

ITEM	SIZE	DESCRIPTION
MAINTENANCE JOINTS	ALL	FLGD., BUT TO BE KEPT MINIMUM
PIPE JOINTS	1.5" & BELOW	SOCKET WELD
	2" & ABOVE	BUTT WELDED
DRAINS	ON LINES ≤ 1.5"	3/4", AS PER MEC/SD/05/21/15/03
	ON LINES ≥ 2"	3/4" OR AS PER P&ID, MEC/SD/05/21/15/01
VENTS	ON LINES ≤ 1.5"	3/4", AS PER MEC/SD/05/21/15/03
	ON LINES ≥ 2"	3/4" OR AS PER P&ID, MEC/SD/05/21/15/01
TEMP. CONN.	1.5"	FLGD. INSTL. AS PER MEC/SD/05/21/15/02
PRESS CONN.	3/4"	SCH. 160 NIPPLE WITH BALL VALVE TO SPEC. INSTALLATION AS PER MEC/SD/05/21/15/05

BRANCH CONNECTIONS

E	TEES BW
H	H. COUPLING
P	PIPE TO PIPE
R	REINFORCED
S	SOCKETLETS
T	TEES SW/
W	WELDOLETS
D	TEE WITH RED.



RUN PIPE NOMINAL DIA (INCHES)

BRANCH PIPE NOMINAL DIA (INCHES)

REV NO DATE ZONE

DESCRIPTIONS

BY

APPRD

REFERENCES

DRG. NO.

SECTION: OIL & GAS

NAME	DATE	CHKD	DATE
DSGN	S.S.	S.K.	
DRWN			

GODAVARI GAS PVT LTD
CITY GAS DISTRIBUTION PROJECT



मेकॉन लिमिटेड
MECON LIMITED

APPROVED A.K.SARKAR

PIPING MATERIAL SPECIFICATIONS
150# (A1A)

SCALE : N.T.S.

(SH. 1 OF 3)

APPENDIX-I

REV 0


PIPELINE/PIPING DESIGN CODE		ASME B 31.8/ OISD 226										DESIGN FACTOR - 0.5						
ITEM	NOMINAL DIAMETER (INCHES)	0.50	0.75	1.00	1.50	2.00	3.00	4.00	6.00	8.00	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0
	WALL THICKNESS (MM/SCH)	S160	S160	XS	XS	XS	STD	STD	S20	S20	S20	S10	S10	S10	S10	S10	S10	S7
	MATERIAL	ASTM A108 GR.B (CHARRY)																
	DIMENSION STD.	B36.10																
	METHOD OF MANUFACTURE. ENDS	SEAMLESS PE										SEAMLESS BE			SAW, BE			
	MATERIAL AND GRADE	ASTM A 105 (CHARRY)																
	TYPE, FLANGE FACING	SW, RF 125AARH																
	DIMENSION STD.	B16.5																
	MATERIAL AND GRADE	ASTM A 105 (CHARRY)																
	FLANGE FACING	RF 125AARH																
	DIMENSION STD.	B16.5																
	MATERIAL AND GRADE	ASTM A 105 (CHARRY)																
	FLANGE FACING	FF 125AARH																
	DIMENSION STD.	B16.4B																
	TYPE	FIG.8 FLANGE																
	STUD BOLTS (FULLY THREADED)	A 193 GR B7, B-18.2																
	NUTS (HEAVY HEXAGONAL)	A 194 GR ZH, B-18.2																
	TYPE, MATERIAL AND Dmn. STD.	SP. WND SS 316+GRAPHITE FILLED AS PER B 16.20/ANSI B 16.5																
	MATERIAL	ASTM A 105																
	END DETAIL	SW,6000# SW,3000# BW, 1.50																
	DIMENSION STD.	B-16.11																
	MATERIAL	ASTM A 105																
	END DETAIL	SW,6000# SW,3000#																
	DIMENSION STD.	B-16.11																
	MATERIAL	ASTM A 105																
	END DETAIL	SCRF6000 SCRF3000																
	DIMENSION STD.	B-16.11																
	MATERIAL	ASTM A 105																
	END DETAIL	SW,6000# SW,3000#																
	DIMENSION STD.	B-16.11																
	TYPE	COUPLING FULL-HALF LH.,RED.																
	MATERIAL	ASTM A 105																
	END DETAIL	SW,6000# SW,3000#																
	DIMENSION STD.	MSS-SP97																
	TYPE	SOCKOLET																

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
SECTION: OIL & GAS		GODAVARI GAS PVT LTD		CITY GAS DISTRIBUTION PROJECT		मेकॉन लिमिटेड	
DSGN	NAME	DATE	CHKD	DATE	MECON LIMITED		
DRWN	S.S.		S.K.		SCALE : N.T.S. (SH. 2 OF 3)		
APPROVED	A.K.SARKAR		PIPING MATERIAL SPECIFICATIONS 150# (A1A)			APPENDIX-I	
							REV 0



VALVES

TYPE	SIZE	RATING	ENDS	MANUF. STD.	BODY MATERIAL	TRIM MATERIAL	SPECIAL REQUIREMENT
BALL	BELOW 2"	800 #	SW	BS 5351	A 105	13 % CR STEEL, SEAT - RPTFE	3000, B-16.11
	2" TO 24"	150 #	RF	API 6D	A 216 GR WCC/A 234 GR WPC	CS+0.003" ENP	125AARH, B-16.5
	2" TO 24"	150 #	BW	API 6D	A 216 GR WCC/A 234 GR WPC	CS+0.003" ENP	B-16.25
PLUG	BELOW 2"	800 #	SW	BS 5353	A 105	CS+0.003" ENP	3000, B-16.11
	2" TO 24"	150 #	RF	API 6D	A 216 GR WCB.	CS+0.003" ENP	125AARH, B-16.5
	2" TO 24"	150 #	BW	API 6D	A 216 GR WCB.	CS+0.003" ENP	B-16.25
CHECK	BELOW 2"	800 #	SW	BS 5352	A 105	TRIM-STELLITED	3000, B-16.11
	2" TO 24"	150 #	RF	API 6D	A 216 GR WCB.	TRIM-STELLITED-13% CR STEEL	125AARH, B-16.5
GLOBE	BELOW 2"	800 #	SW	BS 5352	A 105	STELLITED, STEM-13 % CR STEEL/AISI410	3000, B-16.11
	2" TO 12"	150 #	RF	BS 1873	A 216 GR WCB.	CS+13% CR OVERLAY	125AARH, B-16.5
GATE	BELOW 2"	800 #	SW	API 602	A 105	STELLITED, STEM-13 % CR STEEL/AISI410	3000, B-16.11
	2" TO 24"	150 #	RF	API 6D	A 216 GR WCB.	CS+13% CR OVERLAY	125AARH, B-16.5


REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	DRG. NO.
REVISIONS					REFERENCES	
SECTION: OIL & GAS			GODAVARI GAS PVT LTD CITY GAS DISTRIBUTION PROJECT			 मेकॉन लिमिटेड MECON LIMITED
DSGN	NAME	DATE	CHKD	DATE	SCALE : N.T.S. (SH. 3 OF 3)	
DRWN	S.S.		S.K.		APPENDIX-I	
APPROVED			PIPING MATERIAL SPECIFICATIONS			REV
A.K.SARKAR			150# (A1A)			0

PROCESS & PIPING DESIGN SECTION
MECON LIMITED
DELHI – 110 092



TECHNICAL SPECIFICATION
FOR
PRESSURE SAFETY VALVES


SPECIFICATION NO. : MEC/TS/05/62/056, Rev-1

MECON LIMITED Delhi	PROCESS & PIPING DESIGN SECTION	TECHNICAL SPECIFICATION FOR PRESSURE SAFETY VALVES	
TECHNICAL SPECIFICATION NO. : MEC/TS/05/62/056		REV-1	Page 1 of 9

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3.0	VALVE CONSTRUCTION	5
4.0	NAMEPLATE	7
5.0	INSPECTION & TESTING	7
6.0	SHIPPING	9
7.0	GUARANTEE	9
8.0	REJECTION	9

Revision No.	Date	Revised by	Checked by	Approved by
1		K.P. Singh	A.K. Johri	Niraj Gupta
PREPARED BY : K.P. SINGH		CHECKED BY : A.K. JOHRI		APPROVED BY : NIRAJ GUPTA

MECON LIMITED Delhi	PROCESS & PIPING DESIGN SECTION	TECHNICAL SPECIFICATION FOR PRESSURE SAFETY VALVES	
TECHNICAL SPECIFICATION NO. : MEC/TS/05/62/056		REV-1	Page 2 of 9

1.0 **GENERAL**

1.1 **Scope**


1.1.1 This specification together with the attached data sheets covers the requirements for the design, materials, nameplate marking, testing and shipping of pressure safety valves.

1.1.2 The related standards referred to herein and mentioned below shall be of the latest editions prior to the date of the Purchaser's enquiry :


- | | | |
|-----------------------------|---|--|
| ASME B 1.20.1 | : | Pipe threads |
| ASME B 16.5 | : | Pipe flanges and flanged fittings |
| ASME B 16.20 | : | Ring joint gaskets and grooves for steel pipe flanges |
| ASME Sec.VIII | : | Boiler & pressure vessels codes for unfired pressure vessel |
| API RP 520
(Part-I & II) | : | Sizing, selection and installation of pressure relieving devices in refineries |
| API RP 521 | : | Guide for pressure relieving and depressurising systems |
| API 526 | : | Flanged steel safety-relief valves |
| API 527 | : | Commercial seat tightness of refineries relief valve with metal to metal seats |
| DIN 50049 | : | Document on material testing |
| IBR | : | Indian boiler regulations |

1.1.3 In the event of any conflict between this specification, data sheets, related standards, codes etc, the Vendor should refer the matter to the Purchaser for clarifications and only after obtaining the same, should proceed with the manufacture of the items in question.

1.1.4 Purchaser's data sheets indicate the selected valve's relieving area, materials for the body, bonnet, disc, nozzle, spring, indicative inlet/outlet connection sizes, bellows etc. However, this does not relieve the Vendor of the responsibility for proper selection with respect to the following :

MECON LIMITED Delhi	PROCESS & PIPING DESIGN SECTION	TECHNICAL SPECIFICATION FOR PRESSURE SAFETY VALVES	
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	<ul style="list-style-type: none"> a) Sizing calculations and selection of valve with proper relieving area to meet the operating conditions indicated. b) Selection of materials for all parts of the valve suitable for the fluid and its conditions indicated.
1.1.5	All process-wetted parts, metallic and non-metallic, shall be suitable for the fluids and service specified by the Purchaser. The service gas composition shall be as given in Annexure-I.
1.2	Bids
1.2.1	Vendor's quotation shall include a detailed specification sheet for each pressure safety valve which shall provide all the details regarding type, construction materials, relieving area, relieving capacity, orifice letter designation, overpressure, blowdown, operating pressure, etc., and any other valve accessories.
1.2.2	All the units of measurement for various items in the Vendor's specification sheets shall be to the same standards as those in Purchaser's data sheets.
1.2.3	All the material specifications for various parts in the Vendor's specification sheets shall be to the same standards as those in Purchaser's data sheets.
1.2.4	Deleted.
1.2.5	Vendor shall enclose catalogues giving detailed technical specifications and other information for each type of pressure safety valve covered in the bid.
1.2.6	Vendor's quotation, catalogues, drawings, operating and maintenance manual, etc., shall be in English.
1.2.7	Vendor's quotation shall include detailed sizing calculation for each pressure safety valve. Published data for certified discharge coefficient and certified flow capacities and actual discharge area shall be furnished. Data used by Vendor without the above mentioned supported documentation shall, on prima-facie basis, be rejected.
1.2.8	All valves shall have been type tested for capacity as per ASME. A copy of the certificate shall be provided.
1.2.9	Vendor shall also quote separately for the following : <ul style="list-style-type: none"> a) Two years recommended operational spares for each pressure relief valve and its accessories. List of such spares without price shall be indicated alongwith technical bid and separately with price. b) Any specific tools needed for maintenance work.

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1.2.10 Vendor's quotation shall include general arrangement and sectional drawings showing all features and major parts with reference numbers and material specification.

IMPORTANT

The drawings to be submitted alongwith the bid shall be in total compliance with the requirement of technical specification and data sheets of the valves with no exception & deviation.

1.2.11 Vendor's quotation shall include Quality Assurance Plan (QAP) enclosed with this tender duly signed, stamped & accepted.

1.3 Drawings and Data

1.3.1 Detailed drawings, data, catalogues required from the Vendor are indicated by the Purchaser in this specification. The required number or reproducibles and prints should be dispatched to the address mentioned, adhering to the time limits indicated.


1.3.2 Within two weeks of placement of order, Vendor shall submit six copies of certified drawings and specification sheets for each pressure safety valve for Purchaser's final approval. These documents shall specially include the following :

- a) Flange face to face dimension.
- b) Height of the complete valve assembly.
- c) Weight of the complete valve assembly.
- d) Cold bench set pressure for the valve to be tested at atmospheric temperature and back pressure.
- e) The cold test medium to be used for bench test in case it is different from air.
- f) Horizontal reaction force at center line of valve outlet.
- g) Relieving capacity of the valve under the same operating conditions.
- h) Over pressure and blowdown/ reclosing pressure for each valve.

1.3.3 Vendor shall provide test certificates for all the tests indicated in clause 5.0 of this specification. In addition Vendor shall provide the Manufacturer's certificate of conformity to Purchaser's specifications as per clause 2.2 of Din 50049.

1.3.4 Within 30 days from the approval date, Manufacturer shall submit to Purchaser one reproducible and six copies of the approved drawings, documents and specifications as listed in clause 1.3.2 above.

1.3.5 Prior to shipment, Manufacturer shall submit one reproducible and six copies of the following:

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TECHNICAL SPECIFICATION NO. : MEC/TS/05/62/056		REV-1	Page 5 of 9

- a) Test certificates for all the tests indicated in clause 5.0 of this specification.
- b) Manual for installation, erection, maintenance and operation instructions, including a list of recommended spares for the valves.

2.0 **VALVE SIZING**

2.1 Sizing shall be carried out using the formulae mentioned in the following standards, whenever the sizing code mentioned in the Purchaser's data sheets refers to them:

Sizing Code	Standard
API	API RP 520 Part-I
ASME	ASME boiler and pressure vessel code section VIII titled - Unfired pressure vessels
IBR	Indian Boiler Regulations Paragraph – 293

2.2 Discharge co-efficient of Vendor's pressure safety valves shall be minimum 0.975 as per API – 520. However, for valves covered under IBR, regulations of IBR shall govern.

2.3 For flanged pressure safety valves, the orifice letter designation and the corresponding relieving area indicated in the Purchaser's data sheet shall be as per API 526. For a valve of given inlet and outlet sizes and letter designation, relieving area of the valves offered by Vendor shall meet those in API-526, as a minimum.

2.4 The discharge capacity of selected pressure safety valves shall be calculated based on certified ASME capacity curves or by using ASME certified discharge coefficient and actual orifice area. Higher valve size shall be selected in case pressure relief valve discharge capacity is less than the required flow rate.


2.5 The definitions of various terminologies used in Purchaser's data sheets are as per paragraph 3.1 of API RP 520 Part-I.

3.0 **VALVE CONSTRUCTION**

3.1 **Body**

3.1.1 Unless otherwise mentioned end connection details shall be as below :-

- a) Threaded end connections shall be to NPT as per ASME B 1.20.1.
- b) Flanged end connections shall be as per ASME B 16.5.

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c) Flanged face finish shall be serrated concentric to paragraphs 6.3.4.1, 6.3.4.2 and 6.3.4.3 of ASME B 16.5. The face finish as specified in data sheets, shall have serrations as follows.

Serrated	:	250 to 500 microinches AARH
125 AARH	:	125 to 200 microinches AARH
63 AARH	:	32 to 63 microinches AARH

3.1.2 For flanged valves, inlet and outlet sizes & ratings and center to flange face dimensions shall be in accordance with API-526. Dimensional tolerances shall be as mentioned therein.

3.1.3 Body drain with a plug shall be provided as a standard feature on every pressure safety valve.

3.2 Trim

3.2.1 The term 'trim' covers all the parts of the valves exposed to and in contact with the process fluid except for the body and bonnet assembly.

3.2.2 Valves shall in general be of the full nozzle full lift type, unless otherwise specified.

3.2.3 Wherever stellite of disc and nozzle has been specified, it stands for stellite of the seat joint and the entire disc contour, unless otherwise mentioned.

3.2.4 Resilient seat/ seal or 'O' rings wherever used shall be suitable for pressure and temperature conditions specified.

3.3 Bonnet and Spring

3.3.1 All valves shall be provided with a cap over the adjusting bolt.

3.3.2 Lifting lever shall be provided whenever the fluid to be relieved is steam or air.


3.3.3 Valve spring design shall permit an adjustment $\pm 5\%$ of the set pressure as a minimum.

3.3.4 Carbon Steel spring shall be cadmium/ nickel plated.

3.3.5 The allowable tolerances in set pressures are as below :

$\pm 0.14 \text{ kg/cm}^2(\text{g})$ for set pressures upto and including $5 \text{ kg/cm}^2(\text{g})$;
 $\pm 3\%$ for set pressure above $5 \text{ kg/cm}^2(\text{g})$.

3.3.6 Bonnet shall be of the enclosed type in general. Open type of bonnet may be used only for non-toxic fluids.

MECON LIMITED Delhi	PROCESS & PIPING DESIGN SECTION	TECHNICAL SPECIFICATION FOR PRESSURE SAFETY VALVES	
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3.4 **Pilot**

3.4.1 Wherever pilot operated valves are specified, pilot shall be non-flowing type and shall be designed fail safe.

3.4.2 All accessories like back flow preventer, pilot filter etc. required for proper operation of pilot operated valves as per indicated service conditions shall be included.

3.4.3 Wherever the body is part of flow path, body material shall be same as trim material, as a minimum.

4.0 **NAMEPLATE**

4.1 Each pressure safety valve shall have a S.S. nameplate attached firmly to it at a visible place, furnishing the following information:

- a) Tag number as per Purchaser's data sheets.
- b) Manufacturer's serial no. or model no.
- c) Manufacturer's name/ trade mark.
- d) Nominal flanged size in inches and rating in lbs. for both inlet and outlet.
- e) Orifice letter designation.
- f) Valve set pressure.
- g) Cold bench test set pressure.

Unit of the above pressures shall be marked in the same units as those followed in Purchaser's data sheets.


5.0 **INSPECTION & TESTING**

5.1 Unless otherwise specified, Purchaser reserves the right to test and inspect all the items at the Vendor's works.

5.1.1 Purchaser's Inspector shall perform inspection and witness test on all valves as indicated in the Quality Assurance Plan (QAP) attached with this specification.

5.2 Vendor shall submit the following test certificates and test reports for Purchaser's review:

- a) Material test certificate from the foundry (MIL certificate) for each valve body and bonnet castings, nozzle, disc etc.
- b) Certificate of radiography / x-ray for valve castings. 100% radiography shall be carried out for all valve castings with body rating of 600# and above. A minimum of two shots shall be taken for all curved portion of the body and bonnet.

MECON LIMITED Delhi	PROCESS & PIPING DESIGN SECTION	TECHNICAL SPECIFICATION FOR PRESSURE SAFETY VALVES	
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- c) Hydrostatic test reports for all valve bodies and functional test reports for all valves as per clause 5.3 and 5.4 of this specification.
- d) IBR certificate in Form III item 11 and shall be furnished for all safety valves in steam service in addition to Form III C. Form III C shall also be furnished for pressure relief valves in distribution network.

5.3 Hydrostatic Test

5.3.1 Each pressure safety valve body and nozzle shall undergo hydrostatic test as per outlet flange and inlet flange ANSI rating, respectively. However all the safety valves castings covered under IBR shall be tested as per IBR regulations. There shall not be any visible leakage during this test.

5.4 Functional Tests

5.4.1 Assembled valves shall be subjected to functional tests as below :

- a) Cold bench set pressure test

Pressure relief valve shall be tested for opening at specified set pressure and also for seat tightness.

- b) Seat Leakage test as per API

Whenever the specified set pressure is less than or equal to 70 kg/cm²g, the valve shall meet the seat tightness requirements specified in API RP-527. The maximum permissible leakage rates for conventional and balanced bellow valves against various sizes shall be as specified therein. Whenever the specified set pressure exceeds 70 kg/cm²g, the Vendor shall submit the leakage rates of valves for approval by the Purchaser.


Where bubble tightness has been specified, there shall be no leakage or bubbles of air at the specified percentage of set pressure.

- c) Valve lift test

5.5 Witness Inspection

All pressure safety valves shall be offered for pre-despatch inspection for following as a minimum :

- a) Physical dimensional checks and workmanship
- b) Hydrostatic test as per clause 5.3 of this specification.
- c) Functional test on representative samples.
- d) Review of all certificate and test reports as indicated in clause 5.2 of this specification.

MECON LIMITED Delhi	PROCESS & PIPING DESIGN SECTION	TECHNICAL SPECIFICATION FOR PRESSURE SAFETY VALVES	
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In the event of tests being not witnessed by Purchaser, the tests shall anyway be completed by the Vendor and documents for same submitted for scrutiny.

6.0 **SHIPPING**

- 6.1 Valves shall be supplied as a whole, complete with all the accessories like cap, lifting lever, test gag, etc.
- 6.2 All threaded and flanged opening shall be suitably protected to prevent entry of foreign material.

7.0 **GUARANTEE**

- 7.1 Manufacturer shall guarantee that the materials and machining of valves and fittings comply with the requirements in this specification and in the Purchase Order.
- 7.2 Manufacturer is bound to replace or repair all valve parts which should result defective due to inadequate engineering or to the quality of materials and machining.
- 7.3 If valve defect or malfunctioning cannot be eliminated, Manufacturer shall replace the valve without delay,
- 7.4 Any defect occurring during the period of Guarantee shall be attended to by making all necessary modifications and repair of defective parts free of charge to the Purchaser as per the relevant clause of the bid document.
- 7.5 All expenses shall be to Manufacturer's account.

8.0 **REJECTION**

- 8.1 Vendor shall make his offer in detail with respect to every item of the Purchaser's specifications. Any offer not conforming to this shall be summarily rejected.

Rev. : 0


Edition : 1

**SPECIFICATION
FOR
SEAMLESS FITTINGS & FLANGES
[SIZE UPTO DN 400 mm (16") NB]**

SPECIFICATION NO.: MEC/TS/05/21/025




**(OIL & GAS SBU)
MECON LIMITED
DELHI 110 092**

MECON LIMITED REGD. OFF: RANCHI 834002	STANDARD TECHNICAL SPECIFICATION		
	OIL & GAS SBU, DELHI		
TITLE	SEAMLESS FITTINGS & FLANGES [SIZE UPTO DN 400 mm (16") NB]	DOCUMENT NO. MEC/TS/05/21/025	Page 1 of 1
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PREPARED BY: (Shalini Singh)	CHECKED BY: (Sunil Kumar)	APPROVED BY: (A.K. Johri)	ISSUE DATE : Dec. 2008
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1.0 SCOPE


This specification covers the minimum requirements for the design, manufacture and supply of following carbon steel flanges and fittings of size upto DN 400 mm (16") to be installed in onshore pipeline systems handling non-sour hydrocarbons in liquid or gaseous phase including Liquefied Petroleum Gas (LPG) :

- Flanges such as welding neck flanges, blind flanges, spectacle blinds, spacers and blinds etc.
- Seamless fittings such as tees, elbows, reducers, caps, outlets etc.

2.0 REFERENCE DOCUMENTS

2.1 Reference has been made in this specification to the latest edition (edition enforce at the time of issue of enquiry) of the following Codes, Standards and Specifications :

- | | | |
|---------------|---|---|
| ASME B31.4 | - | Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids |
| ASME B31.8 | - | Gas Transmission and Distribution Piping Systems |
| ASME B16.5 | - | Pipe Flanges and Flanged Fittings |
| ASME B16.9 | - | Factory Made Wrought Steel Butt Welding Fittings |
| ASME B 16.11 | - | Forged Steel Fittings, Socket Welding and Threaded |
| ASME B 16.48 | - | Steel Line Blanks |
| ASME Sec VIII | - | Boiler and Pressure Vessel Code - Rules for Construction of Pressure Vessels |
| ASME Sec IX | - | Boiler and Pressure Vessel Code - Welding and Brazing Qualifications |
| ASTM A 370 | - | Standard Test Methods and Definitions for Mechanical Testing of Steel Products. |
| MSS-SP-25 | - | Standard Marking System for Valves, Fittings, Flanges and Unions |

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MSS-SP-97 - Forged Carbon Steel Branch Outlet Fittings - Socket Welding, Threaded and Butt welding Ends.

2.2 In case of conflict between the requirements of this specification and the requirements of above referred Codes and Standards, the requirements of this specification shall govern.

3.0 MANUFACTURER'S QUALIFICATION

Manufacturer who intends bidding for fittings must possess the records of a successful proof test, in accordance with the provisions of ASME B16.9 / MSS-SP-75 as applicable.

4.0 MATERIAL

4.1 The Carbon Steel used in the manufacture of flanges and fittings shall be fully killed. Material for flanges and fittings shall comply with the material standard indicated in the Purchase Requisition. In addition, the material shall also meet the requirements specified hereinafter.

4.2 Each heat of steel used for the manufacture of flanges and fittings shall have Carbon Equivalent (CE) not greater than 0.45 calculated from check analysis in accordance with the following formula:


$$CE = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$$

Carbon contents on check analysis shall not exceed 0.22%.

4.3 For flanges and fittings specified to be used for Gas service or LPG service, Charpy V-notch test shall be conducted on each heat of steel. Unless specified otherwise, the Charpy V-notch test shall be conducted at 0°C in accordance with the impact test provisions of ASTM A 370 for flanges and fittings.

The average absorbed impact energy values of three full-sized specimens shall be 27 joules. The minimum impact energy value of any one specimen of the three specimens analysed as above, shall not be less than 22 Joules.

When Low Temperature Carbon Steel (LTCS) materials are specified for flanges and fittings in Purchase Requisition, the Charpy V-notch test requirements of applicable material standard shall be complied with.

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4.4 For flanges and fittings specified to be used for Gas service or LPG service, Hardness test shall be carried out in accordance with ASTM A 370. Hardness testing shall cover at least 10% per item, per size, per heat, per manufacturing method. A full thickness cross section shall be taken for this purpose and the maximum hardness shall not exceed 248 HV₁₀.

4.5 In case of RTJ (Ring Type Joint) flanges, the groove hardness shall be minimum 140 BHN. Ring Joint flanges shall have octagonal section of Ring Joint.

5.0 DESIGN AND MANUFACTURE

5.1 Flanges such as weld neck flanges and blind flanges shall conform to the requirements of ASME B16.5.

5.2 Spectacle blind and spacer & blind shall conform to the requirements of ASME B 16.48.

5.3 Fittings such as tees, elbows, reducers, etc. shall be seamless type and shall conform to ASME B16.9 for sizes DN 50 mm (2") to DN 400 mm (16") (both sizes included) and ASME B 16.11 for sizes below ON 50 mm (2").

5.4 Fittings such as weldolets, sockolets, nippolets, etc. shall be manufactured in accordance with MSS-SP-97.


5.5 Type, face and face finish of flanges shall be as specified in Purchase Requisition.

5.6 Flanges and fittings manufactured from bar stock are not acceptable.

5.7 All butt weld ends shall be bevelled as per ASME B 16.5 / ASME B 16.9 / MSS-SP-97 as applicable.

5.8 Repair by welding on flanges and fittings is not permitted.

5.9 Stub-in or pipe to pipe connection shall not be used in the manufacture of tees. Tees shall be manufactured by forging or extrusion methods. The longitudinal weld seam shall be kept at 90° from the extrusion. Fittings shall not have any circumferential joint .

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6.0 INSPECTION AND TESTS

6.1 The Manufacturer shall perform all inspections and tests as per the requirement of this specification and the relevant codes, prior to shipment at his works. Such inspections and tests shall be, not but limited to the following :

- a) All flanges and fittings shall be visually inspected. The internal and external surfaces of the flanges and fittings shall be free from any strikes, gauges and other detrimental defects.
- b) Dimensional checks shall be carried out on finished products as per ASME B16.5 for flanges, ASME B16.48 for spacers and blinds and ASME B16.9 / MSS-SP-97 as applicable for fittings and as per this specification.
- c) Chemical composition and mechanical properties shall be checked as per relevant material standards and this specification, for each heat of steel used.
- d) All finished wrought weld ends subject to welding in field, shall be 100% tested for lamination type defects by ultrasonic test. Any lamination larger then 6.35 mm shall not be acceptable.


6.2 Purchaser's Inspector reserves the right to perform stage wise inspection and witness tests, as indicated in clause 6.1 of this specification at Manufacturer's Works prior to shipment. Manufacturer shall give reasonable notice' of time and shall provide, without charge, reasonable access and facilities required for inspection, to the Purchaser's Inspector.

Inspection and tests performed / witnessed by Purchaser's Inspector shall in no way relieve the Manufacturer's obligation to perform the required inspection and tests.

7.0 TEST CERTIFICATES

Manufacturer shall furnish the following certificates:

- a) Test certificates relevant to the chemical analysis and mechanical properties of the materials used for manufacture of flanges and fittings as per relevant standards and this specification.
- b) Test Reports on non destructive testing.
- c) Certificates for each fitting stating that it is capable of withstanding without leakage a test pressure, which results in a hoop stress equivalent to 100 % of

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the specified minimum yield strength for the pipe with which the fitting is to be attached without impairment of serviceability.

8.0 PAINTING, MARKING AND SHIPMENT

- 8.1 After all inspection and tests required have been carried out; all external surfaces shall be thoroughly cleaned to remove grease, dust and rust and shall be applied with standard mill coating for protection against corrosion during transit and storage. The coating shall be easily removable in the field.
- 8.2 Ends of all fittings and weld neck flanges shall be suitably protected to avoid any damage during transit. Metallic or high impact plastic bevel protectors shall be provided for fittings and flanges. Flange face shall be suitably protected to avoid any damage during transit.
- 8.3 All flanges and fittings shall be marked as per applicable dimension / manufacturing standard.

9.0 DOCUMENTATION

Documentation to be submitted by Manufacturer to Company is summarized below. Number of Copies (Hard copies / soft copies etc.) shall be as indicated in CONTRACT document / Material Requisition.

- 9.1 At the time of bidding, Manufacturer shall submit the following documents:
- Reference list of previous supplies of similar fittings of similar specification.
 - Clausewise list of deviations from this specification, if any.
 - Brief description of the manufacturing and quality control facilities at Manufacturer's works.
 - Manufacturer's qualification requirement as per clause 3.0 of this specification.
 - Quality Assurance Plan (QAP) enclosed with this tender duly signed, stamped and accepted.
- 9.2 Prior to shipment, the Manufacturer shall submit test certificates as listed in clause 7.0 of this specification.
- 9.3 All documents shall be in English Language only.

Rev. : 0


Edition : 1

SPECIFICATION FOR GASKETS, BOLTS & NUTS

SPECIFICATION NO.: MEC/S/05/21/19




**(OIL & GAS SBU)
MECON LIMITED
DELHI 110 092**

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C O N T E N T S

<u>SL.NO.</u>	<u>DESCRIPTION</u>
1.0	GASKETS
2.0	NUTS AND BOLTS


PREPARED BY: (Shalini Singh)	CHECKED BY: (Sunil Kumar)	APPROVED BY: (A.K. Johri)	ISSUE DATE : Jan. 2009
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TECHNICAL NOTES FOR GASKETS

- 1.0 All gaskets shall conform to the codes/standards and specifications given in the requisition. Vendor shall strictly comply with MR / PR stipulations and no deviations shall be permitted.
- 2.0 Process of manufacture, dimensions and tolerances not specified in requisition shall be in accordance with the requirements of the manufacturer's standards.
- 3.0 Test reports shall be supplied for all mandatory tests for gaskets as per the standards specified in the requisition.
- 4.0 Chemical composition and hardness of RTJ gaskets shall also be furnished in the form of test reports on samples.
- 5.0 For Spiral wound material following shall be furnished:
 - a. Manufacturer's test certificate for filler material and spiral material as per the relevant material specifications.
 - b. Manufacturer's test certificate for raw materials and tests for compressibility / seal-ability & recovery as per the relevant material specifications.
- 6.0 Full face gaskets shall have bolt holes punched out.
- 7.0 Filler material for spiral wound gaskets shall not have any colour or dye.
- 8.0 All spiral wound gaskets shall be supplied with Outer ring. Material of the outer ring shall be CS unless other wise specified in the MR.
- 9.0 For spiral wound gaskets, material of Inner Compression ring shall be same as Spiral Strip material. In addition to the requirements as per code and as specified in the MR, inner rings shall be provided for the following:
 - a. Sizes 26" and above.
 - b. Class 900 and above.
- 10.0 Hardness of metallic RTJ gaskets shall not exceed the values specified below unless otherwise specified in MR :

Ring Gasket Material	Maximum Hardness (BHN)
Soft Iron	90
Carbon steel	120
5 Cr. ½ Mo	130
Type 304, 316, 321, 347	140
Type 304L, 316L	120


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- 11.0 Face finish of metallic RTJ gaskets shall be 32 to 63 AARH.
- 12.0 Gaskets of different types and sizes shall be placed in separate shipping containers and each container clearly marked with the size, rating, material specification and item code.
- 13.0 All items shall be inspected and approved by MECON Inspector or any other agency authorized by MECON.
- 14.0 Any additional requirements specified in the requisition, shall be fully complied with.
- 15.0 Non-metallic ring gaskets as per ASME B16.21 shall match flanges to ASME B16.5 upto 24" (except 22" size) and to ASME B16.47B above 24" unless specified otherwise. For 22" size, the matching flange standard shall be MSS-SP44 unless specified otherwise.
- 16.0 Spiral wound gasket as per ASME B16.20 shall match flanges to ASME B16.5 upto 24" (except 22" size) and to ASME B16.47B above 24" unless specifically mentioned otherwise. For 22" size, the matching flange standard shall be MSS-SP44 unless specified otherwise.
- 17.0 The following abbreviations have been used in the Material Requisition for Spiral Wound Gaskets :
- (I) : Inner Ring
(O) : Outer Ring
CAF : Compressed Asbestos Fibre
GRAFIL : Grafoil Filler

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TECHNICAL NOTES FOR BOLTS & NUTS

- 1.0 The process of manufacture, heat treatment, chemical & mechanical requirements and marking for all stud bolts, m/c bolts, jack screws & nuts shall be in accordance with the codes / standards and specification given in the requisition. The applicable identification symbol in accordance with the material specification shall be stamped on each bolt and nut. Vendor shall strictly comply with MR / PR stipulations and no deviations shall be permitted.
- 2.0 Test reports shall be supplied for all mandatory tests as per the relevant material specifications.
- 3.0 Material test certificate shall also be furnished. (Heat Analysis, Product Analysis and Mechanical Requirement)
- 4.0 Stress Rupture Test as detailed in ASTM A453 shall be carried out for all ASTM A453 bolting material irrespective of the temperature.
- 5.0 All bolting shall be as per ANSI B 18.2.1 for studs. M/c bolts and jackscrews and ANSI BI8.2.2 for nuts.
- 6.0 Threads shall be unified (UNC for 1" dia and BUN for > 1" dia) as per ANSI B.1.1 with class 2A fit for studs, M/c bolts and jackscrews and class 2B fit for nuts.
- 7.0 Stud bolts shall be threaded full length with two heavy hexagonal nuts. Length tolerance shall be in accordance with the requirement as per ANSI B 16.5.
- 8.0 The nuts shall be double chamfered, semi-finished, heavy hexagonal type and shall be made by the hot forged process and stamped as per respective material specification.
- 9.0 Heads of jackscrews and m/c bolts shall be heavy hexagonal type. Jackscrew end shall be rounded.
- 10.0 Each size of studs & m/c bolts with nuts and jackscrews shall be supplied in separate containers marked with size and material specifications. 'CRYO' shall be marked additionally in case 'CRYO' is specified in the requisition.
- 11.0 All items shall be inspected and approved (stagewise) by MECON inspector or any other agency authorized by MECON.
- 12.0 The heat treatment for stud bolts & nuts shall be as per code unless mentioned otherwise.
- 13.0 All austenitic stainless steel bolts, nuts, screws shall be supplied in solution annealed condition unless specified otherwise in the material specification.
- 14.0 Any additional requirements specified in the requisition shall be fully complied with.

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- 15.0 Stud bolts, nuts & jackscrews shall be impact tested wherever specified in the material specification and also where the material specification is indicated as "CRYO". For" S.S. nuts and bolts minimum impact energy absorption shall be 27 Joules and test temperature shall be -196°C unless mentioned otherwise. For other materials impact energy and test shall be as per respective code.
- 16.0 Bolts / nuts of material of construction B7M / 2HM shall be 100% Hardness tested as per supplementary requirement S3 of ASTM A 193.
- 17.0 When specified as galvanized, the studs, m/c bolts and nuts shall be 'hot dip zinc coated' in accordance with requirements of 'class C' of 'ASTM A 153'. As an alternative, electro-galvanizing as per IS 1573, 'Service Grade Number 2' is also acceptable.
- 18.0 All Stud Bolts of Bolt diameter size 1" and above shall be provided with three nuts irrespective of whatever has been specified elsewhere in the MR.

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Edition : 1

SPECIFICATION FOR PIPING FABRICATION AND ERECTION

SPECIFICATION NO.: MEC/S/05/21/06



**(OIL & GAS SBU)
MECON LIMITED
DELHI 110 092**

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C O N T E N T S

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1.0	GENERAL
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3.0	BASIS FOR WORK
4.0	FABRICATION
5.0	ERECTION
6.0	WELDING
7.0	ERECTION
8.0	INSPECTION
9.0	PROTECTIVE COATING
10.0	FLUSHING
11.0	HYDROSTATIC TESTING

ANNEXURE-1 - WELDING SPECIFICATION


EXHIBIT-A -	ELECTRODE QUALIFICATIONS TEST RECORD
EXHIBIT-B -	STRESS RELIEF HEAT TREATMENT PROCEDURE SPECIFICATION
EXHIBIT-C -	STANDARD PROCEDURE SPECIFICATION NO.
EXHIBIT-D -	COUPON TEST RECORD
EXHIBIT-E -	WELDER'S IDENTIFICATION CARD
EXHIBIT-F -	RADIOGRAPHIC PROCEDURE FOR PIPE WELDING
EXHIBIT-G -	WELDING SPECIFICATION CHART

ANNEXURE-2 - DESTRUCTIVE TESTING OF WELDED JOINT - BUTT WELDS

ANNEXURE-3 - ULTRASONIC INSPECTION

ANNEXURE-4 - RADIOGRAPHY

PREPARED BY: (Shalini Singh)	CHECKED BY: (Sunil Kumar)	APPROVED BY: (A.K. Johri)	ISSUE DATE : Dec. 2008
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1.0 GENERAL

This specification covers general requirements of fabrication and erection of aboveground and trench piping systems at site. The specification covers the scope of work of contractor, basis of work to be carried out by contractor and standards, specifications and normal practice to be followed during fabrication and erection by the contractor.

2.0 SCOPE

Generally the scope of work of contractor shall include the following :

2.1 Transportation of required piping materials, pipe support and all other necessary piping materials from Owner's storage point or contractor's storage point (in case of contractor's scope of supply) to work site / shop including raising store requisitions for issue of materials in the prescribed format & maintaining an account of the materials received from Owner's stores.

2.1.1 Piping materials include the following but not limited to the same.


- a. Pipes (All sizes and schedule)
- b. Flanges (All sizes, types & Pressure ratings).
- c. Fittings (All sizes, types and schedule)
- d. Valves (All sizes, types and Ratings)
- e. Gaskets (All sizes, types & Ratings)
- f. Bolts, Nuts or M/C Bolts (All types)
- g. Expansion Joint / Bellows (All types)
- h. Specialty items like online filters, ejectors, sample coolers, steam traps, strainers, air traps etc.
- i. Online instruments like control valve, orifice flange, rotameter, safety valves etc.

2.2 Shop & field fabrication and erection of piping in accordance with documents listed under Cl. 3.0 i.e. 'BASIS OF WORK' including erection of all piping materials enumerated above.


2.3 Fabrication and erection of pipe supports like shoe, saddle, guide, stops, anchors, clips, cradles, hangers, turn buckles, supporting fixtures, bracket cantilevers, struts, teeposts including erection of spring supports and sway braces.

2.4 Fabrication

2.4.1 Fabrication of piping specials like special radius bends, reducers, mitres etc.

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- 2.4.2 Fabrication of plain and threaded nipples from pipes as required during erection.
- 2.4.3 Fabrication of swage nipples as and when required.
- 2.4.4 Fabrication of odd angle elbow like 60°, 30° or any other angle from 90/45° elbows as and when required.
- 2.4.5 Fabrication of flange, reducing flange, blind flange, spectacle blinds as and when required.
- 2.4.6 Fabrication of stub-in connection with or without reinforcement.
- 2.4.7 Grinding of edges of pipes, fittings, flanges etc. to match mating edges of uneven / different thickness wherever required.
- 2.5 Modifications like providing additional cleats, extension of stem of valve, locking arrangement of valves etc. as and when required.
- 2.6 Preparation of Isometrics, bill of materials, supporting details of all NON-IBR lines upto 2-1/2" within the unit battery limit and get subsequent approval from Engineer-in-Charge as and when called for.
- 2.7 Obtaining approval for drawings prepared by contractor from statutory authority, if required.
- 2.8 Spun concrete lining of the inside of pipes 3" NB & above including fittings and flanges as required in accordance with specification.
- 2.9 Rubber lining inside pipes, fittings, flanges as and when required, in accordance with specification.
- 2.10 Radiography, stress relieving, dye penetration, magnetic particle test etc. as required in specification.
- 2.11 Performing PMI using alloy analysers as per 'Standard Specification for Positive Material Identification at Construction Sites, 6-82-0002'.
- 2.12 Casting of concrete pedestals and fabrication & erection of small structures for pipe supports including supply of necessary materials.
- 2.13 Providing insert plates from concrete structures and repair of platform gratings around pipe openings.
- 2.14 Making material reconciliation statement and return of Owner's supply left over materials to Owner's storage.
- 2.15 Flushing and testing of all piping systems as per standard specification for inspection, flushing and testing of piping systems (Specification No. MEC/S/05/21/11).

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3.0 BASIS FOR WORK

3.1 The complete piping work shall be carried out in accordance with the following

3.1.1 "Approved for Construction" drawings and sketches issued by MECON to the Contractor - Plans and/or Isometrics.

3.1.2 "Approved for Construction" drawings and sketches issued by Turn-key bidders to the Contractor - Plans and/or Isometrics.

3.1.3 Approved Process licensor's standards and specifications.

3.1.4 Drawings, sketches and documents prepared by contractor duly approved by Engineer-in-Charge' (such as isometrics and offsite piping etc.)


3.1.5 Approved construction job procedures prepared by Contractor as stipulated in 2.16

3.1.6 MECON specifications/documents as below :

- a. Process and Instrument Diagram.
- b. Piping Materials Specification
- c. Piping support standards.
- d. Line list / Number
- e. Piping support index.
- f. Standard specification of NDT Requirement of Piping
- g. Welding specification charts for piping classes.
- h. Standard specification for Pressure Testing of Erected Piping System.
- i. Welding specification for fabrication of piping
- j. Any other MECON or OTHER specifications attached with Piping Material Specification or special condition of contract.
- k. Procedure for storage, preservation and positive identification of materials Contractors works / stores.

3.1.7 Following codes, standards and regulations

- a. ASME B 31.3 : Process Piping
- b. ASME Sec. VIII : Code for unfired pressure vessel.
- c. IBR Regulations

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- d. IS:823 : Code for procedure for Manual Metal Arc Welding of Mild Steel (for structural steel).
- e. NACE Std. : Code for Sour Services material requirements MR.

Note : All codes referred shall be latest edition.

3.2 Deviations

Where a deviation from the "Basis of Work" and approved job procedure described above is required or where the basis of work does not cover a particular situation, the matter shall be brought to the notice of Engineer - in - Charge and the work carried out only after obtaining written approval from him in each case.


4.0 FABRICATION

4.1 Piping Material

Pipe, pipe fittings, flanges, valves, gaskets, studs bolts etc. used in a given piping system shall be strictly as per the "Piping Material Specification" for the "Pipe Class" specified for that system. To ensure the above requirement, all piping material supplied by the Owner / Contractor shall have proper identification marks as per relevant standards / MECON's specifications / Licensors specification. Contractor shall provide identification marks on left over pipe lengths wherever marked up pipe lengths have been fabricated / erected. Material traceability is to be maintained for AS., S.S., NACE, LTCS, material for Hydrogen service and other exotic materials by way of transferring heat number, etc. (hard punching) as per approved procedure. This shall be in addition to colour coding for all piping materials to avoid mix-up.

4.2 Fabrication

- 4.2.1 All fabrication shall be carried out in accordance with piping general arrangement drawings, (prepared by CONTRACTOR and approved by COMPANY) including this specification and codes as specified in section 2.0.
- 4.2.2 CONTRACTOR shall be responsible for working to the exact dimensions as per the approved drawings. Dimensional tolerances to be adopted during implementation of fabrication work shall be as per attached sketch "TOLERANCES FOR FABRICATION".
- 4.2.3 Flange bolt holes shall generally straddle the established centre lines unless other orientation is required and as called out in approved drawings.
- 4.2.4 Threading shall be NPT to ANSI B 1.20.1. Threading shall preferably be done after bending, forging or heat treatment operation. However if it is not possible, precaution shall be taken to protect threading against deformation. Thread shall be clean cut with no burrs or stripping. Dies shall be new, sharp and properly designed for piping material. Ends shall be reamed to remove burrs.

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- 4.2.5 All threaded joints shall be aligned properly. The pipe entering unions shall be true to centrelines so as to avoid forcing of union coupling during make up. Damaged threads shall be cut from the end of run and the pipe shall be rethreaded.
- 4.2.6 Immediately before testing the piping, all threads of pipe and fittings shall be thoroughly cleared of cuttings, fuel oil or other foreign matter. The male threads shall be sealed with thread sealant and the piping made up sufficiently for the thread to seize. Sealant shall be teflon tape.
- 4.2.7 Seal welding of threaded connections when specified shall include the first block valve, cover all threads. The joint shall be cleaned of all cutting oil and other foreign material and made up dry to full thread engagement. Instrument threaded connections which are frequently subjected to testing and maintenance shall not be seal welded.
- 4.2.8 All threaded connections shall be protected from rusting by applying greases or oil when in operating condition.
- 4.2.9 When socket weld fittings or valves are used, pipe shall be spaced approximately 1/16" to avoid bottoming which could result in excessive weld stress.
- 4.2.10 Where the ends of the piping components being welded have an internal surface misalignment exceeding 1.6mm, the wall of the component extending internally shall be trimmed by machining so that the adjoining internal surface will approximately flush.

For the purpose of common understanding the construction job procedure, to be submitted by the contractor, shall include proposal for

- Maximizing prefabrication, inspection and testing at fabrication shop with minimum field joints.
- Positive material identification, handling, storage & preservation.

4.3 Dimensional Tolerances

Dimensional tolerances for piping fabrication shall be as per MECON Standard Specification. The Contractor shall be responsible for working to the dimensions shown on the drawings. However, the Contractor shall bear in mind that there may be variations between the dimensions shown in the drawing and those actually existing at site due to minor variations in the location of equipments, inserts, structures etc. To take care of these variations "Field Welds" shall be provided during piping fabrication. An extra pipe length of 100 mm over and above the dimensions indicated in the drawing may be left on one side of the pipe at each of the field welds. During erection, the pipe end with extra length at each field weld, shall be cut to obtain the actual dimension occurring at site. Isometrics, if supplied may have the field welds marked on them. However, it is the responsibility of the Contractor to provide adequate number of field welds. In any case no extra claims will be entertained from the Contractor on this account. Wherever errors / omissions occur in drawings and Bills of Materials it shall be the Contractor's responsibility to notify the Engineer-in-Charge prior to fabrication or erection.

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4.4 IBR Piping

- 4.4.1 Contractor shall be supplied generally with all drawings for steam piping falling under the purview of Indian Boiler Regulations duly approved by Boiler Inspectorate. The Contractor shall carry out the fabrications, erection and testing of this piping as per requirements of Indian Boiler Regulations and to the entire satisfaction of the local Boiler Inspector. The Contractor shall also get the approval of IBR inspector for all fabrication and testing done by him at his own cost. All certificates of approval shall be in proper IBR forms. . .
- 4.4.2 Approval of boiler inspector on the drawings prepared by the contractor shall be obtained by the contractor at his own cost.

4.5 Pipe Joints

The piping class of each line specifies the type of pipe joints to be adopted. In general, joining of lines 2" and above in process and utility piping shall be accomplished by butt welds. Joining of lines 1-1/2" and below shall be by socket welding / butt welding / threaded joints as specified in "Piping Material Specifications". However, in piping 1-1/2" and below where socket welding/ threaded joints are specified butt - welds may be used with the approval of Engineer-in-Charge for pipe to pipe joining in long runs of piping. This is only applicable for non-galvanized piping without lining.

Flange joints shall be used at connections to Vessels, Equipment's, Valves and where required for ease of erection and maintenance as indicated in drawings.

4.6 Butt Welded and Socket Welded Piping


End preparation, alignment and fit-up of pipe pieces to be welded, welding, pre-heat, post-heating and heat treatment shall be as described in the welding specification and NDT specification.

4.7 Screwed Piping

In general, Galvanized piping shall have threads as per IS:554 or ANSI B 2.1 NPT as required to match threads on fittings, valves etc. All other piping shall have threads as per ANSI B 2.1, tapered unless specified otherwise.

Threads shall be clean cut, without any burrs or stripping and the ends shall be reamed. Threading of pipes shall be done preferably after bending, forging or heat treating operations. If this is not possible, threads shall be gauge checked and chased after welding heat treatment etc.

During assembly of threaded joints, all threads of pipes and fittings shall be thoroughly cleaned of cuttings, dirt, oil or any other foreign matter. The male threads shall be coated with thread sealant and the joint tightened sufficiently for the threads to seize and give a leakproof joint.

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Threaded joints to be seal-welded shall be cleaned of all foreign matter, including sealant and made up to full thread engagement before seal welding.

4.8 Flange Connections

All flange facings shall be true and perpendicular to the axis of pipe to which they are attached. Flanged bolt holes shall straddle the normal centerlines unless different orientation is shown in the drawing.

Wherever a spectacle blind is to be provided, drilling and tapping for the jack screws in the flange, shall be done before welding it to the pipe.

4.9 Branch Connections

Branch connections shall be as indicated in the piping material specifications. For end preparation, alignment, spacing, fit-up and welding of branch connections refer welding specifications. Templates shall be used wherever required to ensure accurate cutting and proper fit-up.

For all branch connections accomplished either by pipe to pipe connections or by using forged tees the rates quoted for piping shall be inclusive of this work.

Reinforcement pads shall be provided wherever indicated in drawings/ specifications etc.

4.10 Bending


Bending shall be as per ASME B31.3 except that corrugated or creased bends shall not be used.

Cold bends for lines 1-1/2" and below, with a bend radius of 5 times the nominal diameter shall be used as required in place of elbows wherever allowed by piping specifications. Bending of pipes 2" and above may be required in some cases like that for headers around heaters, reactors etc.

The completed bend shall have a smooth surface, free from cracks, buckles, wrinkles, bulges, flat spots and other serious defects. They shall be true to dimensions. The flattening of a bend, as measured by the difference between the maximum and minimum diameters at any cross-section, shall not exceed 8% and 3% of the nominal outside diameter, for internal and external pressure respectively.

4.11 Forging and forming

Forging and forming of small bore fittings, like reducing nipples for piping 1-1/2" and below, shall be as per ASME B 31.3.

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4.12 Mitre Bends and Fabricated Reducers

The specific application of welded mitre bends and fabrication reducers shall be governed by the Piping Material Specifications. Generally all 90 deg. mitres shall be 4-piece 3-weld type and 45 deg. mitres shall be 3-piece 2-weld type as per MECON Standard unless otherwise specified. Reducers shall be fabricated as per directions of Engineer-in-Charge. The radiographic requirements shall be as per Material Specifications for process and utility systems and NDT Specification for steam piping under IBR, radiographic requirements of IBR shall be complied with.

4.13 Cutting and Trimming of Standard Fittings & Pipes

Components like pipes, elbows, couplings, half-couplings etc. shall be cut / trimmed / edge prepared wherever required to meet fabrication and erection requirements, as per drawings and instructions of Engineer-in-Charge. Nipples as required shall be prepared from straight length piping.

4.14 Galvanised Piping

Galvanised carbon steel piping shall be completely cold worked, so as not to damage galvanised surfaces. This piping involves only threaded joints and additional external threading on pipes may be required to be done as per requirement.

4.15 Jacketed Piping

The Jacketing shall be done in accordance with MECON Specification or Licensors specification as suggested in material specification or special condition of contract.


Pre-assembly of jacketed elements to the maximum extent possible shall be accomplished at shop by Contractor. Position of jumpover and nozzles on the jacket pipes, fittings etc. shall be marked according to pipe disposition and those shall be prefabricated to avoid damaging of inner pipe and obstruction of jacket space. However, valves, flow glasses, in line instruments or even fittings shall be supplied as jacketed.

4.16 Shop Fabrication / Prefabrication

The purpose of shop fabrication or pre-fabrication is to minimise work during erection to the extent possible. Piping spool, after fabrication, shall be stacked with proper identification marks, so as facilitate their withdrawal at any time during erection. During this period all flange (gasket contact faces) and threads shall be adequately fabricated by coating with a removable rust preventive. Care shall also be taken to avoid any physical damage to flange faces and threads.

4.17 Miscellaneous

4.17.1 Contractor shall fabricate miscellaneous elements like flash pot, seal pot, sample cooler, supporting elements like turn buckles, extension of spindles and interlocking arrangement of valves, operating platforms as required by Engineer-in-Charge.

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4.17.2 Spun Concrete Lining

The work of inside spun concrete lining of pipes and specials of diameter 3" and above shall be done as per material specifications and special condition contract.

4.17.3 Fabrication of pipes from plate

Pipes shall be fabricated at site as and when required as per the specifications attached and the actual Piping Material Specification.

5.0 ERECTION

5.1 Cleaning of Piping before Erection

Before erection all pre-fabricated spool pieces, pipes, fittings etc. shall be cleaned inside and outside by suitable means. The cleaning process shall include removal of all foreign matter such as scale, sand, weld spatter chips etc. by wire brushes, cleaning tools etc. and blowing with compressed air/or flushing out with water. Special cleaning requirements for some services, if any shall be as specified in the piping material specification or isometric or line list. S.S jacketed piping requiring pickling shall be pickled to remove oxidation and discolouring due to welding.

5.2 Piping Routing


No deviations from the piping route indicated in drawings shall be permitted without the consent of Engineer- in-Charge.

Pipe to pipe, pipe to structure / equipments distances / clearances as shown in the drawings shall be strictly followed as these clearances may be required for the free expansion of piping / equipment. No deviations from these clearances shall be permissible without the approval of Engineer-in-Charge.

In case of fouling of a line with other piping, structure, equipment etc. the matter shall be brought to the notice of Engineer-in-Charge and corrective action shall be taken as per his instructions.

5.3 Cold Pull

Wherever cold pull is specified, the Contractor shall maintain the necessary gap, as indicated in the drawing. Confirmation in writing shall be obtained by the Contractor from the Engineer-in-Charge, certifying that the gap between the pipes is as indicated in the drawing, before drawing the cold pull. Stress relieving shall be performed before removing the gadgets for cold pulling.

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5.4 Slopes

Slopes specified for various lines in the drawings / P&ID shall be maintained by the Contractor. Corrective action shall be taken by the Contractor in consultation with Engineer-in-Charge wherever the Contractor is not able to maintain the specified slope.

5.5 Expansion Joints / Bellows

Installation of Expansion Joints/Bellows shall be as follows:

- All Expansion joints / Bellows shall be installed in accordance with the specification and installation drawings, supplied to the Contractor.
- Upon receipt, the Contractor shall remove the Expansion Joints/ Bellows from the case(s) and check for any damage occurred during transit.
- The Contractor shall bring to the notice of the Engineer-in-Charge any damage done to the bellows / corrugations, hinges, tie-rods, flanges / weld ends etc.
- Each Expansion Joint / Bellow shall be blown free of dust / foreign matter with compressed air or cleaned with a piece of cloth.
- For handling and installation of Expansion Joints, great care shall be taken while aligning. An Expansion Joints shall never be slinged from bellows corrugations / external shrouds, tie / rods, angles.
- An Expansion Joints / Bellow shall preferably be slinged from the end pipes / flanges or on the middle pipe.
- All Expansion Joints shall be delivered to the Contractor at "Installation length", maintained by means of shipping rods, angles welded to the flanges or weld ends or by wooden or metallic stops.
- Expansion Joints stop blocks shall be carefully removed after hydrostatic testing. Angles welded to the flanges or weld ends shall be trimmed by saw as per manufacturer's instructions and the flanges or weld ends shall be ground smooth.
- The pipe ends in which the Expansion Joint is to be installed shall be perfectly aligned or shall have specified lateral deflection as noted on the relevant drawings.
- The pipe ends / flanges shall be spaced at a distance specified in the drawings.
- The Expansion Joint shall be placed between the mating pipe ends / flanges and shall be tack welded/bolted. The mating pipes shall again be checked for correct alignment.
- Butt-welding shall be carried out at each end of the expansion joint. For flanged Expansion Joint, the mating flanges shall be bolted.

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- After the Expansion Joint is installed the Contractor shall ensure that the mating pipes and Expansion Joints are in correct alignment and that the pipes are well supported and guided.
- The Expansion Joint shall not have any lateral deflection. The Contractor shall maintain parallelism of restraining rings or bellows convolutions.
- Precautions
 - For carrying out welding, earthing lead shall not be attached with the Expansion Joint.
 - The Expansion bellow shall be protected from arc weld spot and welding spatter.
 - Hydrostatic Testing of the system having Expansion Joint shall be performed with shipping lugs in position. These lugs shall be removed after testing and certification is over.

5.6 Flange Connections

While fitting up mating flanges, care shall be exercised to properly align the pipes and to check the flanges for trueness, so that faces of the flanges can be pulled together, without inducing any stresses in the pipes and the equipment nozzles. Extra care shall be taken for flange connections to pumps, turbines, compressors, cold boxes, air coolers etc. The flange connections to these equipments shall be checked for misalignment, excessive gap etc. after the final alignment of the equipment is over. The joint shall be made up after obtaining approval of Engineer-in-Charge.


Temporary protective covers shall be retained on all flange connections of pumps, turbines, compressors and other similar equipments, until the piping is finally connected, so as to avoid any foreign material from entering these equipments.

The assembly of a flange joint shall be done in such a way that the gasket between these flange faces is uniformly compressed. To achieve this the bolts shall be tightened in a proper sequence. All bolts shall extend completely through their nuts but not more than 1/4".

Steel to C.I. flange joints shall be made up with extreme care, tightening the bolts uniformly after bringing flange flush with gaskets with accurate pattern and lateral alignment.

5.7 Vents and Drains

High point vents and low point drains shall be provided as per the instructions of Engineer-in-Charge, even if these are not shown in the drawings. The details of vents and drains shall be as per piping material specifications / job standards.

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5.8 Valves

Valves shall be installed with spindle / actuator orientation / position as shown in the layout drawings. In case of any difficulty in doing this or if the spindle orientation / position is not shown in the drawings, the Engineer-in-Charge shall be consulted and work done as per his instructions. Care shall be exercised to ensure that globe valves, check valves, and other uni-directional valves are installed with the "Flow direction arrow "on the valve body pointing in the correct direction. If the direction of the arrow is not marked on such valves, this shall be done in the presence of Engineer-in-Charge before installation.

Fabrication of stem extensions, locking arrangements and interlocking arrangements of valves (if called for), shall be carried out as per drawings / instructions of Engineer-in-Charge.

5.9 Instruments

Installation of in-line instruments such as restriction orifices, control valves, safety valves, relief valves, rotameters, orifice flange assembly, venturimeters, flowmeters etc. shall form a part of piping erection work.

Fabrication and erection of piping upto first block valve / nozzle / flange for installation of offline Instruments for measurement of level, pressure, temperature, flow etc. shall also form part of piping construction work. The limits of piping and instrumentation work will be shown in drawings / standards / specifications. Orientations / locations of take-offs for temperature, pressure, flow, level connections etc. shown in drawings shall be maintained.

Flushing and testing of piping systems which include instruments mentioned above and the precautions to be taken are covered in flushing, testing and inspection of piping. Care shall be exercised and adequate precautions taken to avoid damage and entry foreign matter into instruments during transportation, installation, testing etc.

5.10 Line Mounted Equipments / Items


Installation of line mounted items like filters, strainers, steam traps, air traps, desuperheaters, ejectors, samples coolers, mixers, flame arrestors, sight glasses etc. including their supporting arrangements shall form part of piping erection work.

5.11 Bolts and Nuts

The Contractor shall apply molycoat grease mixed with graphite powder (unless otherwise specified in piping classes) all bolts and nuts during storage, after erection and wherever flange connections are broken and made-up for any purpose whatsoever. The grease and graphite powder shall be supplied by the Contractor within the rates for piping work.

5.12 Pipe Supports

Pipe supports are designed and located to effectively sustain the weight and thermal effects of the piping system and to prevent its vibrations. Location and design pipe supports will be shown in drawing for lines 2" NB. However, any extra supports desired by Engineer-in-Charge

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shall also be installed.

No pipe shoe / cradle shall be offset unless specifically shown in the drawings.

Hanger rods shall be installed inclined in a direction opposite to the direction in which the pipe move during expansion.

Preset pins of all spring supports shall be removed only after hydrostatic testing and insulation is over. Springs shall be checked for the range of movement and adjusted if necessary to obtain the correct positioning in cold condition. These shall be subsequently adjusted to hot setting in operating condition. The following points shall be checked after installation, with the Engineer-in-Charge and necessary confirmation in writing obtained certifying that :

- All restraints have been installed correctly.
- Clearances have been maintained as per support drawings.
- Insulation does not restrict thermal expansion.
- All temporary tack welds provided during erection have been fully removed.
- All welded supports have been fully welded.

6.0 **WELDING**

Welding of pipelines shall be done as per applicable codes and **Annexure-1**

7.0 **ERECTION**

7.1 **Pre-fabrication and Field Assembly**


Extent of pre-fabrication shall be purely at the discretion of CONTRACTOR keeping in view the following :-

7.1.1 Field joint shall be decided by CONTRACTOR keeping in view the transportation of pre-fabricated pieces to site.

7.1.2 There can be some variations in the dimensions and level appearing in the arrangement drawings and those actually occurring at site due to minor variations in the location of equipments, structures, cut out etc. Adequate field joints shall be provided, permitting assembly and erection of pipe work without major modification.

7.2 **Supporting**

Location and design of pipe supports shown in approved drawings and support drawings shall be strictly followed.

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7.2.1 Supports shall be installed in such a way that they do not contribute to over stressing of a line.

7.2.2 Fabrication and erection of additional supporting elements and structural fixtures which in COMPANY's view are required for proper supporting of the system, shall be carried out by CONTRACTOR at no extra cost.

7.2.3 All temporary supports, elements required for alignment, erection and assembly shall be removed after completion of work.

7.3 **Equipment hook-up**

7.3.1 Prior to hook-up, the alignment and trueness of flange faces shall be checked to ensure that no undue stresses shall be induced in the system while hooking up.

8.0 **INSPECTION**

8.1

8.2 CONTRACTOR shall provide all facilities/ assistance to COMPANY for proper execution of their inspection without any extra charge.


8.3 All piping work shall be subjected to inspection by COMPANY at any time during fabrication. CONTRACTOR shall furnish to COMPANY detailed work programme sufficiently in advance, in order to enable COMPANY to arrange for inspection.

9.0 **PROTECTIVE COATING**

9.1 All above ground piping system shall be applied with protective coating in accordance with specification for shop & field painting.

9.2 All under ground portion of piping system shall be coated with three layer P.E. coating. CONTRACTOR shall prepared procedure for epoxy painting of buried pipeline for approval of COMPANY. Procedure shall include surface preparation, brand and type of coating to be adopted. Coating of pipes shall not commence without approval of coating procedure. Total dry film thickness to be achieved shall not be less than 300 microns. Compatible primer and finish coat as recommended by coating manufacturer shall only be applied. Coating integrity shall be checked by "Holiday detector" over full length of coated pipe work. Coating to be supplied by CONTRACTOR shall be suitable for design temperature.

9.3 Once the coating has been accepted by COMPANY, backfilling operation can be started. In order to protect coated pipe from damage, the excavated trench shall be examined for stone, rock and any other hard substance detrimental to coating. All such substances shall be removed before lowering the pipe in the trench. COMPANY may ask for a 100mm padding of clear sand under and above pipeline in rocky or otherwise hard soil area. No additional payment on account of padding shall however be admissible.

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10.0 **FLUSHING**

Completed piping systems shall be flushed by CONTRACTOR with fresh water, to clean the pipe of all dirt, debris, and foreign material. CONTRACTOR shall prepare a procedure for flushing of the system for approval of COMPANY. Flushing shall not be commenced without approval of flushing procedure.

10.1 CONTRACTOR shall perform all activities like dismantling and reinstalling of all strainers, in line instruments etc. before and after completion of flushing.

10.2 Flushing shall be considered as complete only after inspection and approval by COMPANY.

10.3 Disposal of muck and flushing media shall be arranged by CONTRACTOR as directed by COMPANY, in such a manner that it does not spoil the adjacent installation. CONTRACTOR shall obtain COMPANY approval regarding the place and method to be adopted for disposal of debris.

10.4 Record of flushing giving following details shall be submitted by CONTRACTOR to COMPANY for its approval and records :

- a) Date of flushing
- b) Identification of line : flushed-line number

11.0 **HYDROSTATIC TESTING**


11.1 Completed piping system as approved by COMPANY shall be hydrostatically tested in the presence of COMPANY. The general requirements of hydrostatic testing shall be in accordance with codes specified in section 2.0.

11.2 CONTRACTOR shall prepare hydrostatic test procedure based on specified codes. The hydrostatic test shall commence only after approval of procedure by COMPANY.


11.3 Piping system shall be hydrostatically tested to a pressure corresponding to 1.4 times the design pressure.

11.4 Fresh water shall be used as test media. CONTRACTOR shall locate the source of water supply and arrange for transportation of water to test site. CONTRACTOR shall arrange at his own cost the water analysis and confirm that water is suitable for testing. In case any corrosion inhibitor is to added, the same shall be done after approval of COMPANY.

11.5 Lines repaired subsequent to hydrostatic test shall be retested using the same procedure as originally adopted. However COMPANY may waive such retest in case of minor repairs by taking precautionary measures to ensure sound construction.

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- 11.6 All equipment and instruments used for hydrostatic test shall be approved by COMPANY before start of tests.
- 11.7 Pressure gauges shall be installed on line to measure test pressures. In case of longer lines two or more pressure gauges shall be installed as directed by COMPANY. One gauge shall be installed at the discharge of the pressurising pump. Pressure gauge used for hydrostatic testing shall be calibrated with dead weight tester in the presence of Engineer-in-charge. Range of pressure gauge shall generally be 1.5 times the test pressure.
- 11.8 Orifice plates and restriction orifices shall not be installed until hydrostatic testing is completed. Temporary gaskets shall be used during testing.
- 11.9 First block valve of pressure instruments shall be half open & plugged at the time of hydrostatic testing. Temperature connections shall be blanked off during testing.
- 11.10 All equipments, in line instruments, relief valves shall be disconnected from piping system by means of blinds during testing. Control valves shall be replaced by spool pieces during testing.
- 11.11 High point vents and low point drain required for testing in addition to those marked in the drawings shall be provided by CONTRACTOR at his own cost.
- 11.12 All welded and screwed joints shall be kept clean for detecting leaks during testing.
- 11.13 Test pressure shall be maintained long enough to facilitate complete inspection of the system. Minimum duration of test shall be 6 hours unless other wise specified. Pressurising equipment shall be isolated immediately after test pressure is attained.
- 11.14 After successful completion of hydrostatic testing, the piping system shall be dewatered. All lines shall be completely dried using compressed air. CONTRACTOR shall make his own arrangement for supply of compressed air. Drying of lines shall be considered complete on approval by COMPANY.
- 11.15 **Test Records**
- The records in duplicate shall be prepared and submitted by CONTRACTOR as below :
- a) Date of test
 - b) Identification of pipe tested - line number
 - c) Test pressure
 - d) Test results
 - e) Signature of CONTRACTOR
 - f) Approval signature by COMPANY.

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ANNEXURE-1

WELDING SPECIFICATION

1.0 GENERAL

This specification shall be followed for the fabrication of all types of welded joints of carbon steel above ground natural gas service piping systems.

The welded pipe joints shall include the following :

- a) All line pipe joints of the longitudinal and circumferential butt welded.
- b) Attachments of castings, forgings, flanges.
- c) Welded manifold headers and other sub-assemblies
- d) Welded branch connections with or without reinforcing pads.
- e) Joints in welded/ fabrication piping components.
- f) The attachments of smaller connections for vents drain drips and other instrument tapplings.

Any approval granted by the Engineer-in-charge or owner's inspectors shall not relieve the contractor of his responsibilities & guarantees.


1.1 Applicable Codes & Standards

All welding work, equipments for welding, heat treatment, other auxiliary functions and the welding personnel shall be as per the requirements of the latest editions of the following approved standards and procedures :-

- i) Code for gas transmission and distribution piping systems. ANSI B31.8.
- ii) Code for petroleum refinery piping, ANSI B31.3.

In addition, the following codes/ specifications referred to in the relevant code of fabrication shall be followed for the welding/ brazing qualifications, consumable qualifications and non destructive test procedures.

- i) Standard for welding of pipelines and related facilities API-1104.
- ii) Material Specifications - Welding rods, electrodes and filler materials - ASME Sec. - IIC.
- iii) Code for non destructive examination ASME Sec-V.
- iv) Qualification standard for welding and brazing procedure and welders, brazers, welding and brazing operators - ASME Sec-I

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In the event of any difference due to the additional requirements mentioned in this specification, over and above those obligation as per codes, this specification shall be binding.

1.2 Base Material

- a) In general carbon steel is used in this plant. The details of material specifications are given in the welding Specification Chart.
- b) The contractor shall provide the Manufacturer's test certificates for every heat of the materials supplied by him.

1.3A Filler Materials

- a) The Contractor shall provide all the necessary welding electrodes, filler materials, etc. required for the execution of the work.
- b) The welding electrodes/ filler wires supplied by the Contractor shall conform to the class specified in the welding specification chart. The materials shall be of the make approved by the Engineer-in-charge.
- c) The electrode shall be suitable for the welding process recommended and base metal used. Unless otherwise specified physical properties of the welds produced by a electrode recommended for the welding of a particular base metal shall not be lower than the minimum values specified for the base metal and shall correspond to the physical properties of the class of electrode adopted. The choice of electrode shall be made after conducting the required tests on the electrodes as per relevant standards, and shall be the sole prerogative of the Engineer-in-charge.
- d) Tungsten electrodes used shall conform to ASME Sec. II C SFA 5.12 specification. Thoriated Tungsten electrodes shall not be permitted due to possible radiation hazard. Instead, ceriated Tungsten Electrodes (EWCe-2 or equivalent) shall be used for GTA Welding.
- e) Electrode qualification test records should be submitted as per the **Exhibit-A** (attached) in respect of the electrodes tested by the contractor, for obtaining the approval of the Engineer-in-charge.
- f) The Contractor shall submit batch test certificate from the electrode Manufacturers giving details of physical and chemical tests carried out by them, for each batch of electrodes to be used.
- g) All electrodes shall be purchased in sealed containers and stored properly to prevent deterioration. The electrodes removed from the containers shall be kept in holding ovens at temperature recommended by the electrode Manufacture. Out-of-the oven time of electrodes before they are consumed shall not exceed the limits recommended by the electrodes manufacturer. The electrodes shall be handled with care to avoid any damage to flux covering.

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- h) All low hydrogen type of electrodes shall be rebaked at 350°C for 1 hour minimum and stored in ovens kept at 80-100°C before use. Recommendations of the electrode Manufacturer shall be followed if available.
- i) The electrodes, filler wires and flux used shall be free from rust, oil, greases, earth and other foreign matter which can affect the quality of welding.

1.3B


SHIELDING & PURGING GAS

- a) Argon gas used in GTA welding for shielding purposes shall be 99.995% pure. The purity of the gas shall be certified by the manufacturer. The rate of flow for shielding purposes shall be established through procedure qualification tests. Normally this rate may be 12-20 CFH.
- b) Argon gas with a purity level of 99.995% shall be used for purging.
- c) When GTAW process alone or a combination of GTA Wand SMAW processes is recommended for the production of a particular joint, the purging shall be maintained during the root pass and for the first filling pass to minimize oxidation on the inner side of the pipe, unless otherwise specified in Welding Specification Chart.
- d) Initial purging shall be maintained for sufficient period of time so that at least 4-5 times the volume between the dams is displaced, in order to completely remove the entrapped air. In no case should the initial purging period be less than 10 minutes. High gas pressure should be avoided.
- e) After initial purging, the flow of the backing gas should be reduced to a point where only a slight positive pressure prevails. For systems, which have a small volume (up to 1/2 cubic foot) to be purged, a gas flow rate of 6-CFH is usually adequate. Systems of larger volume may require higher flow rates and these should be established during procedure qualification tests.
- f) Gas backing (purging) is not required for socket type of welded joints.
- g) Dams, used for conserving inert gas during purging, shall be removed after completion of the welding, and shall be accounted for. Wherever, removal of dams is not possible after welding, use of water-soluble dams should be made.

1.4

Welding Consumables

The Contractor shall provide at this own expense all the welding consumables necessary for the execution of the job such as electrodes filler wires, oxygen, acetylene, etc. and these should bear the approval of the COMPANY.

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1.5 Equipment & Accessories

- 1.5.1 The Contractor should have the arrangement of sufficient number of welding and cutting equipments, auxiliaries and accessories of sufficient capacities so as to meet the target schedule.
- 1.5.2 All the equipment for performing the heat treatment, including transformers, thermocouples, flow meters, automatic temperature recorders with suitable calibration arrangement etc. shall be provided by the Contractor, at his own expense and these should bear the approval of the COMPANY.
- 1.5.3 Contractor shall make necessary arrangements at his own expense for providing the radiographic equipment, radiographic films, and all the equipment/ materials required for carrying out the dye penetrant/ magnetic particle test for satisfactory and timely completion of the job.
- 1.5.4 Redoing of any work necessitated by faulty equipments or operation used by the Contractor, will be done at his own expense.

1.6 Welding Processes

- 1.6.1 Welding of various materials under this specification shall be carried out using Shielded Metal Arc Welding (SMAW) Process with the approval of the Engineer-in-charge.
- 1.6.2 The welding processes to be employed are given in the welding specification chart. Any deviation desired by the Contractor shall be obtained through the express consent of the Engineer-in-charge.
- 1.6.3 Automatic and semi-automatic welding processes shall be employed only with the express approval of the Engineer-in-charge. The welding procedure adopted and consumables used shall be specifically approved.
- 1.6.4 A combination of different welding processes or a could be employed for a particular joint only after duly qualifying the welding procedure as per the requirements of code of fabrication to be adopted and obtaining the approval of the Engineer-in-charge.


1.7 End Preparation

1.7.1 End Preparation

The edges to be welded shall be prepared to meet the joint design requirements by gas cutting, machining or grinding method. After gas cutting, oxides shall be removed by chipping or grinding.

1.7.2 Cleaning

- a) The ends to be welded shall be properly cleaned to remove paint, oil, greases, rust, oxides, sand, earth and other foreign matter. The ends shall be

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completely dry before the welding commences.

- b) On completion of each run, craters, welding irregularities, slag etc., shall be removed by grinding and chiseling. Wire brushes used for cleaning stainless steel joints shall have stainless steel wires and the grinding wheels used for grinding stainless steel shall be of a suitable type. Separate grinding wheels and wire brushes should be used for carbon steels and stainless steels.

1.8 Alignment and Spacing

- a) Prior to alignment, the contractor shall inspect the pipe ends inside and outside for damage, dents, laminations etc. Pipe for welding shall be set up correctly spaced. Temporary attachment of any kind shall not be welded. Every effort shall be made to reduce misalignment by the use of clamp and rotation of pipes to the best fit. For pipes of same nominal wall thickness, the off set should not exceed 1.6mm. Any branch connections sleeve shall be at least 150mm from any other weld. The welds for fitting shall be so located that top of the weld shall not come within 50mm of any other weld. The use of internal line up clamps is mandatory for diameters 10" and above. However, in case where it is impossible to use internal line up clamp, external line up clamp may be used.
- b) Tack welds, for maintaining the alignment, of pipe joints shall be made only by qualified welders using approved WPS. Since the tack welds become part of the final weldment they shall be executed carefully and shall be free from defects. Defective tack welds must be removed prior to the actual welding of the joints.


1.9 Weather Conditions

- 1.9.1 The parts being welded and the welding personnel should be protected from rain and strong winds. In the absence of such a protection no welding shall be carried out.
- 1.9.2 During field welding using GTAW process, particular care shall be exercised to prevent any air current affecting the welding process.

1.10 Welding

1.10.1 Root Pass

- a) Root pass shall be made with electrodes/ filler wires recommended in the welding specification chart. The preferable size of the electrode is 2.5mm diameter (12 SWG) but in no case greater than 3.25mm (10 SWG).
- b) Uphill welding shall be adopted for welding pipes weld fixed with its axis horizontal. Downward technique of welding shall not be used for welding of pipes in horizontal position, unless specifically permitted by Engineer-in-charge for a particular case.

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- c) The root pass of but joints should be executed properly so as to achieve full penetration with complete fusion of the root edges. Weld projection inside the pipe shall not exceed .4mm wherever not specified by the applicable code.
- d) Any deviations desired from the recommended welding technique and electrodes indicated in the welding specification chart should be adopted only after obtaining express approval of the Engineer-in-charge.
- e) Welding shall be continuous & uninterrupted during a pass.
- f) On completion of each run, craters, welding irregularities, slag etc., shall be removed by grinding and chiselling.
- g) While the welding is in progress care should be taken to avoid any kind of movement of components, to prevent occurrence of weld cracks.
- h) Fillet welds shall be made by shielded metal arc/ GTAW welding process irrespective of the thickness and class of piping.
- i) Peening shall not be used unless specified in the welding specification chart.

1.10.2 Joint Completion

- a) Joint shall be completed using the class of filler wires/ electrodes, recommended in the welding specification chart. Size of the electrode shall not exceed 4 mm in diameter for stainless steels and alloy steels used for low temperature applications.
- b) Two weld beads shall not be started at the same point in different layers.
- b) Butt joints shall be completed with a cover layer that would effect good cover at the joint edge and a gradual notch free surface.
- d) Each weld joints should have a workman like finish.
- e) Weld identification mark shall be stamped clearly at each joint, just adjacent to the weld. Metal stamping shall not be used on the thin wall pipe. Suitable paint shall be used on thin wall pipes for identification.
- f) No painting shall be done until the weld joint has been hydrostatically tested.

1.10.3 Dissimilar Welds

Where welds are to be produced between carbon steels and alloy steels, preheat and post weld heat treatment requirements shall be those specified for corresponding alloy steels and filler wire / electrodes shall correspond to ER 70 S-G or AWS E-7016/7018 type. For welds between two dissimilar Cr-Mo low alloy steels, preheat and post weld

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heat treatments shall be those specified for higher alloy steel and electrodes used shall correspond to those specified for steel of lower alloy content. For carbon steel or alloy steel to stainless welds, use of filler wire / electrodes E/ER-309/E-310/E NiCr Fe-3 shall be made. The welding procedure, electrodes / filler wires to be used shall be approved by the Engineer-in-Charge.

1.11 Heat Treatment

1.11.1 Preheating


- a) Preheating requirements for the various materials shall be as per the welding specification chart attached. No welding shall be carried out without preheating the joint to 10°C (50°F) when the ambient temperature is below 10 degree.
- b) Preheating shall be performed using resistance or induction heating methods. Preheating by gas burners, utilising any acetylene or oxy-propane gas mixtures, with neutral flame may also be carried out when permitted by the Engineer-in-charge.
- c) Preheating shall extend uniformly to atleast three times the thickness of the joint, but not less than 50mm, on both sides of the weld.
- d) Preheating temperature shall be maintained over the whole length of the joint during welding. Temperature indicating crayons or other temperature indicating devices shall be provided by the contractor to check the temperature.
- e) Preheating temperature shall be maintained over the whole length of the joint during welding. Temperature recorders shall be provided by the Contractor to record the temperature.

1.11.2 Post Heating

In case of alloy steel materials such as Cr-Mo steels, if the post weld heat treatment is not performed immediately after welding, the weld joint and adjacent portion of pipe, at least 50 mm on either side of weld, shall be uniformly heated to 300°C. This temperature shall be maintained for half an hour minimum, and then wrapped with mineral wool before allowing it to cool to room temperature. If the Post Heating temperature specified in the Welding Specification Charts exceeds 300°C, the same shall be followed. Similarly, if the welding specification chart specifies post-heat time, the same shall be applicable. Post weld heat treatment as specified in the Welding Specification Chart shall be carried out later on.


1.11.3 Postweld Heat Treatment

- a) Post weld heat treatment, wherever required for joints between pipes, pipes and fittings, pipe body and supports shall be carried out as per the relevant specifications, applicable standards and the instructions of the Engineer-in-charge. In this regard procedure qualification to be done before carrying out

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PWHT in production welds.

- b) The heat treatment of welded joints shall be carried out as per the requirements laid down in ANSI B31.8 and welding specification chart.
- c) The contractor shall submit for the approval of the Engineer-in-charge, the details of the post weld heat treatment procedure, as per **Exhibit `B'** attached, that the propose to adopt for each of the materials/ assembly/ part involved, well before carrying out actual heat treatment.
- d) Post weld heat treatment shall be done by using an electric resistance or induction heating equipment as decided by the Engineer-in-charge.
- e) While carrying out local post weld heat treatment, technique of application of heat must ensure uniform temperature attainment at all points of the portion being heat treated. Care shall be taken to ensure that width of treated band over which specified post weld heat treatment is carried out, the temperature attained is atleast as that specified in the relevant applicable standards/ codes.
- f) Throughout the cycle of heat treatment, the portion outside the heated band shall be suitably wrapped under insulation so as to avoid any harmful temperature gradient at the exposed surface of pipe. For this purpose temperature at the exposed surface of the pipes should not be allowed to exceed 400°C.
- g) The temperature attained by the portion under heat treatment shall be recorded by means of thermocouple pyrometers. Adequate number of thermocouples should be attached to the pipe directly at the equally spaced location along the periphery of the pipe joint. The minimum number of thermocouples attached per joint shall be 1 upto 6" dia, 2 upto 10" dia and 3 upto 12" and above. However the Engineer-in-charge can increase the required minimum number of thermocouples to be attached if found necessary.
- h) Automatic temperature recorders which have been duly calibrated should be employed. The calibration chart of each recorder should be submitted to the Engineer-in-charge prior to starting the heat treatment operation and his approval should be obtained.
- i) Immediately on completion of the heat treatment, the post weld heat treatment charts/ records alongwith the hardness test results on the weld joints (whenever required as per the welding specification chart), shall be submitted to Engineer-in-charge for his approval.
- j) Each joint shall bear an identification number which shall be maintained in the piping sketch to be prepared by the contractor. The joint identification number should appear on the corresponding post weld heat treatment charts. The same identification numbers shall also be followed for identification for corresponding radiographic films. The chart containing the identification

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numbers and piping sketch shall be submitted to the Engineer-in-charge in suitable folders.

- k) The hardness of the heat affected zone as well as of the weld metal, after heat treatment, shall be measured using suitable hardness tester and shall not exceed the maximum hardness specified in the welding specification chart. The weld joint shall be subjected to re-heat treatment when hardness measured exceeds the specified limit, at the contractor's own expenses.
- l) The contractor shall arrange for the hardness testing and shall maintain the records of all joints tested. These records shall be checked by the plant Owner's inspector.

1.12 **Cleaning of the Weld Joints**

All weld joints shall be free from adherent weld spatter, slag, dirt or foreign matter. This can be achieved by brushing.


1.13 **Inspection & Testing**

1.13.1 **General**

- a) The owner's inspector shall have free access to all concerned areas, where the actual work is being performed. The contractor shall also offer the Owner's inspector all means and facilities necessary for carrying out inspection.
- b) The owner is entitled to depute his own inspector to the shop or field where pre-fabrication and erection of pipelines are being done with (but not limited to) the following objectives :-
 - i. To check the conformance to relevant standards and suitability of various welding equipments and the welding performance.
 - ii. To supervise the welding procedure qualification.
 - iii. To supervise the welder performance qualifications.
- c) Contractor shall intimate sufficiently in advance the commencement of qualification tests welding works and acceptance tests, to enable the plant owner's inspector to be present to supervise them.

1.13.2 **Welding Procedure Qualifications**

- a) Welding Procedure Qualification shall be carried out in accordance with the relevant requirements of API 1104/ ASME Sec-IX or other applicable codes and other job requirements by the contractor at his expense. The contractor shall submit the welding procedure specifications in format as per **Exhibit-C** (attached) immediately after the receipt of the order.

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- b) COMPANY's inspector will review, check and approve the welding procedure submitted and shall release the procedure for procedure qualification tests. The procedure qualification test shall be carried out by the Contractor under field conditions at this own expense. A complete set of test results in format as per **Exhibit-D** (attached) shall be submitted to the COMPANY's inspector for approval immediately after completing the procedure qualification test and atleast 2 weeks before the commencement of actual work. Standard tests as specified in the code shall be carried out in all cases. In addition to these tests, other tests like radiography, macro/ micro examination, hardness testers, dye penetrant examination, Charpy V-notch etc. shall be carried out on specimens. It shall be the responsibility of the contractor to carry out all the tests required to the satisfaction of the COMPANY's Inspector. The destructive testing of welded joints shall be as per **Annexure-2** and ASME Sec-IX.

1.13.3 Welder's Qualification

- a) Welders shall be qualified in accordance with the API 1104/ ASME IX and other applicable codes by the contractor at his expense. The butt weld test pieces of the qualification test shall meet the radiographic tests requirements as mentioned in this specification. The COMPANY's inspector shall witness the test and certify the qualification of each welder separately. Only those welders who have been approved by the COMPANY's inspector shall be employed for welding. Contractor shall submit the welder qualification test reports in the standard format and obtain express approval, before commencement of the work. No welder shall be permitted to work without the possession of the identify card. It shall be the responsibility of contractor to carry out Qualification tests of welders.
- b) The welders shall always have in their possession the identification card as shown in **Exhibit-E** and shall produce it on demand by the COMPANY's Inspector. It shall be the responsibility, of the Contractor to issue the identify cards after it has been duly certified by the COMPANY. If a welder is found to perform a type of welding for which he is not qualified, he shall be debarred from doing any further work. All welds performed by an unqualified welder shall be cut and redone by a qualified welder at the expense of the Contractor.

1.13.4 Visual Inspection

Inspection of all welds shall be carried out by COMPANY as per the latest editions of the applicable codes and specifications. All finished welds shall be visually inspected for parallel and axial alignment of the work, excessive reinforcement, concavity of welds, shrinkage, cracks, under cuts, dimensions of the weld, surface porosity and other surface defects. Under-cutting adjacent to the completed weld shall not exceed the limits specified in the applicable standard/ code.

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1.13.5 Non-destructive Examination

The non destructive examination shall mainly consist of examination using x-ray radiography as detailed in **Annexure-4**.

Radiographic examination of one hundred percent (100%) girth welds will be required by the COMPANY. Welds shall meet the standards of acceptability as set forth in API 1104 and as per the requirements laid in subsequent paragraphs.

The CONTRACTOR shall make all the arrangements for the radiographic examination of work covered by this specification at his expense.

The COMPANY will review all the radiographs of welds and inform the CONTRACTOR regarding unacceptable welds. The decision of the COMPANY shall be final and binding in this regard.


All requirements mentioned in the specification shall be arranged and executed by the CONTRACTOR through his own resources. In addition, for pipes with wall thickness 9.5mm and above, ultrasonic inspection is required in the following cases as per **Annexure-3** of this specification.

- a) On the first 100 welded joints corresponding to each automatic (GTAW/ GMAW) welding procedure used.
- b) When 20mm or more are cut from the pipe end as supplied, the ends shall be ultrasonically inspected for an additional length of 20mm to ensure no lamination exist.
- c) When welds are repaired.
- d) When in the opinion of COMPANY, ultrasonic inspection is required to confirm or clarify defects indicated by radiography.
- e) When automatic procedure is used at least 10cm on each weld shall be ultrasonically inspected at COMPANY's discretion.

In addition, ultrasonic inspection may be required for certain critical weldings of the pipeline (i.e. tie-ins, welding of valves, flanges) randomly selected at COMPANY's discretion. All fillet and groove welds other than that radiographed shall be subjected to dye penetrant/ MP inspection. The non destructive test system used for inspecting welds must be approved by the COMPANY.

Weld quality is judged on the basis of the acceptability criteria mentioned below :

Any weld which as a result of radiographic and / or ultrasonic examination in the opinion of COMPANY **exhibits** imperfections greater than the limits stated in API-1104 latest edition or as superseded in this article shall be considered defective and shall so be marked with an identification paint marker.


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In addition to the API-1104 requirements, the welds containing cracks including crater cracks regardless of size of location are unacceptable.

- i. Any amount of inadequate penetration of the root bead as defined by API-1104 is unacceptable.
- ii. Any amount of incomplete fusion between the root and bevel as defined by API-1104 is unacceptable.
- iii. Unrepaired burn through areas are unacceptable.

Contractor shall appoint agency for carrying out the radiography works at site from the list of agency (ies) enclosed in the bid document.

- The Radiographic Examination procedures to be adopted shall be submitted by the contractor as per **Exhibit-F** and shall be got approved from the Owner's Inspector prior to employment. A person qualified to ASNT Level-II or ASNT Level-III in Radiographic testing shall prepare the procedure. The Radiography Procedure shall be established to demonstrate that the required sensitivity can be consistently achieved under the most unfavorable parameters (e.g. source to film distance, geometric unsharpness, thickness etc.). The radiographic technique and procedure adopted shall conform of the requirements mentioned in Article 2 as well as Article 22 of ASME Sec.V. The IQI sensitivity obtained shall be equal to or better than the requirements mentioned in Article 2 of ASME Sec.V. Source side penetrameter shall be used in establishing radiographic procedure / technique. The acceptance criteria shall be as per the relevant codes of Fabrication and over riding requirements if mentioned else where in the technical specifications of the contract. The Contractor shall be responsible for carrying out Radiography; rectification of defects and re-radiography of welds repaired/rectified at his cost.
- The extent of Radiography shall be as per specifications to be supplied to the Contractor. For welds between dissimilar materials, the extent of Radiographic Examination shall be the more stringent of the two recommended for the materials being welded. Wherever random Radiography is called for, in a particular piping class, the dissimilar materials weld joints shall essentially be included.
- Type of Radiation source and film to be used shall be as per **Exhibit-H** for carrying out radiographic examination. However if specifications (as given else where in the contract) for some critical material require usage of X-Radiation, then Radiography shall be done using X-Rays only.
- The Contractor shall fulfill all the statutory and owner's safety requirements while handling X-ray and Gamma-ray equipments.


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- In case of random radiography, the joints for Radiography shall be selected by the Owner's Inspector and the Radiography shall be performed in his presence, if he instructs the contractor to do so. The contractor shall furnish all the radiographs, to the Owner's Inspector immediately after processing along with evaluation by a person qualified to ASNT Level-II in Radiographic testing, inline with Article 2 of ASME Sec.V. The certificate of ASNT / ISNT Level II qualification of the NDT personnel shall be submitted to owner's inspector for his approval prior to start of job.
- The Contractor shall provide the Owner's Inspector, all the necessary facilities at site such as a dark room with controlled temperature, illuminator (viewer) suitable for varying densities, a duly calibrated electronic densitometer with batteries, magnifying glass, tracing papers, ruler, marking pencils etc. to enable him to review the radiographs.
- Where random radiography is specified, the first weld of each welder shall be completely radiographed. In the case of pipe of size 6" and below, the first two welds shall be completely radiographed.
- For each weld performed by a welder found unacceptable, two additional checks shall be carried out on welds performed by the same welder. This operation is iterative and the of two additional welds for each weld deemed unsatisfactory shall be continued till such time that two consecutive welds of satisfactory quality are found for every defective weld.
- The Contractor shall carry out these additional radiographic testing at his own expense. To avoid the possibility of too many defective welds by a single welder remaining undetected for a long period to time, the Contractor shall promptly arrange for Radiographic Examination so that there is no accumulation of defective joints.
- Contractor shall quote rates for X-ray as well as Gamma Ray for joints indicated to be radiographed by X-ray in Table of **Exhibit-H**.

1.13.6

Check shots

- (a) Owner / Engineer- in- charge or his representative shall select 5% of the total joints radiographed on a day for check shots. Contractor shall carry out check shots as directed.
- (b) Weld profiles of check shots shall be compared with weld profile observed in the earlier Radiographs. In the event of anyone variation in the check shots and earlier Radiographs, contractor shall re-shoot the entire lot of joints radiographed by particular Radiography agency on the particular date. All the re-shot films shall be compared with the originally submitted films.

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1.13.7 **Magnetic Particle & Liquid Penetrant Examination**

- a) Whenever such tests are specified, the tests shall be carried out on joints chosen by the Owner's inspector, as per ASME Section V article 6 and 7 respectively. The tests are to be performed by a person possessing a valid ASNT / ISNT Level-II qualification in the method being used.
- (b) For austenitic stainless steels and other nonmagnetic materials, liquid (dye) penetrant test shall be carried out. For carrying out this test, the materials shall be brought within a temperature limit of 15° to 50°C.

1.13.8 **Hardness Test**


Hardness requirements for welds shall be as per the Welding Specification Chart / Non Destructive Examination Specification attached elsewhere in the contract. Hardness testing shall be carried out by Vickers Hardness Tester during welding procedure qualification and shall be cross sectional. For production welds, hardness testing shall be carried out by portable digital hardness testers. Poldi hardness tester shall not be permitted. Contractor shall produce documentary evidence/calibration certificate to the Owner's Inspector and obtain approval of the hardness testing equipment.

1.13.9 **Proof Tests**

Hydrostatic and pneumatic tests shall be performed as per the requirements laid down in the respective flushing & testing specification/ applicable codes to demonstrate the soundness of the welds. The tests shall be conducted only after fulfilling the requirements of visual examination, radiography etc. and after the entire work has been certified by the Owner's inspector, as fit for subjecting to such test.

1.14 **Repairs of Welds**

- a) Defects ascertained, through the inspection methods, which are beyond acceptable limits shall be removed from the joint completely by the process of chipping and grinding.
- b) When an entire joint is judged unacceptable, the welding shall be completely cut and the edges be suitably prepared as per required alignment tolerances. The welded joint shall again be examined following standard practices.
- c) No repair shall be carried out without prior permission of the Owner's inspector.
- d) Where random radiography is specified, the test welds of each welder shall be completely radiographed. In the case of pipes of sizes 6" and below, the first two welds shall be completely radiographed.
- e) For each weld found unacceptable due to a welder's fault, two additional checks should be carried out on welds performed by the same welder. This operation is interactive and the procedure of radiographing two additional

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welds for each weld deemed unsatisfactory shall be continued till such time that the two consecutive welds of satisfactory quality are found for every defective weld.

The contractor shall carry out these additional radiographic testing.

To avoid the possibility of too many defective welds by a single welder remaining undetected for a long period of time, the Contractor shall promptly arrange for radiographic examination so that there is no accumulation of defective joints.

1.15 Limitations on Repairs

Only one attempt at repair of any region is permitted. Repairs are limited to a maximum 30% of the weld length. For internal or external repairs which open the weld root, only 20% of the weld length may be repaired. Repairs opening the root must only be carried out in the presence of COMPANY. The minimum length of a repaired area shall be 100mm as measured over the recapped length. Welds containing cracks shall be cut out and rebevelled to make a joint, COMPANY shall authorise all repairs.

1.16 Weld Rejected by Accumulation of Defects

Where a weld is rejected by the accumulation of defect clause, as defined by API-1104 and this specification, repairs within these limitations are permitted. Defects in the filling and capping passes shall be repaired preferentially.

1.17 DOCUMENTS TO BE SUBMITTED BY CONTRACTOR (4 COPIES EACH)

- a) Electrode and Welding Consumable Qualification Records as per **Exhibit-A**, for the Welding Consumables tested and approved for the work.
- b) Batch Test Certificates, for the Electrodes used, obtained from the Electrode Manufacturers.
- c) Proposed Heat Treatment Procedure as per **Exhibit-B**.
- d) Heat Treatment Charts.
- e) Weld joint hardness test results.
- f) Welding Procedure Specifications as per **Exhibit-C** immediately after receipt of the order.
- g) Welding Procedure Qualification records as per **Exhibit-D**.
- h) Welder Performance Qualification records as per **Exhibit-E** immediately after conducting Welder Qualification Tests.
- i) Radiography Procedure as per **Exhibit-F** and other NDT procedures.
- j) Radiographic test Report along with Radiographs and other NDT reports.
- k) Piping Sketch (Isometric) giving all the details regarding the pipe specifications, welded joints, joints radiographed magnetic particle, tested, ultrasonic tested, penetrant tested, joints heat treated, WPS used, welders identification number, etc.


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EXHIBIT-A

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ELECTRODE QUALIFICATIONS TEST RECORD

A : Tested at (Site Name) : Date :
Test Period :

Manufacturer's Name :
Brand Name :
Batch Number & size Tested :
Classification & Code :
Intended for Welding in positions :
In combination with (if any) :
Code of Reference (used for testing) :
Special requirements (if any) :

B : **All - Weld Tensile Test**

Base Material used :
Pre-heat temperature :
Postweld Heat Treatment Details :
Visual Examination :
Radiographic Examination Results :

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E : Fillet Weld Test Results

Welding Positions :

Base Materials :

Size of electrode used :

Visual Inspection Results : 1)
2)
3)

Micro Test Results

Fracture Test Results :

Remarks :

F : Other Test Results

i) Transverse Tensile Test :

In Combination with :

Base Material used :


Position of Welding :

Preheat Temperature :

Postweld Heat Treatment :

Radiography :

Identification No.	U.T.S.	Fracture in	Remarks

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2. **Guide Bend Test**

Position	ID No.	Root, Face or Side Bend	Remarks
	1		
	2		
	3		
	4		
	5		

3. **Any other tests**

Conclusions

Approved By :


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EXHIBIT-B
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STRESS RELIEF HEAT TREATMENT PROCEDURE SPECIFICATION

Name of the Heat - Treatment :
Name of the Project :Specification
Reference No.

1. General Details


Name of the Equipment :
Name of the Assembly/ Part :
Assembly/ Part Drawing No. :
Material :

2. Furnace Details

Type of Heating : Gas/ Oil/ Elec. Res./ Induction (Tick Mark)
Capacity (size) :
Maximum Temp. (°C)
Method of temp. measurement :
Atmosphere Control :

3. Heat Treatment Cycle Details

Charging Temp. °C :
Rate of Heating, °C/Hr :
Soaking Temp., °C :
Soaking Time, Hrs. :
Rate of Cooling, °C/Hr :
Mode of Cooling :

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4. Other Details, if any :
5. The following documents are to be furnished :
along with these specification :
 - i) Material Test Certificates
 - ii) Assembly/ Part Details



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STANDARD PROCEDURE SPECIFICATION NO.

for Welding of Pipe and Fittings

- Process & type (Details of special machines).
- Material (Pipes to which the procedure applied, grade of steel, type of pipe, Reference Specification).
- Diameter and wall thickness (Series of dia and thickness to which procedure is applicable)
- Joint Design
- Filler Metal and Number of Beads
- Electrical or Flame Characteristics
- Position
- Direction of Weldings (Uphill, Downhill, Mixed)
- Number of Welders
- Time Lapse between passes
- Type of Line-up Clamp
- Removal of Line-up Clamp (Minimum percentage of welding carried out before removal of clamps)
- Cleaning
- Preheat, Stress Relief
- Shielding Flux
- Speed of Travel
- Sketches and Tabulations (to be attached)
- Wire Speed (rate of wire speed and variation range)
- Minimum No. of passes which must be completed before discontinuing weld.

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- Minimum No. of welders required for the first pass and second pass :

Tested : Welder

Approved : Welding Supt.

Accepted : Chief Engineer


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EXHIBIT-D
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COUPON TEST RECORD

Location
Date State Roll Weld Fixed position
weld welder Mark
..... Welding Time Time of day
..... M. Temperature F. Weather Condition
..... Wing break used Voltage
..... Amperage Type of welding machine
..... Size Filler Metal
..... Size of reinforcement
..... Pipe kind and Grade
..... Wall thickness
..... Dia O.D.

1 2 3 4 5 6 7

Bead No. Size of electrode
..... No. of electrode
.....

1 2 3 4 5 6 7


Coupon Stenciled Original
Dimension of Plate Original area of plate
(inch²) Maximum Load
..... Tensile S/ in. plate area
..... Fracture Location
.....

Procedure	Qualifying Test	Qualified
Welder	Line Test	Disqualified

Max. tensile strength min. tensile strength

Avg. tensile strength Remarks on tensile strength

1.
2.
3.
4.

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Remarks on Bend Tests

1.
2.
3.
4.

Remarks on Nick Tests

1.
2.
3.
4.

Other Tests

(Use back for additional remarks)


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EXHIBIT-E

WELDER's IDENTIFICATION CARD

Name :
Identification :
Date of Testing :
Valid Unit :
Approval of Welding :
Welding Position :
Material :
Diameter :
Wall Thickness :
Type of Welding Consumable :

Approved By :

Employer's Signature
with Seal


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RADIOGRAPHIC PROCEDURE FOR PIPE WELDING

1. Location
2. Date of Testing
3. Name of Supervised Contractor
4. Material
5. Dia. & Thickness
6. Type of Weld Joint
7. Radiation Source (X-ray, gamma ray)
8. Type of equipment (external/ internal)
9. Intensifying screens and material
10. Filter type and placement mask, diaphragm lead screen etc. adjacent to radiation sources or specimen.
11. Geometric relationship (source local spot size, max and min source strength, object to film distance, radiation angle with respect to weld and film).
12. Limit of film coverage
13. Film type and make
14. Exposure Time
15. Processing (time temperature for development stop bath or rinse, fixation, washing, drying etc.)
16. Density
17. Sensitivity
18. Type of penetrometer

Approval of the COMPANY

Signature of CONTRACTOR
with seal

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WELDING SPECIFICATION CHART

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Class :

Material Specification :

Pipes : API 5L Gr. X 60, API 5L Gr. B API 5L Gr. X 42
 Fittings : A 105, A234 Gr. WPB. MSS-SP-75, Gr. WPHY42, MSS-S
 Flanges : A 105, MSS-SP-44 Gr. F42, MSS-SP as Gr. WPH 60
 Other : _____ 44 Gr. F6C

Base Metal of NCL :

Welding Processes : Groove Joints : Butt

Root Pass SMAW Filler Pass SMAW Root Pass SMAW Filler Pass SMAW Filler Joints/ Socket Joints : SMAW

Welding Materials : Groove Joints : Butt

Root Pass E6010G/ E7010G Filler Pass F7010G/ E8010G/ E8818G
 Root Pass E7010/ E7018G/ E8018G Filler Pass F7016/ E7018G/ E80118G

Filler Joints/ Socket Joints : E7016/ E7018/ E7018G/ E8018G

Backing Page _____ Consumable :

Gases : Purging _____ Sheilding


Gas Composition : Purging _____ Sheilding

Preheating : 10 min for all welds, 100°C Post heating

Post weld heat treatment :

Holding temp. : 595-650 C Holding Time : 1 Hr. per inch thk
 Rate of heating : 200 C/hr max. Min holding time : 1 hr.
 Method of cooling : Controlled Rate of cooling : 200°C/hr max.

Mechanical property requirements :


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Charpy `V' notch impact test valve :

Normal : 22 J
 Average : 27 J
 At temperature : 0 °C
 Hardness : 300 HV10 (for weld & HAZ)

Code of fabrication : ANSI B31.8; API 1104 and welding specifications.

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TECHNICAL NOTES

1. Welding, heat treatment and non destructive testing shall be carried out in accordance with the requirement of ANSI B31.8/ API-1104 and additional requirement specified in the specification. In case of conflict between code and specification more stringent conditions shall be applicable.
2. No welding shall be carried out without preheating the joint to 10°C (50 °F) when the ambient temperature is below 10°C (50 °F).


3. Preheat shall be applied while welding the following material as detailed below :

API 5L Gr. B	:	Thickness upto and inclusive of 12mm	100 °F min.
A 105	:		
MSS-SP-44 Gr. F60	:	Thickness beyond	200 °F
A 234 Gr. WPB	:	12 mm	
MSS-SP-75-WPHY60	:		

4. For fillet welds complete welding may be carried out using the electrodes recommended for filler passes.
5. All weldments & HAZ shall meet the hardness requirements of 300 HV10 during procedure qualification. If the hardness exceeds 300 HV10 the joints shall be heat treated at temp. 1100-1250 °F for one hour. The heating and cooling rates shall be decided during procedure qualification subject to a maximum of 200 °C/Hr. Hardness testing shall be carried out by Vickers hardness tester during welding procedure qualification test only. No hardness test is required for production welds.
6. The electrodes used shall meet the following additional requirement :

<u>Specification</u>	<u>UTS (Min.) (As welded)</u>	<u>Impact (As welded)</u>
E7018-G	52.7 kg/mm ²	20 ft. lb. at 0°C
E7018-I	52.7 kg/mm ²	-
E6010	-	-
E6018	-	20 ft. lb. at 0°C

7. All the weldments & HAZ shall meet the impact test requirement of 20 ft. lb at 0°C.

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ANNEXURE-2

1.0 DESTRUCTIVE TESTING OF WELDED JOINT - BUTT WELDS

1.1 Preparation

Having passed the visual and the non destructive inspection, the test weld shall be subjected to mechanical test.

After satisfactory completion of all visual and non destructive testing the procedure test weld shall be set aside for a period not less than 24 hours. No further work on the test weld and no cutting of test specimens from the weld be performed till a period of at least 24 hours has expired.


Weld specimens, for pipe diameter greater than or equal to 12.3/4" shall be taken from the positions indicated in Fig. 1 of this specification from areas as free from defects as possible. For this reason it is necessary to take the previous non destructive tests into account. The minimum no. of tests to be carried out is given in Table-I of this specification.

The test shall be carried out at laboratories approved by COMPANY. The specimens shall be prepared in accordance with the figure given in the paragraphs which refer to the individual test.

Table-I

TYPE AND NUMBER OF TEST SPECIMENS FOR PROCEDURE QUALIFICATION TEST

Pipe Size, Out-side diameter Inches	Number of Specimens									
	Tensile API	Tensile ISO	Nick Break	Root Bend	Face Bend	Side Bend	Macro	Hard- ness	Impa ct	Total
Wall Thickness > 1/2 inch (12.7mm) and under										
Under 2 3/8	0	0	2	2	0	0	0	0	0	4
2 3/8 to 4 1/2 incl.	0	0	2	2	0	0	0	0	0	4
Over 4 1/2 less than 12 3/4	2	0	2	2	2	0	2	2	12	24
12 3/4 and over	2	2	4	4	4	0	2	2	24	44
Wall Thickness > 1/2 inch (12.7mm)										
4 1/2 and smaller	0	2	0	0	0	2	0	0	0	4
Over 4 1/2 less than 12 3/4	2	0	2	2	2	0	2	2	12	24
12 3/4 and over	2	2	4	0	0	8	2	2	24	44

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1.2 Tensile Strength

Specimens for pipe diameter over 12 3/4" shall be taken from the position indicated in Fig. 1 of this specification. Two API type specimen shall be taken for pipe diameter greater than or equal to 12 3/4".

1.3 Nick-Break Test

1.3.1 Preparation

Specimens for nick-break test with notches thus worked can break in the base metal, instead of in the fusion zone; therefore an alternative test piece may be used after authorisation by the COMPANY with a notch cut in the reinforcement of outside weld bead to a maximum depth of 1.5mm measured from the surface of the weld bead.

1.4 Macroscopic Inspection

1.4.1 Preparation

Specimens shall be taken from the positions indicated in Fig. 1 of this specification and shall be prepared in accordance with ASTM E2 and E3.

The width of the macrosection has to be at least three times the width of the weld. The section is to be prepared by grinding or polishing and etching to clearly reveal the weld metal and heat effected zone.

1.4.2 Method

Specimens shall be carefully examined under the microscope with a magnification of at least 25 times. The COMPANY may ask for a macrograph with 5 times magnification for documentation purposes.


1.4.3 Requirements

Under macroscopic examination, the welded joints shall show good penetration and fusion, without any defect exceeding the limits stated in the evaluation criteria of the nick break test.

1.5 Hardness Test

1.5.1 Preparation

The prepared macrosection is to be used for hardness testing using the Vickers method with 100 N (10 kg) load. Indentations are to be made along traverses each approximately 1mm below the surface at both side of the weld.

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In the weld metal a minimum of 6 indentations equally spaced along the traverses are to be made. The HAZ indentations are to be made along the traverses for approximately 0.5mm each into unaffected material, and starting as close to the fusion line as possible.

One indentation at each side of the weld along each traverse has to be made on parent metal. Reference is made to fig. 3 of this specification. The indentation are to be made in the adjacent region as well as on the opposite side of the macrosection along the specified traverses.

1.5.2 Method

The test shall be carried out in accordance with Recommendation ISO R81, Vickers hardness, using laboratory type machine controlled as per-recommendation of ISO R 146 and using a diamond pyramid penetrator set at 2.37 rad. (136) with a load of 100 N (10 kg).

1.5.3 Requirements

Hardness value shall not exceed 300 H VI0 . In case of a single reading slightly (+10 HV) higher than the specified limit, further indentations should be made to check if the high value was an isolated case.

All the hardness values obtained from the heat effected zone shall not exceed 100 HV with respect to the average hardness of the values obtained for the base metal.


If these additional tests mentioned above give a hardness within the specification limit, the slightly higher value may be accepted.

1.6 Charpy-V-notch Impact Test

1.6.1 Specimens shall be taken from the position indicated in Fig. 1 of this specification. The test specimens will be prepared in accordance with ISO R 148. Charpy V-notch specimens shall have dimensions as given in Fig. 3 of the specification.

Three test specimens shall be taken from each sample and they shall be cut and worked so that their length is transversal and perpendicular to the weld bead with the notch position as shown in Fig. 4 of this specification. The notch shall be perpendicular to the roller surface. The test specimens width shall depend upon the pipe wall nominal thickness as following :

Nominal wall thickness in mm	Test Specimens width in mm
> 12	12
> 9.5 and ≤ 12	7.5

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 ≥ 7 and ≤ 9.5

5

 < 7

2.5

1.6.2 Test Method

The test shall be carried out as indicated in ISO R 148 "Beam Impact Test V-notch.

Test pieces shall be immersed in a thermostatic bath and maintained at the test temperature for at least 15 minutes. They shall then be placed in the testing machine and broken within 5 seconds of their removal from the bath.

1.6.3 Requirements

The impact energy shall be greater or equal to :-

Test Specimens in mm	Average of Three specimens Joule (min) (Note-2)	Minimum Single Value Joules (Note 1)
10	27	22
7.5	21.5	17.5
5	18.5	15.0
2.5	10.0	8.0

Note:

1) Only one value is permitted to be lower than average upto the value specified.


1.7 Bend Test Requirements

The bend test specimens shall be made and tested as per the requirements of API-1104 sixteenth edition - May, 1983 except that the dimensions of Jig for guided bend test fig. 5 para 2.6 API-1104 shall be modified as follows :

Radius of the plunger	°A'	= 2 t
Radius of the die	°B'	= 3 t + 1.6mm
Width of the die	°C'	= 50.8

The acceptance criteria shall however be as per para 2.643 and 2.653 of API-1104 sixteenth edition - May, 1983.

Note t = Thickness of Specimen (nominal)

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ANNEXURE-3

1.0 **ULTRASONIC INSPECTION**

In addition to the radiographic inspection ultrasonic inspection is required as per conditions mentioned in **Annexure-1** of this specification.

This section concerns manual ultrasonic inspection. However ultrasonic inspection by automatic equipment may be used if approved by the COMPANY.

1.1 **Equipment and Operators**

The CONTRACTOR who carries out the ultrasonic inspection shall have sufficient qualified personnel, equipment and instrument at his disposal to be able to effect the tests without hindering or delaying the pipeline assembly operations.

- Calibrate the equipment;
- Perform an operational test under production conditions;
- Interpret the screen picture;
- Evaluate the size and location of reflectors
- Interpret the type of defects detected.

The COMPANY has the option of checking the ability of personnel employed for ultrasonic testing by means of qualification tests.

The CONTRACTOR appointed to carry out UT inspection shall supply the instruments necessary for their execution on site.


1.2 **Specification for Ultrasonic Testing Procedure**

Qualification

Before work begins the CONTRACTOR shall present a specification describing the proposed U.T. procedure qualification.

This specification shall be state, as an indication only but not limited to the following information :

- Type of U.T. equipment used
- Type and dimensions of transducers
- Frequency range
- Details for calibration
- Coupling medium
- Inspection technique
- Record details
- Reference to the welding procedure where it is intended to adopt the specification.
- Temperature range of the joints to be inspected.

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1.3 Qualification of Ultrasonic Inspection Procedure

The ultrasonic inspection procedure shall be approved by the COMPANY. Before inspection begins, the COMPANY may require the qualification test of the ultrasonic inspection procedure. This specification test consists in testing (under normal operating conditions) some CONTRACTOR welds made according to the same production procedure, when there are typical defects the test intends to detect.

1.4 Test Procedure

Circumferential weld shall be inspected from both sides using angled. Probes.

The surface with which the probe comes into contact shall be free of metal spatter, dirt, iron oxide and scales of any type: therefore it shall be necessary to clean a strip at least 50mm wide on both sides of the weld with steel - wire brushes and anyhow the cleaned strip must be atleast wide enough to allow full skip examination.

If during the test, echoes of doubtful origin appear, it shall be necessary to inspect a convenient area on the pipe surface, close to the weld, with a straight beam transducer in order to check whether any manufacturing defects are present which could have interfered with the ultrasonic beam.

By way of an example, the equipment shall include but not be limited to the following :


- Ultrasonic equipment and coupling medium
- Sample sections for calibration of instruments.
- Equipment for cleaning of surface to be examined.
- Rulers calibrated in centimeters for exact location of the position of defects.

The characteristics of the above-listed instruments and equipment shall guarantee:

- a) that the required standards of the inspection procedure, as previously established and approved by the COMPANY, are satisfied.
- b) continuous operation

All the instruments and equipment shall be approved by the COMPANY before being used. The COMPANY has the authority to reject any item which is considered unsuitable. The decision of the COMPANY is final. The CONTRACTOR appointed to carry out ultrasonic inspection shall also ensure the operational efficiency and maintenance of the instruments and equipment, and shall immediately substitute any item rejected by the COMPANY.

All the instrument and equipment necessary for carrying out ultrasonic inspection on site shall satisfy the requirements laid down by the public board of institutions which regulate "safety at work".

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1.5 Ultrasonic Instruments

The ultrasonic instruments :

- Shall be each pulse type, able to generate, receive and display, on the screen a cathode ray tube (CRT) pulse, at frequencies between 1 and 6 mhz. The useful part of the CRT screen shall be at least 70mm wide and at least 50mm high.
- Shall have various amplification, with steps of 1 or 2 dB over a range of a least 60 dB.
- The regulation control shall be accurate to within 1 dB and this accuracy shall be certified by the instrument manufacturer.
- May be powered by a battery or an electric generator. In the first case, the autonomy of operation (endurance) of the instrument shall be sufficient to carry on working without frequent interruptions, and the instrument shall be equipped with an automatic switch which switches it off when the battery runs down, in the second case, there must be a voltage stabilising device with a tolerance of 2 volts.

1.6 Probes

The probes used shall have dimensions, frequencies, and a refraction angle suited to the type of steel, the diameter the thickness of the pipeline and to the joint design.

1.7 Reference Sample Pieces


The efficiency of the equipment used, the effective refraction angle of the probe, and the beam output points, shall be checked using a V₁ and V₂ sample block, IIW type or the calibration block ASTM E-428.

For the calibration of runs and the regulation of detection sensitivity during the test, a calibration piece be used. This piece shall be taken from the production material, and will be at least 150mm long (measured in the direction of the axis), and at least 50mm wide (measured in the direction of the circumference), (see Fig. 4 of this specification).

In the middle of the inside and the outside surface of the calibration piece a groove shall be made. The groove will have a rectangular cross-section, a flat bottom and the following dimensions :-

- Depth : 1 +/- 0.1mm
- Breadth (measured parallel to the 150mm side) : 1 +/- 0.1mm
- Length (measured parallel to the 50mm side) not less than 30mm.

In addition, the calibration piece shall have a hole, 2mm in diameter, passing through its thickness and positioned so that during calibration the echoes returning from the two grooves do not interfere with those returning from the hole.

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1.8 Calibration

For a precise check of the sound paths necessary for a full inspection of the weld joint, the probe shall be moved (half skip and full skip distance) until internal and external notches on the test piece are detected (see Fig. 5 of this specification).

The relevant defect limits the path lengths on the time base. The calibration of reference sensitivity is obtained by utilising the through drilled test hole in the thickness of the reference block to draw the distance amplitude correction curve relevant to the test probe.

Calibration shall be carried out according to the following procedure : place its internal vertex until the maximum height of echo is displayed on the screen; this echo is adjusted to 80% of full screen height by means of the sensitivity adjuster set in dB. Without varying the amplification, the probe placed at full skip distance from the hole is moved to detect the external vertex the hole until the maximum height of echo is obtained. The straight line connecting the peaks of the two echoes obtained by the above procedure, represents the 100% reference level, while the one connecting the two points at half height of the same echoes represents "50% reference level".

The two straight lines shall be marked on the screen with a pen. Calibration shall be repeated each time tests are re-started at intervals not longer than 30 minutes during normal operations; each time the conditions fixed in advance are altered. This calibration is applicable provided that the crystal of the probe is 8 x 9mm size. Should this size of the crystal be different, the value of the sensitivity obtained from the calibration by a crystal of a different size shall be brought to the value of sensitivity obtained from the calibration by a 8 x 9mm crystal. The sensitivities of the two different size probes shall be compared through the echoes obtained on the notch of the test piece with the probe position at half skip of the distance.

1.9 Regulation of Amplification during Production Testing


The amplification during production testing shall be obtained by adding 2-6 dB (according to the surface condition of the pipe and its cleanness) to the reference amplification.

1.10 Qualification of Ultrasonic Testing Operators

Before the inspection begins or during the same inspection, the COMPANY may require a qualification test for the ultrasonic equipment operators.

1.11 Evaluation of Indications given by Ultrasonic Tests

Each time that echoes from the weld bead appear during production testing, the instrument amplification shall be altered to coincide with the reference amplifications and the probe shall be moved until maximum respond is obtained paying attention all the time to the probetube coupling.

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If, under these conditions, the height of the defer echo is equal to or greater than that of the reference echo, the defect shall be evaluated. If the defect has also been detected by the radiographic and or visual examination, the dimensions shall be judged according to the type of examination which detects the greater defects. Returns which are less than 50% of the reference echo, will not be considered. It returns are above 50% but lower than 100% of the reference echo, and if the operator has good reasons to suspect that the returns are caused by unfavorably oriented cracks, he shall inform the COMPANY. Moreover, when there is a defect to be repaired such defect shall be removed for a length corresponding to the one where no more return echo is given.

1.12

Other Equipment

The use of rules calibrated in centimeters, attached if possible to the probe, for the precise location of the position of welding defects, it recommended. Defect location is effected by measuring the projection distance between the probe output and the reflecting surface.

The operators carrying out the tests shall have besides the probing instrument, tools for cleaning the pipe surface (files, brushes, etc.) as well as the coupling liquid or paste appropriate for the temperature of the section to be examined.

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ANNEXURE-4

RADIOGRAPHY

1.0 **SCOPE**

This annexure covers the radiographic inspection of all types of welded joints of the main pipeline. The welded joints shall include the following :

- i) Full girth welds on the mainline construction including double jointing of pipe, if adopted.
- ii) Welds for installation of block valves, insulating joints and other appurtenances and tie-ins.
- iii) Welds at scraper launching and receiving barrels
- iv) Terminal Piping.

2.0 **APPLICABLE STANDARDS**

This specification shall apply in conjunction with the following (all latest edition) :


- i) API 1104, Standard for welding pipelines and related facilities.
- ii) ANSI B31.8, code for Gas Transmission and Distribution Piping Systems.
- iii) ANSI B31.4, Code for Liquid Petroleum Transportation Piping System.
- iv) ASTM E94, Recommended practice for Radiographic Testing.
- v) ASTM, E 142, Standard Method for Controlling Quality of Radiographic Testing.
- vi) The American Society for non-destructive Testing. Recommended Practice No. SNT-TC-1A Supplement-A.

3.0 **PROCEDURE**

3.1 The radiographic examination procedure to be adopted shall be submitted by the CONTRACTOR as per **Exhibit-F**.


3.2 The procedure of radiographic examination shall be qualified to the entire satisfaction of COMPANY prior to use. It shall include but not be limited to the following requirements.

- i) Lead foil intensifying screens, at the rear of the film shall be used in all exposures.

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- ii) Type 2 and 3 films as per ASTM E-94 shall be used.
- iii) A densitometer shall be used to determine film density. The transmitted film density shall be 2.0 and 3.5 through out the weld. The unexposed base density of the film shall not exceed 0.30.
- iv) Radiographic identification system and documentation for radiographic interpretation reports and their recording system.

- 3.3 The CONTRACTOR shall qualify each procedure in the presence of the COMPANY prior to use.
- 3.4 The procedure of radiographic examination shall produce radiographs of sufficient density, clarity and contrast so that defects in the weld or in the pipe adjacent to the weld, and the outline and holes of the pentrameter are clearly discernible.
- 3.5 All the girth welds of mainline shall be subjected to 100% radiographic examination. The CONTRACTOR shall furnish all the radiographs to the COMPANY, immediately after processing them, together with the corresponding interpretation reports on approved format. The details of the radiographs alongwith the joint identification number shall be duly entered in a register and signed by the CONTRACTOR and submitted to the COMPANY for approval.
- 3.6 When the radiation source and the film are both on the outside of the weld and located diametrically opposite each other, the maximum acceptable length of film for each exposure shall not exceed the values given in Table 4 of API 1104. The minimum film overlap, in such cases, shall be 40mm. The ellipse exposure technique may be used on nominal pipe sizes of 2 inch and smaller provided that the source to film distance used is a minimum of 12 inches.
- 3.7 Three copies of each acceptable radiographic procedure (as outlined in Specification no. MEC/S/05/62/02) and three copies of radiographic qualification records, shall be supplied to COMPANY. One set of the qualifying radiographs on the job shall be kept by the CONTRACTOR's authorised representative to be used as a standard for the quality of production radiographs during the job. The other two sets shall be retained by COMPANY for its permanent record.
- 3.8 Three copies of the exposure charts relating to material thickness, kilo voltage, source to film distance and exposure time shall also be made available to aCOMPANY by the CONTRACTOR.
- 3.9 The CONTRACTOR shall, on a daily basis, record for each radiograph (1) radiography number (2) approximate chainage of weld location, (3) whether or not the welds meet the specified acceptance standards and (4) the nature and approximate location of unacceptable defects observed. It must be possible to relate to a particular butt weld and welder on piping drawing and pipeline alignment drawing.

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3.10 Each day's production of processed radiographs shall be properly packaged separately, identified by at least the (1) date, (2) radiographic unit, (3) job locations, (4) starting and ending progress survey stations and (5) shall include original and three copies of the daily radiographic record. The package shall be submitted to the COMPANY daily when possible, but in no event later than noon of the following day.

3.11 The CONTRACTOR shall provide all the necessary facilities at site, such as a dark room with controlled temperature, film viewer etc. to enable the COMPANY to examine the radiographs.

3.12 The CONTRACTOR, if found necessary, may modify the procedure of radiographic examination suiting the local conditions prevailing. This shall, however, be subject to the approval of the COMPANY.

3.13 COMPANY shall have free access to all the CONTRACTOR's work facilities in the field.

3.14 Any approval granted by the COMPANY shall not relieve the CONTRACTOR of his responsibilities and guarantees.

4.0 **RADIATION SOURCE**

4.1 Radiographic examination shall be carried out using x-radiations. Radiographic examination by Gamma rays may be allowed, at the discretion of the COMPANY, in case of inaccessible joints.

4.2 Whenever possible, pipeline welds will be inspected by placing the radiation source inside the pipe, on the pipeline axis, with a radiation of 6.28 rad. (360°).


If it is impossible to place the radiation source inside the pipe, the weld will be inspected with the source on the outside. An overlap of at least 40mm at the ends of each film shall be required to ensure that the first and last location increment numbers are common to successive films and to establish that no part of a weld has been omitted.

5.0 **LEVEL OF QUALITY**

The quality level of radiographic sensitivity required for radiographic inspection shall be at least equivalent to the values in Figure-6.

6.0 **PENETRIMETERS**

6.1 The image quality indicator (abbreviation : IQI) shall be used for the qualification of the welding procedure and during normal line production. Radiographic sensitivity shall be measured with the wire image quality indicator (Penetrameter). The penetrameter shall be selected according to DIN 54109 or ISO 1027. For radiographs made with the source on the outside, a penetrameter shall be placed on each side of the film with the smaller wire of the penetrameter turned towards the end of the film itself. When a complete weld is radiographed in a single exposure using a source inside the piping,

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four penetrameters approximately equally spaced around the circumference shall be used. During the procedure qualification, IQI shall be placed both on the source side and on the film side. The sensitivity obtained with IQI on the source side shall not be less than the values shown in Fig. 6 of this specification.

The sensitivity limit may be considered to have been reached when the outline of the IQI, its identification number and the wire of the required diameter show up clearly on the radiographs.

The COMPANY may authorise use of types of IQI other than those planned, provided that they conform with recognised standards and only if the CONTRACTOR is able to demonstrate that the minimum sensitivity level required is obtained. For this demonstration, a test shall be carried out comparing the IQI specified and the CONTRACTOR's to show up the identification number and other details of the proposed IQI, which must be visible in the test radiograph.

7.0 **FILM IDENTIFICATION MARKERS**

All films shall be clearly identified by lead numbers, letters, and/ or markers. The image of the markers shall appear on the films, without interfering with the interpretation. These markers positions shall also be marked on the part to be radiographed and shall be maintained during radiography.

8.0 **PROTECTION AND CARE OF FILM**

8.1 All unexposed films shall protected and stored properly as per the requirements of API 1104 standard and ASTM E 94.

8.2 The exposed and unexposed film shall be protected from heat, light, dust and moisture. Sufficient shielding shall be supplied to prevent exposure of film to damaging radiation prior to and following the use of the film for radiographic exposure.


9.0 **RE-RADIOGRAPHY**

9.1 The weld joints shall be re-radiographed in case of unsatisfactory quality of the radiographs, at the expense of the CONTRACTOR.

9.2 All the repaired weld joints shall be re-radiographed at no extra cost to the COMPANY in the same manner as that followed for the original welds. In addition, the repaired weld area shall be identified with the original identification number plus the letter 'R' to indicate the repair.

9.3 When evaluating repair film, radiographers shall compare each section (exposure) of the weld with the original film to assure repair was correctly marked and original defect removed.

9.4 The COMPANY will review prior to any repair of welds, all the radiographs of welds which contain, according to the CONTRACTOR's interpretation, unacceptable defects.

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The final disposition of all unacceptable welds shall be decided by the COMPANY.

10.0 **QUALIFICATION OF RADIOGRAPHERS**

10.1 Pipeline radiographers shall be qualified in according with the requirement of API 1104 and to the full satisfaction of COMPANY.

10.2 Certification of all the radiographers, qualified as per 10.1 above, shall be furnished by the CONTRACTOR to the COMPANY before a radiographer will be permitted to perform production radiography. The certificate record shall include :

- i) Background and experience record
- ii) Training course record
- iii) Technical examination record
- iv) Doctor's report on radiographer's Oaecuer 0-1 acquity eye test.
- v) Date of qualification.

10.3 The radiographers shall be required to qualify with each radiographic procedure they use, prior to performing the work assigned to him in accordance with the specification.

11.0 **PRESERVATION OF RADIOGRAPHS**

11.1 The radiographs shall be processed to allow storage of films without any discoloration for at least three years. All the radiographers shall be presented in suitable folders for preservation alongwith necessary documentation.

11.2 All radiographs shall become property of the COMPANY.

12.0 **EQUIPMENT AND ACCESSORIES**


12.1 CONTRACTOR shall make necessary arrangement at his own expense, for providing the radiographic equipment, radiographic films and the accessories for carrying out the radiographic examination for satisfactory and timely completion of the job.

12.2 For carrying out the mainline radiographic examination the CONTRACTOR shall be equipped with suitable mobile/ stationary type with rooms. These shall have all the required facilities for film processing. Film viewer used shall be equipped with the film illuminator that has a light source of sufficient intensity and can be suitably controlled to allow viewing film densities upto 4.0 without damaging the film.

13.0 **RADIATION PROTECTION**

13.1 CONTRACTOR shall be responsible for the protection and personal monitoring of every man with or near radiation sources.

13.2 The protection and monitoring shall comply with local regulations.

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13.3 In view of visual hazards in the handling of radioactive source of material, CONTRACTOR shall be solely responsible for complying with all rules and regulations set forth by Atomic Energy Commission or any other Government agencies of India in this regard and COMPANY shall not be responsible and shall be kept indemnified by the CONTRACTOR for default(s) of whatever nature by the Contractor. Safety equipment as considered adequate by the COMPANY for all necessary personnel shall be made available for use and maintained for immediate and proper use by the CONTRACTOR.

14.0 **DISPLAY OF SAFETY INSTRUCTIONS**

14.1 The safety provisions shall be brought to the notice of all concerned by display on a notice board at prominent place at the work spot. The person responsible for the "safety" shall be named by the CONTRACTOR.

15.0 **ENFORCEMENT FOR SAFETY REGULATIONS**

15.1 To ensure effective enforcement of the rules and regulations relating to safety precautions, the arrangement made by the CONTRACTOR shall be open to inspection by COMPANY or its representatives.

16.0 **FIRST AID INDUSTRIAL INJURIES**

16.1 CONTRACTOR shall maintain first aid facilities for its employees and those of its sub-contractors.

16.2 CONTRACTOR shall make outside arrangements for ambulance service and for treatment of industrial injuries. Names of those providing these services shall be furnished to COMPANY prior to start of work and their telephone no. shall be posted prominently in CONTRACTOR's field office.

16.3 All critical industrial injuries shall be reported promptly to the COMPANY and a copy of CONTRACTOR's report covering each personal injury requiring the attention of physician shall be furnished to the COMPANY.

17.0 **NO EXEMPTION**

17.1 Notwithstanding the above there is nothing in these clauses to exempt the CONTRACTOR from the operation of any other act or rules in force.

Rev. : 0


Edition : 1

**SPECIFICATION
FOR
VENTS, DRAINS AND WELLS**

SPECIFICATION NO.: MEC/S/05/21/15



**(OIL & GAS SBU)
MECON LIMITED
DELHI 110 092**

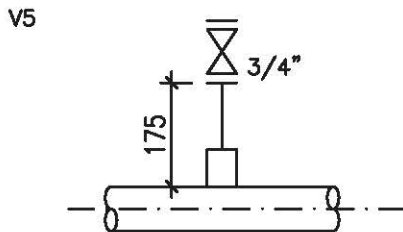
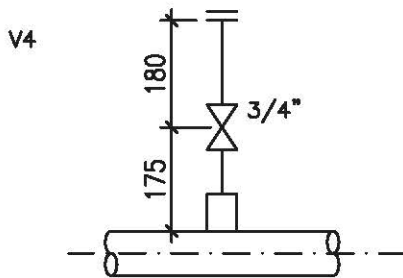
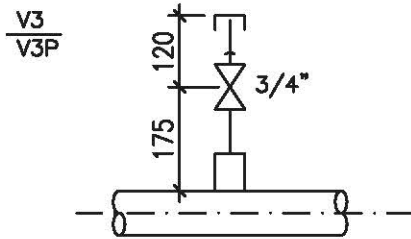
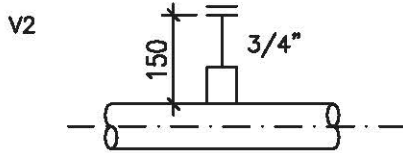
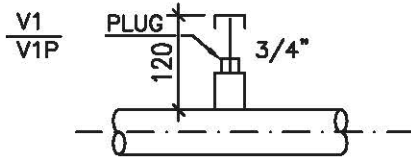
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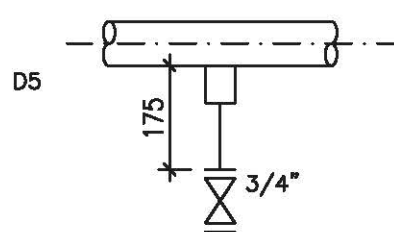
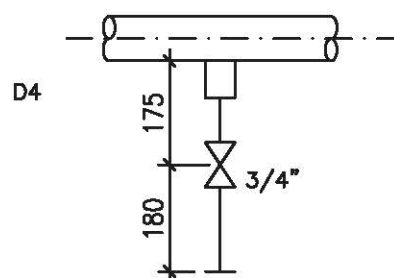
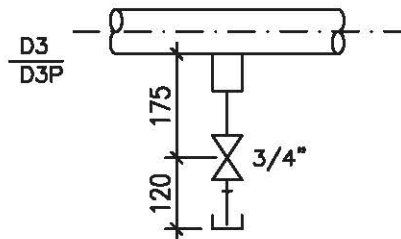
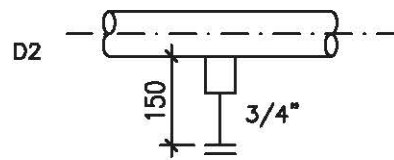
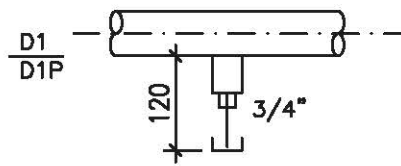
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5.	Pressure Tapping	MEC/SD/05/21/15/05

PREPARED BY: (Binita Brahma)	CHECKED BY: (Sunil Kumar)	APPROVED BY: (A.K. Johri)	ISSUE DATE : Feb. 2009
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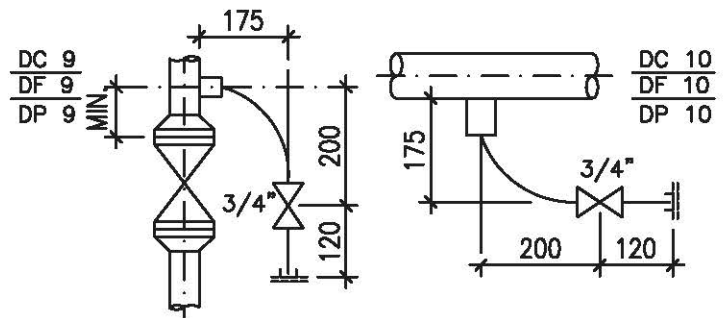


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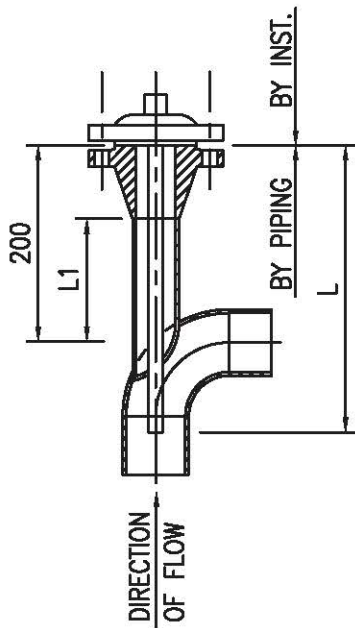


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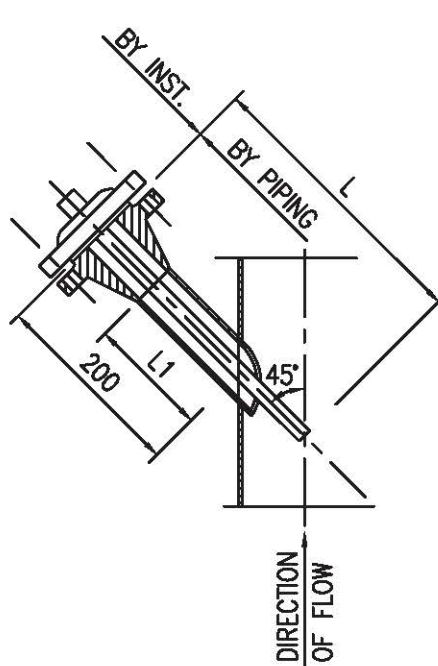
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- VENTS & DRAINS SHALL BE PROVIDED WITH GATE, GLOBE OR PLUG VALVE WITH HALF COUPLING OR STUB IN WITH CAP OR FLANGE, BLIND FLANGE, AS PER PIPING SPECIFICATIONS.
- VENTS/DRAINS CAN BE PROVIDED ON FLAT SIDE OF ECCENTRIC REDUCERS ON SIZES 4" & ABOVE.
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- PLUGGED END OF VALVE OR FITTING SHALL BE THREADED.



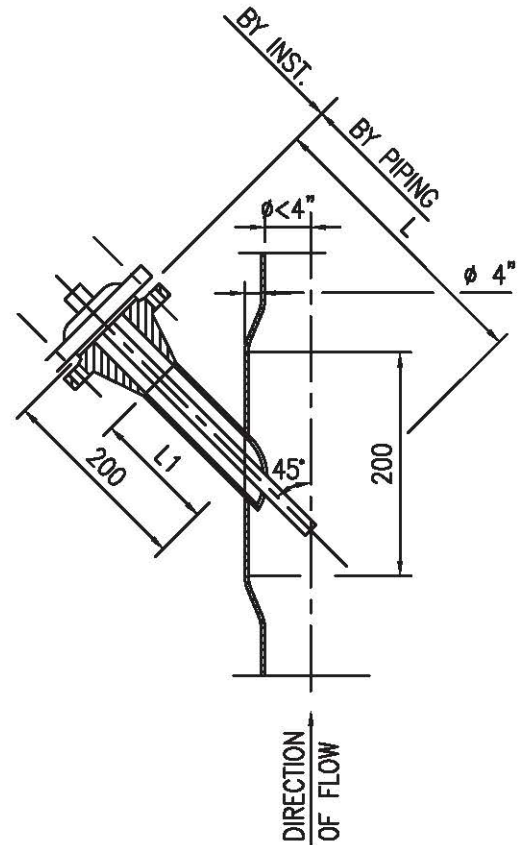
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DRWN								DRG.NO MEC/SD/05/21/15/01	
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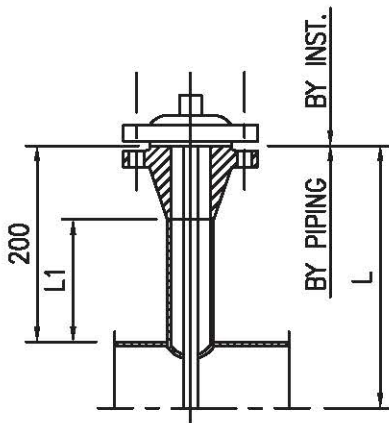
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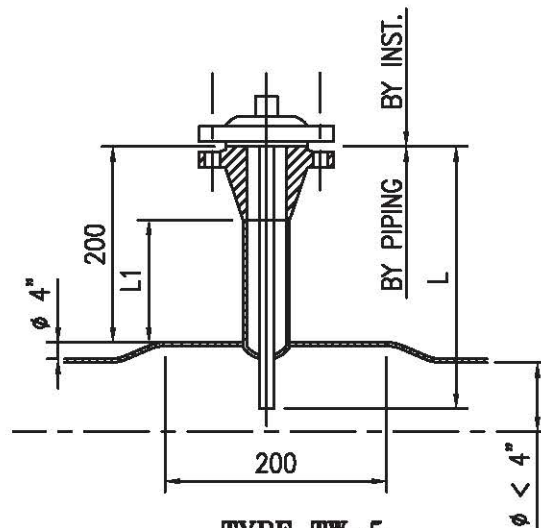
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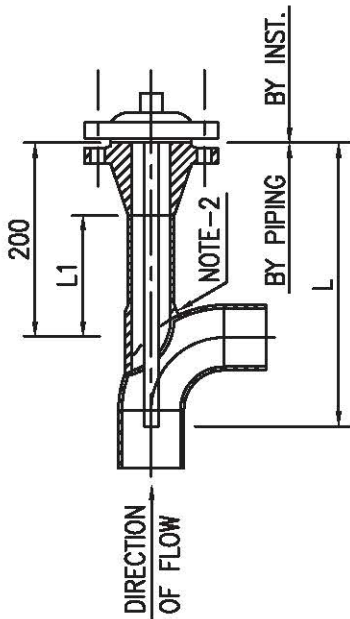
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6"	300
8"	300
10"	300
12"	300
14"	300
16"	400
18"	400
20" & LARGER	500
VESSELS	AS REQUIRED

1. ELBOW MIN. 4" ϕ OR LARGER
2. VERTICAL LINE 4" ϕ OR LARGER
3. HORIZONTAL LINE 4" ϕ OR LARGER
4. VERTICAL LINE DIA LESS THAN 4"
5. HORIZONTAL LINE DIA LESS THAN 4"

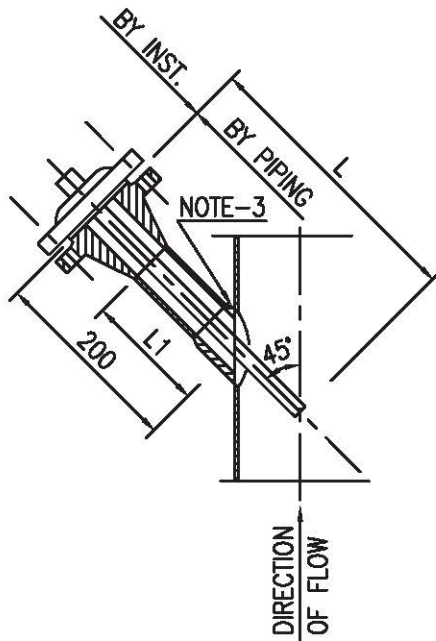
NOTES:

1. BOLTS, NUTS AND GASCKETS BY PIPING.
2. MIN. CLEARANCE FOR REMOVAL L+550
3. L1 DIMENSIONS ARE CALCULATED FOR WN, RF FLG. ONLY.
4. IN CASE ANY DEVIATION IS REQUIRED FOR INSTALATION TAPS FROM THIS STD. INST. DEPTT. TO BE CONSULTED.

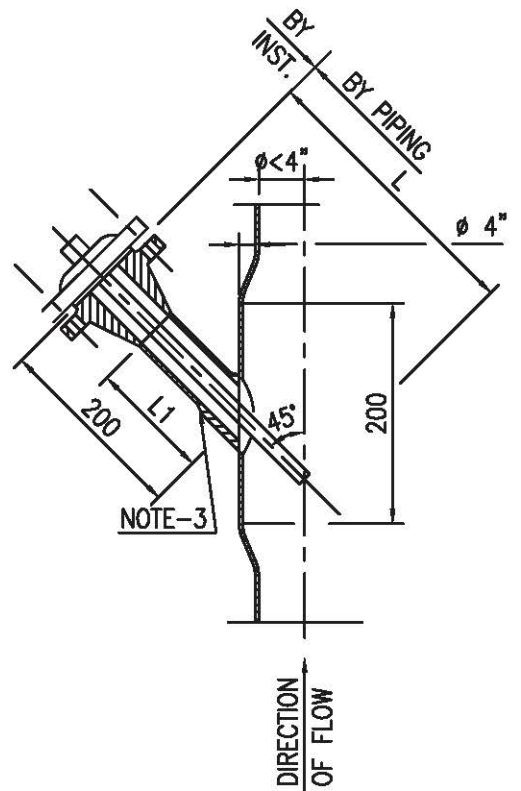
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APPROVED									



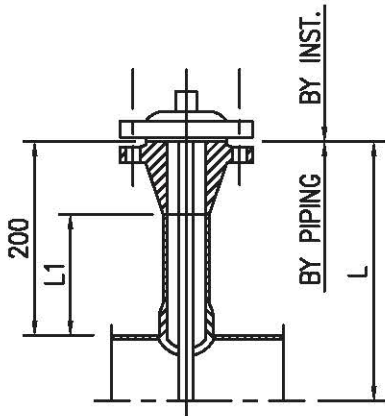
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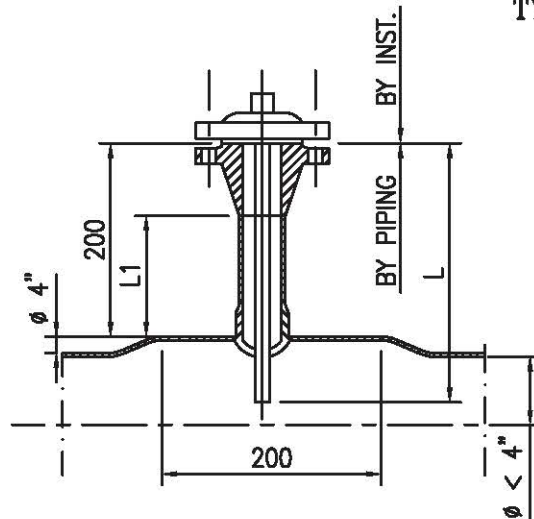
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TYPE TW-9



TYPE TW-8



TYPE TW-10

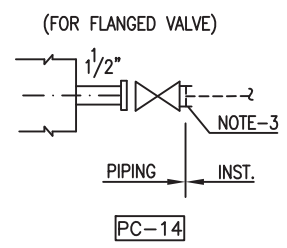
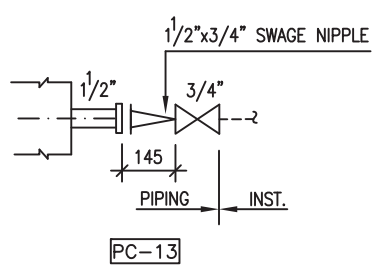
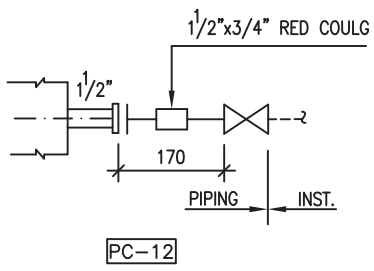
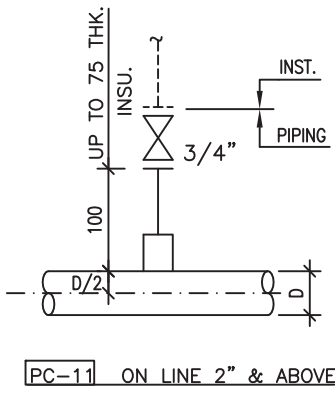
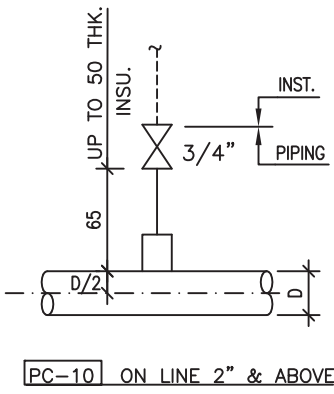
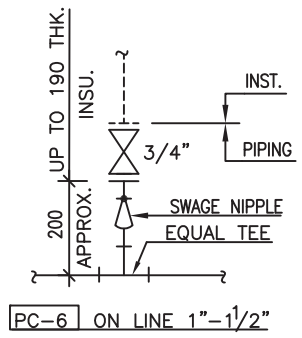
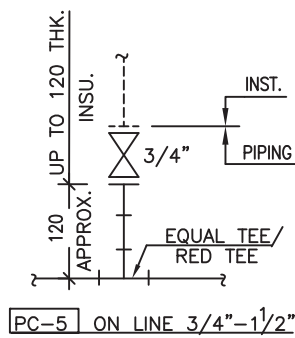
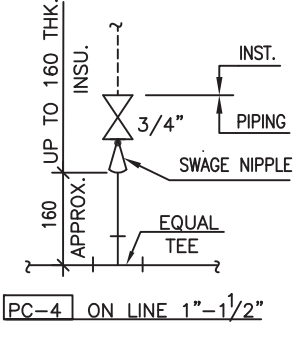
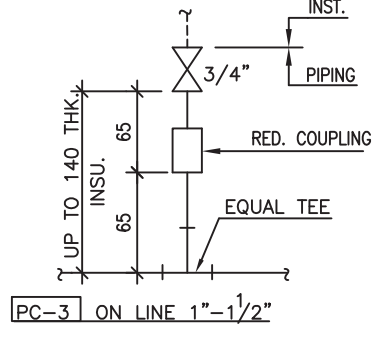
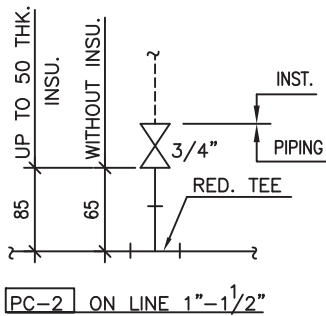
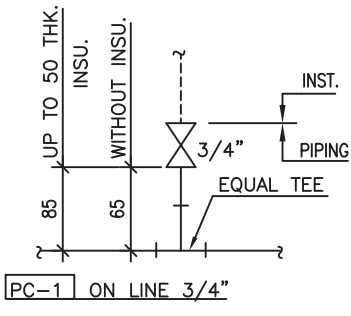
LINE DIA	L 1.5" FLANGED WELD
4"	200
6"	300
8"	300
10"	300
12"	300
14"	300
16"	400
18"	400
20" & LARGER	500
VESSELS	AS REQUIRED

- 6. ELBOW MIN. 4" ϕ OR LARGER
- 7. VERTICAL LINE 4" ϕ OR LARGER
- 8. HORIZONTAL LINE 4" ϕ OR LARGER
- 9. VERTICAL LINE DIA LESS THAN 4"
- 10. HORIZONTAL LINE DIA LESS THAN 4"

NOTES:

- 1. BOLTS, NUTS AND GASCKETS BY PIPING.
- 2. MIN. CLEARANCE FOR REMOVAL L+350.
- 3. COUPLING TO BE SPECIAL LENGTH.

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NCL
<p>SECTION: P&PD</p> <p>WELLS INSTALLATION</p> <p>1 1/2" DIA TAPS</p> <p>MECON LIMITED</p> <p>SCALE : N.T.S.</p> <p>DRG.NO MEC/SD/05/21/15/02 (SH. 2 OF 2)</p> <p>REV 0</p>							
DSGN							
DRWN							
APPROVED							



PC-15 WITH 2" VALVE

ON VESSELS/ COLUMNS

NOTES:-

1. THE INDICATED DIMENSIONS ARE IN MINIMUM WHICH ALSO COVER INSULATION TO THE EXTENT SHOWN ABOVE. IN HIGHER THICKNESS OF INSULATION THAN INDICATED, THE DIFFERENCE SHALL BE ADDED IN THE DIMENSIONS SHOWN ABOVE ACCORDINGLY.
2. PRESSURE TAPPING SHALL BE PROVIDED WITH GATE, GLOBE OR PLUG VALVE WITH TEE, HALF COUPLING OR STUB-IN, AS PER PIPING SPECIFICATION.
3. IN CASE OF FLGD. VALVES BOLTING & GASKET ON BOTH SIDES OF VALVE SHALL BE IN PIPING SCOPE.
4. IN CASE OF TAPPINGS PROVIDED OTHER THAN INDICATED IN THIS STD FOR LAYOUT REASONS DETAILED DIMENSIONS WILL BE CALLED OUT.

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	REFERENCES	DRG. NO.
SECTION: P&PD			REVISIONS		REFERENCES		DRG. NO.
DSGN							
DRWN							
APPROVED			PRESSURE TAPPING		MECON LIMITED		
SCALE : N.T.S.						REV 0	
DRG.NO MEC/ SD/05/21/15/05							

Rev. : 0


Edition : 1

**SPECIFICATION
FOR
FLUSHING AND TESTING OF
PIPING SYSTEMS**

SPECIFICATION NO.: MEC/S/05/21/11




**(OIL & GAS SBU)
MECON LIMITED
DELHI 110 092**

MECON LIMITED REGD. OFF: RANCHI 834002	STANDARD TECHNICAL SPECIFICATION		
	OIL & GAS SBU, DELHI		
TITLE	FLUSHING AND TESTING OF PIPING SYSTEMS	DOCUMENT NO. MEC/S/05/21/11	Page 1 of 1
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5.1	EXTENT OF TESTING
5.2	GENERAL REQUIREMENT/TEST PREPARATION FOR TESTING
5.3	TESTING MEDIA, TEST PRESSURE AND TEST PRESSURE GAUGES.
5.4	TESTING PROCEDURE
5.5	COMPLETION OF TESTING
5.6	TEST RECORDS

PREPARED BY: (Shalini Singh)	CHECKED BY: (Sunil Kumar)	APPROVED BY: (A.K. Johri)	ISSUE DATE : Dec. 2008
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1.0 SCOPE

This specification covers the general requirements for Inspection, flushing and testing of piping systems. However testing of steam lines falling under IBR shall also be governed by Indian Boiler Regulations.

Flushing and testing of all piping system shall be witnessed by the Consultant Representative / Engineer-in- Charge.

2.0 REFERENCE

ASME B31.3-2004 : Process Piping

IBR : Indian Boiler Regulations

3.0 INSPECTION

During various stage and after completion fabrication and erection, the piping system shall be inspected by the Consultant Representative / Engineer- in - Charge to ensure that :

- Proper piping material has been used.
- Piping has been erected as per drawings and the instruction of the engineer- in charge.
- All supports have been installed correctly.
- Test preparations mentioned in this specification have been carried out.


4.0 FLUSHING

Flushing of all lines shall be done before pressure testing.

Flushing shall be done by 'fresh potable water' or 'dry compressed air, wherever water flushing is not desirable' to clean the pipe of all dirt, debris or loose foreign materials.

Required pressure of water, flushing shall meet the fire hydrant pressure or utility water pressure. For air flushing the line, system will be pressurised by compressed air at the required pressure which shall be 50 psi maximum. The pressure shall then be released by quick opening of a valve, already in the line for this purpose. This procedure shall be repeated as many times as required till the inside of the pipe is fully cleaned.

In line instruments like control valves, orifice plates, rotameters, safety valves and other instruments like thermowells which may interfere with flushing shall not be included in the flushing circuit.

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From all permanent strainers the screens/meshes shall be removed before flushing. Screens/meshes shall be re- installed after flushing but before testing.

During flushing temporary strainers shall be retained. These shall be removed, cleaned and reinstalled after flushing, but, before testing.

In case an equipment such as column, vessel, exchanger etc. forms part of a piping circuit during flushing, this shall be done with the approval of Engineer- in - Charge. However equipment thus included in the circuit, shall be completely cleaned and dried with compressed air, after flushing is completed.

During flushing discharged water/air shall be drained at the place directed the Engineer- in - Charge. If necessary, proper temporary drainage shall be provided by the contractor.

Care shall be taken during flushing so as not to damage/spoil work of other agencies. Precautions shall also be taken to prevent entry of water/foreign matter into equipment, electric motors, instruments, electrical installations etc. in the vicinity of lines being flushed.

The contractor shall carry out all the activities required before, during and after the flushing operation, arising because of flushing requirements, such as but not limited to the following.

Dropping of valves, specials, distance pieces, online instruments and any other piping part before flushing. The flanges to be disengaged for this purpose shall be envisaged by the contractor and approved by the Engineer-in-Charge. These flanges shall be provided with temporary gaskets at the time of flushing.


After flushing is completed and approved, the valve, distance pieces, piping specials etc. shall be re-installed by the contractor with permanent gaskets. However, flanges of equipment nozzles and other places where isolation is required during testing, only temporary gaskets shall be provided.

Records in triplicate shall be prepared and submitted by the Contractor for each piping system for the flushing done in the proforma provided / approved by EIC.

5.0

TESTING

Pressure testing, in general shall be as per clause 345 of ASME B31.3, unless otherwise specified, herein. Lines carrying highly hazardous / poisonous fluids must have a sensitive leak test. For IBR lines, 'IBR Regulations' shall also be followed.

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5.1 Extent of testing

With the exclusion of instrumentation. piping system fabricated or assembled in the field shall be tested irrespective of whether or not they have been pressure tested prior to site welding of fabrication.

To facilitate the testing of piping systems, vessels and other equipments may be included in the system with the prior approval of Engineer-in-charge, if the test pressure specified is equal to or less than that for the vessels and other equipments.

Pumps, compressors and other votary equipments shall not be subjected to field test pressures.

Lines which are directly open to atmosphere such as vents, drains, safety valves, discharge need not be tested, but all joints shall be visually inspected wherever necessary such lines shall be tested by continuous flow of fluid to eliminate the possibility of blockage. However, such lines if provided with block valve shall be pressure tested upto the first block valve.

Seats of all vales shall not be subjected to a pressure in excess of the maximum cold welding pressure of the valve. Test pressure applied to vales shall not be grater than the manufacturer is recommendation nor less than that required by the applicable code. Where desirable set pressure is less than test pressure, test shall be made through an open valve.


Instruments in the system to be tested, shall be excluded from the test by isolation or removal, unless approved otherwise by the Engineer-in-charge. Restrictions which interfere with filling, venting and drawing such as orifice plates etc. shall not be installed unless testing is complete.

Control valves shall not be included in the test system. Where by-passes are provided test shall be performed through the by-pass end/or necessary spool shall be used in place of the control valve.

Pressure gauges which are part of the finished system, but cannot withstand test pressure shall not be installed until the system has been tested. Where piping systems to be tested are directly connected at the battery limits to piping for which the responsibility tests with other agencies, the piping to be tested shall be isolated from such piping by physical disconnection such as valves or blinds.

5.2 General Requirement/Test preparation for Testing

Test shall be carried out with permanent gaskets installed unless specified otherwise or instructed by the Engineer-in- charge.

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No pressure test shall be carried out against close valve unless approved by the Engineer-in-charge.

The Engineer-in-charge shall be notified in advance by the contractor, of the testing sequence and programme, to enable him to be present for witnessing the test. The contractor shall be fully responsible for making arrangements with the local boiler inspector to witness the tests for steam lines falling under IBR. IBR certificates for these tests shall be obtained in the relevant IBR forms and furnished to the Engineer-in-charge. Before testing, all piping shall be cleaned by flushing to make it free from dist loose scale, debris and other loose foreign materials.

All piping systems to be hydrostatically tested shall be vented at the high points and the systems purged of air before the test pressure is applied.

Wherever in the line any void is existing due to any reasons, for absence of control valve, safety valve, check valves etc. it shall be filled with temporary spools.

All joints welded, screwed or flanged shall be left exposed for examination during the test. Before pressuring the lines, each weld joint shall be cleaned by wire brush to free it from rust and any other foreign matter.


Where a system is to be isolated of a pair of companion flanges, a blank shall be inserted between the companion flanges. Minimum thickness of the blank shall be designed in accordance with applicable design code.

Open ends of piping system where blanks cannot be used, such as pumps, compressors, turbines or wherever equipment or pipe spool have been received or disconnected prior to hydrostatic testing, shall be blinded – off by using standard blind flanges of same rating as the piping system being tested.

Pressure gauges used in testing shall be installed as close as possible to the lowest point in the piping system to be tested, to avoid overstressing of any of the lower portion of the system. For longer lines and vertical lines, two or more pressure gauges shall be installed at locations selected by the Engineer-in-charge. For lines containing check valves any of the following alternatives shall be adopted for pressure testing. Wherever possible pressurise up-stream side of valve.

Replace the valve by a temporary spool and re-install the valve after testing.

Provide blind on valve flanges and test the upstream and downstream of the line separately and remove the blind after testing. All these flanges, temporary gaskets shall be provided during testing and shall be replaced by permanent gaskets subsequently. For check valves in lines 1-1/2" and below, flapper or seat shall be

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removed during testing (if possible). After completion of testing the flopper/ seat shall be refitted.

Gas lines when hydrostatically tested shall be provided with additional temporary supports during testing as directed by Engineer-in-charge.

Piping which is spring or counter – weight supported shall be temporarily supported, where the weight of the fluid would overload the support. Retaining pins for spring supports shall be removed only after testing is completed and test fluid is completely drained.

When testing any piping system, air or steam of approximately 2 kg/cm² (g) may be used as preliminary test to detect missing gaskets etc. as this avoids the necessity of purging the gas to make repairs. However, this method may not be used for this purpose, if the steam temperature is more than the design temp. of the line.

For jacketed pipes testing of core pipes shall be done on individual pieces where the pipe is continuously packed, before it is jacketed. The outer jacket shall be tested separately as a system for piping with discontinuous jacketing, the core pipe and the jacket shall be tested as separate system.


5.3 Testing Modes, Test pressure and Test Pressure Gauges

5.3.1 Testing Modes

In general all pressure test shall be hydrostatic using iron free water, which is clean and free of silt. Maximum chlorine content in water for hydrostatic testing for MS piping shall be 15-20 ppm. Air shall be used for testing only if water would cause corrosion of the system or overloading of supports etc. in special cases as directed by Engineer-in-charge.

If operating fluid in the line is much lighter than testing fluid, the additional weight of testing fluid may render piping supports (as designed) inadequate. This will call for additional temporary supports. The typical examples are flare and vapor lines. It is preferable that hydrostatic testing is avoided in such systems and instead pneumatic testing may be specified.

Where air/water tests are undesirable substitute fluid such as gas, oil, methanol etc. shall be used as the testing medium, with due consideration to the hazards involved. These test fluids shall be specified in the line list given to the contractor.

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5.3.2 Test Pressure

The hydrostatic/pneumatic test pressure shall be as indicated in the line list or as per the instruction of Engineer-in-charge.

The selection of the piping system for one individual test shall be based on the following :-

Test pressure required as per line list.

Maximum allowable pressure for the material of construction of piping depending upon the above requirements and based on construction progress, maximum length of piping shall be included in each test.

5.3.3 Test Pressure Gauge

All gauge used for field testing shall have suitable range so that the test pressure of the various system falls in 35% to 65% of gauge scale range. Pressure gage shall be minimum of 150 mm. Size of Bourdon shall not be less than 75% of nominal diameter of dial range. Gauge shall be of a good quality and in first class working condition.

Prior to the start of any test or periodically during the field test programmes, all test gauges shall be calibrated using a standard dead weight gauge tester or other suitable approved testing apparatus. Any gauge having an incorrect zero reading or error of more than $\pm 2\%$ of full scale range shall be discarded. The Engineer-in-charge shall check the accuracy of master pressure gauge used for calibration.


5.4 Testing Pressure

5.4.1 Hydrostatic Test

All vents and other connections used as vents shall be kept open while filling the line with test fluid for complete removal of air. For pressurising and depressurising the system, temporary isolating valves shall be provided if valves, vents, drains do not exist in the system.

Pressure shall be applied only after the system/line is ready and approved by the Engineer-in-charge.

Pressure shall be applied by means of a suitable test pump or other pressure source which shall be isolated from the system as the desired test pressure is reached and stabilised in the system.

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A pressure gauge shall be provided at the pump discharge for guiding the system to the required pressure.

The pump shall be attended constantly during the test by an authorised person. The pump shall be isolated from the system wherever the pump is to be left unattended.

Test pressure shall be maintained for a sufficient length of time to permit through inspection of all joints for leakage or signs of failure. Any joint found leaking during a pressure test, shall be re-tested to the specified pressure after repair. Test period shall be maintained for a minimum of four hours.

The pump and the piping system to be tested are to be provided with separate pressure indicating test gauges. These gauges are to be checked by the standard test gauge before each pressure test.

Care shall be taken to avoid increase in the pressure due to atmospheric variation during the test.

5.4.2 Air Test

When testing with air, pressure shall be supplied by means of a compressor. The compressor shall be portable type with a receiver after cooler & oil separator.

Piping to be tested by air shall have joints covered with a soap and water solution so that the joints can be examined for leaks.


All other activities shall be same as per hydrotesting procedure (specified above).

5.5 Completion of Testing

After the hydrostatic test has been completed, pressure shall be released in a manner and at a rate so as not to endanger personnel or damage equipments.

All vents and drains shall be opened before the system is to be drained and shall remain open till all draining is complete, so as to prevent formation of vacuum in the system. After draining lines/systems shall be dried by air.

After testing is completed the test blinds shall be removed and equipment/piping isolated during testing shall be connected using the specified gaskets, bolts and nuts. These connections shall be checked for tightness in subsequent pneumatic tests to be carried out by the contractor for complete loop/circuit including equipments (except rotary equipments).

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Pressure tests shall be considered complete only after approved by the Engineer-in-charge. Defects, if any, noticed during testing shall be rectified immediately and retesting of the system/line shall be done by the contractor at his cost.

5.6 Test Records

Records in triplicate shall be prepared and submitted by the contractor for each piping system, for the pressure test done in the proforma provided / approved by the Engineer-in-charge.

Rev. : 0


Edition : 1

SPECIFICATION FOR BALL VALVES

SPECIFICATION NO.: MEC/TS/05/21/002



**(OIL & GAS SBU)
MECON LIMITED
DELHI 110 092**

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ABBREVIATIONS :

ASME	:	American Society of Mechanical Engineers
ASTM	:	American Society for Testing and Materials
API	:	American Petroleum Institute
BHN	:	Brinell Hardness Number
DN	:	Nominal Size
HAZ	:	Heat Affected Zone
LC	:	Lock Close (valve locked in full close position)
LO	:	Lock Open (valve locked in full open position)
MSS-SP	:	Manufacturers Standardization Society – Standard Practice
NDT	:	Non Destructive Testing
NPS	:	Nominal Pipe Size
RTJ	:	Ring Type Joint
SSPC	:	Steel Structures Painting Council

Pipeline Engineering Standards Committee

Convenor :


Members :

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PREPARED BY:	CHECKED BY:	APPROVED BY:	ISSUE DATE :
(SHALINI SINGH)	(GURDEEP SINGH)	(A.K. JOHRI)	Oct. 2008

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1.0 SCOPE

This specification covers the minimum requirements for design, manufacture, testing and supply of carbon steel ball valves of size DN 50mm (2") and above and ANSI class 150 to 900 to be used in on-shore pipeline systems handling non-sour hydrocarbons in liquid or gaseous phase, including Liquid Petroleum Gas (LPG).


This specification does not cover ball valves for sour hydrocarbon (liquid/ gas) service as defined in NACE standard MR-01-75.

2.0 REFERENCE DOCUMENTS

2.1 All valves shall be manufactured and supplied in accordance with the Twenty Second Edition, January, 2002, or the latest edition of American Petroleum Institute (API) Specification 6D / ISO 14313 : 1999, with additions and modifications as indicated in the following sections of this specification.

2.2 Reference has also been made in this specification to the latest edition of the following Codes, Standards and Specifications :

ASME B 16.5	:	Pipe flanges and flanged fittings
ASME B 16.25	:	Butt welding ends
ASME B 16.34	:	Valves – Flanged, threaded and welding end
ASME B16.47	:	Large diameter steel flanges
ASME B 31.3	:	Chemical & process plant piping system
ASME B 31.4	:	Liquid transportation systems for hydrocarbons and other liquids
ASME B 31.8	:	Gas transmission and distribution piping systems
ASME Sec.VIII/IX	:	Boiler and pressure vessel code
ASTM A 370	:	Standard test methods and definitions for mechanical testing of steel products
ASTM B 733	:	Autocatalytic nickel phosphorous coating on metals
API 6FA	:	Fire test for valves
API 607	:	Fire test for soft-seated quarter-turn valves
API 1104	:	Welding of pipelines and related facilities

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BS:6755 (Part-II) : Testing of valves – Specification for fire type - testing requirements

MSS-SP-6 : Standard finishes for contact faces of pipe flanges and connecting-end flanges of valves and fittings

MSS-SP-44 : Steel pipeline flanges

SSPC-VIS-1 : Steel structures painting council-visual standard

ASMEB 16.10 : Face-To-Face and End-To-End Dimensions of valves.

2.3 **In case of conflict** between the requirements of this specification, API 6D and the Codes, Standards and Specifications referred in clause 2.2 above, the requirements of this specification shall govern. Order of precedence shall be as follows :

- Data Sheets
- This Specification
- API 6D Specification
- Other Referred Codes & Standards
- Manufacturer's Standard

3.0 **MATERIALS**


3.1 Material for major components of the valves shall be as indicated in Valve Data Sheet. Other components shall be as per Manufacturer's standard (suitable for the service conditions indicated in Data Sheet) and shall be subject to approval by Purchaser. In addition, the material shall also meet the requirements specified hereinafter.

3.2 Carbon steel used for the manufacture of valves shall be fully killed.

3.3 The Carbon Equivalent (CE) of valve end connections which are subject to further field welding by Purchaser, shall not exceed 0.45% (as calculated by the following formula) on check analysis for each heat of steel used:

$$CE = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$$

3.4 For Valves specified to be used for Gas service or LPG service, Charpy V-notch test, on each heat of base material shall be conducted as per API 6D Clause 7.5, for all pressure containing parts such as body, end flanges and welding ends as well as bolting material for pressure containing parts. Unless otherwise, the Charpy V-notch test shall be conducted at 0 °C. Test procedure shall conform to ASTM A370. The average absorbed energy value of three full sized specimens shall be 27 J. The minimum impact energy value for any one specimen of the three specimens analysed as above, shall not be less than 22 J.


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When Low Temperature Carbon Steel (LTCS) materials are specified in Valve Data Sheet or offered by Manufacturer, the Charpy V-notch test requirements of applicable material standard shall be complied with.

- 3.5 For all such valves where carbon steel is used as ball material, the ball shall have 75 micrometer (0.003 inch) thick Electroless Nickel Plating (ENP) as per ASTM B733 with following classification : SC2, Type II, Class 2. The hardness of plating shall be minimum 50 RC.
- 3.6 When specified in Valve Data Sheet, hardness test shall be carried out on each heat of base material for all pressure containing parts of the valve. A full thickness cross-section shall be taken for this purpose and the maximum hardness shall not exceed 248 HV₁₀ based on minimum four measurements representing the entire thickness.
- 3.7 All process-wetted parts, metallic and non-metallic, shall be suitable for the fluids and service specified by the Purchaser. The service gas composition shall be as given in Annexure-I.
- 3.8 Non-metallic parts of the valves (including O-rings, soft seals etc.) intended for hydrocarbon gas service shall be resistant to explosive decompression.

4.0 **DESIGN AND CONSTRUCTION**

- 4.1 Valve design shall meet the requirements of API 6D and other referred codes and shall be suitable for the service conditions indicated in Valve Data Sheet. The ASME Boiler & Pressure Vessel Code, Section VIII, Division 1, shall be used to design the valve body. Allowable stress requirements shall comply the provisions of ASME B31.3. In addition, corrosion allowance indicated in Valve Data Sheet shall be considered in valve design. However, the minimum wall thickness shall not be less than the minimum requirement of ASME B16.34. The Manufacturer shall have a valid license to use API 6D monogram for manufacture of ball valves.
- 4.2 Valve body shall be either fully welded or bolted. Valve body joints with threads are not permitted.
- 4.3 Ball shall be of single piece, solid type construction.
- 4.4 Valves shall be Full Bore (FB) or Reduced Bore (RB) as indicated in Valve Data Sheet. Full bore valves shall be suitable for the passage of all types of pipeline scraper and inspection pigs on regular basis without causing damage to either the valve component or the pig. The full bore valve shall provide an unobstructed profile for pigging operations in either direction. Full bore valves shall be designed to minimize accumulation of debris in the seat ring region to ensure that valve movement is not impeded. In case of reduced bore valves, the nominal valve size indicated in Valve Data Sheet corresponds to the end connection. Nominal valve size of reduced bore shall be as per Table below:


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Nominal Valve Size	Nominal Valve Size for Reduced Bore	Nominal Valve Size	Nominal Valve Size for Reduced Bore
DN _{mm} (NPD _{inches})	DN _{mm} (NPD _{inches})	DN _{mm} (NPD _{inches})	DN _{mm} (NPD _{inches})
50 (2)	50 (2)	600 (24)	500 (20)
80 (2)	50 (2)	650 (26)	550 (22)
100 (4)	80 (3)	700 (28)	600 (24)
150 (6)	100 (4)	750 (30)	600 (24)
200 (8)	150 (6)	800 (32)	650 (26)
250 (10)	200 (8)	850 (34)	700 (28)
300 (12)	250 (10)	900 (36)	750 (30)
350 (14)	250 (10)	950 (38)	800 (32)
400 (16)	300 (12)	1000 (40)	850 (34)
450 (18)	350 (14)	1050 (42)	900 (36)
500 (20)	400 (16)	1200 (48)	1050 (42)
550 (22)	450 (18)		


- 4.5 Ball mounting shall be trunnion/ pivot type or as indicated in Valve Data Sheet. Valve design shall minimize the possibility of debris ingress into the trunnion as far as practicable. Ball mounting either trunnion or floating may be as follows :

Sl. No.	Rating	Floating Ball Design	Trunnion Mounted Design
1.	150	Up to 8"	More than 8"
2.	300	Up to 4"	More than 4"
3.	600	Nil	2" & Above


- 4.6 Valve seats shall have metal to metal contact. O-rings or other seals, if used for drip tight sealing, shall be encased in a suitable groove in such a manner that it can not be removed from seat ring and there is no extrusion during opening or closing operation of valve at maximum differential pressure corresponding to valve class rating. The seat rings shall be so designed as to ensure sealing at low as well as high differential pressures. Seat design with PTFE insert is not acceptable.
- 4.7 Valves shall have double block and bleed feature to facilitate complete flushing, draining and venting of the valve body cavity.
- 4.8 For valves to be used in liquid service, the body cavity over-pressure shall be prevented by self relieving seat rings/assemblies. A pressure relief hole in the ball is not permitted. Self relieving seat rings shall relieve at a body cavity differential pressure not exceeding 50% of the valve class rating pressure.
- 4.9 When specified in Valve Data Sheet, valves shall be designed to withstand a sustained internal vacuum of at least 1 (one) milli-bar in both open and closed positions.

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- 4.10 Full Bore Valves of nominal size DN 200mm(8") & above and Reduced Bore Valves of nominal size DN 250mm(10") & above shall have provision for secondary sealant injection under full line pressure for seat and stem seals. All sealant injection connections shall be provided with a needle valve, a grease fitting and non-return valve. Valve design shall have a provision to replace the sealant injection fitting under full line pressure. Location and arrangement of sealant points shall be as per Figure-1 (Annexure-II).
- 4.11 Valves shall be provided with vent and drain connections. Location and arrangement of vents and drains alongwith provision of valves shall be as per Figure-1 (Annexure-II).
- 4.12 Valve design shall ensure repair of stem seals / gland packing under full line pressure.
- 4.13 a) Valve ends shall be either flanged or butt welded or one end flanged and one end butt welded as indicated in Valve Data Sheet. Flanges of the flanged end cast/forged body valves shall be integrally cast/forged with the body of valve. Face-to-face/ end-to-end dimensions shall conform to API 6D. Face-to-face and end-to-end dimensions for valve sizes not specified in API 6D shall be in accordance with ASME B 16.10. Face-to-face and end-to-end dimensions not shown in API 6D or in ASME B 16.10 shall be as per Manufacturer Standard and shall be subject to approval by Company.
- b) Flanged end shall have dimensions as per ASME B16.5 for valve sizes upto DN 600mm (24 inches) excluding DN 550mm (22 inches) and as per MSS-SP-44 / ASME B 16.47 series A for valve sizes DN 550mm (22 inches) & for DN 650mm (26 inches) and above. Flange face shall be either raised face or ring joint type as indicated in Valve Data Sheet. Flange face finish shall be serrated or smooth as indicated in Valve Data Sheet. Smooth finish when specified shall be 125 to 200 AARH. In case of RTJ flanges, the groove hardness shall be minimum 140 BHN.
- c) Butt weld end preparation shall be as per ASME B16.25. The thickness of the pipe to which the valve has to be welded shall be as indicated in Valve Data Sheet. Valves shall be without transition pups. In case significant difference exists between thickness of welding ends of valve and connecting pipe, the welding ends of valve shall have bevel preparation as per ASME B31.4 or ASME B31.8, as applicable.
- 4.14 Design of weld end valves shall be such that during field welding operations, the soft seals or plastic components of the valve (where ever used) are not liable to be damaged. The manufacturer shall furnish necessary field welding instructions and post-weld test procedure to demonstrate integrity and leak-tightness of valves after field welding operations.
- 4.15 Valves shall be provided with ball position indicator and stops of rugged construction at the fully open and fully closed positions.

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- 4.16 Full Bore Valves of nominal size \geq DN 200mm(8") and Reduced Bore Valves of nominal size \geq DN 250mm(10") shall be equipped with support foot and lifting lugs. Tapped holes and eye bolts shall not be used for lifting lugs. Height of support foot shall be kept minimum. The location and size of support foot / lifting lugs shall ensure unrestrictive operation of vent / drain valves.
- 4.17 Valve design shall be such as to avoid bimetallic corrosion between carbon steel and high alloy steel components. Suitable insulation shall be provided as required.
- 4.18 When indicated in Material Requisition, valves shall have locking devices to lock the valve either in full open (LO) or full close (LC) positions. Locking devices shall be permanently attached to the valve operator and shall not interfere with operation of the valve.
- 4.19 Valves shall be of fire resistant design as per API 607/BS:6755 (Part-II)/API 6FA, as indicated in Valve Data Sheet.
- 4.20 Valves shall be provided with anti-static devices to ensure electrical continuity between stem / ball and valve body. Valve design shall be such as to avoid bimetallic corrosion between carbon steel and high alloy steel components. Suitable insulation shall be provided as required.
- 4.21 Valves shall be suitable for either buried or above ground installation as indicated in Valve Data Sheet.
- 4.22 When stem extension requirement is indicated in Valve Data Sheet, the valves shall have the following provisions :
- a) Valves provided with stem extension shall have water proof outer casing. Length of stem extension shall be as indicated in Valve Data Sheet. The length indicated corresponds to the distance between centreline of the valve opening and the top of mounting flange for valve operating device (gear operator / power actuator as applicable).
 - b) Vent and drain connections and sealant injection lines shall be terminated adjacent to the valve operator by means of suitable piping anchored to the valve body. Pipe used shall be API 5L Gr. B/ ASTM A 106 Gr. B, with Sch. 160. Fittings shall be ASTM A 105/ ASTM 234 Gr. WPB, Socket Welded, ANSI class 6000.
 - c) Stem extension and stem housing design shall be such that the complete assembly will form a rigid unit giving a positive drive under all conditions with no possibility of free movement between valve body, stem extension or its operator.
 - d) Outer casing of stem extension shall have 3/8" or 1/2" NPT plugs at the top and bottom, for draining and filling with oil to prevent internal corrosion.

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4.23 Operating Devices

- a) Valves shall have a power actuator or manual operator as indicated in Valve Data Sheet. In case of manual operator, valve sizes \leq DN 100mm (4 inches) shall be wrench operated and valve sizes \geq DN 150mm (6 inches) shall be gear operated. Each wrench – operated valve shall be supplied with wrench. Valve design shall be such that damage due to malfunctioning of the operator or its controls will only occur in the operator gear train or power cylinder and that damaged parts can be replaced without the valve cover being removed.
- b) The power actuator shall be in accordance with the Purchaser specification issued for the purpose and as indicated in Valve and Actuator Data Sheet. Operating time shall be as indicated in Valve Data Sheet. Valve operating time shall correspond to full close to full open/full open to full close under maximum differential pressure corresponding to the valve rating. For actuated valves, the actuator torque output shall be 1.25 times the break torque required to operate the ball valve under the maximum differential pressure corresponding to the valve class rating.
- c) For manual operator of all valves, the diameter of the hand wheel or the length of operating wrench shall conform to API 6D requirements and be such that under maximum differential pressure, the total force required to operate the valve does not exceed 350 N. Manufacturer shall also indicate the number of turns of hand wheel (in case of gear operators) required for operating the valve from full open to full close position.
- d) Direction of operation of hand wheel or wrench shall be in clock-wise direction while closing the valve. Hand wheels shall not have protruding spokes.
- e) Gear operators, when provided, shall have a self locking provision and shall be fully encased, in water proof/ splash proof/ dust proof/ weather proof enclosure and shall be filled with suitable grease.
- f) Operating devices shall be designed for easy operation of the valve under maximum differential pressure corresponding to the valve rating.

4.24 All welds shall be made by welders and welding procedures qualified in accordance with the provisions of ASME Section IX. The procedure qualification shall include impact test and hardness test and shall meet the requirements of clauses 3.4 and 3.6 of this specification, respectively.

4.25 All welds shall be stress relieved in accordance with ASME Section VIII.

4.26 Repair by welding is not permitted for fabricated and forged body valves. However repair by welding as per ASME B16.34 is permitted for cast body valves. Such repairs shall be carried out at casting supplier's care only. Repair shall be carried out before any heat treatment of casting is done. Repair welding procedure qualification shall include impact test and hardness test and shall meet the requirements of clauses 3.4, 3.5 & 3.6 of this specification, respectively.

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4.27 The tolerance on internal diameter and out of roundness at the ends for welded end valves shall be as per applicable connected pipe specification as indicated in Valve Data Sheet.

4.28 When indicated in Material Requisition, valves shall have locking device to lock the valve either in full open (LO) or full close (LC) positions. Locking devices shall be permanently attached to the valve operator and shall not interfere with operation of the valve.

4.29 Valve stem shall be capable of withstanding the maximum operating torque required to operate the valve against the maximum differential pressure corresponding to applicable class rating. The combined stress shall not exceed the maximum allowable stresses specified in ASME Section VIII, Division I. In case of power actuated valves, the valve stem shall be capable of withstanding maximum output of the power actuator.

5.0 **INSPECTION AND TESTS**

5.1 The Manufacturer shall perform all inspection and tests as per the requirements of this specification and the relevant codes, prior to shipment, at his works. Such inspection and tests shall be, but not limited to, the following:

5.1.1 All valves shall be visually inspected. The internal and external surfaces of the valves shall be free from any strikes, gouges and other detrimental defects. The surfaces shall be thoroughly cleaned and free from dirt, rust and scales.


5.1.2 Dimensional check on all valves shall be carried out as per the Purchaser approved drawings.

5.1.3 Chemical composition and mechanical properties shall be checked as per relevant material standards and this specification, for each heat of steel used.

5.1.4 a) Non-destructive examination of individual valve material and components consisting of, but not limited to castings, forgings, plate and assembly welds shall be carried out by the Manufacturer.


b) Body castings of all valve shall be radiographically examined on 100% of the surface of critical areas as per ASME B16.34. Procedure and acceptance criteria shall be as per ASME B16.34. The extent of radiography shall be as follows:

ANSI class 150	-	All sizes	-	Nil
ANSI class 300	-	\leq DN 400mm (16")	-	Nil
		\geq DN 450mm (18")	-	100%
ANSI class 600 and above	-	All sizes	-	100%

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All castings shall be wet magnetic particle inspected 100% of the internal surfaces. Method and acceptance shall comply with ASME B.16.34.

- c) All valves, with body fabricated from plates made or by forgings, shall be ultrasonically examined in accordance with the procedure and acceptance standard of Annexure E of ASME B16.34. All forgings shall be wet magnetic particle inspected 100% of the internal surfaces. Method and acceptance shall comply with ASME B 16.34
- d) Bodies and bonnets made by welded assembly of segments of castings, forgings, plates or combinations thereof shall be examined, as applicable, by methods of clause 5.1.4 b) for cast components or clause 5.1.4 c) for forged components and plates.
- 5.1.5 Full inspection by radiography shall be carried out on all welds of pressure containing parts. Acceptance criteria shall be as per ASME B 31.4 or ASME B31.8, as applicable, and API 1104.
- 5.1.6 Welds which in Purchaser's opinion cannot be inspected by radiographic methods, shall be checked by ultrasonic or magnetic particle methods and acceptance criteria shall be as per ASME Section VIII, Division 1, Appendix 12 and Appendix 6, respectively.
- 5.1.7 a) All finished wrought weld ends subject to welding in field shall be 100% ultrasonically tested for lamination type defects for a distance of 50mm from the end. Laminations shall not be acceptable.
- b) Weld ends of all cast valves subject to welding in field shall be 100% radiographically examined and acceptance criteria shall be as per ASME B16.34.
- c) After final machining, all bevel surfaces shall be inspected by dye penetrant or wet magnetic particle methods. All defects longer than 6.35 mm are rejected, as are defects between 6.35 mm and 1.59mm that are separated by a distance less than 50 times their greatest length. Rejectable defects must be removed. Weld repair of bevel surface is not permitted.
- 5.1.8 All valves shall be tested in compliance with the requirements of API 6D. During pressure testing, valves shall not have sealant lines and other cavities filled with sealant, grease or other foreign material. The drain, vent and sealant lines shall be either included in the hydrostatic shell test or tested independently. Test pressure shall be held for at least 30 minutes. No leakage is permissible during hydrostatic testing. The body cavity self-relieving feature meeting the requirements of clause 4.8 of this specification shall also be checked.
- 5.1.9 A supplementary air seat test as per API 6D shall be carried out for all valves. A bubble tight seal is required without the use of any sealant. No leakage is allowed. Test pressure shall be held for at least 15 minutes.

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5.1.10 Manufacturer who intends bidding, must submit at bid stage, certificate and report for successful fire type-tests for valves in accordance with API-607/ BS EN – 10497 / API 6FA, as applicable in Valve Data Sheet.

Failure to comply with this requirement shall be a cause of rejection of the offer.

5.1.11 Valves shall be subjected to Operational Torque Test as per supplementary test requirement of API 6D (Appendix C, para C.3.3 Type-II) under hydraulic pressure equal to maximum differential pressure corresponding to the valve rating.

For manually operated valves, it shall be established that the force required to operate the valve does not exceed the requirements stated in clause 4.20(c) of this specification.

5.1.12 Power actuated valves shall be tested after assembly of the valve and actuator at the valve Manufacturer's works. At least five open-close-open cycles without internal pressure and five open-close-open cycles with maximum differential pressure shall be performed on the valve actuator assembly. The time for full open to full close shall be recorded during testing.

If required, the actuator shall be adjusted to ensure that the opening and closing times are within the limits stated in Actuator Data Sheet issued for the purpose.


Hand operator provided on the actuator shall also be checked after the cyclic testing, for satisfactory manual over-ride performance.

These tests shall be conducted on minimum one valve out of a lot of five(5) valves of the same size, rating and the actuator model/ type. In case the tests do not meet the requirements, retesting / rejection of the lot shall be decided by Purchaser's Inspector.

5.1.13 Subsequent to successful testing as specified in clause 5.1.11 and 5.1.12 above, one (1) valve out of the total ordered quantity shall be randomly selected by the Company Representative for cyclic testing as mentioned below :

- a) The valve shall be subjected to at least 100 Open-Close-Open cycles with maximum differential pressure corresponding to the valve rating.
- b) Subsequent to the above, the valve shall be subjected to hydrostatic test and supplementary air seat test in accordance with clause 5.1.8 and 5.1.9.

In case this valve fails to pass these tests, the valve shall be rejected and two more valves shall be selected randomly and subjected to testing as indicated above. If both valves pass these tests, all valves manufactured for the order (except the valve that failed) shall be deemed acceptable. If either of the two valves fails to pass these tests, all valves shall be rejected or each valve shall be tested at the option of manufacturer.

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Previously carried out test of similar nature shall be considered acceptable if the same has been carried out by Manufacturer in last two years. Valves of two sizes below and two sizes above the size of valve previously tested, and rating similar or one rating lower of valve tested previously, shall be qualified.

- 5.1.14 Checks shall be carried out to demonstrate that the dissimilar metal used in the valves are successfully insulated as per the requirement of clause 4.17 of this specification.
- 5.1.15 When indicated in Valve Data Sheet, valves shall be subjected to anti-static testing as per supplementary test requirement of API 6D.
- 5.2 Purchaser reserves the right to perform stage-wise inspection and witness tests as indicated in clause 5.1 above at Manufacturer's works prior to shipment. Manufacturer shall give reasonable access and facilities required for inspection to the Purchaser's Inspector.

Purchaser reserves the right to require additional testing at any time to confirm or further investigate a suspected fault. The cost incurred shall be to Manufacturer's account.

In no case shall any action of Purchaser or his Inspector relieve the Manufacturer of his responsibility for material, design, quality or operation of valves.


Inspection and tests performed/ witnessed by the Purchaser's Inspector shall in no way relieve the Manufacturer's obligation to perform the required inspection and tests.

6.0 **EXTENT OF INSPECTION & TESTING**

- 6.1 Purchaser's Inspector shall perform inspection and witness tests on all valves or as indicated in the Quality Assurance Plan (QAP) attached with this specification.
- 6.2 The hydrostatic testing and cyclic opening and closing of the valves with the operator shall be witnessed by Purchaser's Inspector.

7.0 **TEST CERTIFICATES**

- 7.1 Manufacturer shall submit the following certificates :
- a) Mill test certificates relevant to the chemical analysis and mechanical properties of the materials used for valve construction as per the relevant standards.
 - b) Test certificates on hydrostatic and pneumatic tests complete with records of timing and pressure of each test.


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- c) Test reports on radiograph and ultrasonic inspection.
- d) Test report on operation of valves conforming to clause 5.1.11 and 5.1.12 of this specification.
- e) All other test reports and certificates as required by API 6D and this specification.

The certificates shall be valid only when signed by Purchaser's Inspector. Only those valves which have been certified by Purchaser's Inspector shall be despatched from Manufacturer's works.

8.0 **PAINTING, MARKING & SHIPMENT**

- 8.1 Valve surface shall be thoroughly cleaned, freed from rust and grease and applied with sufficient coats of corrosion resistant paint. Surface preparation shall be carried out by shot blasting to SP-6 in accordance with "Steel Structures Painting Council – Visual Standard SSPC-VIS-1". For valves to be installed underground, when indicated in Valve Data Sheet, the external surfaces of the buried portion of valves shall be painted with three coats of suitable coal tar epoxy resin with a minimum dry film thickness of 300 microns.
- 8.2 Manufacturer shall indicate the type of corrosion resistant paint used, in the drawings submitted for approval.
- 8.3 All valves shall be marked as per API 6D. The units of marking shall be metric except Nominal Diameter which shall be in inches. Marking shall be done by die-stamping on the bonnet or on the housing. However, for buried valves the marking shall be done on the above ground portion of the stem housing only.
- 8.4 Valve ends shall be suitably protected to avoid any damage during transit. All threaded and machined surfaces subject to corrosion shall be well protected by a coat of grease or other suitable material. All valves shall be provided with suitable protectors, for flange faces, securely attached to the valves. Bevel ends shall be protected with metallic or high impact plastic bevel protectors.
- 8.5 All sealant lines and other cavities of the valve shall be filled with sealant before shipment.
- 8.6 Packaging and shipping instructions shall be as per API 6D.
- 8.7 On packages, following shall be marked legibly with suitable marking ink :
- a) Order Number
 - b) Manufacturer's Name
 - c) Valve Size and Rating
 - d) Tag Number
 - e) Serial Number

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9.0 **SPARES & ACCESSORIES**

- 9.1 Manufacturer shall furnish list of recommended spares and accessories for valves required during start-up and commissioning and supply of such spares shall be included in the price quoted by Manufacturer.
- 9.2 Manufacturer shall furnish list of recommended spares and accessories required for two years of normal operation and maintenance of valves.
- 9.3 Manufacturer shall quote for spares & accessories as per Material Requisition.

10.0 **DOCUMENTATION**

10.1 At the time of bidding, Manufacturer shall submit the following documents :

- a) General arrangement/assembly drawings showing all features and relative positions and sizes of vents, drains, gear operator / actuator, painting, coating and other external parts together with overall dimensions.
- b) Sectional drawing showing major parts with reference numbers and material specification. In particular, a blow-up drawing of ball-seat assembly shall be furnished complying the requirement of clause 4.5 of this specification.
- c) Reference list of similar ball valves manufactured and supplied in last five years indicating all relevant details including project, year, client, location, size, rating, service etc.
- d) Torque curves for the power actuated valves along with the break torque and maximum allowable stem torque. In addition, sizing criteria and torque calculations shall also be submitted for power actuated valves.
- e) Descriptive technical catalogues of the Manufacturer.
- f) Installation, Operational and Maintenance Manual.
- g) Copy of valid API 6D certificate.
- h) Details of support foot, including dimensions and distance from valve centre line to bottom of support foot.
- i) Quality Assurance Plan enclosed with this tender duly signed, stamped and accepted.
- j) Clause wise list of deviations from this specification, if any.
- k) List of recommended spares required during start-up and commissioning.

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- l) List of recommended spares required for 2 years of normal operation and maintenance.

IMPORTANT

The drawings to be submitted alongwith the bid shall be in total compliance with the requirement of technical specification and data sheets of the valves with no exception & deviation.

10.2 Within two weeks of placement of order, the Manufacturer shall submit six copies of, but not limited to, the following drawings, documents and specifications for Purchaser's final approval :


- a) Detailed sectional arrangement drawings showing all parts with reference numbers and material specifications as referred to in clause 10.1 above.
- b) Assembly drawings with overall dimensions and features. Drawing shall also indicate the number of turns of hand wheel (in case of gear operators) required for operating the valve from full open to full close position and the painting scheme. Complete dimensional details of support foot (where applicable) shall be indicated in these drawings as referred to in clause 10.1 above.
- c) Welding, heat treatment and testing procedures.
- d) Details of corrosion resistant paint to be applied on the valves.
- e) Design calculation for Pressure containing parts.
- f) Procedure for cyclic testing.

Manufacture of valves shall commence only after approval of the above documents. Once the approval has been given by Purchaser, any changes in design, material and method of Manufacture shall be notified to Purchaser whose approval in writing of all changes shall be obtained before the valve is manufactured.

10.3 Within 30 days from the approval date, Manufacturer shall submit to Purchaser one reproducible and six copies of the approved drawings, documents and specifications as listed in clause 10.2 above.

10.4 Prior to shipment, Manufacturer shall submit one reproducible and six copies of the following:

- a) Test certificates as per clause 7.0 of this specification.
- b) Manual for installation, erection, maintenance and operation instructions, including a list of recommended spares for the valves.

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10.5 All documents shall be in English language.

11.0 **GUARANTEE**

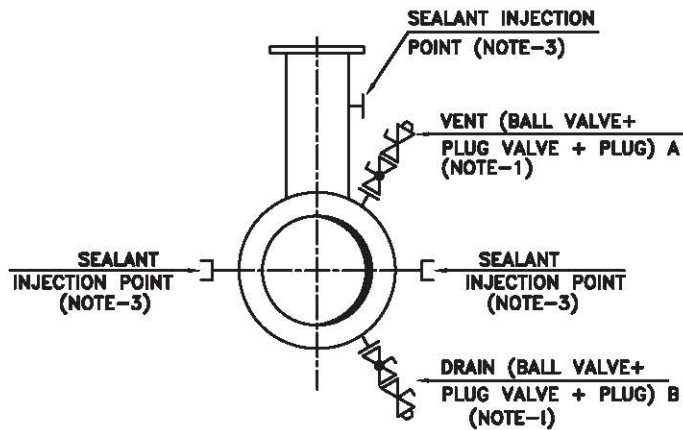
11.1 Manufacturer shall guarantee that the materials and machining of valves and fittings comply with the requirements in this specification and in the Purchase Order.

11.2 Manufacturer is bound to replace or repair all valve parts which should result defective due to inadequate engineering or to the quality of materials and machining.

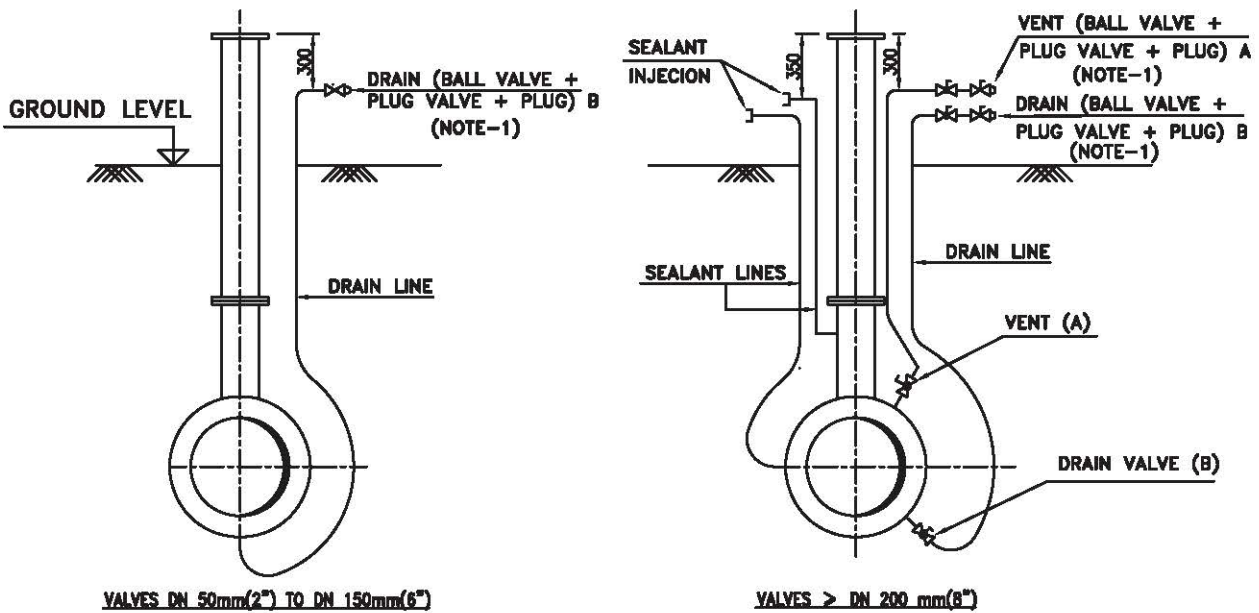
11.3 If valve defect or malfunctioning cannot be eliminated, Manufacturer shall replace the valve without delay,

11.4 Any defect occurring during the period of Guarantee shall be attended to by making all necessary modifications and repair of defective parts free of charge to the Purchaser as per the relevant clause of the bid document.

11.5 All expenses shall be to Manufacturer's account.



ABOVE GROUND INSTALLATION



UNDERGROUND INSTALLATION

SIZES OF VENT & DRAIN CONNECTIONS		
NOM. VALVE SIZE	A, DN(mm)	B, DN(mm)
50 TO 150	-	15
200 TO 600	15	25
750 & ABOVE	15	50 (REFER NOTE-2)

NOTES:

1. ALL VALVES (BALL & PLUG) AND PLUGS FOR A AND B SHALL BE APPROVED BY THE PURCHASER.
2. VALVES OF SIZE 50mm SHALL BE MANUFACTURED AS PER API-6D.
3. SEALANT POINTS SHALL BE PROVIDED FOR FULL BORE VALVES OF NOMINAL VALVE SIZE 200mm (8") & ABOVE AND REDUCED BORE VALVES OF NOMINAL VALVE SIZE, DN 250mm (10") AND ABOVE ONLY.

LEGEND:

- ⊘ BALL VALVE
- ⊘ PLUG VALVE
- ⊘ PLUG

FIGURE-1

REV NO	DATE	ZONE	DESCRIPTIONS	BY	APPRD	
REVISIONS			REFERENCES			
DRG. NO.			THIS DRAWING IS PROPERTY OF MECON AND IS ISSUED FOR THE SPECIFIC PROJECT MENTIONED THEREIN. THIS IS NOT TO BE COPIED OR USED FOR OTHER PROJECTS UNLESS EXPRESSLY PERMITTED BY MECON.			
SECTION		CIVIL DELHI		<p>मेकॉन लिमिटेड</p> <p>MECON LIMITED</p>		
NAME	SIG.	DATE	<p>VENT AND DRAIN ARRANGEMENT FOR BALL VALVE</p>			
DSGN	SS					
DRWN	IRFAN					
CHKD. & VERIFIED	GS					
APPROVED	A.K.JOHR		<p>SCALE :- NTS</p> <p>DRG.NO.:- FIGURE-1</p>			
					REV 0	


PROCESS & PIPING DESIGN SECTION
MECON LIMITED



DELHI - 110 092

TECHNICAL SPECIFICATION
FOR
PLUG VALVES
(NB \geq 2")


SPECIFICATION NO.: MEC/TS/05/62/003, Rev-2

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C O N T E N T S

<u>Sl.No.</u>	<u>Description</u>	<u>Page No.</u>
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4.0	DESIGN & CONSTRUCTION	4
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PREPARED BY : Gurdeep Singh Date	CHECKED BY : A.K. Sarkar Date	APPROVED BY : A.K. Johri Date
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1.0

SCOPE

This specification covers the minimum requirements for design, manufacture and supply of carbon steel plug valves of size DN 50mm (2") and above and ANSI Class 150# thru 900# for use in onshore pipeline systems handling non sour hydrocarbons in liquid phase or gaseous phase including Liquefied Petroleum Gas (LPG).

2.0

REFERENCE DOCUMENTS


2.1

All valves shall be manufactured and supplied in accordance with the Twenty Second Edition, January, 2002, or the latest edition of American Petroleum Institute (API) Specification 6D, twenty first edition, 1994 including supplement 1 & 2 thereof with additions and modifications as indicated in the following sections of this specification.

2.2

Reference has also been made in this specification to the latest edition of the following Codes, Standards and Specifications :

ASME B 16.5	:	Pipe flanges and flanged fittings
ASME B 16.25	:	Buttwelding ends
ASME B 16.34	:	Valves – Flanged, threaded and welding end
ASME B16.47	:	Large diameter steel flanges
ASME B 31.3	:	Chemical & process plant piping system
ASME B 31.4	:	Liquid transportation systems for hydrocarbons and other liquids
ASME B 31.8	:	Gas transmission and distribution piping systems
ASME Sec.VIII	:	Boiler and pressure vessel code
ASTM A 370	:	Standard test methods and definitions for mechanical testing of steel products
ASTM B 733	:	Autocatalytic nickel phosphorous coating on metals
API 6FA	:	Fire test for valves
API 1104	:	Welding of pipelines and related facilities
BS:6755 (Part-II)	:	Testing of valves – Specification for fire type - testing requirements
MSS-SP-6	:	Standard finishes for contact faces of pipe flanges and connecting-end flanges of valves and fittings

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MSS-SP-44 : Steel pipeline flanges

SSPC-VIS-1 : Steel structures painting council-visual standard

2.3 **In case of conflict** between the requirements of this specification, API 6D and the Codes, Standards and Specifications referred in clause 2.2 above, the requirements of this specification shall govern. Order of precedence shall be as follows :

- Data Sheets
- This Specification
- API 6D Specification
- Other Referred Codes & Standards
- Manufacturer's Standard

3.0 **MATERIALS & TEST PROCEDURES**

3.1 Material for major components of the valves shall be as indicated in Valve Data Sheet. Other components shall be as per Manufacturer's standard which will be subject to approval by Purchaser.

3.2 Carbon steel used for the manufacture of valves shall be fully killed.

3.3 Chemical composition (check analysis) of valve end connection which are subject to further welding by Purchaser shall meet the following requirements for each heat of steel used:


- | | | | |
|----|------------|---|----------------|
| a) | Carbon | : | 0.22% (max.) |
| b) | Manganese | : | 1.70 % (max.) |
| c) | Silicon | : | 0.55 % (max.) |
| d) | Phosphorus | : | 0.030 % (max.) |
| e) | Sulphur | : | 0.030 % (max.) |

Total percentage of Vanadium, Niobium and Titanium shall not exceed 0.20. Residual elements shall not exceed the following limits :

- | | | | |
|----|------------|---|---------|
| a) | Nitrogen | : | 0.019 % |
| b) | Nickel | : | 0.30 % |
| c) | Copper | : | 0.20 % |
| d) | Aluminum | : | 0.070 % |
| e) | Chromium | : | 0.15 % |
| f) | Molybdenum | : | 0.05 % |

Carbon equivalent (CE) as calculated by the following shall not exceed 0.45%.

$$CE = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$$

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3.4 For valves specified for Gas Service or high vapour pressure liquid service, Charpy V-Notch test on each heat of base material shall be conducted as per API 6D, for all pressure containing parts such as body, end flanges and welding ends as well as the bolting material for pressure containing parts. Unless specified otherwise in Valve Data Sheets, the Charpy impact test shall be conducted at 0°C. The Charpy impact test specimen shall be taken in the direction of principal grain flow and notched perpendicular to the original surface of plate or forging.

Unless specified otherwise in Valve Data Sheets, the minimum average absorbed energy per set of three specimens shall be 27 J with an individual minimum per specimen of 22 J.

3.5 For valves specified for Gas Service or high vapour pressure liquid service, the hardness of base material of body and principal parts of the valve such as plug, stem, etc., shall not exceed 22 RC.

3.6 Plug for valve size DN 200mm (8") and above or as specified in Valve Data Sheets shall have Electroless Nickel Plating (ENP) or equivalent. The hardness of plating shall be minimum 50 RC. Manufacturer shall ensure that the adhesive strength of plating is sufficient so as to prevent peeling of plating during operation of the valve.


3.7 All process-wetted parts, metallic and non-metallic, shall be suitable for the fluids and service specified by the Purchaser. The service gas composition when applicable shall be as given in Annexure-I.

4.0 **DESIGN & CONSTRUCTION**


4.1 The Manufacturer shall have a valid license to use API 6D monogram for manufacture of Plug Valves.

4.2 Valve pattern shall be short, regular or venturi as specified in the following table:

Class	Size Range, NB mm (inch)	Pattern
150	50-100 (2-4)	Short
	150-300 (6-12)	Regular
	350 (14) & above	Venturi
300	50-100 (2-4)	Short
	150-250 (6-10)	Regular
	300 (12) & above	Venturi
600	50-250 (2-10)	Regular
	300 (12) & above	Venturi
900	50-250 (2-10)	Regular
	300 (12) & above	Venturi

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4.3	Valve shall have an inherent feature using line pressure to ensure that the line pressure cannot cause taper locking of the plug/ plug movement into taper i.e. valves shall be of pressure balanced design.
4.4	Cover shall be bolted to the body and screwed connections are not acceptable.
4.5	Soft seats to achieve a seal between plug and body are not permitted.
4.6	All valves shall have provisions for secondary sealant injection under full line pressure for seat and stem seals. Sealant injection points shall be provided with a ball type check valve or needle valve to replace the sealant injection fitting under full line pressure.
4.7	Valves shall have vent and drain connections as per API 6D.
4.8	When specified in the Valve Data Sheet, valves shall be designed to withstand a sustained internal vacuum of at least one milli-bar in both open and closed position.
4.9	Valve design shall ensure repair of gland packing under full line pressure.
4.10	<p>a) Valve ends shall be either flanged or butt welded or one end flanged and one end butt welded as indicated in Valve Data Sheet. Flanges of the flanged end cast/ forged body valves shall be integrally cast/forged with the body of valve. Face-to-face/ end-to-end dimensions shall conform to API 6D.</p> <p>b) Flanged end shall have dimensions as per ASME B16.5 for valve sizes upto DN 600mm (24 inches) excluding DN 550mm (22 inches) and as per MSS-SP-44 for valve sizes DN 550mm (22 inches) & for DN 650mm (26 inches) and above. Flange face shall be either raised face or ring joint type as indicated in Valve Data Sheet. Flange face finish shall be serrated or smooth as indicated in Valve Data Sheet. Smooth finish when specified shall be 125 to 200 AARH. In case of RTJ flanges, the groove hardness shall be minimum 140 BHN.</p> <p>c) Butt weld end preparation shall be as per ASME B16.25. The thickness of the pipe to which the valve has to be welded shall be as indicated in Valve Data Sheet. Valves shall be without transition pups. In case significant difference exists between thickness of welding ends of valve and connecting pipe, the welding ends of valve shall have bevel preparation as per ASME B31.4 or ASME B31.8, as applicable.</p>
4.11	Valves shall be provided with position indicator and stops at the fully open and fully closed positions.
4.12	Valves of size DN 200mm (8") and above shall be equipped with lifting lugs. Tapped holes and eye bolts shall not be used for lifting lugs.
4.13	Valves shall have locking devices to be locked either in full open or full close position when indicated in the Valve Data Sheets. Locking devices shall be permanently attached to the valve operator and shall not interfere with operation of the valve.

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4.14 Valves shall be of fire safe design as per BS:6755 (Part-II)/ API 6FA, if indicated in Valve Data Sheet.


4.15 Valves shall be suitable for either buried or above ground installation as indicated in the Valve Data Sheet.

4.16 Valves with stem extension, when indicated in Valve Data Sheet shall have following provisions :

- a) Valves provided with stem extension shall have water proof outer casing. Length of stem extension shall be as indicated in the Valve Data Sheet. The length indicated corresponds to the distance between the centreline of the valve opening and the top of the mounting flange for valve operating device (gear operator/ power actuator as applicable).
- b) Vent and drain connections shall be terminated adjacent to the valve operator by means of suitable piping anchored to the valve body. Pipe used shall be API 5L Gr. B/ ASTM A106 Gr. B, with Sch. 160. Fittings shall be ASTM A105/ ASTM A 234 Gr. WPB, Socket Welded, ANSI class 6000.
- c) Sealant injection lines shall be extended and terminated adjacent to the valve operator in manner as indicated in (b) above.
- d) Stem extension and stem housing design shall be such that the complete assembly will form a rigid unit giving a positive drive under all conditions with no possibility of free movements between valve body stem extension or its operator.
- e) Outer casing of stem extension shall have 3/8" or 1/2" NPT plugs at the top and bottom, for draining and filling with oil to prevent internal corrosion.

4.17 **Operating Devices**

- a) Valves shall have a power actuator or manual operator as indicated in the Valve Data Sheet. Manual operated valves of size \leq DN 100mm (4") shall be wrench operated and valves of sizes \geq DN 150mm (6") shall be gear operated. Each wrench operated valve shall be supplied with wrench. Valve design shall be such that damage due to malfunctioning of the operator or its controls will only occur in the operator gear train or power cylinder and damaged parts can be replaced without the bonnet being removed.
- b) The power actuator shall be in accordance with the specification issued for the purpose and as indicated in the valve and actuator data sheet. Operating time shall be as indicated in valve data sheet. Valve operating time shall correspond to full close to full open / full open to full close under maximum differential pressure corresponding to the valve rating. For actuated valves, the actuator torque shall be atleast 1.25 times the maximum torque required to operate the valve under maximum differential pressure corresponding to the valve class rating.
- c) Operating device shall be designed for easy operation of valve under maximum differential pressure corresponding to the valve rating.

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- d) For manual operation of all valves, the diameter of the hand wheel or the length of operating lever shall be such that under the maximum differential pressure, the total force required to operate the valve does not exceed 350 N. Manufacturer shall also indicate the number of turns of hand wheel (in case of gear operator), required to operate the valve from full open to full close position.
- e) Direction of operation of hand wheel or wrench shall be in clock-wise direction while closing the valve. Hand wheels shall not have protruding spokes.
- f) Gear operators, if specified, shall have a self locking provision and shall be fully encased in waterproof/ dustproof/ weatherproof/ splashproof enclosure and shall be filled with suitable grease.

4.18 Repair by welding is not permitted for fabricated and forged body valves. However repair by welding as per ASME B16.34 is permitted for cast body valves. Repair shall be carried out before any heat treatment of casting is done. Repair welding procedure qualification shall also include impact test and hardness test when required as per Clause 3.4 and 3.6 of this specification and shall meet the requirements as specified therein.

4.19 The tolerance on internal diameter and out of roundness at the ends for welded ends valves shall be as per connected pipe specification as indicated in the Valve Data Sheet.

4.20 Valve stem shall be capable of withstanding the maximum operating torque required to operate the valve against the maximum differential pressure corresponding to applicable class rating. The combined stress shall not exceed the maximum allowable stresses specified in ASME section VIII, Division-1.

For Power Actuated Valves, the valve stem shall be designed for maximum output torque of the selected power actuator (including gear box, if any) at the valves stem.

5.0 **INSPECTION & TESTS**


5.1 The Manufacturer shall perform all inspection and tests as per the requirements of this specification and the relevant codes, prior to shipment at his works. Such inspection and tests shall be, but not limited to, the following :

5.1.1 All valves shall be visually inspected.

5.1.2 Dimensional check shall be carried out as per the Purchaser approved drawings.

5.1.3 Chemical composition and mechanical properties shall be checked as per relevant material standards and this specification, for each heat of steel used.

5.1.4 a) Non-destructive examination of individual valve material and component consisting of but not limited to castings, forgings, plates and assembly welds shall be carried out by the Manufacturer.

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- b) Valves castings shall be radiographically examined at the cover and body portion, seat location, flanged body ends and circumference of ends to be field welded. Procedure and acceptance criteria shall be as per ASME B16.34. The extent of radiography shall be as follows :

ANSI Class 150-	All Sizes	-	Nil
ANSI Class 300-	≤ DN 400mm (16")	-	Nil
	≥ DN 450mm (18")	-	100%
ANSI Class 600- and above	All Sizes	-	100%

All castings shall be wet magnetic particle inspected 100 % of the internal surfaces. Method and acceptance shall comply with ASME B16.34.


- c) Valve forgings shall be examined by ultrasonic method. Inspection procedure and acceptance criteria shall be as per Annexure E of ASME B16.34.

5.1.5 Areas which, in Purchaser's Inspector's opinion, cannot be inspected by radiographic methods shall be checked by ultrasonic or magnetic particle methods and acceptance criteria shall be as per ASME Sec-VIII, Division I, Appendix 12 and Appendix 6 respectively.

- 5.1.6
- a) Weld ends of all cast valves shall be 100% radiographically examined and acceptance criteria shall be as per ASME B16.34.
- b) After final machining all bevel surfaces shall be inspected by dye penetrant, or wet magnetic particle methods. Any defects longer than 6.35mm shall be rejected and also defects between 6.35mm and 1.59mm that are separated by a distance less than 50 times their greatest length. Weld repair of bevel surface is not permitted. Rejectable defects must be removed.
- c) All finished wrought weld ends subject to welding in the field shall be 100% ultrasonically tested for lamination type defects for a distance of 50mm from the end. Laminations shall not be acceptable.

5.1.7 All valves shall be tested in compliance with the requirements of API 6D. Hydrostatic shell testing shall ensure that the whole of the shell is subjected to the test pressure. If necessary, the empty shell shall be pressure tested prior to assembly of the plug. The drain, vent and sealant lines shall be either included in the hydrostatic shell test or tested independently. No leakage is permissible during hydrostatic testing.

5.1.8 A supplementary air seat test as per API 6D shall be carried out for all valves. No leakage is allowed. Test pressure shall be held for at least 15 minutes.

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5.1.9 Manufacturer who intends bidding must submit at bid stage, certificate and report for successful fire safe tests for all types of valves in accordance with BS:6755 (Part-II)/ API 6FA, as applicable in Valve Data Sheet.

Failure to comply with the requirement shall be a cause of rejection of the offer.

5.1.10 Valve shall be subjected to Operational Torque Test as per supplementary test requirement of API 6D under hydraulic pressure equal to the maximum differential pressure corresponding to the valve rating. The maximum handwheel force shall not exceed 350 N.

5.1.11 Power actuated valves shall be tested after assembly at the valve Manufacturer's works. Actuator shall be capable to allow minimum five consecutive "opening" and "closing" cycles. To achieve this, the Manufacturer shall provide "closing" and "opening" operations. This test shall be conducted on one valve out of a lot of five valves of the same size, rating and actuator type. In case the test result dose not meet the requirements, retesting/ rejection of the lot shall be as decided by Purchaser's Inspector.

The actuator shall be adjusted to ensure that opening and closing time is within the limits stated in Actuator Data Sheet issued for the purpose.

The hand operator installed on the actuator shall also be checked after the cyclic testing, for satisfactory manual over-ride performance.

5.2 Purchaser reserves the right to perform stagewise inspection and witness tests as indicated in para 5.1 at Manufacturer's works prior to shipment. Manufacturer shall give reasonable access and facilities required for inspection to Purchaser's Inspector.

Purchaser reserves the right to request additional testing at any time to confirm or further investigate a suspected fault. If the suspected fault is confirmed, the cost incurred shall be to Manufacturer's account.


In no case shall any action of Purchaser or his representative relieve the Manufacturer of his responsibility for material, design, quality or operation of valves.

Inspection and tests performed/ witnessed by the Purchaser's Inspector shall in no way relieve the Manufacturer's obligation to perform the required inspection and tests.

6.0 **EXTENT OF INSPECTION & TESTING**

6.1 Purchaser's Inspector shall perform inspection and witness test on all valves as indicated in the Quality Assurance Plan (QAP) attached with this specification.

6.2 The hydrostatic testing and cyclic opening and closing of the valves with the operator shall be witnessed by Purchaser's Inspector.

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7.0 **TEST CERTIFICATES**

7.1 Manufacturer shall submit the following certificates :

- a) Mill test certificates relevant to the chemical analysis and mechanical properties of the materials used for valve construction as per the relevant standards.
- b) Test certificates on hydrostatic and pneumatic test complete with records of timing and pressure of each test.
- c) Test reports conforming to clause 5.1.9 of this specification, if applicable.
- d) Test reports on radiographic and ultrasonic inspection.
- e) Test reports on operation of valves conforming to clause 5.1.10 and 5.1.11 of this specification.
- f) All other test reports and certificates as required by API 6D and this specification.

The certificates shall be valid only when signed by Purchaser's Inspector. Only those valves which have been certified by Purchaser's Inspector shall be dispatched from Manufacturer's works.


8.0 **PAINTING, MARKING & SHIPMENT**

8.1 Valve surface shall be thoroughly cleaned, freed from rust and grease and applied with sufficient coats of corrosion resistant paint. Surface preparation shall be carried out by shot blasting to SP 6 in accordance with "Steel Structures Painting Council - Visual Standard - SSPC-VIS-1". For the valves to be installed underground, when indicated in Valve Data Sheet, external surfaces of the buried portion of valves shall be painted with three coats of suitable coal tar epoxy resin with a minimum dry film thickness of 300 microns.

8.2 Manufacturer shall indicate the type of corrosion resistant paint used, in the drawings submitted for approval.

8.3 All valves shall be marked as per API 6D. The units of marking shall be metric except Nominal Diameter which shall be in inches. Marking shall be done by die-stamping on the bonnet or on the housing. However for buried valves the marking shall be done on the above ground portion of the stem housing only.

8.4 Valve ends shall be suitably protected to avoid any damage during transit. All threaded and machined surfaces subject to corrosion shall be well protected by a coat of grease or other suitable material. All valves shall be provided with suitable protectors, for flange faces, securely attached to the valves. Bevel ends shall be protected with metallic bevel protectors.

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8.5 All sealant lines and other cavities of the valves shall be filled with sealant before shipment.

8.6 Packaging and shipping instructions shall be as per API 6D.

8.7 Packages shall be marked legibly, with suitable marking ink, the following.

- a) Order Number
- b) Manufacturer's Name
- c) Valve Size and Rating
- d) Tag Number
- e) Serial Number

9.0 **SPARES & ACCESSORIES**


9.1 Manufacturer shall recommend and quote separately the spares for valves required for commissioning and two years of normal operation. List of such spares without price shall be indicated alongwith technical bid and separately with price.

9.2 Manufacturer shall recommend and quote unit price separately for the accessories (like wrench, sealant injector, etc.), sealant and special tools required for maintenance of valves.

10.0 **DOCUMENTATION**

10.1 At the time of bidding, the bidder shall submit the following documents :

- a) General arrangement/ assembly drawings showing all features and relative positions & sizes of vents, drains, gear box & other external parts together with overall dimensions.
- b) Sectional drawing showing major parts with reference numbers and material specification.
- c) Reference list of similar plug valves manufactured and supplied in last five years, indicating all relevant details including project, year, client, location, size rating, service, etc.
- d) Torque curves for the power actuated valves alongwith break torque and maximum allowable stem torque. In addition, sizing criteria and torque calculations shall also be submitted for power actuated valves.
- e) Descriptive technical catalogues of the Manufacturer.
- f) Copy of valid API 6D certificate, wherever applicable.

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- g) Details of support foot, including dimensions and distance from valve centre line to bottom of support foot.
- h) Quality Assurance Plan enclosed with this tender duly signed, stamped and accepted.

IMPORTANT

The drawings to be submitted alongwith the bid shall be in total compliance with the requirement of technical specification and data sheets of the valves with no exception & deviation.

10.2 Within two weeks of placement of order, the manufacturer shall submit six copies of, but not limited to, the following drawings, documents and specifications for approval :

- a) Design drawings and relevant calculations for pressure containing parts and other principle parts.
- b) Detailed sectional arrangement drawing showing all parts with reference numbers and materials specification.
- c) Assembly drawings with overall dimensions & clearances required and showing all features. Drawing shall also indicate the numbers of turns of handwheel (in case of gear operator) required for operating the valve from full open to full close position and the painting scheme.
- d) Welding, heat treatment, testing and quality control procedures.
- e) Details of corrosion resistant paint to be applied on the valves.
- f) Design calculation for pressure containing parts.


Manufacture of valves shall commence only after approval of the above documents. Once approval has been given by Purchaser, any change in design, material and method of manufacture shall be notified to the Purchaser, whose approval in writing for all changes shall be obtained before the valves are manufactured.

10.3 Within 30 days from the approval date, Manufacturer shall submit one reproducible and six copies of the approved drawings, documents and specification as listed in clause 10.2 of this specification.

10.4 Prior to shipment, Manufacturer shall submit one reproducible and six copies of following :-

- a) Test certificates as listed in clause 7.0 of this specification.
- b) Manual for installation, erection instructions, maintenance and operation instructions, including a list of recommended spares for the valves.

10.5 All documents shall be in English Language.

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11.0 **GUARANTEE**

- 11.1 Manufacturer shall guarantee that the materials and machining of valves and fittings comply with the requirements in this specification and in the Purchase Order.
- 11.2 Manufacturer is bound to replace or repair all valve parts which should result defective due to inadequate engineering or to the quality of materials and machining.
- 11.3 If valve defect or malfunctioning cannot be eliminated, Manufacturer shall replace the valve without delay.
- 11.4 Any defect occurring during the period of Guarantee shall be attended to by making all necessary modifications and repair of defective parts free of charge to the Purchaser as per the relevant clause of the bid document.
- 11.5 All expenses shall be to Manufacturer's account.

TECHNICAL NOTES FOR GATE & GLOBE VALVES

(A) **TECHNICAL NOTES FOR GATE & GLOBE VALVES**

1.0 **General**

- 1.1 Valves shall be designed, manufactured, tested, inspected, marked and supplied as per the specifications, applicable design standards & codes and manufacturing standards (latest editions) as specified.
- 1.2 Material test certificates (Physical property, Chemical composition & Heat treatment report) of the pressure containing parts shall be furnished for the valves supplied. Material test certificates of other parts shall also be furnished for verification during inspection.
- 1.3 For heavy valves, provision for lifting shall be made by way of lugs, eyebolts, or similar standard devices.
- 1.4 Unless otherwise stated, all flanged valves shall have end flanges integral with valve body. Weld on flanges are not acceptable. Flange finish shall be serrated finish 250 AARH (250 AARH to 500 AARH) or 125 AARH (125 AARH to 250 AARH) or 63 MRH (32 AARH to 63 AARH) as per valve specification sheet.
- 1.5 For all weld end valves, with bevel end as per ANSI B 16.25, the bevel contour shall be as follows:

Material	Wall Thickness	Weld Contour
Carbon Steel (Except Low Temp. Carbon Steel)	Upto 22 mm > 22 mm	Figure 2 Type A Figure 3 Type A
Alloy Steel Stainless Steel & Low Temp Carbon Steel	Upto 10 mm > 10 mm & upto 25 mm > 25mm	Figure 4 Figure 5 Type A Figure 6 Type A

- 1.6 If an overlay weld-deposit is used for the body seat ring, seating surface, the seat ring base material shall be at least equal to the corrosion resistance of the materials of the shell.
- 1.7 For valve body/ bonnet, forging is acceptable where castings are specified but not vice versa.
- 1.8 Material of construction of yoke shall be as a minimum equivalent to body/ bonnet material.
- 1.9 Stem shall be forged or machined from a forged bar. Castings are not permitted except integral stem.
- 1.10 Stellite/ hard facing by deposition shall have minimum 1.6mm thickness. Renewable seat rings shall be seal welded.
- 1.11 Face to face dimension of flanged valves shall conform to ANSI B 16.10 to the extent covered. For valves not covered in the ANSI specification, Contractor shall furnish certified dimensional drawings.

- 1.12 Flange dimensions of steel, alloy steel and stainless steel flanged valves shall conform to ANSI B 16.5 for sizes up to 24" and API 605 for size 26" and above.
- 1.13 Flange dimensions for cast iron flanged valves shall conform to ANSI B 16.1 for size up to 24" class 125 and API 605 with flat face for sizes greater than 24".
- 1.14 Unless otherwise mentioned, various valves should conform to following standards / codes.
- | | | |
|--|---|-------------------|
| SW gate valves (1 1/2" and below) | : | API 602 |
| SW Globe/Check valves (1 1/2" and below) | : | BS 5352 |
| Flanged gate valves | : | API 600 |
| Flanged Globe valves | : | BS 1873 |
| Flanged check valves | : | BS 1868 |
| Diaphragm valves | : | BS 5156 |
| Butterfly valves | : | BS5155/AWWVA C504 |
- 1.15 Wherever stellite is specified, it means facing of seat and disc are welded by Cr-Co-W alloy. Stellite facing shall maintain minimum hardness of 375 BHN at high temperature.
- 1.16 All weld end valves shall have bevel ends as per ANSI B 16.25.
- 1.17 If an overlay weld deposit is used for the body seat ring or seating surface, the seat ring base material shall be at least equal to corrosion resistance of the material of the shell.
- 1.18 By Pass
- Unless otherwise noted, by-pass requirement for gate valves shall be under -

150 Class	:	on sizes 26" and above
300 Class	:	on sizes 16" and above
600 Class	:	on sizes 6" and above
900 Class	:	on sizes 4" and above
1500 Class	:	on sizes 4' and above
2500 Class	:	on sizes 3" and above
 - By-pass valve shall be a globe valve.
 - Contractor shall supply the by-pass valve duly tested and fitted to the main valve. By-pass attachment to the main valve body shall not be screwed. All fillet welds for by-pass installation shall be 100% examined by DP / MP test.
- 1.19 Spiral wound bonnet gasket is to be provided with inner / outer ring except when encapsulated gaskets type body bonnet joints are employed. Outer ring may be avoided in case of non-circular spiral wound gasket used in 150#

valve provided the outermost layer of spiral touches the bolts ascertaining the centering.

1.20 Pressure Test

- Valves covered under API codes shall be tested as per API 598 unless otherwise specified in the applicable valve code.
- Valves covered under BS code shall be tested as per BS 6755 unless otherwise specified in the applicable valve codes.

1.21 For all austenitic stainless valves, inter-granular corrosion test shall have to be conducted as per following: -

- ASTM A 262 Practice 'E' with acceptance criteria of "60 mils / year (max.)".
- OR
- ASTM A 262 practice 'E' with acceptance criteria of "No cracks as observed from 20X magnification U & Microscopic structure to be observed from 250X magnification".

1.22 When specifically asked for high temperature application of some grades of austenitic stainless steel (like SS 309, 310, 316, 316H etc.) ASTM A 262 practice 'C' with acceptance criteria "15 MILS/YEAR" shall have to be conducted. When testing is conducted as per practice 'E' photograph of microscopic structure shall be submitted for record.

1.23 For the IGC test as described in 1.16.1 & 1.16.2 two sets of samples shall be drawn from each solution treatment lot, one set corresponding to highest carbon content and other set corresponding to the highest rating/ thickness.

2.0 OPERATION

2.1 Valves shall be supplied with gear operations based on the following requirements:

Valve Types	Class	Size Requiring Gear Operation
Gate & Diaphragm Valves	150	14" and larger
	300	14" and larger
	600	12" and larger
	900	6" and larger
	1500	3" and larger
	2500	3" and larger
Globe Valves	900	6" and larger
	1500	3" and larger
	2500	3" and larger
Butterfly Valves	150	10" and larger
	300	6" and larger

2.2 Gear operator shall be as under with position indicators for open / close positions, with limit stops.

For Gate / Globe / Diaphragm Valves	Totally enclosed bevel gear in grease case with grease nipples/ plug
For Butterfly Valves	Totally enclosed helical worm gear or combination of helical worm and spur gear in grease case with grease nipples/ plugs.

2.3 Gear operators shall be so designed to operate effectively with the differential pressure across the closed valve equal to the cold non-shock pressure rating.

2.4 Butterfly valves even with wrench or lever operators shall have "open" and "closed" position indicators with limit stops.

2.5 Hand wheel diameter shall not exceed 750 mm and effort to operate shall not exceed 35 kg at hand wheel periphery. In case these limits cannot be satisfied for any valve, a gear operation shall be provided.

3.0 **INSPECTION AND TESTING**

3.1 All valves and valves operators shall be subject to stage wise and final inspection by third party inspection agency (at Contractor's cost). However, Company reserves the right to depute its authorized / representative in addition to third party inspection agency. Minimum 15 days notice shall be given to Company for all shop inspection and testing.

3.2 All the mandatory shop tests and inspection required by the respective data sheet and applicable standards & codes etc. shall be carried out.

3.3 The extent of inspection by shall be as under. However the exact extent with hold points shall be decided during review of the inspection plan to be submitted to Company as part of the post-order documentation.

3.4 Valves under NACE should follow the requirements of MR-01-75

FORGED VALVES

- Visual and dimensional inspection
- Review of material test certificates
- Any mandatory or supplementary test
- Hydrostatic test of all valves
- Strip check on 1% of total ordered quantity of valves at random to verify compliance with specification requirements.

CAST STEEL VALVES

- Visual and dimensional inspection
- Review of material test certificates

- Review of radiographs / radiographic reports and reports of any other NDT tests, wherever applicable as per data sheets
- Any mandatory or supplementary tests
- Hydrostatic test 100% for body
- Strip check on 1% of total ordered quantity of valves at random to verify compliance with specification requirements.

3.5 For motor /actuator operated valves, functional / operational checks as per the requirements of the specifications shall be made on each valve.

4.0 **RADIOGRAPHY OF CAST VALVES**

4.1 When specifically not mentioned in individual data sheets, valves castings shall undergo radiographic examination as specified hereunder:

MATERIAL	RATING	SIZE RANGE	RADIOGRAPHY
All	150#	24" and below	Nil
	150#	26" and above	100%
	300#	16" and below	Nil
	300#	18" and above	100%
	600# and above	All sizes	100%

4.2 Radiography procedure areas of casting to be radiographed shall be as per ANSI B 16.34 and acceptance criteria shall be as per ANSI B 16.34 Annexure -B. However for areas of casting to be radiographed for types of valve not covered in ANSI B 16.34, Contractor shall enclose details of areas to be radiographed in line with ANSI B 16.34.

5.0 **IBR VALVES**

5.1 All valves described as "IBR Valves" shall be in accordance with the latest IBR (Indian Boiler Regulations) as well as the other requirements specified in the specification.

5.2 For BW / SW end carbon steel valves under "IBR", the chemical composition shall conform to the following:

Carbon (Max.) : 0.25%
 Others (S, B, Mn) : As per IBR

Above composition is not applicable for non-IBR valves.

5.3 For all "IBR Valves", test certificate in form III-C shall be furnished duly signed by IBR inspection authority or an IBR approved representative.

5.4 All valves shall be painted red.

6.0 **MARKING**

6.1 Valves markings, symbols, abbreviations, etc. shall be in accordance with

MSS-SP-25 or the standard referred to in the specifications as applicable Manufacturer's name, valve size and rating, material designation, nominal size, direction of flow (if any) etc. shall be integral on the body.

6.2 Each valve shall have a corrosion resistant tag giving size and valve tag/code no. securely attached on the valve body.

6.3 Paint or ink used for marking shall not contain any harmful metal or metal salts such as zinc, lead or copper which may result in corrosive attack on heating.

6.4 Carbon steel valves shall be painted with two coats of red oxide zinc chromate primer.

6.5 All alloy steel high temp valves shall be painted with heat resistant silicone paint suitable for intended temperature.

7.0 **DESPATCH**

7.1 Valves shall be dry, clean and free from moisture, dirt and loose foreign material of any kind.

7.2 Valves shall be protected from rust, corrosion and any mechanical damage during transportation, shipment, and storage.

7.3 Rust preventative applied on machined surfaces to be welded shall be easily removable with a petroleum solvent or shall not be harmful to welding.

7.4 Each end of valves shall be protected as follows:

Flange Face	:	Wood, plastic or metal cover
Beveled End	:	Wood, plastic or metal cover
SW / Screwed End	:	Plastics cap

7.5 End protectors to be used on flange faces shall be attached by at least three bolts or wires through bolt holes and shall not be smaller than the outside diameter of the flange. Plastic caps for SW / Screwed and valves shall be press fit type.

7.6 End protectors to be used on beveled ends shall be securely attached.

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SPECIFICATION FOR SHOP & FIELD PAINTING

SPECIFICATION NO.: MEC/S/05/21/07




**(OIL & GAS SBU)
MECON LIMITED
DELHI 110 092**

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C O N T E N T S

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6.0	PAINT MATERIALS
7.0	PAINTING SYSTEMS
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7.2	REPAIR OF PRE-ERECTION/ FABRICATION AND SHOP PRIMING AFTER ERECTION/ WELDING FOR CARBON STEEL, LOW TEMPERATURE CARBON STEEL & LOW ALLOY STEEL, ITEMS IN ALL ENVIRONMENTS.
8.0	FIELD PAINT SYSTEM FOR NORMAL CORROSIVE ENVIRONMENT (FOR CARBON STEEL, LOW TEMPERATURE CARBON STEEL & LOW ALLOY STEEL)
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10.0	FIELD PAINT SYSTEM FOR HIGHLY CORROSIVE AREA (FOR CARBON STEEL, LOW ALLOY STEEL) EXTERNAL SURFACE OF UNINSULATED COLUMNS, VESSELS, HEAT EXCHANGERS, BLOERS, PIPING, PUMPS, TOWERS, COMPRESSORS, FLARE LINES, STRUCTURAL STEEL ETC.
11.0	FIELD PAINT SYSTEM FOR CARBON STEEL STORAGE TANKS (EXTERNAL) FOR ALL ENVIRONMENTS
12.0	FIELD PAINT SYSTEM FOR CARBON STEEL AND LOW ALLOY STEEL STORAGE TANK (INTERNAL)
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14.0	PAINTING UNDER INSULATION FOR (HOT, COLD & SAFETY) CARBON STEEL LOW TEMPERATURE CARBON STEEL & STAINLESS STEEL PIPING AND EQUIPMENT IN ALL ENVIRONMENT
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	ANNEXURE-II- LIST OF RECOMMENDED MANUFACTURE'S PRODUCTS.

PREPARED BY:	CHECKED BY:	APPROVED BY:	ISSUE DATE :
(Shalini Singh)	(Sunil Kumar)	(A.K. Johri)	Dec. 2008

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1.0 **GENERAL**

1.1 These technical specifications shall be applicable for the work covered by the contract, and without prejudice to the various codes of practice, standard specifications etc. it is understood that contractor shall complete the work in all respects with the best quality of materials and workmanship and in accordance with the best engineering practice and instructions of Engineer-in-charge.

1.2 Wherever it is stated in the specification that a specific material is to be supplied or a specific work is to be done it shall be deemed that the same shall be supplied or carried out by the contractor.

Any deviation from this standard without within deviation permit from appropriate authority will result in rejection to job.

2.0 **SCOPE**


Scope of work covered in the specification shall include, but not limited to the following.

2.1 This specification defines the requirements for surface preparation, selection and application of paint on external surfaces of equipment, vessels, machinery, piping, ducts, steels structures, external & internal protection of storage tanks for all services RCC Chimney & MS Chimney with or without refractory lining and flare lines etc.

2.2 **Extent of Works**

2.2.1 The following surface and materials shall require shop, pre-erection and field painting.

- a. All uninsulated C. S. & A.S. equipment like columns, vessels, drums, storage tanks, heat exchangers, pumps, compressors, electrical panels and motors etc.
- b. All uninsulated carbon and low alloy piping fitting and valves (including painting of identification marks), furnace, ducts and stacks.
- c. All items contained in a package unit as necessary.
- d. All structural steel work, pipe, structural steel supports, walkways, handrails, ladders, platforms etc.

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- e. RCC/ MS chimneys with or without refractory lining & Flare lines.
- f. Identification colour bands on all piping as required including insulated aluminium clad, galvanised, SS and non-ferrous piping.
- g. Identification lettering/ numbering on all painted surface of equipment/ piping insulated aluminium clad, galvanised, SS and non-ferrous piping.
- h. Marking/ identification signs on painted surfaces of equipment/ piping for hazardous service.
- i. Supply of all primers, paints and all other materials required for painting other than owner's supply.
- j. Over insulation surface of equipments and pipes wherever required.
- k. Painting under insulation for carbon steel and stainless steel as specified.
- l. Repair work of damaged/ preerection/ fabrication shop primer and weld joints at field.


2.2.2 The following surface and materials shall not be painted unless otherwise specified:

- a. Uninsulated austentic stainless steel.
- b. Plastic and/ or plastic coated materials.
- c. Non ferrous materials like aluminium, galvanised "piping", "gratings" and "handrails" etc. except G. I. Towers.

2.3 Documents

2.3.1 The contractor shall perform the work in accordance with the following documents issued to him for executions of work.

- a. Bill of quantities for piping, equipment, machinery and structure etc.
- b. Piping line list.
- c. Painting specifications including special civil defence requirement.

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2.4 Unless otherwise instructed final painting on pre-erection/ shop primed pipes and equipments shall be painted in the field, only after mechanical completion and testing on system are completed as well as, after completion of steam purging wherever required.

2.5 Changes and deviations required for any specific job due to clients requirement or otherwise shall be referred to MECON for deviation permit.

3.0 CODES & STANDARDS

3.1 Without prejudice to the provision of clause 1.1 above and the detailed specifications of the contract, the following codes and standards shall be followed for the work covered by this contract.


IS:5	:	Colour coding
IS-101	:	Methods of test for ready mixed paint and enamels.
IS-2379:1990	:	Indian standard for pipe line Identification –Colour code.
ASTM Vol. 6.01 and 6.03	:	American standard test methods for Paints and coatings.
ANSI A 13.1-1981	:	Scheme for Identification of piping systems : American National Standard Institution.

3.2 Surface Preparation Standards:

Following standards shall be followed for surface preparations:

3.2.1 Swedish Standard : SIS-05 5900-1967/ ISO-8501-1-1998 (Surface preparation standards for painting steel surfaces).

This standard contains photographs of the various standards on four different degrees of rusted steel and as such is preferable for inspection purpose by the Engineer-in-Charge.

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3.2.2 Steel structure painting Council, U.S.A (surface preparations specifications (SSPC-SP).

3.2.3 British standard (surface finish or Blast-cleaned for painting) BS:4232

3.2.4 National Associations of Corrosion Engineers, U.S.A. (NACE)

3.2.5 Various International Standards equivalent to swedish Standard for surface preparation are given in Table-I.

3.3 The contractor shall arrange, at his own cost, to keep a set of latest edition of any one of the above standards and codes at site.

3.4 The paint manufacturer's instructions shall be followed as far as practicable at all times. Particular attention shall be paid to the following:

- a. Instructions for storage to avoid exposure as well as extremes of temperature.
- b. Surface preparations prior to painting.
- c. Mixing and thinning.
- d. Application of paints and the recommended limit on time intervals between coats.


4.0 EQUIPMENT

4.1 All tools, brushes, rollers, spray guns, abrasive materials hand/ power tools for leaning and all equipments, scaffolding materials, shot/ wet abrassive blasting, water blasting equipments & air compressors etc. required to be used shall be suitable for the work and all in good order and shall be arranged by the contractor at site and in sufficient quantity.

Mechanical mixing shall be used for paint mixing operations in case of two pack systems except that the Engineer-in-Charge may allow the hand mixing of small quantities at his discretion.

5.0 SURFACE PREPARATION, SHOP COAT, COATING APPLICATION & REPAIR AND DOCUMENTATION

5.1 General

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5.1.1 In order to achieve the maximum durability, one or more of following methods of surface preparation shall be followed, depending on condition of steel surface and as instructed by Engineer-in-Charge. Adhesion of the paint film to surface depends largely on the degree of cleanliness of the metal surface. Proper surface preparation contributes more to the success of the paint protective system:

- a. Manual or hand tools cleaning.
- b. Mechanical or power tool cleaning.
- c. Blast cleaning.

5.1.2 Mill scale, rust, rust scale and foreign matter shall be removed fully to ensure that a clean and dry surface is obtained. The minimum acceptable standard in case of manual or hand tool cleaning shall be St. 2 or equivalent, in case of mechanical or power tool cleaning it shall be St. 3 or equivalent, in case of blast cleaning it shall be Sa 2½ or equivalent as per Swedish Standard SIS-055900-1967/ ISO-8501-1-1988. Where highly corrosive condition exists, then blast cleaning shall be Sa3 as per Swedish Standard.


Remove all other contaminants, oil, grease etc. by use of an aromatic solvent prior to surface cleaning.

5.1.3 Blast cleaning shall not be performed where dust can contaminate surfaces undergoing such cleaning or during humid weather conditions having humidity exceeding 85%.

5.1.4 Irrespective of the method of surface preparation, the first coat of primer must be applied on dry surface. This should be done immediately and in any case within 4 hours of cleaning of surface. However, at times of unfavourable weather conditions, the Engineer-in-Charge shall have the liberty to control the time period, at his sole discretion and / or to insist on recleaning, as may be required, before primer application is taken up. In general, during unfavourable weather conditions, blasting and painting shall be avoided as far as practicable.

5.1.5 The external surface of R.C.C. chimney to be painted be dry and clean. Any loose particle of sand, cement, aggregate etc. shall be removed by rubbing with soft wire brush if necessary, acid etching with 10-15% HCL solution about 15 minutes shall be carried out and surface must be thoroughly washed with water to remove acid & loose particles then dry completely before application of paint.

5.2 Procedure of Surface Preparation.

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5.2.1 Blast Cleaning

5.2.1.1 Air Blast Cleaning

The surface shall be blast cleaned using one of the abrasives: AL₂O₂ particles chilled casts iron or malleable iron and steel at pressure of 7kg. Cm² at appropriate distance and angle depending on nozzle size maintaining constant velocity and pressure. Chilled cast iron, malleable iron and steel shall be in the form of shot or grit of size not greater than 0.055" maximum in case of steel and malleable iron and 0.04" maximum in case of chilled iron. Compressed air shall be free form moisture and oil. The blasting nozzles should be venturi style with tungsten carbide or boron carbide as the material for liners. Nozzles orifice may vary from 3/16" to 3/4". On completion of blasting operation, the blasted surface shall be clean and free from any scale or rust and must show a grey white metallic lusture. Primer or first coat of paint shall be applied within 4 hours of surface preparation. Blast cleaning shall not be done outdoors in bad weather without adequate protection or when there is dew on the metal which is to be cleaned, surface profile shall be uniform to provide good key to the paint adhesion (i.e.35to 50μ). If possible vacuum collector shall be installed for collecting the abrasive and recycling.


5.2.1.2 Water Blast cleaning

Environmental, health and safety problems associated with abressive blast cleaning limit the application of air blast cleaning in many installations. In such case water blast cleaning is resorted to.

Water blast cleaning can be applied with or without abressive and high-pressure water blasting. The water used shall be inhibited with sodium chromate/ phosphate. The blast cleaned surface shall be washed thoroughly with detergents and wiped solvent and dried with compressed Air. For effective cleaning abressives are used. The most commonly used pressure for high pressure water blast cleaning for maintenance surface preparation is 3000 to 6000 psi at 35-45 liters/ minute water volume and pressure upto 10000 psi and water volume of 45 liters/ minute provide maximum cleaning.

The wate blast cleaned surface shall be comparable to SSPC-SP-12/ NACE No. 5. The operation shall be carried out as per SSPC guidelines for water blast cleaning. The indicative values for sand injection is

Air : 300 to 400 Cu.ft/ min.

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Water : 5-10 liter/ min. with corrosion inhibitor
Sand : 200-400 lbs/ hr.
Nozzle : 0.5 to 1" dia

Special equipments for water blast cleaning with abrasives now available shall be used.

5.2.2 Mechanical of Power tool cleaning

Power tool cleaning shall be done mechanical striking tools, chipping hammers, grinding wheels or rotating steels wire-brushes. Excessive burnish of surface shall be avoided as it can reduce paint adhesion. On completion of cleaning, the detached rust mill scale etc. shall be removed by clean rags and/ or washed by water or stream and thoroughly dried with compressed air jet before application of paint.

5.2.3 Manual or hand tool cleaning

Manual or hand tool cleaning is used only where safety problems limit the application of other surface preparation procedure and hence does not appear in the specifications of paint systems.


Hand tool cleaning normally consists of the following:

- a. Hand descaling and/ or hammering
- b. Hand scraping
- c. Hand wire brushing

Rust, mill scale spatters, old coating and other foreign matter, shall be removed by hammering, scraping tools, emery paper cleaning, wire brushing or combination of the above methods. On completion of cleaning, loose materials shall be removed from the surface by clean rags and the surface shall be brushed, swept, deducted and blown off with compressed air/ steam to remove all loose matter. Finally the surface may be washed with water and dried for effective cleaning.


5.3 Non compatible shop coat primer

The compatibility of finishing coat should be confirmed from the paint manufacturer. In the event of use of primer such as zinc rich epoxy, inorganic zinc silicate etc. as shop coat the pant system shall depend on condition of shop coat, if shop coat is in satisfactory condition showing no major defects, the shop

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coat shall not be removed. The touch up primer and finishing coat(s) shall be identified for application by Engineer-in-Charge.


- 5.4 Shop coated (coated with primer & finishing coat) equipment should not be repainted unless paint is damaged.
- 5.5 Shop primed equipment and surface will only be 'spot cleaned' in damaged areas by means of power tool brush cleaning and then spot primed before applying one coat of filed primer unless otherwise specified. If shop primer is not compatible with field primer then shop coated primer should be completely removed before applications of selected paints system for particular environment.
- 5.6 For packaged units/ equipment, shop primer should be as per the paint system given in this specification. However, manufacturer's standard can be followed after review.
- 5.7 **Coating Procedure and Application:**
- 5.7.1 Surface shall not be coated in rain, wind or in environment where injurious airborne elements exists, when the steel surface temperature is less than 5° F above dew point when the relative humidity is greater then 85% or when the temperature is below 40° F.
- 5.7.2 Blast cleaned surface shall be coated with one complete application of primer as soon as practicable but in no case later than 4 hrs. the same day.
- 5.7.3 To the maximum extent practicable, each coat of material shall be applied as a continuous film uniform thickness free of probes. Any spots or areas missed in application shall be recoated and permitted to dry before the next coat is applied. Applied paint should have the desired wet film thickness.
- 5.7.4 Each coat shall be proper state of cure or dryness before the application of succeeding coat. Material shall be considered dry for recoating when an additional coat can applied without the development of any detrimental film irregularities such as lifting or loose of adhesion of the under coat. Manufacturer instruction shall be followed for intercoat interval.
- 5.7.5 When the successive coat of the same colour have been specified, alternate coat shall be tinted, when practical, sufficiently to produce enough contrast to indicate complete coverage of the surface. The tinting material shall be compatible with the material and not detrimental to its service life.

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5.7.6 Air spray application shall be in accordance with the following:

- a. The equipment used shall be suitable for the intended purpose, shall be capable of properly atomizing the paint to be applied, and shall be equipped with suitable pressure regulators and gauges. The air caps, nozzles, and needles shall be those recommended by the manufacturer of the equipment for the material being sprayed. The equipment shall be kept in satisfactory condition to permit proper paint application.
- b. Traps or separators shall be provided to remove oil and condensed water from the air. These traps or separators must be of adequate size and must be drained periodically during operations. The air from the spray gun impinging against the surface shall show condensed water or oil.
- c. **Ingredients shall be kept properly mixed in the spray pots or containers during application by continuous mechanical agitation.**
- d. The pressure on the material in the pot and of the air at the gun shall be adjusted for optimum spraying effectiveness. The pressure on the material in the pot shall be adjusted when necessary for change in elevation of the gun above the pot. The atomizing air pressure at the gun shall be high enough to properly atomize the paint but not so high as to cause excessive fogging of paint, excessive evaporation of solvent, or less by overspray.
- e. Spray equipment shall be kept sufficiently clean so that dirt, dried paint, and other foreign materials are not deposited in the paint film.

Any solvents left in the equipment shall be completely removed before applying paint to the surface being painted.
- f. Paint shall be applied in a uniform layer, with overlapping at the edge of the spray pattern. The spray patterns shall be adjusted so that the paint is deposited uniformly. During application the gun shall be held perpendicular to the surface and at a distance which will ensure that a wet layer of paint is deposited on the surface. The trigger of the gun should be released at the end of each stroke.
- g. All runs and sags shall be brushed out immediately or the paint shall be removed and the surface repainted.

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- h. Areas inaccessible to the spray gun shall be painted by brush: if not accessible by brush, daubers or sheepking shall be used.
- i. All nameplates, manufacturer's identification tags, machined surface instrument glass, finished flange faces, control valve items and similar items shall be masked to prohibit coating disposition. If these surface are coated, the component shall be cleaned and restored to its original condition.
- j. Edges of structural shapes and irregular coated surface shall be coated first and an extra pass made later.
- k. If spray gun shown choking, immediately dechoking procedure shall be followed.


5.7.7 Airless spray application shall be in accordance with the following procedure: as per steel structure paint manual vol. 1 & vol. 2. By SSPC, U.S.A., Air less spray relies on hydraulic pressure rather than air atomization to produce the desired spray. An air compressor or electric motor is used to operate a pump to produce pressures of 1,000 to 6,000 psi. Paint is delivered to the spray gun at this pressure through a single hose within the gun, a single paint stream is divided into separate streams, which are forced through a small orifice resulting in atomization of paint without the use of air. This result in more repaid coverage with less overspray. Airless spray usually is faster, cleaner, more economical and easier to use than conventional airspray.

Airless spray equipment is mounted on wheels, and paint is aspirated in a hose that sucks paint from any container, including drums. The unit shall have in built agitator that keep the paint uniformly mixed during the spraying. The unit shall consists of in built strainer. Usually very small quantities of thinning is required before spray. Incase of High Build epoxy coating (two pack), 30:1 pump ratios and 0.020-0.023" tip size will provide a good spray pattern. Ideally fluid hoses should no be less than 3/8" ID and not longer than 50ft to obtain optimum results.

In case of gun choking, decoking steps shall be followed immediately.

5.7.8 Brush application of paint shall be in accordance with the following:

- a. Brushes shall be of a style and quality that will enable proper application of paint

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- b. Round or oval brushes are most suitable for rivets, bolts, irregular surfaces and rough or pitted steel. Wide flat brushes are suitable for large flat areas, but they shall not have width over five inches.
- c. Paints shall be applied into all corners.
- d. Any runs or sags shall be brushed out.
- e. There shall be minimum of brush marks left in the applied paint
- f. Surface not accessible to brushes shall be painted by spray, duubers, or sheepkin.

5.7.9 Manual application by sling (where 6 O' clock position of pipe is not approachable)


A canvas strip (alternatively a tinplate strip) about 450mm wide and 1.5m long is held under the pipe by two men. Liquid coating is poured on the sling at each side of the pipe. The men holding this sling move it up and down and walk slowly forward while fresh coating is poured on the pipe and they manipulate the sling so that an even coating is obtained all round the bottom. This work shall be done very carefully and by experienced personnel. There shall be no formation of "Whiskers" and holes in the coating. The coating film shall be inspected by mirror.

5.7.10 For each coat the painter should know the WFT corresponding to the specified DFT and standardise the paint application technique to achieve the desired WFT. This is to be ensured in the qualification trial.

5.8 **Drying of Coated Surface**

5.8.1 No coat shall be applied until the preceding coat has dried. The material shall be considered dry for re-coating when another coat can be applied without the development of any film irregularities such as lifting or loss of adhesion of undercoats. Drying time of the applied coat should not exceed maximum specified for it as a first coat; if it exceeds the paint material has possibly deteriorated or mixing is faulty.

5.8.2 No paint shall be force dried under condition which will cause checking, wrinkling blistering formation of pores, or detrimentally after the condition of the paint.

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No drier shall be added to a paint on the job unless specifically called for in the manufacturer's specification for the paint.

Paint shall be protected from rain, condensation, contamination snow and freezing until dry to the fullest extent practicable.

5.9 **Repair of damaged paint surface.**

5.9.1. Where paint has been damaged in handling and in transportation, the repair of damaged coating of pre-creation/ fabrication shall be as given below.

5.9.2. Repair of damaged inorganic zinc silicate primer after erection/ welding:

Quickly remove the primer from damaged area by mechanical scraping and emery paper to expose the white metal. Blasts clean the surfaces possible. Feather the primer over the intact adjacent surface surrounding the damaged area by emery paper.

5.9.3 Repair of damaged pre-erection and shop priming in the design temperature of 90° C to 500° C.

- Surface preparation shall be done as per procedure 5.9.2

- One coat of F-9 shall be applied wherever damaged was observed on pre-erection/ pre-fabrication/ shop primer of inorganic zinc silicate coating (F-9) shall not be applied if damaged area is not more than 5 x 5 cm.

5.10 **PAINT APPLICATION**


5.10.1 Shop priming/ pre-erection priming with F9 of F12 shall be done only on blasted surface.

5.10.2 Shop priming/ pre-erection priming with F-9 or F-12 shall be done only with airless spray.

5.10.3 For large flat surface field painting shall be done by airless spray otherwise brush can be used.

5.11 **Assessment of Painting Requirement**

The paint system to be applied for a specific job shall be arrived as sequentially as given below :


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- Identify the environment from area classification details and chose the appropriate table.
- Identify the design temperature from the technical documents.
- Identify the specific field paint system and surface preparation requirement from the above identified table and temperature range.
- Identify the shop priming requirement from Table .1 based on compatibility of the above paint system.
- Identify the need of repair of shop primer and execute as per Table .2.

5.12


Documentation.

- written quality plan with procedure for qualification trials and for the actual work.
- daily progress report with details of weather condition, particular of application no of coats and type of materials applied, anomalies, progress of work versus programme.
- Result of measurement of temperature relative humidity, surface profile, film thickness, holiday detection, adhesion tests with signature of appropriate authority.
- particular of surface preparation and paint application during trials and during the work.
- details of non-compliance, rejects and repairs.
- Type of testing equipments and calibration.
- Code and batch numbers of paint material used.

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**TABLE-I (for clause 5.0)
SURFACE PREPARATION STANDARDS**

S. NO.	DESCRIPTION	VARIOUS INTERNATIONAL STANDARDS (EQUIVALENT)			REMARK
		SWISS STS-05-5900 19	SSC-S	BRITISH ST BS-232: 19	
1.	<p>OR TO C</p> <p>OF REST OOS</p> <p>SC OF OOS T, C</p> <p>SCR, S WR</p> <p>BR S, SFC S O S</p> <p>F T C S</p>	SSC-S			<p>T S T O S</p> <p>W T S R F C S</p> <p>O S TO O R</p> <p>T O S R C C O T O</p> <p>W O T R T O S</p> <p>C O T B O T T O S</p> <p>S O F S O T C</p> <p>R T</p> <p>T</p>
2.	<p>C OR OW R TO C</p> <p>R O OF OOS RST, OOS</p> <p>SC OF OOS T TO R</p> <p>S C F B OW R TO C</p> <p>SC, S, W R B R S</p> <p>S R F C S O O F O S T,</p> <p>T C S</p>	SSC-S-2	-	-	-O-
		ST.3	SSC-S-3		

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T B C (for clause 5.0)
S R F C R R T O S T R S

S. NO.	DESCRIPTION	VARIOUS INTERNATIONAL STANDARDS (EQUIVALENT)			REMARKS
		SW S S-05-5900 19	SS C-S S S	BRIT S ST BS-232: 19	
3.	B C (R W T R) T R F O R C O O R R S O F B C				
3.1	W T B C T O W T C S S R O F S B R S T, S S C T F O R T T R 100 C S S W T S R S R F C R O F.	S-3	SS C-S-5	F R S T Q	W R T R C S R F C C B C T F O R R O O F O F S S T S.
3.2	R W T B C T O W T C S S, T T 95 O F F R O F S B R S W T S R S R F C R O F.	S 2	SS C-S-10	S C O Q	T R Q R F O R C C R S S T T S S T S C C S O O, O, O, O R T B S O R C S C T T S, S O F O R C O T O S S O F R C O R R O S C O T I O N S T O O B T S R O F O F T S S T.

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T B (for clause 5.0)
S R F C R R T O S
VARIOUS INTERNATIONAL STANDARDS
(EQUIVALENT)


S. NO.	DESCRIPTION	VARIOUS INTERNATIONAL STANDARDS (EQUIVALENT)			REMARKS
		SW S ST S-05-5900 19	SS C-S S	BR T S ST BS-232: 19	
3.3	CO RC B ST B ST C T T ST TWO T R OF C C T OF S R F C R S F R OF S B R S S W T S R S R F C R OF				FOR ST R Q R TO B T W T C O T O T S FOR O S R TO C O R R O S T O S R FOR O R F OF T T S T S
3.1	BR S-OFF B ST B ST C T W T C O S S, R O F S B R ST, S C, T FOR T T R, S R F C R OF S O T S O T	S-2	SS C-S- 0.3	T R Q	
		S-1	SS C-S- 0.1		

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PAINT MATERIALS

□aint manufacturers shall furnish all the characteristics of paint material on printed literature, alongwith the test certificate for all the specified characteristics given in this specifications. □ll the paint materials shall be of first quality and conform to the following general characteristics as per the table □.1, □.2 and □.3.

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**PAINT MATERIALS
TABLE NO.: 6.1 PRIMERS**

S. No.	Technical Name	Volume solids (approx) FT (dry film thickness) per coat (approx) Theoretical covering capacity in 2/ coat/ litre (approx) Weight per litre in kgs/ litre (approx) Touch dry at 30° C (approx) Hard dry at 30° C (approx)	Chlorinated rubber phosphate primer Single pack, air drying chlorinated rubber based medium plasticised with unsaponifiable plasticizer, pigmented with zinc phosphate.	Chlorinated rubber phosphate primer Two pack polyvinyl butyral resin medium cured with phosphoric acid solution pigmented with zinc tetroxy chromate.	epoxy zinc phosphate primer Two component polyamide cured epoxy resin medium, pigmented with zinc phosphate.
1.		30 minutes in.: 2 hrs. max.: no limitation			
2.		30 minutes in.: 2 hrs. max.: 2 hrs.			
3.		30 minutes in.: 2 hrs. max.: 2 hrs.			
4.		30 minutes in.: 2 hrs. max.: 2 hrs.			
5.		30 minutes in.: 2 hrs. max.: 2 hrs.			
6.		30 minutes in.: 2 hrs. max.: 2 hrs.			
7.		30 minutes in.: 2 hrs. max.: 2 hrs.			
8.		30 minutes in.: 2 hrs. max.: 2 hrs.			
9.		30 minutes in.: 2 hrs. max.: 2 hrs.			
10.		30 minutes in.: 2 hrs. max.: 2 hrs.			
11.		30 minutes in.: 2 hrs. max.: 2 hrs.			

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**PAINT MATERIALS
TABLE NO.: 6.2FINISH PAINT**


S. No	DESCRIPTION	F-2	F-3	F-6	F-7
1.	Technical name	<input type="checkbox"/> acrylic polyurethane finish paint	Chlorinated rubber based finish paint	<input type="checkbox"/> epoxy- <input type="checkbox"/> high build finish paint	<input type="checkbox"/> high build coaltar epoxy coating.
2.	Type and composition	Two-pack aliphatic isocyanate cured acrylic finish paint	Single pack plasticised chlorinated rubber based medium with chemical and weather resistant pigments.	Tow- pack polyamide/ polyamine cured epoxy resin medium suitable pigmented.	Tow pack polyamide cured epoxy resin blended with coal/ tar medium, suitably pigmented.
3.	<input type="checkbox"/> volume solids (approx)	<input type="checkbox"/> 0	<input type="checkbox"/> 0	<input type="checkbox"/> 2	<input type="checkbox"/> 5
<input type="checkbox"/>	<input type="checkbox"/> FT (<input type="checkbox"/> dry film thickness) per coat (approx)	30- <input type="checkbox"/> 0 μ	<input type="checkbox"/> 0-50 μ	100-125 μ	100-125 μ
5.	Theoretical covering capacity in <input type="checkbox"/> 2/ coat/ litre (approx)	10-13	<input type="checkbox"/> -10	5- <input type="checkbox"/>	5-2- <input type="checkbox"/> 5
<input type="checkbox"/>	Weight per litre in kgs/ litre (approx)	1.3	1.2	1. <input type="checkbox"/>	1.5
<input type="checkbox"/>	Touch dry at 30° C (approx)	1 hrs.	30 minutes	3 hrs.	<input type="checkbox"/> hrs.
<input type="checkbox"/>	<input type="checkbox"/> hard dry at 30° C (approx)	Overnight	<input type="checkbox"/> hrs.	Overnight	<input type="checkbox"/> hrs.
9.	Overcoating interval (approx)	<input type="checkbox"/> in.: Overnight (12) hrs. <input type="checkbox"/> ax.: <input type="checkbox"/> unlimited	<input type="checkbox"/> in.: Overnight <input type="checkbox"/> ax.: <input type="checkbox"/> unlimited	<input type="checkbox"/> in.: Overnight <input type="checkbox"/> ax.: 5 day	<input type="checkbox"/> in.: 2 <input type="checkbox"/> hrs. <input type="checkbox"/> ax.: 5 day
10.	<input type="checkbox"/> pot life at 30° C for two component paints (approx).	<input type="checkbox"/> - <input type="checkbox"/> hrs.	<input type="checkbox"/> not applicable	<input type="checkbox"/> - <input type="checkbox"/> hrs.	<input type="checkbox"/> - <input type="checkbox"/> hrs.
11.	Temperature Resistance	<input type="checkbox"/> 0°C	<input type="checkbox"/> 0°C	<input type="checkbox"/> 0°C	125°C

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**PAIN T MATERIALS
TABLE NO.: 6.3 FINISH PAINTS**

S. No	DESCRIPTION	F-8	F-9	F-11	F-12
1.	Technical name Self priming type surface tolerant high build epoxy coating (Complete rust control coating)	<input type="checkbox"/> Inorganic <input type="checkbox"/> Silicate coating	<input type="checkbox"/> Synthetic based aluminum paint suitable upto 250°C dry temperature	<input type="checkbox"/> eat resistant medium pack aluminum paint suitable upto 500° C temperature	
2.	Type and composition Two-pack epoxy resin based suitable pigmented and capable of pigmented and capable of adhering to manually prepared surface and old coating	<input type="checkbox"/> two-pack air drying self-curing solvent based inorganic zinc silicate coating.	<input type="checkbox"/> eat resistant synthetic medium based two pack aluminum paint suitable upto 250°C	Single pack silicone resin based medium with aluminum flakes.	
3.	<input type="checkbox"/> Volume solids (approx) <input type="checkbox"/> FT (Dry film thickness) per coat (approx)	<input type="checkbox"/> 0 <input type="checkbox"/> 5- <input type="checkbox"/> 5μ	25 20-25μ	20 20-25μ	
5.	Theoretical covering capacity in <input type="checkbox"/> 2/ coat/ litre	<input type="checkbox"/> 9	10-12	<input type="checkbox"/> 10	
<input type="checkbox"/>	Weight per litre in kgs/ litre (approx)	2.3	1.2	1.1	
<input type="checkbox"/>	Touch dry at 30° C (approx)	30 min.	3 hrs.	30 min.	
<input type="checkbox"/>	Hard dry at 30° C (approx)	12 hrs.	12 hrs.	2 hrs.	
9.	Overcoating interval (approx)	<input type="checkbox"/> in.: <input type="checkbox"/> hrs. at 20° C and 50 <input type="checkbox"/> R. <input type="checkbox"/> ax.: <input type="checkbox"/> unlimited	<input type="checkbox"/> in.: <input type="checkbox"/> hrs. <input type="checkbox"/> ax.: <input type="checkbox"/> unlimited	<input type="checkbox"/> in.: <input type="checkbox"/> hrs. <input type="checkbox"/> ax.: <input type="checkbox"/> unlimited	

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S. No	DESCRIPTION	F-8	F-9	F-11	F-12
10.	<input type="checkbox"/> ot life (approx) at 30° C for two component paints (approx). 90 min.	<input type="checkbox"/> - <input type="checkbox"/> hrs.	<input type="checkbox"/> ot applicable	<input type="checkbox"/> ot applicable	<input type="checkbox"/> ot applicable
11.	Temperature resistance <input type="checkbox"/> 0° C	<input type="checkbox"/> 00° C	<input type="checkbox"/> 250° C	<input type="checkbox"/> 500° C	<input type="checkbox"/> 500° C

F-1 Specially formulated polyamine cured coal tar epoxy suitable for 5° C to 125° C for application under insulation
 F-15: Two pack cold cured epoxy phenolic coating suitable for 5° C to 125° C for application under insulation
 F-1 oxy siloxane anser coat 3

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**PAINT MATERIALS
TABLE NO. 6.4 FINISH PAINTS**

Sl. No.	Description	F-14	F-15	F-16	F-17
1.	Technical name	polyamine cured coal tar epoxy	Two-component epoxy phenolic coating cured with polyamine adduct hardner system (primer intermediate coat finish paint)	ambient temperature curing epoxy Siloxane coating / high build cold applied inorganic copolymer based aluminum coating suitable for under insulation coating of CS and SS piping for high temperature service.	Two component solvent free type high build epoxy phenolic / novalac epoxy phenolic coating cured with polyamine adduct hardner system.
2.	Type composition	Specially formulated polyamine cured coal tar epoxy suitable for application under insulation	Two pack ambient temperature curing epoxy phenolic coating system suitable for application under insulation of CS / SS piping.	mercoat 3 from meron products, S / Berger 93 from Berger paints Ltd., or Intertherm 51 CS from kzo obel coating. Note :	Two component solvent free type high build epoxy phenolic / novalac epoxy phenolic coating cured with polyamine adduct hardner system.
3.	Volume Solids (minimum)	0	5	0	9-100
	FT (dry Film thickness) per coat (minimum)	125 μm	5 - 100 μm	5 - 100 μm	125- 150 μm
5.	Theoretical covering capacity in m ² / coat / litre (minimum)	5.5	5-15	0-10	5-10
	Weight per liter in kgs/litre (max paint) (minimum)	1.5	1.	1.3	1.
	Touch dry at 30°C (maximum)	hrs.	2 hrs.	1 hr.	2 hrs.

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Sl. No.	Description	F-14	F-15	F-16	F-17
	Hard dry at 30°C (maximum) Full cure 30°C (for immersion / high temp. service)	2 hrs. 1 hrs. (days)	2 hrs. 1 hrs. (days)	1 hrs. -	2 hrs. 1 hrs. (days)
9.	Over-coating interval	in. hrs. ax. 5 days	in. 3 hrs. ax. 21 days	in. 1 hrs. ax. applicable ot	in. 1 hrs. ax. 21 days.
10.	ot life at 30°C for two component paints (minimum)	hrs.	1.5 hrs.	1 hr.	1 hr.
11.	Temperature Resistance (min.)	-5°C to 125°C under insulation	-5°C to 125°C under insulation (ote : 5)	p to 00°C for CS SS under insulation	-5°C to 150°C for immersion service

Notes:


- Covering capacity and FT depends on method of application. Covering capacity specified above are theoretical. Following the loose during the application, minimum specified FT should be maintained.
 - All primers and finish coats should be cold cured and air drying unless otherwise specified.
 - All paints shall be applied in accordance with manufacturer's instruction for surface preparation, intervals, curing and application. The surface preparation, quality and workmanship should be ensured.
- Technical data sheets for all paints shall be supplied at the time of submission of quotations.

List of recommended manufacturers

The paint shall conform to the specifications given above and the best quality in their products range of the manufacturers listed in annexure-

7.0 PAINT SYSTEM

The paint system should vary with type of environment envisaged in and around the plants. Three types of environment as given below are considered for selection of paint system. The paint system is also given for specific requirements.

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Primers & finish coats covered in table nos. 7.0 to 15.0

PRIMERS

- R-1 : Chlorinated Rubber Zinc Phosphate Primer
R-2 : Zinc Primer/ Wash Primer
R-3 : Epoxy Zinc Phosphate Primer

FINISH COATS/ TOP COATS

- F-1 : Acrylic- Polyurethane finish paint
F-2 : Chlorinated Rubber Finish Paint
F-3 : High Build Epoxy finish coating
F-4 : High Build Coal Tar epoxy coating
F-5 : Self-priming surface tolerant high build epoxy coating
F-6 : Inorganic Zinc Silicate Coating.
F-7 : Heat resistant Synthetic medium based Aluminum paint.
F-8 : Heat resistant Silicone Aluminum paint.
F-9 : Specially formulated polyamine-cured coal for epoxy coating
F-10 : Epoxy phenolic coating
F-11 : Epoxy Siloxane Coating : Mercoat 300
F-12 : Two component solvent free type high built epoxy phenolic / novalac epoxy phenolic coating cured with polyamine.


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TABLE 7.1: PRE-ERECTION/ PRE-FABRICATION AND SHOP PRIMING FOR CARBON STEEL, LOW TEMPERATURE CARBON STEEL & LOW ALLOY STEEL, STEEL STRUCTURE, PIPING AND EQUIPMENT ETC.

S. No.	□□S□□□T□□□□R□□□ °C	SURFACE PREPARATION	PAINT SYSTEM	TOTAL DFT IN MICRONS (MIN.)	REMARKS
□1.1	-90 TO □00	SS□C-S□-10	1 CO□T OF F-9	□5-□5	□□ overcoating is to be done
□1.2	□01 To 500	SS□C-S□-10	1 CO□T OF F-12	□0-50	Finish Coat at Site
□1.3	□□ to 150 for Structures, hand rails and □rating only	SS□C-S□-3	1 CO□T OF F-9 OR 2 CO□TS OF □-□ □ □0μ □FT / CO□T	□5-□5 OF F-9 OR □0 (□-□)	For □amaged □rea of more than 5 x 5 Cm2.

TABLE 7.2: REPAIR OF PRE-ERECTION/ PRE- FABRICATION AND SHOP PRIMING AFTER ERECTION/ WELDING FOR CARBON STEEL LOW TEMPERATURE CARBON STEEL & LOW ALLOY STEEL, ITEMS IN ALL ENVIRONMENT.

S. No.	DESIGN TEMPERATURE IN °C	SURFACE PREPARATION	□□□□T S□□ST□□	TOTAL DFT IN MICRONS (MIN.)	REMARKS
□2.1	-90 TO □00	SS□C-S□-3 (FOR R□□□R O□□□) SS□C-S□-10	1 CO□T OF F-9	□5-□5	FOR □□□□□□□□ □R□□ OF □OR□ T□□□ 5□5 C□.
□2.2	□01 TO 550	SS□C-S□-3	1 CO□T OF F-12	20	FOR □□□□□□□□ □R□□ OF □OR□ T□□□ 5□5 C□.



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TABLE 8.0: FIELD PAINT SYSTEM FOR NORMAL CORROSIVE ENVIRONMENT (FOR CARBON STEEL, LOW TEMPERATURE CARBON STEEL & LOW ALLOY STEEL)

FOR CORROSION RESISTANT OFF SITE STRUCTURES SURFACE OF STRUCTURES, COSS, COATS, BLOWERS, TOWERS, CROSSERS, STRUCTURES, WORCS, RCC CONCRETE WJ OR WOOD FACTORY CONCRETE (CONCRETE), CONCRETE TOSS, FERR CONCS, O.O. COATS, TREATMENT OF TSS ETC. FOR CORROSION RESISTANT ROOF TOSS TOSS CONCRETE CONCRETE

S. NO.	DESIGN TEMPERATURE IN C	SURFACE PREPARATION	PAINT SYSTEM		TOTAL DFT IN MICRONS (MIN.)	REMARKS
			FIELD PRIMER	FURTHER COAT		
01	-90 TO 15	SSC-S-10	ROOF OF F-FBRIT ROOF 1 COAT OF F-9 5-5μ FT/COAT	0	5-5	over coating to be done follow repair procedure only on damaged areas of pre-erection/ pre-fabrication primer/ coating F-9
02	-1 TO 0	SSC-S-10	ROOF OF F-FBRIT ROOF 1 COAT OF F-9 5-5μ FT/COAT 2 COATS OF 2 0μ FT/COAT 2 0 0 0	2 COATS OF F-3 0 μ FT/COAT 2 0 0 0	225	
03	1 TO 0	SSC-S-10	ROOF OF F-FBRIT ROOF 1 COAT OF F-9 5-5μ FT/COAT 2 COATS OF 2 0μ FT/COAT 2 0 0 0	1 COATS OF F-3 100 μ FT/COAT	25	

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S. NO.	DESIGN TEMPERATURE IN C	SURFACE PREPARATION	PAINT SYSTEM		TOTAL DFT IN MICRONS (MIN.)	REMARKS
			FIELD PRIMER	F S T		
01	TO 250	SSC-S-10	R OF R-FBRCT R 1 COAT OF F-9 5-5μ FT/COAT	3 COATS OF F-11 20 μ FT/COAT 3 20 00	125	
05	251 TO 00	SSC-S-10	R OF R-FBRCT R 1 COAT OF F-9 5-5μ FT/COAT	2 COATS OF F-12 20 μ FT/COAT 2 20 00	105	
00	01 TO 500	SSC-S-10	R R S 2.2	2 COATS OF F-12 20 μ FT/COAT 2 20 00	00	

01 : FOR SC OR WT RFRCTOR 3, 5 S B FOW.
 02 : FOR T SRF OF RCC : 2 COATS OF F- 100 μ FT/ COAT TO OBBT 2 100 200μ S B SRF R S 1.5
 03 : W R R R R S. O. 3 S B S FOR 1°C TO 0°C S. O. 2 W B S.

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TABLE 10.0: FIELD PAINT SYSTEM FOR HIGHLY CORROSIVE (FOR CARBON STEEL, LOW TEMPERATURE CARBON STEEL & LOW ALLOY STEEL) EXTERNAL SURFACES OF UNINSULATED COLUMNS, VESSELS, HEAT EXCHANGERS, BLOWERS, PIPING PUMPS, TOWERS, COMPRESSORS, FLARE LINES, STRUCTURE STEEL ETC.

□□□□ OS□□ TO S□□□□□□□□ OR F□□□□ S OF □C□□S□□ S□□T□ W□T□R □□□□□□□□□□T, C□□OR□□□□TC.

S. NO.	DESIGN TEMPERATURE IN °C	SURFACE PREPARATION	PAINT SYSTEM		REMARKS
			FIELD PRIMER	FINISH PAINT	
10.1	-90 TO □15	SS□C-S□-10	R□□□R OF □R□-F□BR□□T□□ □R□□R 1 CO□T OF F-9 □5-□5μ □FT/CO□T	□O□□	□5-□5 Repair of pre-erection/ fabrication primer shall be followed. □o over coating is allowed
10.2	-1□ TO □0	SS□C-S□-10	R□□□R OF □R□-F□BR□□T□□ □R□□R 1 CO□T OF F-9 □5-□5μ □FT/ CO□T □ 1 CO□TS OF □-□ □ □0 μ □FT/CO□T	2 CO□TS OF F-□ □ 100μ □FT/ CO□T □ 2 □ 100□ 200 □ 1 CO□T OF F-2 □ □0μ □FT/ CO□T	3□5 Surface preparation is required only for repairing of damaged pre-erection/ fabrication primer.
10.3	□1 TO □00	SS□C-S□-10	R□□□R OF □R□-F□BR□□T□□ □R□□R 1 CO□T OF F-9 □5-□5μ □FT/CO□T	2 CO□TS OF F-12 □ 20 μ □FT/ CO□T 2 □ 20 □□	105
10.□	□01 TO 500	SS□C-S□-10	R□□□R □S□□R □2.2	3 CO□TS OF F-12 □ 20 μ □FT/ CO□T 2 □ 20 □□	□0


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TABLE 12.0 : FIELD PAINT SYSTEM FOR CARBON STEEL AND ALLOY STORAGE TANK: (INTERNAL)

S. NO.	DESIGN TEMPERATURE IN °C	SURFACE PREPARATION	PAINT SYSTEM		TOTAL DFT IN MICRONS (MIN.)	REMARKS
			FILED PRIMER	FINISH PAINT		
			STRUCTURE OF ROOF, INTERIOR STRUCTURE OF COIL ROOF, BOTTOM OF ROOF, ROOF STRUCTURE, STAIRS, SUPPORTS FOR STORAGE (CORROSION RESISTANT COATINGS)			
12.1	-10 TO 0	SS-C-S-10	1 COAT OF F-9 5μ FT/COAT	3 COATS OF F-9 100μ FT/COAT 3 100 300	3 5	F should be suitable for immersion service of the products given.
12.2			BOTTOM OF STRUCTURE OF ROOF FOR ROADSIDE STORAGE			
12.2.1	-10 TO 0	SS-C-S-10	2 COATS OF TRIM W 2 10 20	2 COATS OF OS (2 COATS)	20	
12.3			FLOOR ROOF FOR INTERIOR ROADSIDE STORAGE, ROOF, MOTOR STRUCTURE OF BOTTOM OF ROOF, INTERIOR ROOF, STAIRS, SUPPORTS FOR ROADSIDE STORAGE, STAIRS ETC.			
12.3.1	-10 TO 0	SS-C-S-10	1 COAT OF F-9 5μ FT/COAT	3 COATS OF F-9 100μ FT/COAT 3 100 300	3 5	F should be suitable for immersion service of petroleum products like ATF, kerosene, petrol etc.
12.4			BOTTOM OF STRUCTURE OF ROADSIDE STORAGE			
12.4.1	-10 TO 0	SS-C-S-10	1 COAT OF F-9 5μ FT/COAT	2 COATS OF F-9 100μ FT/COAT	2 100 200	F should be suitable for immersion service of petroleum products like ATF, kerosene, petrol etc.
12.5			STRUCTURE OF ROADSIDE STORAGE FOR ROADSIDE STORAGE, ROOF, MOTOR STRUCTURE OF BOTTOM OF ROOF, INTERIOR ROOF, STAIRS, SUPPORTS FOR ROADSIDE STORAGE, STAIRS ETC.			
12.5.1	-10 TO 0	SS-C-S-10	2 COATS OF F-9 100μ FT/COAT	2 COATS OF F-9 100μ FT/COAT	2 100 200	F should be suitable for immersion service.
12.6			BOTTOM OF ROADSIDE STORAGE (CORROSION RESISTANT COATINGS)			
12.6.1	-10 TO 0	SS-C-S-10	3 COATS OF F-9 100μ FT/COAT	3 COATS OF F-9 100μ FT/COAT	3 100 300	
12.7			BOTTOM OF ROADSIDE STORAGE (CORROSION RESISTANT COATINGS)			
12.7.1	-10 TO 0	SS-C-S-10	3 COATS OF F-9 100μ FT/COAT	3 COATS OF F-9 100μ FT/COAT	3 100 300	

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S. NO.	DESIGN TEMPERATURE IN °C	SURFACE PREPARATION	PAINT SYSTEM		TOTAL DFT IN MICRONS (MIN.)	REMARKS
			FILED PRIMER	FINISH PAINT		
12.1	-1 TO 0	SS-C-S-3	1 COAT OF F-100μ FT/COAT	1 COATS OF F-100μ FT/COAT	200	
12.9	-1 TO 0	SS-C-S-10	1 COAT OF F-95μ FT/COAT	2 COATS OF F-15 FT/COAT	215-225	

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TABLE 13.0 : COATING SYSTEM FOR EXTERNAL SIDE OF UNDERGROUND CARBON STEEL PLANT PIPING AND TANKS

S. NO.	DESIGN TEMPERATURE IN °C	SURFACE PREPARATION	PAINT SYSTEM		TOTAL DFT IN MICRONS (MIN.)	REMARKS
			PRIMER	FINISH PAINT		
13.1	CORROSION RESISTANT COATING (EPOXY/RO)					
13.1.1	CORROSION RESISTANT COATING					
13.1.1.1	25 TO 00	SS-C-S-10	1 COAT OF SPOXY FOSTER RUST RESISTANT BONDING PRIMER (1991)	2mm TITANIUM DIOXIDE COATING	mm	CT coating shall confirm to 120/ 5 as per BS: 1
13.1.2	OXYGEN RESISTANT COATING					
13.1.2.1	25 To 00	SS-C-S-10	1 COAT OF SPOXY FOSTER RUST RESISTANT BONDING PRIMER (1991)	2 COATS OF TITANIUM DIOXIDE COATING	mm	
13.2	CORROSION RESISTANT COATING (EPOXY/RO)					
13.2.1	01 TO 000	SS-C-S-10	1 COAT OF F-9 5-5μ FT/COAT		5-5	
13.3	CORROSION RESISTANT COATING (EPOXY/RO)					
13.3.1	00 TO 00	SS-C-S-10	1 COAT OF F-9 5-5μ FT/COAT	3 COATS OF F-9 100μ FT/COAT	300	
13.3.2	-90 TO 001 TO 000° c	SS-C-S-10	1 COAT OF F-9 5-5μ FT/COAT	1 COAT OF RCOAT 3 250μ FT/COAT	5-5	250

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TABLE 14.0 : PAINTING UNDER INSULATION FOR INSULATED (HOT COLD SAFETY CARBON STEEL, LOW ALLOY STEEL, LOW TEMPERATURE CARBON STEEL & STAINLESS STEEL PIPING, STORAGE TANKS EQUIPMENTS IN ALL ENVIRONMENT

S. NO.	DESIGN TEMPERATURE IN °C	SURFACE PREPARATION	PAINT SYSTEM		TOTAL DFT IN MICRONS (MIN.)	REMARKS
			PRIMER	FINISH PINTS		
1.1		SS-C-S-10				
1.1.1	-10 TO 125	SS-C-S-10	PRIMER OF F-10 F-10	2 COATS OF F-10 125µ FT/COAT	315	For other temperature ranges no painting is required under insulation.
1.1.2	0 TO 120	SS-C-S-10	PRIMER OF F-10 F-10	2 COATS OF F-10 OR 3 125µ FT	105-115	
1.2		SS-C-S-10				
1.2.1	0 TO 120	SS-C-S-10	PRIMER OF F-10 F-10	3 COATS OF F-10 20µ FT/COAT		the piping equipments are already erected then surface shall be prepared by cleaning with emery paper and wash/ flush with chloride free water followed by wiping with organic solvent
1.2.2	0 TO 120	SS-C-S-10 (15-25µ SURFACE PROF)		2 COATS OF F-10 125µ FT/COAT	250	

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S. NO.	DESIGN TEMPERATURE IN °C	SURFACE PREPARATION	PAINT SYSTEM		TOTAL DFT IN MICRONS (MIN.)	REMARKS
			PRIMER	FINISH PINTS		
1.2.3	121 TO 500	SS-C-S-10	PO	3 COATS OF F-12 20µ FT/COAT 3 20 0 0	0	no pre erection primer to be applied
1.2.4	501 TO 1000	SS-C-S-10	PO	1 COAT OF Rcoat 3 150µ FT/COAT	150	Only morcoat 3 from moron is available for this temperature range.
1.2.5	COCORC-19 TO CO COCT 5 TO 120	SS-C-S-10	PO	1 COAT OF Rcoat 3 150µ FT/COAT	150	
1.3	CO COCT RQR FOR SOR FOR COCO COCT					


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TABLE 15.0 : INTERNAL PROTECTION OF CARBON STEEL WATER BOXES AND TUBE SHEETS OF COOLERS/ CONDENSERS WATER BOXES, CHANNELS, PARTITION PLATES, END COVERS AND TUBE SHEETS ETC.

S. NO.	DESIGN TEMPERATURE IN °C	SURFACE PREPARATION	PAINT SYSTEM		TOTAL DFT IN MICRONS (MIN.)	REMARKS
			PRIMER	FINISH PAINT		
15.1	□pto □5	SS□C-S□-10	1 CO□TS OF F-□□ □0μ □FT/ CO□T	2 CO□TS OF F-□ □ 125μ □FT/ CO□T 2 x 125 □250	290	For C. S.
15.2	□pto □5 □□ F□RRO□S □□□ BR□SS T□B□ S□□□TS	SS□C-S□-10	1 CO□TS OF □-□□ □μ □FT/ CO□T 1 CO□TS OF □-□□ □0μ □FT/ CO□T	2 CO□TS OF F-□ □ 125μ □FT/ CO□T 2 x 125 □250	300	FOR F□RRO□S S□RF□C□

TABLE 16.0 FIELD PAINTING SYSTEM FOR GI TOWERS/ NON-FERROUS TUBE SHEET

S. NO.	DESIGN TEMPERATURE IN °C	SURFACE PREPARATION	PAINT SYSTEM		TOTAL DFT IN MICRONS (MIN.)	REMARKS
			FILED PAINT	FINISH PAINT		
1□.1	□pto □5	SS□C-S□-10	1 CO□TS OF □-□□ □-10μ □FT/ CO□T □ 1 CO□T OF □-□ □ □μ □FT/ CO□T	2 CO□TS OF F-2 □ □0μ □FT/ CO□T 2 x □0 □250	130	S□□□□ □S □□R □□F□□C□ R□□□R□□□□TS
1□.2	□pto □5 □□ F□RRO□S □□□ BR□SS T□B□ S□□□TS	SS□C-S□-10	1 CO□TS OF □-□□ □μ □FT/ CO□T 1 CO□TS OF □-□□ □0μ □FT/ CO□T	2 CO□TS OF F-□ □ 125μ □FT/ CO□T 2 x 125 □250	300	

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SR. NO.	DESCRIPTION	GROUND COLOUR	FIRST COLOUR BAND	SECOND COLOUR BAND
1.1.3	COLOURS OF TANKS STRUCTURES TOWER OIL CO ₂	Sky Blue -do- -do- Canary Yellow -do- -do-	Signal Red Silver Grey French Blue Black White Light Grey	- - - - - -
1.1.4	COLOURS OF FACILITIES OF SOIL COLUMNS ROCKERS, etc. COLUMNS SWITCHES	Canary Yellow -do- -do- -do- -do-	Grey Signal Red Oxide Red Service Brown Grey	Dark Violet French Blue White - -
1.1.5	COLOURS OF COLUMNS SUPPORTS TOWER ROCKERS COLUMNS COLUMNS COLUMNS COLUMNS	Dark Violet -do- -do- -do- smoke Grey Canary Yellow	Brilliant Green French Blue Signal Red Silver Grey Light Orange Dark Violet	Light Orange -do- -do- -do- - -do-
1.1.6	COLOURS OF CARBON TANKS ROCKERS ROCKERS C. (Q) TANKS CO TANKS CO BANKS BANKS TANKS (Q) ROCKERS (Q) TANKS (Q) TANKS ROCKERS SO TANKS (Q) ROCKERS S SO TANKS (Q) TANKS (Q) ROCKERS TANKS (W/T) TANKS (B/C)	Dark Admiralty Grey -do- -do- -do- -do- -do- Dark Admiralty Grey -do- -do- -do- -do- -do- -do- -do- -do- -do- Light Brown -do- -do-	Brilliant Green -do- -do- -do- Dark Red Canary Yellow Black Light Grey Signal Red Light Grey Signal Grey Brilliant Green White Brilliant Green Signal Green Brilliant Green -do- -do- -do-	Black Smoke Grey Dark Red - - - - French Blue Black Black Black Brilliant Green Canary Yellow Dark Red Black Black Dark Violet - - -

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1.2 The colour code scheme is intended for identification of the individual group of the pipeline. The system of colour coding of a ground colour and colour bands superimposed on it.

1.3 Ground colours as given in Table 1.1 shall be applied throughout the entire length for uninsulated pipes, on the metal cladding on surfaces covered by Clause 2.2.2, ground colour coating of minimum 2m length or of adequate length not to be mistaken as colour band shall be applied at places requiring colour bands. Colour band(s) shall be applied at the following location.

- a. At battery limit points
- b. Intersection points and change of direction points in piping ways.
- c. Other points, such as midway of each piping way, near valves, junction joints of services appliances, walls, on either side of pipe culverts.
- d. For long stretch/ yard piping at 50m interval.
- e. At start and terminating points.

1.4 Identification Sign


1.4.1 Flow direction shall be indicated by an arrow in the location stated in para a,b,c and d and as directed by engineer-in-charge.

1.4.2 Colours of arrows shall be black or white and in contrast to the colour on which they are superimposed.

1.4.3 Product names shall be marked at pump inlet, outlet and battery limit in a suitable size as approved by engineer-in-charge.

1.4.4 Size of arrow shall be either of those given in 1.5.

1.5 Colour Bands

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14.5.1 As a rule minimum width of colour band shall conform to the following table:

Nominal Pipe Size	Width : (mm)
300B and below	25mm
Above 300B upto 600B	50mm
Above 600B upto 1200	75mm
Above 1200	100mm

Note: For insulated pipes, nominal pipe size means the outside diameter of insulation.

Nominal pipe size figures are to be inches.

14.5.2 Colour band(s) shall be arranged in the sequence shown in Table 14.1 and the sequence follows the direction of flow. The relative proportional width of the first colour band to the subsequent bands shall be 1:1, minimum width of any band shall be as per Clause 14.5.1.


14.5.3 Whenever it is required by the Engineer-in-charge to indicate that a pipeline carries a hazardous material, a hazard marking of diagonal strips of black and golden yellow as per IS:2319 shall be painted on the ground colour.

14.4 Wherever it is required by the Engineer-in-charge to indicate that a pipeline carries a hazardous material, a hazard marking of diagonal strips of black and golden yellow as per IS:2319 shall be painted on the ground colour.

19.0 **IDENTIFICATION OF VESSELS, PIPING ETC.**

19.1 Equipment number shall be stencilled in black or white on each vessel, column, equipment & machinery (insulated or uninsulated) after painting. Line number in black or white shall be stencilled on all the pipelines of more than one location as directed by Engineer-in-charge, size of letters printed shall be as below :

Column & Vessels	-	150mm(high)
Drum, Compressor and other machinery	-	50mm (high)
Piping	-	50-150mm

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19.2 Identification of storage tanks

The storage tanks shall be marked as detailed in the drawing.

20.0 PAINTING FOR CIVIL DEFENCE REQUIREMENTS

20.1 Following items shall be painted for camouflaging if required by the client.

- a. All columns
- b. All tanks in offsites
- c. Large vessels
- d. Spheres

20.2 Two coats of selected finishing paint as per defence requirement shall be applied in a particular pattern as per 20.3 and as per the instructions of Engineer-in-charge.

20.3 Method of Camouflaging

20.3.1 Disruptive painting for camouflaging shall be done in three colours in the ratio of 5:3:2 (all matt finish).

Dark Green	Light Green	Dark Medium Brown
5:	3:	2

20.3.2 The patches should be asymmetrical and irregular.


20.3.3 The patches should be inclined at 30 degree to 60 degree to the horizontal.

20.3.4 The patches should be continuous where two surfaces meet at an angle.

20.3.5 The patches should not coincide with corners.

20.3.6 Slits and holes shall be painted and dark shades.

20.3.7 Width of patches should be 1 to 2 meters.

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21.0 INSPECTION AND TESTING

21.1 All painting materials including primers and thinners brought to site by contractor for application shall be procured directly from manufacturers as per specifications and shall be accompanied by manufacturer's test certificates. Paint formulations without certificates are not acceptable.


21.2 Engineer-in-charge at his discretion may call for tests for paint formulations. Contractor shall arrange to have such tests performed including batchwise test of wet paints for physical & chemical analysis. All costs there shall be borne by the contractor.

21.3 The painting work shall be subject to inspection by Engineer-in-charge at all times. In particular following stagewise inspection will be performed and contractor shall offer the work for inspection and approval of every stage before proceeding with the next stage. The record of inspection shall be maintained in the registers. Stages of inspection are as follows:

- a. Surface preparation
- b. Primer application
- c. Each coat of paint

In addition to above record should include type of shop primer already applied on equipment e. g. Red oxide zinc chromate or zinc chromate or lead primer etc.

Any defect noticed during the various stages of inspection shall be rectified by the contractor to the entire satisfaction of Engineer-in-charge before proceeding further. Irrespective of the inspection repair and approval at intermediate stages of work. Contractor shall be responsible for making good any defects found during final inspection guarantee period defect liability period as defined in general condition of contract. Dry film thickness (DFT) shall be checked and recorded after application of each coat and extra coat of paint should be applied to make-up the DFT specified without any extra cost to owner the extra cost should have prior approval of Engineer-in-charge.

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21.4 **Primer Application**

After surface preparation the primer should be applied to cover the crevices□ corners□ sharp edges etc. in the presence of inspector nominated by Engineer-in-□harge.

21.5 The shades of successive coats should be slightly different in colour in order to ensure application of individual coats□the thickness of each coat and complete coverage should be checked as per provision of this specification. This should be approved by Engineer-in-□harge before application of successive coats.


21.6 The contractor shall provide standard thickness measurement instrument with appropriate ranges(s) for measuring.

Dry film thickness of each coat□surface profile guage for checking of surface profile in case of blast cleaning. □oliday directors and pinhole detector and positector whenever required for checking in case of immersion conditions.

21.7 □rior to application of paints on surface of chimneys the thickness of the individual coat shall be checked by application of each coat of same paint on M. S test panel. The thickness of paint on test panel shall be determined by using guage such as 'Elkomere'□ This thickness of each coat shall be checked as per provision of this specification. This shall be approved by Engineer-in-□harge before application of paints on surface of chimney.

21.□ At the discretion of Engineer-in-□harge□ the paint manufacturer must provide the e□pert technical service at site as and when required. This service should be free of cost and without any obligation to the owner□as it would be in the interest of the manufacturer to ensure that both surface preparation and application are carried out as per their recommendations.

21.□ Final inspection shall include measurement of paint dry film thickness. Adhesion □oliday detection check of finish and workmanship. The thickness should be measured at as many points□locations as decided by Engineer-in-□harge and shall be within □ 10□ of the dry thickness□ specified in the specifications.

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21.10 The contractor shall arrange for spot checking of paint materials for Sp. Gr. flow time (ford cup) and spreading rate.

22.0 **GUARANTEE**

22.1 The contractor shall guarantee that the chemical and physical properties of paint materials used are in accordance with the specifications contained herein to be provided during execution of work.

22.2 The contractor shall produce test report from manufacturer regarding the quality of the particular batch of paint supplied. The Engineer-in-charge shall have the right the test wet samples of paint at random for quality of same as stipulated in clause 11 above. Batch test report of manufacturer for each batch paint supplied shall be made available by the contractor.


23.0 **QUALIFICATION CRITERIA OF PAINTING CONTRACTOR**

Painting contractor who is awarded any job for ME projects under this standard must have necessary equipments machinery tool and tackles for surface preparation paint application and inspection. The contractor must have qualified trained and experienced surface preparation paint applicator inspector and supervisors. The contractor supervisor inspector surface perpetrator and paint applicator must be conversant with the standards referred in this specification the contractors capacity capability and competency requirements for the job shall be quantified in the tender document and shall be assessed by an ME team before awarding any job.

24.0 **PROCEDURE FOR APPROVAL OF NEW COATING MATERIALS AND MANUFACTURER'S**

Following procedure is recommended to be followed for approval of new manufacturers.

24.1 The manufacturer should arrange testing of the inorganic zinc silicate coating materials as per the list of tests given in para 24.5 below from one of the reputed Government laboratories.

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24.2 Samples of coating should be submitted to the Govt. laboratory in sealed containers with batch no. and test certificate on regular format of manufacturer's testing laboratory. The sampling shall be certificate and sealed by a certifying agency.

24.3 All test panels should be prepared by govt. testing agency coloured photographs of test panels should be taken before and after the test should be enclosed alongwith test report.

Sample batch. No. and manufacturer's test certificate should be enclosed alongwith the report. Test reports contain details of observation and rusting if any as per the testing code. Suggested government laboratories are:

- L□□ayderabad
- BT□□anpur
- DMS□DE□□anpur
- T□Mumbai
- BIS Laboratory
- D□T□Mumbai
- TES□□alcutta
- D□


24.4 Manufacturers should intimate the company details of sample submitted for testing name of Govt. testing agency date contact personnel of the Govt. testing agency. At the end of the test the manufacturer should submit the test report to the company for approval. The manufacturer(s) shall be qualified based on the result of these tests and other assessment and the company's decision in this regard shall be final and binding on the manufacturer.

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24.5 Tests required for evaluation of acceptance of coating materials for offshore application.

Test	ASTM Test Method
Density	D 1475
Dipping properties	D 123
Film characteristics	
Drying time	D 1640
Flexibility	D 1737 & D 522
Hardness	D 3363
Adhesion	D 2107
Abrasion resistance	D 660 & D 1044
DFT Coat	AS 1E, SS, G, DEL, ES
Storage Stability	D 140
Resistance to	
Humidity for 2000 hrs.	D 2247
Salt Spray for 2000 hrs.	B 117
Accelerated Weathering	D 22
Change in DFT	G 53

24.6 Coating system for panel test shall be decided after discussion with ME.

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ANNEXURE-I

LIST OF RECOMMENDED MANUFACTURERS

Indian Vendors

- 1.0 Asian Paints(India) Ltd.
- 2.0 Berger Paints Ltd.
- 3.0 Goodlass Perolac Paints Ltd.
- 4.0 Benson And Nicholson Paint Ltd Chokugu Benson & Nicholson Ltd.
- 5.0 Shalimar Paints Ltd.
- 6.0 Sigma Coating Mumbai
- 7.0 DD Carboline Ltd.
- 8.0 Premier Products Ltd.
- 9.0 Moromandel Paints & Chemicals Ltd.
- 10.0 Anupam Enterprises
- 11.0 Grand Polycoats
- 12.0 Bombay Paints Ltd.
- 13.0 Anaprabha Esters & Glycer Mumbai
- 14.0 Sunil Paints and Varnishes Pvt. Ltd.
- 15.0 Courtaulds Coating & Sealants India (Pvt.) Ltd.
- 16.0 Mark-chem Incorporated Mumbai (for phosphating chemicals only)
- 17.0 DD Polyurethane Paint (for polyurethane paint only)

Foreign Vendor Details

- 1.0 Sigma Coating Singapore
- 2.0 Ameron USA
- 3.0 Kansai Paint Japan
- 4.0 Tempel Paint USA
- 5.0 Alspar Corporation USA
- 6.0 Courtaulds Coating.

Note: This list subjected to revision based fresh approval which will be intimated to DD Vendor Cell.

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S. No.	MANUFACTURER NAME	P2 CHLORINATED RUBBER Zp PRIMER	P4 ETCH PRIMER/ WASH PRIMER	P6 EPOXY ZINC PH. PRIMER	F9 INORGANIC ZINC SILICATE PRIMER/ COATING
10.	AAM ESES	AL	AME 2	AM A A-E-500	-
11.	GA LATS	GL	GLME 401	-	-
12.	BMB LTD. T MA	EM 4633	ET ME	EM E-1530	GAL 1570
13.	AA ESTES GL	EG 1143	EG 11	EG 1241	-
14.	S A LTD.	S S	S	S S	-
15.	T G LTD.	-	-	TEGA 251	TE
16.	MA (F EM	ST L			
17.	M L A E E L)				
18.	T A			E	TA 2

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S. No.	MANUFACTURER NAME	P2 CHLORINATED RUBBER Zp PRIMER	P4 ETCH PRIMER/ WASH PRIMER	P6 EPOXY ZINC PH. PRIMER	F9 INORGANIC ZINC SILICATE PRIMER/ COATING
1	□□□□□□□□□□ (□□□□EA)			S□□□AL □□□□ □□□□S□□□ATE □□□□ME□	E□1□□(□)

LIST OF RECOMMENDED MANUFACTURER'S PRODUCTS (Contd....)

S. No.	MANUFACTURER NAME	F2 ACRYLIC-POLY YURETHANE FINISH PAINT	F3 CHLORINATED RUBBER FINISH PAINT	F6 HIGH BUILD FINISH PAINT	F7 HIGH BUILD COAL TAR EPOXY COATING
1.	AS□□□□□□□□□□ LTD. (□)	A□□□□□T□□□□□□ 110□	AS□□□□□□□□□□ (□□ 161)	A□□□□□□□□□□ □□□□□□□□□□	A□□□□□□□□□□ □□□□□□□□□□
2.	BA□□GE□□□□□□ LTD.	BA□□GE□□□□□□ E□□□□□□□□□	L□□□□□□□□□□ □□□□□□□□□□ □□□□□□□□□□ □□□□□□□□□□	E□□□□□□□□□□ □□□□□□□□□□ □□□□□□□□□□	E□□□□□□□□□□ □□□□□□□□□□
3.	AME□□□□□□□□ G□□□□□□□□□□ □□□□□□□□□□ LTD.	AME□□□□□□□□□□ 450GL	AME□□□□□□□□□□ 515	AME□□□□□□□□□□ □□□□□□□□□□	AME□□□□□□□□□□ 7□□□□□
4.	E□□□□□□□□□□ □□□□□□□□□□ □□□□□□□□□□ LTD.	□□□□□□□□□□ □□□□□□□□□□ □□□□□□□□□□	E□□□□□□□□□□ □□□□□□□□□□	E□□□□□□□□□□ □□□□□□□□□□	E□□□□□□□□□□ □□□□□□□□□□

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S. No.	MANUFACTURER NAME	F2 ACRYLIC-POLY YURETHANE FINISH PAINT	F3 CHLORINATED RUBBER FINISH PAINT	F6 HIGH BUILD FINISH PAINT	F7 HIGH BUILD COAL TAR EPOXY COATING
	LTD. ADD ESES SALS	FSS AAT.	BBE FSS AAT		TAE E ATG
5.	SALMA ATS LTD.	SALTAE FSS	LLTE FSS	EAGD FSS	BGADS BLA B AL TAE ATG
6.	SIGMA ATG	SIGMAD SEMGLSS 7530 ABLE 132	SIGMA FSS 730	SIGMA M 7456 ABLE 101	LLTET T 300 ABMAST-14
	ME D TS LTD.	32 L ETAE	-71 FSS AAT	42B4A B LD E E E B ATG D A AT-6000	350B3A AL TAE E E E E AL TAE ATG G A D
	AMADEL ATS EMALS	-	LLLE FSS G		
10.	AM E TES	A TAE E AMEL	A L B E AMEL		
11.	GA D L ATS	G AT 131 B D 141	G L G A D 631	G G A D 234	L G A D GE

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LIST OF RECOMMENDED MANUFACTURER'S PRODUCTS


S. NO.	MANUFACTURER'S NAME	F2	F3	F6	F7
12.	BOMBAY ALKATHS LTD. ALKATHS	E T A T A E F 4510	E M A T E B I D 4633	E M A D G B I D 5520	E M A D 1510
13.	AAABAA ESTES GLIDES	E G T A E F 3641	E G L F 3140	E G - 3265 E G 3562	E G 4265
14.	ALKATHS AD ALKATHS LTD.	S T A E (AL K A T)	S L L B B A T G	L B S 01	L B L A . S. 551
15.	ALDLS ALKATHS LTD.	T E T A E	-	T E G A D E M S E T E S	T E T F A 006 007010
16.	MA-EM ALKATHS (F S S A T S)				
17.	M ALKATHS (F S S A T S)	T A E A L K A T F S S A T			
18.	T A T S	A D T A S		E G A D	T A G A D 5
19.	D D T S (EA)			T T A T B E T 5740	E 173

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LIST OF RECOMMENDED MANUFACTURER'S PRODUCTS

S. NO.	MANUFACTURER'S NAME	F-8 EPOXY MASTIC COATING SURFACE TOLERANT	F-11 HEAT RESISTANCE SYNTHETIC MEDIUM ALUMINUM PAINT	F-12 HEAT RESISTANCE SILICON AL. PAINT
1.	ASIA PAINTS LTD.	AQUADON F 640	ASIA ALUMINUM PAINT (300)	SILICON ALUMINUM PAINT (100)
2.	BARGE PAINT LTD.	TEPTMAST	FELOL PAINT	BARGE EAT START SILICON ALUMINUM PAINT
3.	AMEGODDGLASS EOLA PAINTS LTD.	AMELO 400		AMEGODDGLASS
4.	ESOS PAINTS LTD. ADD SONGS GESS LS	-	FELOL SOTET ALUMINUM PAINT 4000	FELOL ESTAE 1000
5.	SALIMA PAINTS LTD.	ELOS 56	EAT ESTG LOL ALUMINUM	LOST ALUMINUM PAINT
6.	SIGMA PAINTING	SIGMA ET ALUMINUM	TEMP ESTAE SYSTEM 200 4062	AFAST TEMP
7.	DOB ABLE LTD.	ABMAST-15	ABLE 124	ABLE 4674
8.	IME DDTS LTD.	BE MAT 150B 150A		
9.	AMADEL PAINTS EMALS	-	SLOT ALUMINUM PAINT	SILICON ALUMINUM PAINT
10.	AM ETESES	AMAST-102	-	AM EAT GOOD

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S. NO.	MANUFACTURER'S NAME	F8	F11	F12
11.	G A A D L L O O A T S	G O O M E G A A D 235		-
12.	B M B A A A T S L T D . E M E L M A O E A A T S	E M A D A 170	A G A O O O O O A L M O O M 4 5 0	E M A D O O O G O B I L D 5520
13.	A A A B A E S T E S S G L O E D E S	E G E O O M A S T 2255	E G O O A L A A T T \$21133	E G O O A L A A T T O 600
14.	S O I A A T S A D A S E E T . L T D .	L O O O O G B I L D S . 01	-	-
15.	T A L D S A T G L T D .	T E O O L O O	-	T E T E M 50
16.	M A - E M O O O A T E D (F O O O O S O A T E A A T S O O L O)			
17.	M O L O O E T A E A A T S (F O O O L O E E E T A E A A T S O O L O)	-		
1	T O O A A T S	T M A T 7		S L E L J T T E A T E S T A T S I L O O O A A T
1	O O O O O O O T S (O O E A)	E 415		T 606

Rev. : 0


Edition: 1

SPECIFICATION
FOR
INSTALLATION OF INSTRUMENTS

SPECIFICATION NO.: MEC/S/05/26/01




ELECTRICAL & INSTRUMENTATION
(OIL & GAS SBU)
MECON LIMITED
DELHI 110 092

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C O N T E N T S

- 1) SCOPE
- 2) STANDARDS OF MATERIALS
- 3) INSTALLATION OF INSTRUMENTS
- 4) TESTING
- 5) CALIBRATION OF INSTRUMENTS

PREPARED BY: (R. SANJAY BABU)	CHECKED BY: (RAKESH SHUKLA)	APPROVED BY: (PANKAJ SHIVASTAVA)	ISSUE DATE : 08 Th DEC 08
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INSTALLATION, TESTING AND CALIBRATION OF INSTRUMENTATION AND CONTROL SYSTEM

1.0 SCOPE

- 1.1 The purpose of this specification is to define the general requirements for the installation, installation materials, testing and calibration of instruments and control system.
- 1.2 The work shall be carried out in accordance with the codes, standards and recommended practice listed in this specification and in accordance with local 'Statutory regulations'.
- 1.3 For installation of instruments and control system, of the new material where quality is of the prescribed standards and which is in every way fit for its intended purpose shall be used.
- 1.4 Unless otherwise specified all the materials shall be indicated in this specification except where it is not compatible with fluids being handled. In such cases the selection of the material shall be approved by MECON.
- 1.5 Only the best trade practices shall be used. All the work shall be carried out in a neat, workman like manner and to the satisfaction of MECON.


2.0 STANDARDS OF MATERIALS

- 2.1 Instrument process piping / tubing upto and including the first block valve and 'in-line' instrument equipment shall conform to the line class or vessel rating concerned instrument piping or tubing after the first lock valve may use alternate materials consistent with service conditions. In general they shall conform to the following specification as a minimum.
- 2.1.1 Stainless tubes shall be fully annealed and cold drawn seam less as per ASTM A 269 TP316 with size 1/2"OD x 0.65" WT (wall thickness).
- 2.1.2 Monel tubing shall be fully annealed seamless as per ASTM B165 with size 1/2" OD x 0.35"WT.
- 2.1.3 Carbon steel pipe shall be 1/2" seamless and shall be as per ASTM A106 Gr B min of sch 80 & dimensions as per ANSI B36.10.
- 2.1.4 Seamless stainless steel pipes shall be as per ASTM A 312 Gr TP 316L Sch 80S, dimensions as per ANSI B 36.19.

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- 2.1.5 Instrument air supply piping from the main instrument air header shall be galvanised heavy class pipes to IS 1239.
- 2.2 Individual pneumatic signal and air supply tubing shall conform to the following specifications:
- 2.2.1 Stainless tubes shall be used in general and shall be fully annealed and cold drawn seamless as per ASTM A269 TP 316 with 6mmOD x 1mmWT.
- 2.2.2 Copper tubing where specified shall be seamless 6mmOD x 1.0mmWT soft annealed as per ASTM 868.74a cd No. 122 (DHP) sheathed with PVC 1.0mm thick coloured Black.
- 2.3 All fittings shall be as a minimum of 100 rating except for tube fittings. The fittings shall have threading as per B2.1 and socket weld connections as per B 16.11. These shall conform to the following specifications in general.
- 2.3.1 Tube fittings shall be flare type compression fittings Swagelok or equivalents make double ferrule and pressure seat type.
- All tube fittings in impulse lines shall be rated to 5000 PSIG at 38°C.
- 2.3.2 Carbon steel pipe fittings shall be forged as per ASTM A105 stainless steel pipe fittings shall be as per ASTM –182 Grf 316L
- 2.4 Valve shall have normally Globe body and shall be fabricated out of Bar-stock and rated to min. of 1500. These shall be screwed bonnet type with 13% GSS trim and plug shall be integral with the stem. Face to face dimensions shall be approx. 80mm. End connections shall be socket weld to ANSI 16.11 and threaded to B2.1
- 2.5 Multibore tubing shall have a maximum 19 single polyethylene tubes, 6mmOD x 1mm numbered for easy identification. The bundle shall be marked with inner and outer fire resistance PVC sheath. They shall carry a pair of telephone wire 0.6mm diameter flexible.
- 2.6 Single pair and multi pair extension cables for Thermocouples shall be matched and calibrated in accordance with ISA MC 96.1. Conductor size shall be AWG for single pair and 20 A for Multipair.

The cable shall be armoured, each twisted pair shall be individually shielded with aluminium Mylar tape and a tinned copper drain wire. The wires and the cable shall be colour coded as per ISA recommended practices.

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2.7 Instrument Electrical cables shall conform to the following specifications:

2.7.1 Instrument electronic signal cables single pair/ Multipair shall have copper conductor, twisted in pair and individually shielded with Aluminium Mylar tape with drain wire. In multipair cables, each pair shall be armoured with inner and cut PVC sheath. Minimum conductor size shall be 1.5 mm².

2.7.2 Control Cables for control signal, alarms actuating devices and solenoid valves of the interlock and shutdown valves shall generally be 1.5 mm² copper conductors armoured with inner and cut PVC sheath.

2.7.3 All power supply cables shall have copper/Aluminium conductor depending upon the conductor size. The cables shall be armoured with inner and cut PVC sheath. The cables shall be sized adequately. Minimum conductor size shall be 2.5 mm².

2.7.4 2-core armoured cable shall be used for illuminator on level gauges.

2.7.5 The material and construction of all electrical cables shall conform to IS- 1554 Part I or appropriate equivalent code and standard.

3.0 INSTALLATION OF INSTRUMENTS

3.1 Instrument Mounting


3.1.1 No instrument shall be installed in such a way that it bends for support on the impulse piping or electrical connection on it.

3.1.2 Pressure gauges and temperature indicator shall normally be mounted directly on line. However direct on line mounting shall be avoided where vibrations are likely to be present.

3.1.3 Local mounted instruments shall be mounted on brackets, panels or placed on a suitable pedestal. Transmitters shall be mounted on 2" pipe supports where practical. Instruments to be mounted on steel columns, masonry structure etc. These shall not be mounted on heating equipments, pipelines and structures.


3.1.4 Blind transmitters shall be mounted at 130mm above graded platform. Local controllers, indicating transmitters and indicating instruments shall be mounted at approximately 1500 mm.

3.1.5 All the instruments shall be accessible from grade, ladder or platform etc. Pressures gauges and other local indicating instruments shall be readable from grade or operating level and if used for manual control shall be visible from the related valve.


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All the instruments shall be located such that they don't impede the process operation.

- 3.1.6 Local mounted instruments which are not available in weather proof housing shall be mounted inside a weather proof case.
- 3.1.7 Items such as pilot valves, solenoid valves etc. shall be located local to its point of application or near to the device being actuated by them.
- 3.1.8 For blind transmitters output meters shall be mounted on instrument supports.
- 3.1.9 Filter regulators shall be mounted on the instrument supports below pneumatic transmitter or on the control valve yoke.
- 3.1.10 Instruments or instrument lines shall not be supported on hand rails, in general.
- 3.1.11 The use of process piping to support instrument lines shall be avoided as far as possible.
- 3.1.12 The instrument impulse piping shall be kept as short as possible.
- 3.1.13 Instruments and impulse lines shall be protected against mechanical damage.
- 3.1.14 In case of capillary tube instruments, capillary tube is to be supported and protected against mechanical damage.
- 3.1.15 Orifice meters shall not be installed on the top of orifice fittings. On horizontal lines orifice pressure taps shall be located as follows:
- a) On top for air and gas service
 - b) Horizontal for liquid and condensable vapour service.
- 3.2 Instrument Piping & Tubing.
- 3.2.1 Impulse Piping/tubing
- 3.2.1.1 The primary instrument block valves for all instruments shall be as per piping specifications.
- 3.2.1.23-Valve manifold in general shall be integral type. For pressure gauges, 2-valve manifolds shall also be acceptable instead of isolation valve, drain valve and pipe fittings.
- 3.2.1.3 Differential or static pressure sensing lines shall not exceed 6 mtrs. (20 feet) in general for direct connected or locally mounted instruments.

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- 3.2.1.4 All impulse lines shall be run with a slope not less than 1 in 12 except where otherwise specified. Direction of slope is to be downward from the process for liquid service and upward from the process for gas service.
- 3.2.1.5 Tubing shall be joined by compression fittings.
- 3.2.1.6 Piping shall be joined by pipe fittings/flanges as per the piping specifications.
- 3.2.1.7 All instruments pipes and tubes shall run in horizontal and vertical planes only and shall run with minimum number of changes in direction, consistent with good engineering practices and neat appearance.
- 3.2.1.8 Tubing shall be bent with correct size tube bender as far as possible to avoid use of fittings. Hot bending shall be totally avoided.
- Tube cutter shall always be used to cut tubing. The use of short lengths of tubing in long runs shall be avoided in order to avoid the fittings.
- 3.2.1.9 All tubing shall run in such a manner as to give the maximum protection against mechanical damage. Tubing runs shall be grouped together and clamped.
- 3.2.1.10 Tubing shall be arranged so that the unions can be tightened without distorting lines.
- 3.2.1.11 Instrument tubing or piping shall not run on trays intended for cables and shall not share the same transit.
- 3.2.1.12 No pipe or tube shall be left with mechanical strain on them.
- 3.2.1.13 A mechanical ferrule seater shall be used on tubing for 140 kg/cm² (2000 psi) or more.
- 3.2.1.14 Pipe bushings shall not be used.
- 3.2.1.15 Pipe plugs shall be fabricated out of bar stock and shall have hex-head.
- 3.2.2 Air/Signal Tubing
- 3.2.2.1 Signal Transmission tubes shall be laid on perforated trays prefabricated out of min 2.5 mm. thick steel plates. The width of the tray shall be selected as per the number of tubes to be laid.
- 3.2.2.2 Where tubing is run in permanent enclosures, it should be ensured that entry and exit of such enclosures is clean and smooth.
- 3.2.2.3 Tubing run in permanent enclosures shall not have joints, except at special junctions


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boxes provided for this purpose.

- 3.2.2.4 Where permanent enclosures are left with space for instrument tubing to be laid at some later date, a galvanised pull wire of adequate size shall be left in the tray.
- 3.2.2.5 Where the length of transmission tubing exceeds 60 mtrs (200ft) necessity of installing signal booster relays shall be considered.
- 3.2.2.6 In case of `Skidded' equipment or vessels with instrumentation, where off- skid alarms shutdown or control functions are provided the signal tubes shall be terminated on the control bulk head near the skid boundary.
- 3.2.3 All threaded pipe joints shall be joined after applying Teflon tape. It should be applied in a manner to ensure that the tape does not spill over the end of the male fitting. No other pipe joining compound shall be used except on high temperature service where graphite sealing compounds shall be used.
- 3.2.4 All reasonable precautions shall be taken to prevent foreign materials entering pipe lines or tubing before and during erection.
- 3.2.5 Pipes and tubes installed but not connected, shall have the ends clad in approved fashion to prevent the entry of foreign material. For a period upto one week adhesive tape may be used, for longer periods, caps or plugs shall be used.
- 3.2.6 Piping/Tubing supports
- 3.2.6.1 Piping and tubing shall be adequately supported and fixed at a distance not exceeding that in the following table:

Table

Single tubing/Piping	Max. distance between supports
3/8" OD or less	Continuous
1/2" to 3/4" Nom. size	2 meters (6ft.)
3/4" to 1" Nom. size	3 meters (9ft.)
Multitube bundle	3 meters (9ft)

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3.2.6.2 All field mounted instrument air tubing shall be supported with galvanised steel angles or channels of minimum 1/8" thickness fabricated to present neat appearance.

3.2.6.3 All instruments tubing supports shall be galvanised prior to installation

3.2.6.4 Trays shall be properly supported either from any rigid steel structure or concrete member. In case of non-availability of above, a suitable support shall be fabricated.

3.3 Instrument Air Supply Distribution

3.3.1 Piping material for instrument main and branched air headers upto the isolation valve at each take-off from main or branch header shall conform to piping specification.

3.3.2 The air header size shall be established in accordance with the table below, unless otherwise specified, for a header pressure of 4 to 8.5 kg/cm²

Table – 2

Max number of users	Nominal pipe size
upto 5	1/2"
upto 10	3/4"
upto 25	1"
upto 80	1-1/2"
upto 150	2"
upto 500	3"


3.2.3 All take off for branch lines are to be from the top of the main header with block valves equal in size to the branch line. All low point shall have a 1/2" valve installed as a drain and blow down point.

3.3.4 A minimum size of 1/2" pipe shall be run to the instrument with a 1/2" valve for each user. Tubing from the isolation valve to the instrument shall be 6.0 mm.

3.2.5 Union shall be provided at convenient location in the air header.

3.3.6 Filter regulator shall be provided for individual field mounted consumer and shall be complete with an output gauge.

3.3.7 In case of skid mounted equipments or vessels which incorporate instrumentation requiring pneumatic supply, on skid supply piping shall terminate at the skid boundary location and size of the supply connections shall be noted on the vendor approval drawings.

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3.4 Installation of multitude and Multicore cables.

3.4.1 Multicore/ Multitube cables shall generally be installed on trays or ducts and properly clamped. At bends minimum radius shall be maintained as per cable manufacturer's standards.

3.4.2 All cables shall be rigidly supported on structural steel and masonry. Drilling of steel member should normally be avoided. However, if the drilling of steel must be resorted to, it must be drilled where minimum of weakening of structure will result cables shall be support at every 500 mm. At every vertical drop these shall be clamped at more frequent intervals max of 300 mm.

3.4.3 Directly buried cables shall be laid underground in excavated cable trenches. Trenches shall have sufficient depth and width to accommodate all cables correctly spaced and arranged with a view of heat dissipation and economy of design construction of trenches laying of cables and filling up of trenches shall be as per relevant standard.

3.4.4 Each underground cable shall be provided with identifying tag of load securely fastened every 30 M of its underground length with at least one tag at each end before the cable enters the ground.

Before cables are placed, the trench bottom shall be filled with a layer of sand. The cables shall be covered with 150 mm of sand on the top of the largest dia. cable tube and sand shall be lightly pressed. A protective covering of 75 mm thick second class red bricks shall be laid flat and the balance portion of the trench shall be filled with soil, compacted and levelled.


3.4.5 At each road crossing and other places where cables enter pipe sleeves, adequate bed of sand shall be given so that the cables don't slack and get damaged by pipe ends after back filling.

3.4.6 At the entry into concrete blocks loops shall be provided at either end to prevent any damage to cable.

3.4.7 The cable entry to control room shall be suitably filled and sealed after laying of cables so as to achieve a positive sealing against the entry of gas/water.

3.4.8 All wiring, tubing, cables, Junctions boxes and auxiliary equivalent shall be suitably identified as per applicable codes and practices. All piping and tubing shall be tagged with slip-on or clip on wire marker at both ends.

3.4.9 Jointing of cables is generally not permitted. Cables shall be cut after the exact site measurements at the cable drums shall be so selected before cutting the lengths as to avoid any unnecessary wastage.

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- 3.4.10 Low signal cables like alarms, analysers cables, special cables for turbine meter, thermocouple compensating cables etc. shall be layed separated from power supply cables in ducts/trenches/trays.
- 3.4.11 Electric signal lines for electronic transmitters to receive and to final control element shall be continuously shielded with the shield grounded at the same point as the signal circuit generally at the control instrument.
- 3.4.12 Separate junction boxes shall be used for intrinsically sage cables.
- 3.4.13 Different intrinsically safe system e.g., systems having different rounds shall not be run in the same multicore cable, in general.

Recommended minimum separation distance between twisted pair signal leads and AC Power Lines.

AC Power Cable		Minimum Distance to Signal Lead
Voltage (Volts)	Current (Am) in (cm)	
0 to 125	0 to 10	12" (30)
125 to 250	0 to 50	15" (38)
250 to 440	0 to 200	18" (46)
5KV & Up	200 Amp. & Up	24" (61)

Different intrinsically safe circuits e.g., circuits having different voltage levels, of the same intrinsically safe system shall not be run in the same cable unless each conductor insulation is at least 0.25mm or no hazard can result from interconnection.

- 3.4.14 The physical separation of power and signal cables shall be as per API 550 Part I Section VII. Cable in intrinsically safe circuits shall preferably be not run in the same tray where-- on intrinsically safe circuits cables are being run. If these are being run in the same tray, a metallic earthed separately shall be provided.
- 3.4.15 For temperature controllers, single pair thermocouple extension cable or cable for resistance thermometer, shall be layed directly from the element to the transducer in the control room without intermediate terminal blocks.

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3.4.16 In case of skid mounted equipment or equipment which incorporate skid instrumentation like alarms, shutdown or control function shall terminate signals or control junction box near skid boundary for connection of off skid equipment.

3.4.17 No wire shall be terminated or left with mechanical strain within any conductor.

3.4.18 Splices shall be made only at terminals, in instruments or approval equipment/ junction boxes using lugs and screwed connections. No intermediate splices shall be made in cable trays or in conduct. Number of junction boxes in any cable path shall be limited to only one.

3.5 Installation of Zener barriers

3.5.1 Zener barriers shall be installed in the circuit to make the system intrinsically safe provided:

- a) There is no energy storage system in excess to the minimum permitted by the barrier design on the hazardous side of the barrier. The same shall be met by taking intrinsically safe transmitters and selecting the cable electrical parameters like inductance L/R ratio & capacitance in accordance with the maximum parameters given in barrier specifications.
- b) No power source exceeding the voltage rating of Zener barrier shall be connected on safe side of the Zener barrier.
- c) No outside power source including other intrinsically safe circuits shall be connected to the hazardous side of the barrier.


3.5.2 Zener barriers shall be located as close as possible to the field wiring entry point in the control room.

3.5.3 Single barrier are bolted directly to copper bus bar and multiple barriers on the barrier mounting plates. Copper bus or barriers mounting plates shall be isolated from the panel frame.


3.5.4 The signal ground system for intrinsically safe system shall be separate from power ground system and shall be connected to the signal ground reference point. The maximum resistance allocable between the farthest point on intrinsically safe barrier ground bus and signal ground reference point shall be less than 1 ohm.

3.5.5 Field wires shall directly terminate at the barriers and not through intermediate terminals.

3.6 Installation of Analyser / Gas Chromatograph

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- 3.6.1 Installation of all analyser shall be in general, as per APIP 550 Part II.
- 3.6.2 The analyser housing at its installation shall meet all safety requirements as per classifications.
- 3.6.3 Sampled process fluid, if not returned to the process shall be disposed to a safe location. Piping shall be provided so that vapours can be vented to a safe location and liquids shall be drained in a clean and orderly fashion to a safe place. Toxic vapours shall not be vented to atmosphere.
- 3.6.4 Analyser shall be located as near to the sampling point as possible.
- 3.6.5 Analyser equipment must be protected from the following:
- a) Hot equipment
 - b) Severe ambient temperature changes
 - c) Shock
 - d) Mechanical damage
 - e) Vibration
- 3.6.6 If a separate vent for the analyser is used, the location of that vent shall be in area of minimum air Turbulence. If the vents of different analysers are vented into a common vent, a back pressure regulator shall be used.
- 3.6.7 Vent piping shall be designed to prevent condensate from accumulation in low point and obstruct a free vent flow.
- 3.7 Ducts, Trays and Supports
- 3.7.1 Main cable duct shall be of bottom open type with flat/angle --- construction with side sheet and top cover of 3.2 mm thickness.
- 3.7.2 The ducts and trays shall be properly supported at regular intervals. Wherever insert plates are not available, support on concrete structure or ceiling shall be fixed with a minimum of 10 mm expansion bolts Angle supports for ducts shall be fabricated from minimum of 40 mm angle.
- 3.7.3 All supports shall be neatly cut with hacksaw only and not with gas cutting. Free ends of angle supports shall not have sharp ends and shall be properly rounded off.
- 3.7.4 Ducts and supports shall be painted with one coat of Red oxide Zinc chromate primer conforming to IS-2074 after cleaning to remove scale and then painted with 2 coats of final enamel paint as given below:

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- a) Duct - Dark admirately Grey as per IS0632.
- b) Supports - Black.

3.8 Instrument Steam Tracing

- 3.8.1 Steam for Tracking of instruments shall be taken from main steam header take of valve through carbon steel pipes supported at regular intervals.
- 3.8.2 Steam tracing around individual instrument shall be by copper tube of 1/8" diameter.
- 3.8.3 Piping or tubing for steam tracing shall be installed in such a way as to avoid condensate pockets.
- 3.8.4 After steam tracing, the line is connected to drain funnel through steam trap.

3.9 Identification of Lines and Instruments


- 3.9.1 All site mounted instruments, junction boxes, air headers, tubing and wiring terminations shall be labelled or tagged.
- 3.9.2 Instruments shall be furnished with stainless steel name tags containing Tag no., manufacturer's name, and model no. serial number. This tag number shall be approximately 3"x1" size and shall be attached to the instruments with -- gauge stainless steel wire.
- 3.9.3 Unused cable entries in junction boxes and field instruments are to be plugged.

4.0 **TESTING**

4.1 Instrument Impulse piping/Tubing

- 4.1.1 All process impulse lines shall be disconnected both from the instrument and vessel/piping end and flushed with water.
- 4.1.2 After thorough flushing the impulse lines shall be isolated from the instruments and pressurised hydraulically to 1.5 times the maximum working pressure corrected for ambient temperature. They shall then be isolated from the pressure source and the pressure reading on a test pressure gauge shall not fall at a rate exceeding one psig/hour.

In case no isolation valve is provided near the instrument, impulse piping/tubing shall be pressurised along with the instrument to the maximum pressure of scale in case of pressure transmitter and max. Operating pressure in case of differential pressure instrument with equalising valve open

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4.1.3 In special conditions where hydro- testing is not permissible due to service requirements, testing shall be carried out by using compressed air/nitrogen.

4.1.4 The external displacer type instruments and cage type level switches shall be tested to 1.5 times the operating pressure using air/nitrogen after thorough flushing.

4.2 Instrument Air lines/signal tubing.

4.2.1 Instrument air lines/signal tubing shall not be hydrostatically tested.

4.2.2 Instrument air tubing shall be disconnected upstream of all filter regulators and blown down to remove water, slag and mill scale, from lines at 7.0 kg/cm² G for fifteen minutes.

Air filter shall be taken in line and tubing shall be disconnected at instrument end, and blown for 3 minutes to remove traces of dirt.

4.2.3 Testing of instrument air shall be carried out with instrument air at 7 kg/cm²G upto the upstream of the filter regulator after thorough flushing. All lines shall be checked with soap solution and bubbler unit for possible leak at joints.

4.2.4 All signal tubing shall be checked with 1.5 kg/cm² after proper flushing. After pressuring, source shall be cut off and rate of fall in pressure shall be less than IPSL for each 100 feet of tubing for a test period of 2 minutes as per instrument society of American RP 7.1 'Pneumatic Control Circuit Pressure Test'

4.3 Cables


4.3.1 All wiring shall be checked to ensure that it is correctly connected and properly grounded.

4.3.2 All cables shall be checked for continuity proper connection and insulation testing.

Insulation test shall be carried out on all wiring with a certified magger after disconnecting the cables at both ends.

4.4 All the results of the above mentioned testing shall be recorded and submitted for check.

4.5 All the in line instruments like orifice plates, turbine meters, Rotameters, Target meters, vortex meters, control valves, safety valves etc. shall be removed and spool pieces shall be provided prior to the flushing of the lines.

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5.0 CALIBRATION OF INSTRUMENTS

5.1 All instruments shall be calibrated strictly as per manufacturer's instructions prior to the installation. In addition to calibration of instruments, setting of safety devices like process switches, safety valves etc. and simulation testing of all interlock and shutdown system shall be carried out.

5.2 In general, all tests shall simulate, as closely as possible, design process condition by the use of manometers, potentiometers, deadweight testers, test pressure gauges etc. Four point calibration shall refer to the input signal to an instrument equivalent to 0, 25, 50, 75, 100% of instrument range upscale (rising) and 75, 50, 25, 0% of instrument (downscale) (falling).

All instruments unless otherwise noted shall be calibrated in upscale and downscale direction and if necessary, adjusted until their accuracies conform to those limits state by the manufacturer.

Upon completion of these tests, the instruments shall be drained, completely.

5.3 Temperature Instruments

5.3.1 Temperature Gauges Filled type and Bi metallic dial type Thermometers shall be four point bench checked for proper operation and calibration using a temperature bath prior to installation.

5.3.2 Temperature Elements and Temperature Transmitters.

Temperature Elements and Transmitter shall be four point bench calibrated using a temperature bath precision meter or precision gauge prior to installation.

5.4 Pressure Instruments


5.4.1 Pressure Gauges

5.4.1.1 Direct connected bourdon type pressure gauges shall be dead weight tested or tested against a test gauges prior to installation.

5.4.1.2 Receiver type pressure gauges shall be four points calibrated using a precision gauge and precision air regulator.


5.4.1.3 Pressure and Differential Pressure Transmitters.

Pressure and differential pressure transmitters shall be four points calibrated using a hydraulic or dead weight tester or a precision pneumatic calibrator prior to the


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installation. A precision output meter or gauge shall be used to monitor the output.

- 5.5.1 Orifice plates shall be checked visually for the name plate and for an upstream sharp edge. Bore dia. shall be checked for compliance with the specification.
- 5.5.2 Differential pressure type of flow instruments shall be four points calibrated using precision pneumatic calibrator or a manometer and precision regulator. A precision output meter or gauge shall be used to monitor the output of the transmitter.
- 5.5.3
- a) Rotameters shall be installed as received. A check shall be made to confirm that shipping stops have been removed and float has been installed.
 - b) Where rotameters have transmitting mechanism, the float shall be raised and lowered mechanically and output shall be checked. Vendor calibration data/ curve shall be checked.
 - c) A check shall be conducted with plumb for a vertical installation.
- 5.5.4 Turbine meters, Annubar, positive displacement meters, vortex meter, ultrasonic flow meter, etc. shall be installed as received.
- 5.5.5 Target meters shall be checked for calibration using calibration weights. Output shall be monitored using precision output meter.
- 5.6 Level Instruments
- 5.6.1 Level Gauge Glasses
- Gauge glasses shall be installed as received installation of illuminators, frost protectors and other accessories shall be checked.
- 5.6.2 Displacer Type, Level Transmitter
- Displacer type level transmitter shall be checked by raising and lowering mechanically the displacement and checking the pilot or transmitter action. Check transmitter with out put gauge or meter for smooth and full output change.
 - A check shall be conducted with plumb for a vertical installation.
- 5.6.3 Differential pressure type level transmitter Differential pressure type level transmitter shall be calibrated with pneumatic calibrator at four points prior to installation. A precision meter or gauge shall be used to monitor the output of the transmitter.

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- 5.6.4 Tank level gauges
- Tank level gauges shall be checked by raising and lowering mechanically the displacer and checking the indicator on the gauge board.
 - Check for proper liquid seal prior to installation in case of liquid seal tank gauges.
 - In case of servo type gauges, the displacer is hoisted from the tank into the calibration chamber.
- 5.7 Control Valves, shutdown valves and self actuated valves
- 5.7.1 All diaphragm and piston operated control valve shall be stroked pneumatically using a pressure regulator and pressure gauge against the spring range specified on the name plate of the valve.
- 5.7.2 Mechanical seating and travel of the valve stem shall be checked against the side indicator and the name plate
- 5.7.3 Valve positioner shall be calibrated with the control valve in accordance with the name plate data and specifications with the help of pneumatic calibrator or gauge with precision regulator. Zero position or fully close position of the valve shall be a live zero i.e., the plug shall be just off the seat at the minimum setting.
- 5.7.4 Volume bottles, where used shall be checked for proper filling. The signal line shall be bled to zero pressure and failure action shall be confirmed.
- 5.7.5 Control valve accessories such as handwheels, boosters, relays etc. shall be checked operationally. Declutch able handwheel shall be operable both with and without an air signal to the diaphragm.
- 5.7.6 Self actuated control valves shall be installed as received, checking inlet and outlet points and name plate data. Regulators with external pressure connections shall be inspected for proper installation.
- 5.7.7 Butterfly shall be checked carefully to see that the vane moves freely into the upstream and down stream piping. Proper vane movement to stroke shall be confirmed.
- 5.7.8 All control valves and regulators shall be removed from the line prior to flushing and during hydro testing.

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5.8 Safety Relief Valves

5.8.1 Safety relief valves shall be installed as received after carefully checking the name plate data. Pilots, if used, shall be checked carefully for installation on the proper safety valve.

5.8.2 Valves, which are installed in such a manner as to permit on line testing, shall be pressure tested after installation to determine proper operation and setting. Compressed air or nitrogen shall be used for testing of safety relief valves.

5.9 Switches

5.9.1 Level Switches shall be actuated mechanically for switch operation but shall not be calibrated for level setting.

5.9.2 Pressure switches shall be calibrated using hydoric or dead weight tester or precision air regulator and gauge. The setting/trip point shall be checked using a continuity tester.

5.9.3 Temperature switches shall be calibrated using a temperature both prior to installation and set to the required alarm/ trip point using a continuity tester.

5.10 Receiver Instruments

5.10.1 Receiver Indicator/Recorders

5.10.1.1 Pneumatic indicators/ Recorders shall be calibrated using pneumatic calibrator/ precision pressure regulator and gauge.

5.10.1.2 Electronics indicators/ Recorders shall be calibrated using a current generator and a precision meter.


5.10.1.3 Chart drive assembly shall be checked for proper operation.

5.10.2 Controllers

5.10.2.1 Proper balancing of the controller shall be checked as per the manufacturers catalogues.

5.10.2.2 Controllers shall be checked for manual and Auto operation and Transfer. The transfer from manual to Auto and vice versa shall be bumpless and smooth.

5.10.3.1 Manual loader station Output of the manual loader shall be checked with a precision meter.

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5.10.4.1 Multipoint Temperature Recorders

Each point shall be calibrated using a temperature simulator/ decade box for RTD / voltage generator and precision meter for the thermocouples.

5.10.4.2 Point synchronisation shall be checked.

5.10.5 Pneumatic receiver switches shall be calibrated using precision air regulator and gauge. The setting/alarm/trip point shall be checked using continuity tester.

5.10.6 Trip Amplifiers Trip amplifiers shall be calibrated using a temperature simulators or voltage generator and precision meter for thermocouple or Resistance box for RTD's. The required setting/ alarm point/ trip point shall be checked using a continuity tester.

5.10.7 Receiver Switch module Receiver switch modules shall be calibrated using a current source and a precision meter. The required setting/alarm/trip point shall be checked using a continuity tester.

5.10.8 Alarm and Annunciator system

5.10.8.1 Alarm and annunciator system shall be checked for visual and audio alarm operation using dummy signals. Full alarm sequence of each alarm point shall be checked.

5.10.8.2 Each point shall be checked for proper engraving.

5.10.9 Shutdown System


5.10.9.1 Operation of final actuating elements shall be checked for proper operation using dummy signals.

5.10.9.2 All timers, push buttons and switches shall also be checked for their proper operation.

5.11 Analytical Instruments

5.11.1 Check the full analyser system including sample handling system for leakage.

5.11.2 Check the full sample handling system for its proper operation. Calibrate and check completely all analysers using zero and span samples as per vendor catalogues.

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5.12 Flow computer / Volume corrector

5.12.1 Corrected flow values shall be checked for various D.C. inputs and pressure and temperature variations for upscale and downscale ranges.

5.13 The list of test and calibration instruments with traceability certificates shall be submitted to MECON for approval before carrying out the tests / calibration of instruments at site.

5.14 The formats / description of tests / calibration of all instruments shall be submitted to MECON for approval.

5.15 Daily / weekly reports shall be submitted during execution of work at site.

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**SPECIFICATION
FOR
INSTRUMENT TUBING**

SPECIFICATION NO.: MEC/S/05/26/02




**ELECTRICAL & INSTRUMENTATION
(OIL & GAS SBU)
MECON LIMITED
DELHI 110 092**

MECON LIMITED REGD. OFF: RANCHI 834002	STANDARD SPECIFICATION		
	ELECTRICAL & INSTRUMENTATION OIL & GAS SBU, DELHI		
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PREPARED BY: (R. SANJAY BABU)	CHECKED BY: (RAKESH SHUKLA)	APPROVED BY: (PANKAJ SHIVASTAVA)	ISSUE DATE : 08Th DEC 08
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1.0 **GENERAL**

1.1 Scope

1.1 This standard specifications, together with the data sheets attached herewith, covers the requirements for the design, materials, testing and shipping of Instrument Tubing which includes the following types:-

- a) SS tubes
- b) Copper tubes

1.1.2 The related standards referred to herein and mentioned below shall be of the latest edition prior to the date of Purchaser's enquiry:

- ASTM A 269 - Specification for seamless and welded ferritic stainless steel tubing for general services.
- ASTM B 251 - Specification for general requirements for wrought seamless copper and copper alloy tube.
- ASTM B 251M - Specification for general requirements for wrought seamless copper and copper alloy tube (Metric)
- ASTM B 68 - Specification for seamless copper tube, bright annealed.
- ASTM B 68M - Specification for seamless copper tube, bright annealed. (Metric)

1.1.3 In the event of any conflict between these specifications, data sheets, related standards, codes, etc., the vendor shall refer the matter to the purchaser for clarifications and only after obtaining the same shall proceed with the manufacture of the items in question.


1.2 Bids

1.2.1 Vendor's quotation shall include a detailed specification sheet for each type of tube which shall provide the following information:

- a) All the details regarding the type, construction, materials etc. of the items.
- b) Overall the dimensions in mm.

1.2.2 All the units of measurement and material specifications for various parts in the vendor's specification sheets shall be to same standards as in purchaser's data sheets.

1.2.3 Vendor shall attach a list of items, type wise, summing up all the deviations from this specification and purchaser's data sheets if there are any. Also vendor shall provide reasons for these deviations.

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1.2.4 Vendor shall enclose catalogues giving detailed technical specifications and other information for each type of tube in the bid.

1.2.5 Vendor's quotation, catalogues, drawings etc. shall be in English language.

1.3 Drawings, Data and Certification

Detailed drawings, data, catalogues and manuals etc. required from the vendor are indicated by the purchaser in vendor data requirement sheets. The required number of reproducible and prints shall be despatched to the address mentioned, adhering to the time limits indicated.

2.0 CONSTRUCTION

2.1 Stainless Steel Tubes

2.1.1 SS tubes of the tubes shall be Rockwell RB 70-70. Tubes shall be free from scratches and to be suitable for bending.

2.1.3 Tube wall thickness shall be 0.049" for 1/2" OD and 1mm for 6 mm unless otherwise specified.

2.1.4 Maximum working pressure shall be 153.0 kg/cm² at 38°C for 1/2" OD Tube, unless otherwise specified and 80.0 kg/cm² at 38° for 6mm OD tube.

2.1.5 Tubes shall be supplied in minimum length of 6 metres without brazing in between.

2.1.6 Dimensional tolerances shall be as per ASTM A 269.

2.1.7 The following shall be marked on the tube:


- a) Name of manufacturer
- b) Type and material grade of tube
- c) Tube O.D. and wall thickness

2.2 Copper Tubes

2.2.1 Copper Tubes (PVC Jacket)

2.2.1.1 The tube shall be soft annealed copper with 6mm OD and a wall thickness of 1.0 mm as per ASTM B 68M Copper No.C12200.

2.2.1.2 The tube shall be jacketed with black PVC. The jacket thickness shall be 1.6mm. The PVC jacket shall conform to ASTM D-1047.

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2.2.1.3 The tube ends shall be plugged prior to transportation.

2.2.1.4 The tube shall be of continuous length without any brazing in between for 100 metres length.

2.2.1.5 Minimum length of single tube shall be 100 metres.

2.2.1.6 The dimensional tolerances shall be as per ASTM B 251M.

2.2.2 Bare Copper Tubes (For Steam Tracing)

2.2.2.1 The tube shall be soft annealed copper with 3/8" OD or 6mm OD with a wall thickness of 1.0 mm as per ASTM B68 copper No.C12200.

2.2.2.2 The tube ends shall be plugged prior to transportation.

2.2.2.3 The tube shall be of continuous length without any brazing in between for 100 metres length.

2.2.2.4 Minimum length of tube shall be 100 metres.

2.2.2.5 The dimensional tolerances shall be as per ASTM B 251.

3.0 TESTING

3.1 The following tests shall be done for SS tubes.

- a) Hardness test
- b) Hydrostatic test at 153.0 kg/cm² at 38° C for 1/2" tube and at 80.0 kg/cm² at 38° C for 6mm tube, unless otherwise specified.

3.2 PVC jacketed copper tubes shall be tested at 7.0kg/cm²g with dry air for leak check.


3.3 Bare copper tubes shall be hydrostatically tested at 80.0 kg/cm²g at 38°C.

3.4 Final test before delivery shall include ball test to ensure clear opening of the tube for copper tubes. The O.D of the ball shall be minimum 1mm for 6mm O.D tube and 2mm for 3/8" tube.

4.0 SHIPPING

4.1 The tubes shall be plugged at both ends to avoid entry of foreign matter. The tubes shall be packed carefully so as to avoid damage during transport.

5.0 REJECTION

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Vendor shall make his offer in detail, with respect to every item of the purchaser's specifications. Any offer not conforming to this shall be summarily rejected.

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Edition: 1

SPECIFICATION
FOR
INSTRUMENT TUBE FITTINGS

SPECIFICATION NO.: MEC/S/05/26/04




ELECTRICAL & INSTRUMENTATION
(OIL & GAS SBU)
MECON LIMITED
DELHI 110 092

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PREPARED BY: (R. SANJAY BABU)	CHECKED BY: (RAKESH SHUKLA)	APPROVED BY: (PANKAJ SHIVASTAVA)	ISSUE DATE : 08Th DEC 08
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MECON LIMITED REGD. OFF: RANCHI 834002	STANDARD SPECIFICATION		
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1.0 GENERAL

1.1 Scope

1.1.1 This standard specifications, together with the data sheets attached herewith, covers the requirements for the design, materials, testing and shipping of instrument tube fittings which includes the following types:-

- a) SS compression fittings (SS tube)
- b) Brass compression fittings (copper tube)

1.1.2 The related standards referred to herein and mentioned below shall be of the latest edition prior to the date of Purchase's enquiry:

- | | | |
|-------------|---|---|
| ANSI B 2.1 | - | Pipe Threads |
| B16.11 | - | Forged steel fittings-socket welding and threaded. |
| IS:319 | - | Specification for free cutting brass bars, rods and sections. |
| ISA RP 42.1 | - | Nomenclature for instrument tubing - fittings. |

1.1.3 In the event of any conflict between these specifications, data sheets, related standards, codes etc., the vendor shall refer the matter to the purchaser for clarifications and only after obtaining the same shall proceed with the manufacture of the items in question.

1.2 Bids

1.2.1 Vendor's quotation shall include a detailed specification sheet for each type of tube fittings which shall provide the following information:


- a) All the details regarding the type, construction, materials, etc. of the items.
- b) Overall dimensions in mm.

1.2.2 All the units of measurement and material specifications for various parts in the vendor's specification sheets shall be to same standards as in purchaser's data sheets.

1.2.3 Vendor shall attach a list of items, typewise, summing up all the deviations from this specification and purchaser's data sheets if there are any. Also vendor shall provide reasons for these deviations.

1.2.4 Vendor shall enclose catalogues giving detailed technical specifications and other information for each type of fitting in the bid.

1.2.5 Vendor's quotation, catalogues, drawings, etc. shall be in English language.

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1.3 Drawings, Data and Certification

Detailed drawings, data, catalogues and manuals etc., required from the vendor are indicated by the purchaser in vendor data requirement sheets. The required number of reproducibles and points shall be despatched to the address mentioned, adhering to the time limits indicated.

2.0 CONSTRUCTION

2.1 SS Tube fittings:

2.1.1 Nomenclature of all tube fittings shall be as per ISA RP 42.1.

2.1.2 Fittings shall be flareless compression type and of three piece construction with ferrule, nut and body suitable for use on SS tubes conforming to ASTM A 269 TP316, hardness not exceeding RB80.

2.1.3 All parts shall be of SS 316.

2.1.4 Hardness of the ferrules shall be in the range of RB 85-90 so as to ensure a minimum hardness difference of 5 to 10 between tube and fittings, for better sealing.

2.1.5 Nuts and ferrules of particular size shall be interchangeable for each type.

2.1.6 Spanner hold shall be metric.

2.1.7 Threaded ends of fittings shall be NPT as per ANSI B 2.1.

2.1.8 Copper Tube Fittings


2.2.1 Nomenclature of all tube fittings shall be as per ISA 42.1.

2.2.2 Fittings shall be of flareless compression type and of three-piece construction consisting of ferrule, nut and body suitable for use on copper tubes conforming to ASTM B 68/B 68M hardness not exceeding RB 50.

2.2.3 All parts shall be manufactured from Brass as per IS 319 barstock and Nickel plated.

2.2.4 For better grip, vendor shall maintain hardness difference between tube & ferrule and indicate the same along with the offer.

2.2.5 Nuts & ferrules of particular size shall be interchangeable for each type.

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2.2.6 Threaded ends of fittings shall be NPT as per ANSI B 2.1.

2.2.7 Spanner hold shall be metric.

2.2.8 Vendor shall ensure that the ferrules and nuts supplied for fittings shall be suitable for sample tube which shall be supplied during manufacture.

3.0 TESTING

3.1 Random samples of SS tube fittings shall be hydrostatically tested as follows:-

For 6 mm fittings at 80.0 kg/cm², 1/2" fittings at 153.0 kg/cm² at 38°C unless otherwise specified.

3.2 Random samples of brass compression fittings shall be hydrostatically tested as follows:-

For 1/4" fittings, at 10 kg./cm², 3/8" at 80.0 Kg/cm² and all at 38°C.

4.0 SHIPPING

4.1 All thread/ends shall be protected with plastic caps to prevent damage/entry of foreign matter.

5.0 REJECTION

Vendor shall make his offer in detail, with respect to every item of the purchaser's specifications. Any offer not conforming to this shall be summarily rejected.

Rev.: 0


Edition: 1

SPECIFICATION
FOR
INSTRUMENT VALVES AND MANIFOLDS

SPECIFICATION NO.: MEC/S/05/26/05




ELECTRICAL & INSTRUMENTATION
(OIL & GAS SBU)
MECON LIMITED
DELHI 110 092

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PREPARED BY: (R. SANJAY BABU)	CHECKED BY: (RAKESH SHUKLA)	APPROVED BY: (PANKAJ SRIVASTAVA)	ISSUE DATE : 08 Th DEC 08
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1.0 GENERAL

1.1 Scope

1.1.1 This standard specifications, together with the data sheets attached herewith, covers the requirements for the design, materials, testing and shipping of Instrument Valves & Manifolds which includes the following types:-

- a) Miniature instrument valves
- b) Instrument valve manifolds
- c) Instrument air valves

1.1.2 The related standards referred to herein and mentioned below shall be of the latest edition prior to the date of Purchaser's enquiry:

- ANSI B 2.1 - Pipe threads
- ANSI B 16.11 - Forged steel fittings-socket welding and threaded.

1.1.3 In the event of any conflict between these specifications, data sheets, related standards, codes etc, the vendor shall refer the matter to the purchaser for clarifications and only after obtaining the same shall proceed with the manufacture of the items in question.

1.2 Bids

1.2.1 Vendor's quotation shall include a detailed specification sheet for each type of Valves & Manifolds which shall provide the following information:


- a) All the details regarding the type, construction, materials etc. of the items.
- b) Overall dimensions in mm.

1.2.2 All the units of measurement and material specifications for various parts in the vendor's specification sheets shall be to same standards as in purchaser's data sheets.

1.2.3 Vendor shall attach a list of items, typewise, summing up all the deviations from this specification and purchaser's data sheets if there are any. Also vendor shall provide reasons for these in the bid.

1.2.5 Vendor's quotation, catalogues, drawings etc. shall be in English language.

1.3 Drawings, Data and Certification

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Detailed drawings, data, catalogues and manual etc. required from the vendor are indicated by the purchaser in vendor data requirement sheets. The required number of reproducible and prints shall be despatched to the address mentioned, adhering to the time limits indicated.

2.0 CONSTRUCTION

2.1 Instrument Valves (Miniature)

- 2.1.1 The instrument valves shall be globe pattern-needle valves forged/ barstock with inside screwed bonnet.
- 2.1.2 Body and trim material shall be 316 SS unless otherwise specified.
- 2.1.3 The valve body rating shall be 3000 lbs unless specified in piping material specification which shall govern in case it is specified.
- 2.1.4 The end connection shall be 1/2" NPTF to ANSI B2.1.
- 2.1.5 The packing material shall be teflon unless otherwise specified.
- 2.1.6 The hand wheel material shall be carbon steel zinc plated.
- 2.1.7 Flow direction shall be marked on the body.
- 2.1.8 The valve dimension shall be as follows:

- a) End to end dimensions 76 mm (approximately).
- b) Height in fully open condition - 135mm maximum.


2.2 VALVE MANIFOLDS

2.2.1 3-Valve & 5-Valve manifolds:

2.2.1.13 Valve manifold shall be designed for direct coupling to differential pressure transmitters having 2 bolt flanges with 54 mm (2-1/8") centre to centre connections and 41.3 mm (1-5/8") bolt to bolt distance. The manifold shall contain two main block valves and an equalizing by-pass valve. The valves shall be needle valves. They shall use self aligning 316SS ball seats.

2.2.1.25 Valve manifold shall contain two main line block valves and a combination double block and bleed for the bypass line.

2.2.1.3 The manifold shall be suitably for mounting directly on the stanchion (2" pipe).

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2.2.1.4 All bonnets shall have teflon packing unless otherwise specified.

2.2.1.5 The material of construction shall be 316 SS unless otherwise specified.

2.2.1.5 The material of construction shall be 316SS unless otherwise specified.

2.2.1.6 The flanges shall be integral part of the block.

2.2.1.7 The process connection shall be 1/2" NPTF to ANSI B2.1.

2.2.1.8 The manifolds shall be supplied alongwith mounting accessories. The bolts and nuts shall be alloy steel as per ASTM A 193 Gr B ASTM A 194 GR 2H respectively. Rings shall be teflon and other accessories shall be cadmium plated.

2.2.1.9 Vendor shall furnish the material certificate for body.

2.2.2 3 Way 2 Valve Manifold for pressure gauges.

2.2.2.1 The manifold shall be designed for use with pressure gauges.

2.2.2.2 The valve shall be a ball valve.

2.2.2.3 The body shall be either straight or angle as specified in data sheets.

2.2.2.4 The body and trim material shall be 316SS, packing material shall be teflon unless otherwise specified.

2.2.2.5 The inlet connection shall be 3/4" plain end (female) for socket weld as per ANSI B 16.11.

2.2.2.6 The gauge connections shall be with union nut & tail piece threaded 1/2" NPT (F).

2.2.2.7 The drain connection shall 1/2"NPTF.


2.3 Instrument Air Isolation Valves

2.3.1 The valves shall be full bore ball valves.

2.3.2 Body material shall be Nickel or Cadmium plated carbon steel.

2.3.3 Trim material shall be 316SS.

2.3.4 The end connection shall be 1/2" NPTF to ANSI B2.1 unless otherwise specified.

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2.3.5 The packing material shall be teflon.

2.3.6 The handle/wrench material shall be cadmium or nickel plated carbon steel.

2.3.7 The valve body rating shall be ANSI 800 lb.

2.3.8 End to end dimensions shall be 70mm (approximately).

3.0 TESTING

3.1 The instrument valves (miniature) shall be hydrostatically tested at 200kg/cm² g at 38°C.

3.2 All manifolds (3 valves, 5 valves and 3 ways, 2 valves) shall be hydrostatically tested at 200 kg/cm² at 38C.

3.3 The instrument air valves shall be hydrostatically tested at 15.0 kg/cm²g at 38°C and at 10.5 kg/cm²g with dry air.

4.0 SHIPPING

4.1 All threads/ends shall be protected with plastic caps to prevent damage/entry of foreign matter.

5.0 REJECTION

Vendor shall make his offer in detail, with respect to every item of the purchaser's specifications. Any offer not conforming to this shall be summarily rejected.

Rev.: 0


Edition: 1

**SPECIFICATION
FOR
JUNCTION BOXES AND CABLE GLANDS**

SPECIFICATION NO.: MEC/S/05/26/06




**ELECTRICAL & INSTRUMENTATION
(OIL & GAS SBU)
MECON LIMITED
DELHI 110 092**

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PREPARED BY: (R. SANJAY BABU)	CHECKED BY: (RAKESH SHUKLA)	APPROVED BY: (PANKAJ SRIVASTAVA)	ISSUE DATE : 08 Th DEC 08
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1.0 General

1.1 Scope

1.1.1 This standard specifications, together with the data sheets attached herewith, covers the requirements for the design, materials, nameplate marking, testing and shifting of junction boxes & cable glands which include the following types:

- a) Electrical junction boxes.
- b) Pneumatic junction boxes
- c) Cable glands (whenever specified)

1.1.2 The related standards referred to herein and mentioned below shall be of the latest editions prior to the date of the purchaser's enquiry:

- ANSI B 2.1 : Pipe threads
IS-5 : Colours for ready mixed paints and enamels
IS-2147 : Degrees of protection provided by enclosures for Low voltage switchgear and control gear.
IS-2148 : Flame proof enclosure of electrical apparatus.


1.1.3 In the event of any conflict between specifications, data sheets, related standards, codes etc., the vendor shall refer the matter to the purchaser for clarifications and only after obtaining the same should proceed with the manufacture of the items in questions.

1.2 Bids

1.2.1 Vendor's quotation shall include a detailed specification sheet for each type of junction box and cable gland which shall provide the following information:

- a) All the details regarding the type, construction, materials, housing, entries, etc.
- b) All dimensions in millimetre.
- c) Sketch for each type of JB with dimensional details showing the terminal and entries arrangement.
- d) Mounting details.
- e) Vendor shall furnish certificate from statutory body for explosion proof enclosure, indicating the gas group and temperature class.

1.2.2 All the material specifications for various parts in the vendor's specification sheets shall be to the same standards as those in purchaser's data sheets (e.g. BS IS, etc.)

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1.2.3 Vendor shall attach a list of items, tag number wise, summing up all the deviations from the purchaser's data sheets, if there are any. Also vendor shall furnish reasons for these deviations.

1.2.4 Vendor shall enclose catalogues giving detailed technical specifications and other information for each type of JB/cable glands and its accessories covered in the bid.

1.2.5 Vendor's quotation, catalogues, drawings, etc. shall be in English language.

1.3 Drawings, Data and Certification

1.3.1 Detailed drawings, data, catalogues required from the vendor are indicated in vendor data requirements sheets. The required number of reproducible and prints shall be despatched to the address mentioned, adhering to the time limits indicated.

1.3.2 After placement of purchaser order, vendor shall submit certified drawings and specifications sheets for each type of JB/cable gland which shall include the following:

- a) Detailed dimensional drawings
- b) Weight of each in grams/Kg.
- c) Certificate from statutory body suitable for installation in specified hazardous area.

2.1 **Junction Boxes**


2.0 Junction boxes shall be either of the following type as specified in data sheets.

- I. Weather proof junction boxes.
- II. Weather proof & Explosion proof junction boxes.

2.2 The enclosure shall be as per IS-2147 for weather proof junction boxes and for Explosion proof it shall be as per IS-2148 suitable for the area classification specified.

2.3 Number of entries and locations shall be as per data sheets.

2.4 Junction boxes shall be provided with telephone sockets and plugs for connection of hand powered telephone set.

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2.5 Electrical Junction boxes

2.5.1 Material shall be die-cast aluminium of minimum 5 mm thick (LM-6 alloy)

2.5.2 Explosion proof junction boxes shall have detachable cover which is fixed to the box by means of cadmium plated triangular head/hexagonal head screws.

2.5.3 Weather proof junction boxes shall have doors which shall be hinged type and these shall be fixed with cadmium plated countersunk screws.

2.5.4 Explosion proof junction boxes shall have a warning engraved/integrally cast on the cover as given below:

"Isolate power supply elsewhere before opening"

2.5.5 Terminals shall be spring loaded, vibration proof, clip-on type, mounted on nickel plated steel rails complete with end cover and clamps for each row.

2.5.6 All terminals shall be suitable for accepting minimum 2.5 sq. mm copper conductor, in general. However for power supply distribution boxes, terminal detail shall be as per job specification/Data sheets.

2.5.7 Sizing shall be done with due consideration for accessibility and maintenance in accordance with the following guidelines.

- i) 50 to 60 mm between terminals and sides of box parallel to terminal strip for upto 50 terminals and additional 25mm for each additional 25 terminals.
- ii) 100 to 120mm between terminals for upto 50 terminals and additional 25mm for each additional 25 terminals.
- iii) Bottom/top of terminal shall not be less than 100 mm from bottom/top of the junction box.


2.5.8 Terminals shall be marked as per the various types indicated in data sheets.

2.5.9 Shall be provided with external earthing lugs.

2.6 Pneumatic junction boxes

2.6.1 Pneumatic junction boxes shall be made of 3mm thick hot rolled steel. They shall have necessary neoprene gasket between door and body. Door shall be flush with the box and shall be hinged type and provided with wing nuts.

2.6.2 Single tube entries shall be suitable for 6mm O.D. copper tube with bulk head fittings. Multi tube bundle entry shall be suitable for the data furnished in data sheets.

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2.7 Painting

2.7.1 Surface shall be prepared for painting. It shall be smooth and devoid of rust and scale.

2.7.2 Two coats of lead-free base primer and two final coats of lead free epoxy based paint shall be applied both for interior and exterior surfaces.

2.7.3 The colour shall be as specified in data sheets.

3.0 **Cable glands & plugs, Reducers/Adaptors**

3.1 Cable glands shall be supplied by vendor whenever specified.

3.2 Cable glands shall be double compression type for use with armoured cables.

3.3 The cable glands shall be of Nickel plated brass.

3.4 The cable gland shall be weather proof. Whenever specified they shall be explosion proof and certificate from statutory body shall be furnished.

3.5 Cable glands shall be supplied to suit the cable dimensions indicated along with tolerance indicated in data sheets. Various components like rubber ring, metallic ring, metallic cone and the outer/inner nuts etc. shall be capable of adjusting to the above tolerances of cable dimensions.

3.6 Reducers/Adaptors shall be supplied as per details indicated in data sheets. They shall be nickel plated brass. These shall be weather proof in general. These shall also be explosion proof wherever specified and certificate from statutory body for explosion shall be furnished.


3.7 Plugs shall be provided wherever specified. They shall be of Nickel plated brass.

3.8 Plugs shall be certified explosion proof when used with explosion and junction boxes.

4.0 **Name Plate**

4.1 Each junction box shall have an anodised aluminium name plate permanently fixed to it at a visible place bearing the tag no. & enclosure. The name plate shall also bear the stamp of certifying agency with certificate number.

5.0 **Shipping**

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5.1 All threaded openings shall be suitably protected to prevent entry of foreign material.

5.2 All threaded components shall be protected with plastic caps to prevent damage of threads.

6.0 Rejection

Vendor shall furnish his offer in detail, with respect to every item of the purchaser's specifications. Any offer not conforming to this shall be summararily rejected.

Rev.: 0


Edition: 1

**SPECIFICATION
FOR
SIGNAL CABLES**

SPECIFICATION NO.: MEC/S/05/26/07




**ELECTRICAL & INSTRUMENTATION
(OIL & GAS SBU)
MECON LIMITED
DELHI 110 092**

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- 1.0 GENERAL
- 2.0 CONSTRUCTION
- 3.0 ELECTRICAL CHARACTERISTICS
- 4.0 TESTING

PREPARED BY: (R. SANJAY BABU)	CHECKED BY: (RAKESH SHUKLA)	APPROVED BY: (PANKAJ SRIVASTAVA)	ISSUE DATE : 08Th DEC 08
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1.0 GENERAL

1.1 Scope:

This specification together with the job Specifications attached herewith forms the requirements for design, materials manufacturing, testing and shipping of PVC insulated signal cables.

1.2 Standards:

The cables shall conform to the latest editions of the various standards mentioned in the specification.

In case of any conflict between any standard and this - specifications the matter shall be referred to the purchaser before proceeding with the manufacture of the cables.

1.3 Bids:

1.3.1 Vendor's quotation shall include the following as a minimum.

Completed job spec. Pair identification method, type test certificates, technical literatures, various testing methods and cross sectional dimensional drawings. All information/data shall be in English language.


1.3.2 Vendor's quotation shall include a list of deviations if any from purchaser's specifications and shall also indicate the reasons for such deviations for consideration to arrive at mutually agreed deviations. However vendor shall note that no deviation shall be accepted in respect of the permissible limits of resistance capacitance and L/R ratio of cables.

1.3.3 Vendor shall quote unit price per metre for each type of cable.


1.4 Instructions to Bidder:

1.4.1 The quantity indicated against each type of cable in the job specification may vary by $\pm 25\%$ at the time of placement of order. Vendor shall confirm that there shall be no price implication on this account in unit prices typewise.

1.4.2 Drum length for each type of cable shall be 500 to 1000 metres. Vendor shall indicate the maximum drum length possible for each type of cable in his bid. Exact requirements of drum length will be specified after purchase order during detailed engineering and vendor shall confirm that the same shall not affect the price or delivery schedule. The actual produced drum length shall not vary by more than $\pm 5\%$ from the value indicated in the purchase order.

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- 1.4.3 Tolerance over the total ordered length shall be as follows:
 $\pm 5\%$ for total length less than 5 km
 $\pm 2\%$ for total length 5 km or more
- 1.4.4 Cable dimensions furnished by vendor in his bid shall be firm. Vendor shall comply with all the values during execution.
- 1.5 All cables shall be suitable for laying in open air, corrosive hydrocarbon plant atmosphere, direct sun and in trenches. The cable shall also be designed for prolonged use in tropical atmosphere.
- 1.6 On demand vendor shall furnish documents such as invoice and test certificates to prove the quality and composition of the materials used for manufacturing the cable to the satisfaction of client/ consultant or authorised representative during various stages of expediting and inspection.
- 2.0 Construction:**
- 2.1 Type 1
(Single pair/triad shielded cable)
- 2.1.1 Each core shall be 1.5 sq. mm made of 7 stranded annealed electrolytic copper conductors. Each strand shall be 0.53 mm dia.
- 2.1.2 Primary insulation shall be 85°C polyvinyl chloride (PVC) as per IS-5831 Type C. Thickness shall be 0.5 mm minimum.
- 2.1.3 Each wire shall have twisted cores and No. of twists shall be not less than 10 per metre. Colour of cores insulation shall be black blue in a pair and black, blue and brown in a triad.
- 2.1.4 Individual pair and triad shall be shielded. Shield shall be Aluminium backed by Mylar/polyester tape bonded together with the metallic side down helically applied with either side - 25% overlap and 100% coverage. Minimum shielded thickness shall be 0.05mm. Drain wire shall be 0.5 sq.mm multistrand bare tinned annealed copy conductor. The drain wire shall be in continuous contact with Aluminium side of the shield.
- 2.1.5 Inner and outer jacket shall be made of extruded flame retardant 90°C PVC to IS 5831-Type ST2 Oxygen index of PVC shall be 30. Temp. Index shall be over 250° C.
- Inner jacket colour shall be black. Outer jacket colour shall be black except for cable to be used in intrinsically safe systems it shall be light blue.

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2.1.6 Armour over inner jacket shall be of galvanised steel wire/flat as per IS-1554 part-I.

2.1.7 A pair or triad identification shall be with numbers at interval of not more than 250 mm as per vendor's standard.

2.1.8 Tolerance in overall diameter of cable shall be within ± 2 mm over offered value for cables with OD less than 30mm and ± 3 mm for cables with OD more than 30mm.

2.2 Type-II

(Multipair / Multitraid cable with individual pair shield and overall shield)

The cable shall be same as single pair shielded cable except conductor size shall be 0.5 sq.mm made of 16 strands of annealed electrolytic copper conductor. Each strand shall be of 0.2mm dia.

Additional feature shall be as follows:

2.2.1 Overall shield shall be of Aluminium backed up by Mylar/polyester tape helically applied with the metallic side down either side - 25% overlap and 100% coverage. Minimum shield thickness shall be 0.075mm Drain wire shall be similar to individual pair drain wire and shall be in continuous contact with the Aluminium side of the overall shield.

2.2.2 Overall twist of all pair/triads shall be as per vendor's standard.

2.2.3 A pair of communication wire shall be provided for multipair/multitriad cables. Each wire shall be 0.5 sq. mm of plain annealed single or multistrand copper conductor with 0.4 mm thick 85°C PVC insulation. Insulation shall be green and red colour coded.

2.3 Type-III


(Multipair/Multitriad cable with only overall shield)

These cables shall be same as type-II cables except that the individual pair/triad shall not have shielding.

2.4 Type-IV

(Multipair/ multitriad cable with individual pair shield and overall shield)

The cable shall be same as Type II except conductor size shall be 1.5 sq.mm made of 7 stranded annealed electrolytic copper conductor. Each strand shall be 0.53 mm dia.

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2.5 Type-V

(Multipair/ Multitriad cable with overall shield only)

The cable shall be same as type IV except that the individual pair/triad shall not have the shielding.

3.0 Electrical Characteristics

3.1 Maximum d.c. resistance of the conductor of the completed cable shall not exceed 12.3 ohms/km at 20° C for cables with 1.5 sq.mm conductor and 39.7 ohms/km at 20°C for cables with 0.5 sq.mm conductor.

3.2 Capacitance

3.2.1 Mutual Capacitance

The mutual capacitance of the pairs or adjacent cores shall not exceed a maximum of 250 pF/Meter at a consequence of 1 KHz.

3.2.2 Capacitance between any core or screen.

The capacitance between any core or screen shall not exceed a maximum of PF/Meter at a frequency of 1KHz.

3.3 L/R ratio of adjacent core shall not exceed 40 micro henry/ohm for cables with 0.5 sq. mm conductor.

3.4 The drain wire resistance including shield shall not exceed 30 ohms/km.


3.5 Electrostatic noise rejection ratio shall be over 76 dB.

4.0 Testing

4.1 Type test: Cable shall be flame retardant to IEC 332 Part III Cat. A. For qualification certificates from third party or client /consultants authorised representative for this test shall be furnished by vendor for cables similar to those being offered.

4.2 Routine tests: (To be carried out by vendor during various stages of manufacture. Purchaser shall review the related documentation).

4.2.1 Insulation and jackets: All tests as per IS-5831 except insulation resistance, voltage and spark test shall be as per BS-5308. Part-II(1986)

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- 4.2.2 Armour test as per IS-3975.
- 4.2.3 Conductor resistance.
- 4.2.4 Cable capacitance and L/R ratio.

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GENERAL SPECIFICATIONS FOR INSTRUMENTATION

SPECIFICATION NO.: MEC/S/05/26/08




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(OIL & GAS SBU)
MECON LIMITED
DELHI 110 092**

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- 8.0 SPECIAL INSTRUCTIONS TO CONTRACTOR

PREPARED BY: (R. SANJAY BABU)	CHECKED BY: (RAKESH SHUKLA)	APPROVED BY: (PANKAJ SRIVASTAVA)	ISSUE DATE : 08 Th DEC 08
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1.0 GENERAL

1.1 INTRODUCTION

1.1.1 This part of the technical specifications covers in general, definitions, standards, scope of works, specifications of work, documentation, scope of supply of materials and scrap and excess materials and different requirements to be adhered to during the course of execution of instrumentation works.

1.1.2 Instrumentation works shall be performed in accordance with this technical specification and various other drawings and schedules supplied during the execution and time to time instructions from Engineer-in-Charge or his authorised representative(s) during the progress of the work.

2.0 DEFINITIONS

2.1 MANIFOLDS

2.1.1 For close coupled instruments "Manifold" shall mean complete piping of instruments from first block valve upto the instruments, if the distance of the Instrument is within 2 feet (0.6m), from the Instrument tapping. If the distance of instrument is more than 2 feet (0.6m) from primary tapping such as orifice, then the installation is to be considered under remote installation.


2.1.2 For remote mounted instrument, "Manifold" shall mean the assembly of nipples, valves and fittings around the instrument to form a block and bleed or by pass manifold or drain manifold as the case may be. These shall be generally according to the hook up drawings enclosed with tender. Wherever the instruments are with 3--way-valve manifold, this definition shall not be applicable as 3-way manifold forms part of instrument.

2.2 FIRST BLOCK VALVE

First block valve shall mean the valve/valves that are mounted directly on equipment, columns, pipe, standpipe etc. and shall be operated to isolate the instrument and connected instrument piping from the above items.

2.3 SUPPORTS

Supports shall mean the MS angles, flats, channels that are generally provided to support the main cable ways, cable ducts, junction boxes, angle trays, perforated trays, instrument piping, signal tubing, instrument air supply lines etc., at specified intervals from the structures, concrete columns etc. to keep all items firmly secured against vibration, warping, bending etc.

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2.4 SCRAP

2.4.1 Salvageable scraps

Salvage scrap shall mean lengths of tubes, pipes, multicables, other cables etc. that can be used one time or other at later date and normally they are recovered from the cut-pieces of tubes, pipes, multicables, cables, etc.

2.4.2 Non Salvageable Scrap

Non salvageable scrap shall mean the lengths of tubes, pipes, multicables, cables, etc. that cannot be used at all one time or other.

2.5 Standards

The instrumentation erection and calibration works shall be carried out generally in accordance with various international and Indian standards in instrumentation listed below but not limited to the following:

2.5.1 API -RP-550 Manual on Practices for instrumentation.

2.5.2 ISA standards and Practices for instrumentation

2.5.3 Instrumentation hook-up standards enclosed.

2.5.4 Instrumentation supports standard enclosed.

2.5.5 Manufacturer's standards and Practices.


3.0 **SCOPE OF WORK**

3.1.0 The Scope of work shall consist of supply of instrument items (as per schedule of quantities/rates and SCC), instruments, their erection, testing, calibration and commissioning and making it ready for commercial operation. The scope covers various jobs listed under the schedule of quantities/rates. However to ensure proper execution and completeness of instrument--work any or all of the following shall also form the part of the scope and shall be covered in the quoted rates.


3.1.1 Fabrication of pipe nipples, including threading whenever required.

3.1.2 Fabrication of seal pot/syphon/drain pot as per standards. Filling of seal pots with filling liquids as per instructions from Engineer-in-charge.

3.1.3 Back/seal welding of screwed fittings as required by standards.

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- 3.1.4 Laying of cable underground including excavation, sand filling, brick laying and back filling.
- 3.1.5 Connection of purging devices for instruments to the systems provide as per drawings.
- 3.1.6 Civil works including the casting of foundation as per requirements for instruments supports where paved surface do not exist.
- 3.1.7 Minor civil works like chipping of pavement and grouting on the pavements the instrument panels/supports/stanchions, and chipping and refilling of the pavement for conduits.
- 3.1.8 Sealing of cables/ tube entries into the control room after laying and testing of all tubes, cables etc.
- 3.1.9 Degreasing of handwheels of control valves, stud bolts, nuts of side and bottom flange of control valves, orifice plates, other primary elements flanges, oxygen service impulse lines, instruments as per manufacturers instructions and other items as required by Engineer- in-charge.
- 3.1.10 Rotation of control valve bonnet wherever required.
- 3.1.11 Reversing the action of control valves either the replacement of springs, accessories or in positioner wherever required.
- 3.1.12 Minor modification/repairs required to be done on the instruments namely, changing the dial, glasses for pressure gauges, temperature gauges and other instruments, replacement of rotameter tubes, level gauge glasses, replacement of damaged signal tubes, threads, couplings etc.
- 3.1.13 Painting of all structural supports for trays, pipes, junction boxes, instruments, etc, as per painting specification.
- 3.1.14 Identification with approved colour of paint the instruments/impulse, lines manifold connected with alarm/trap circuit. Also, punching of tag numbers on items shall be carried out as per instructions of Engineer-in-charge.
- 3.1.15 Coordination with mechanical and other sub-contractors for proper installation of line/ vessels/ equipment mounted instruments like control valves, orifice assemblies, turbine meters, PD meters, level transmitters, level gauges, level switches etc. which involves removal of instruments, disconnection of tubes/cables, reconnection for alignment proper installation etc.
- 3.1.16 Drilling holes on all panels, shut down cabinets, power supply cabinets, control panels pneumatic enclosures etc., for cables/ multitubes/ glands/ groomats.


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- 3.1.17 Grounding of shield of all shielded cables to respective instruments earth bus provided in the control room/local panel/thermocouple head.
- 3.1.18 Laying and termination at both ends between instrument earth buses provided in control room/ local panel to instrument earth pit provided by others.
- 3.1.19 Supply of all types of consumables required for the execution of the job.
- 3.1.20 Submission of monthly material appropriation statements for cables, piping materials fittings, including the quantity issued and expended in standard proforma.
- 3.1.21 Completion of owners drawings/documents, as per the execution of work at site.
- 3.1.22 Preparation and submission of as built drawings as required.
- 3.1.23 Start-up and commissioning.
- 3.1.24 Submission of final material appropriation statements for all the materials issued by the owner.
- 3.1.25 Any other work not mentioned above, but required for the proper execution of the works.
- 3.1.26 Where requested by owner/Engineer-in-charge or his authorised representatives, all or any of the works detailed above and schedule quantities shall also be performed on package units, local panels/cabinets/gauge board installed by owner or by others.
- 3.1.27 Sealing of safety valves/switches with standard lead seals after final setting in the presence of Engineer- in-charge.

4.0 DESCRIPTION OF WORK

4.1.0 INSTRUMENT PIPING

- 4.1.1 All primary piping shall be installed in the best workman like manner and shall follow installation standards in each case. Where there is no installation standard, the instruction of the Engineer-in-charge shall be followed.
- 4.1.2.1 Horizontal and vertical lines shall be installed using levels and plumo bobs.
- 4.1.3 Unless otherwise specified in the drawings pipelines shall have a slope of 8% on the horizontal runs.

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4.1.4 All welding shall be carried out as per welding procedures and codes with electrodes approved by Engineer-in-charge. Only qualified welders approved by Engineer-in-charge shall carry out welding. Charges for non-destructive testing like radiography, Dye penetration tests, post heat treatment tests and stress relieving shall be carried out on the basis of actual man hours spent towards these works and man-hour charges with cost of all materials, test equipments, etc. shall be used. However, any materials like electrode, equipments, testing charges for various tests, etc., required for the initial qualification of the welder/welders shall be or the scope of the contractor.

4.1.3.1 Pipe shall be bent using pipe benders only and any bending will be totally rejected. Pipes shall be cut using pipe cutting device. Hot cutting will not be allowed.

4.1.6 Piping for steam tracing shall be installed according to the standards and avoiding condensate pockets.

4.1.7 All threaded joints shall be jointed with Teflon tape and no other pipe jointing compound shall be used except on high temperature service where graphited sealing compounds shall be used.

4.1.8 All primary piping shall be properly supported at regular intervals of 1.0 meters. Angle supports shall be fabricated from 40mmx40mmx5mm MS angles as minimum.


4.2.0 PVC COVERED/BARE TUBE (COPPER/SS/ALUMINIUM)

4.2.1 Single copper/SS/Aluminium tubes shall be laid as per standards on trays. Fabricated out of 2.5 mm thick perforated steel plate. The width of the trays shall be selected as per the number of tubes laid. Tubes shall be clamped to the trays at every 300 mm using clamps made of galvanized steel/Aluminium strips. The practice of flattening tubes for clamping purposes shall be avoided. In case of PVC covered tubes, any exposed portion at ends and connection shall be neatly taped to appropriate thickness.


4.2.2 Trays shall be properly supported either from any rigid steel structure or concrete member as detailed under trays and supports below.

4.2.3 All male/female tube connectors shall be installed with Teflon tape only. Identification tag plates/ferrules shall be provided on either side of copper tubing as per tubing/junction box schedules. Ferrules shall be single sleeve type with letters and numbers neatly printed.

4.3.0 INSTALLATION OF MULTITUBES AND MULTICORE CABLES

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- 4.3.1 Multiple cables/ multitubes shall always be installed on ducts/trays and properly clamped. At every vertical drop to junction boxes, they shall be clamped at more frequency intervals (Maximum of 300mm). They shall be connected inside junction boxes strictly according to the number system as mentioned in cable schedule. At bends minimum radius shall be maintained as per manufacturer's standard. The angle tray supports shall be fabricated from 40mmx40mmx5mm angles minimum size.
- 4.3.2 Identification tags shall be provided on either end of multitubes, multicore cables as per cable/tubing/cable schedules. Engraved tag plates or PVC ferrules shall be used for identification of tubes/cables.
- 4.3.3 All Multitubes and Multicables shall be cut after the exact site measurements are taken between ends and the cable/tube drums shall be selected before cutting the lengths so as to avoid any wastage.
- 4.3.4 In the field, the cables shall be laid in perforated trays as per layout drawings. Cables shall also be buried or laid in concrete trenches. Inside control room, these shall be laid in concrete trenches or under false floorings.
- 4.3.5 In the field, the cables shall be laid in perforated trays as per layout drawings. Cables shall also be buried or laid in concrete trenches. Inside control room, these shall be laid in concrete trenches or under false floorings.
- 4.4.0 INSTALLATION OF INSTRUMENTS
- 4.4.1 All instruments shall be generally installed on supports as per installation standards in each case, and shall be accessible.
- 4.4.2 Receiver gauges shall be mounted on instrument support itself as per tubing hook up standards.
- 4.4.3 Filter regulators shall be mounted on the instruments support itself below the instruments or on the control yoke.
- 4.5.0 INSTRUMENT AIR SUPPLY
- 4.5.1 The main instrument air header in each area is laid by other contractor. Air supply from the main air header take off valve to individual instrument shall be through either galvanized steel pipe or 1/4" OD PVC covered copper tube or SS tubes.
- 4.5.2 Individual takes off valves shall always be located on top of the main air header. Unions shall be provided at convenient locations. There shall be one isolation valve at each instrument end. The galvanised pipe shall be supported at a minimum interval of 1000 mm with 40mmx40mmx5mm MS angles. Final

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connection to be instrument shall be copper/SS tubing as per tubing hookup standards.

4.5.3 Teflon tapes shall be used on all threaded joints.

4.6.0 INSTRUMENT STEAM TRACING

4.6.1 The mainsteam header in each area is laid by the other contractor. From the main steam header take off valve, steam to individual instrument shall be taken through carbon steel pipes supported at regular intervals. Steam tracing around individual instruments shall be to copper tubes. After steam tracing, the line is connected to the drain funnel through individual steam trap/condensate return header/tapper point as the case may be.

4.6.2 Electrical tracing shall be done by others.

4.7.0 PERFORATED TRAYS AND SUPPORTS

4.7.1 The perforated trays / angle trays shall be properly supported at a regular interval of max. 1000mm from insert plates or steel structures. Wherever insert plates are not available supports on concrete structures on ceiling shall be fixed with a minimum 10mm diameter expansion bolts. Angle supports for perforated trays/angle trays shall be fabricated from 40mmx40mmx5mm M.S. angles minimum size.


4.7.2 All supports shall be cut with hacksaw and any work executed by gas cutting for cutting and drilling holes will be totally rejected. Free ends of angle support shall not have sharp edges and shall be properly rounded off.

4.7.3 Perforated trays/angle trays shall be used for branching cables and tubes from main trays. Perforated trays shall be used for branching cables and tubes from main trays. Perforated trays shall be fabricated out of 2.5 mm perforated steel sheet. Width of trays shall be selected according to number of tubes and cables. Trays shall be laid generally as per site conditions with the approval of Engineer-in-charge.

4.8.0 LAYING OF CABLES


4.8.1 All cables shall be laid in accordance with installation drawings and cable schedules. Before laying, cable/multicable on drums shall be meggered and tested to ascertain the transit damages.

4.8.2 All cables routes shall be carefully measured and cables cut to the required lengths, leaving sufficient amount for the final connection of the cable to the terminals on either end. The various cable lengths cut from the cable reels shall be carefully selected to prevent undue wastage of cables. Sufficient extra length

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of cable shall be kept at the terminal on points.

- 4.8.3 Cables shall have complete uncut lengths from one terminal to the other.
- 4.8.4 All cables shall be identified close to their termination point by cables number as per cable schedules/junction boxes schedules. PVC ferrule/tag plate shall be used and these identification tags shall be securely fastened to the cables.
- 4.8.5 All cores of electrical cables shall be identified by their wire numbers by means of the PVC ferrules. Wire numbers shall be as per schedules. All temporary ends of cables shall be protected against dirt and moisture. For this purpose, ends of all PVC insulation cables shall be taped with an approved PVC or rubber insulating tape. Use of function type or other fabric type is not permitted.
- 4.8.6 The cable shall be bent in a large radius. Cables installed above ground shall be run exposed on walls, ceilings, structures and shall run parallel or at right angles with beams, walls or columns.
- 4.8.7 Cables shall be rigidly supported on structural steel and masonry individually or in groups as required using galvanised clips, multiple cable supports or cable trays. If drilling of steel must be resorted to, approval must be obtained and steel must be drilled where the minimum of weakening of the structure will result. Cable shall be supported at every 500 mm.
- 4.8.8 All special cables and power supply cables will be laid directly to the field instrument without any junction boxes, unless otherwise specified.
- 4.8.9 While laying cable in trenches or burying them care shall be taken to ensure that low signal cables like alarm, analyser cables, special cables, special cables from turbine meters, compensating cable etc. are separated from other power supply cables.
- 4.8.10 Each underground cable (either in concrete trenches or burried) shall be provided with identifying tag of lead securely fastened every 30m of its underground length with atleast one tag at each end before the cable leaves/enters the ground.
- 4.8.11 Directly buried cables shall be laid underground in excavated cable trench wherever specified in layout drawings. Trenches shall have sufficient depth and width to accommodate all cables correctly spaced. Before cables are placed the trench bottom shall be filled with 100 mm layer of sand and leveled. Each layer of cables shall be covered with 150 mm of sand on top and sand shall be lightly pressed. A protective covering of 75 mm thick second-class red bricks shall be placed flat on the final layer of sand and cable. The remaining portion of the trench shall be then back filled with soil compacted and leveled. On complete of every group of cable laying and before sand filling, every cable shall be given insulation test in the presence of Engineer-in-charge. Any cable proved to be defective should be replaced before the next groups of cables are laid. Cable route markers indicating number of cables, depth and direction will be placed

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enroute, on crossovers/turnings, etc. to mark the cable route.

- 4.8.12 At each road crossings and other places, where cables enter pipe sleeves, adequate bed of sand shall be given so that the cables do not slack and get damaged by pipe ends after pack filling.
- 4.8.13 At the entry into concrete blocks at road crossings cable loops shall be provided at either end to prevent any damage to cables. Each cable shall have one tag at each end before the cable enters/leaves conduct pipes
- 4.8.14 After laying of all the cables and multitubings, cables, the cable entry to control room shall be suitably filled and sealed so as to achieve a positive seal against the entry of gas/water.
- 4.8.15 All cables and tubes shall be laid in accordance with the layout drawings with sand and precast concrete slabs shall be placed on the trench.
- 4.8.16 On completion of cable laying in concrete trenches, the trenches shall be filled with sand and precast.
- 4.9.0 EARTHING
- 4.9.1 Earthing of junction boxes, local cabinets as per the documents and instruction from Engineer-in-charge.
- 4.10.0 PAINTING
- 4.10.1 This part of the specification is applicable to cable ducts, MS cable ways, angle trays, instrument supports, perforated trays, all structural supports for the above items, etc.
- 4.10.2 The surface to be painted shall be thoroughly cleaned with wire brush, sand paper to remove all scales. After cleaning, the surface is painted with one coat of red oxide zinc chromate primer conforming to IS- 207 and allowed to dry completely.
- 4.10.3 Primer coated surface is painted with one coat of paint to the colour nearest to the final paint and allowed to dry. The colour number shall be specified from IS-5.
- 4.10.4 Final second coating shall be with the paint of desired colours and shall be selected from IS-5.
- 4.10.5 It shall be noted that final second coating of external surfaces not covered by cables, copper tubes etc. shall be applied just before handling over the plant or commissioning of the plant whichever is earlier.
- 4.10.6 The name of manufacturer, colour and quality of all types of primer paint shall be

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subject to approval of Engineer-in-charge.

4.11.0 TESTING

4.11.1 Electrical cables for signal power supply alarms, and compensating cables for thermocouples; resistance thermometer cables shall be checked for megger values and continuity before proper termination and ferruling.

4.11.2 Testing shall be carried out after the installation of instrument with primary piping complete in all respects and approved by Engineer-in-charge.

4.11.3 Primary piping shall be tested hydraulically pneumatically to 1.5 times the operating pressure after isolating the instruments. Flushing of piping shall be carried out as per instructions of Engineer-in-charge. Lines shall be blown after hydro-testing. All external displacement /float type level instrument level gauges shall also be tested as per instructions of Engineer- in-charge.

4.11.4 Tubes and air line shall be tested with compressed air to 7 kg/cm² upto the filter regulator. The down steam side of the filter regulator shall be tested for 1.5kg/cm². The lines shall be blown with the instrument air upto the regulator for 15 minutes to remove any traces of oil, dust & moisture. All lines shall be checked with soap solution and bubbler unit for possible leak at joints. After pressurizing, source shall be cut off and rate of fall in pressure shall be less than 1 p.s.i. for each 100 ft. of copper tubing for a test period of 2 minutes as per I.S.A.R.P.7-1 "Pneumatic control circuit pressure test".


4.11.5 All test results shall be recorded in the approved format.

4.12.0 CALIBRATION

4.12.1 All instruments shall be calibrated strictly as per manufacturer's instructions prior to installation. The scope of calibration includes all field and control rooms of all types namely, pneumatic, electronic, electrical etc.

4.12.2 Contractor shall use his own oil free instruments, air compressor for calibration purposes.

4.12.3 The level switches (external cage type) shall be set by filling the cage with water to the desired alarm/trip level, while setting the switches, it shall be ensured that the micro switches do not reset for full rated travel of the float.

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4.12.4 Control valves and positioners shall be checked for hysteresis and linearity and calibration for rated strokes. Prior to calibration, valves shall be cleaned externally. The stem is then lubricated if required, and stroked few times to extreme positions of plug to ensure that movement is free from friction. The valve shall then be calibrated for rated stroke and linearity also. Subsequently the valves shall be checked for hysteresis to the accuracy of 1% FS with positioners and 5% FS without positioners.

Stroke speed has to be evaluated for all trip/shutdown valves.

4.12.5 All calibrations reading shall be recorded in the enclosed format and submitted to Engineer-in-Charge for approval. Where significant deviations from specifications are obtained, the matter shall be brought to the immediate notice of the Engineer-in- Charge for corrective actions.

4.12.6 Furnished hereunder is a list of recommended calibration and test equipments required as a minimum for calibration work. The contractor shall clearly state in his offers the complete list of calibration and test equipments along with the range, accuracy and quantity, which he proposes to use for this job. Contractor should also ensure that any equipment not listed below but required at the time of calibration shall be made available at his own cost.

4.12.7 All test equipments/kits shall be approved by NPL authorities.

4.12.7.1 Controller test stands Mft. Standard

4.12.7.2 Indicator/recorder test stands -do-

4.12.7.3 Squeeze bulb (Flow calibrator
Range: 0-770, 10,000 mm wg. -

4.12.7.4 Dead weight testers (Budenberg or equivalent) - +/- 0.1%
For ranges upto 350 kg/cm²


4.12.7.5 Gauge comparator for pressure gauges
Rating : upto 350 kg/cm² -

4.12.7.6 Oil bath for temperature calibrations
max. Temp 350°C. Mfr's Std

4.12.8.7 Standard Mercury in glass thermometers
Range : -50 to + 50°C. 0 to 100°C
(NPL certified) 0-250°C, 0-350°C ± 0.25%

4.12.7.8 Standard gauges for Ranges upto 350kg/cm² ±0.25%


4.12.7.9 U-tube differential manometers/inclined

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	tube manometer Static pr. rating : 7 kg/cm ²	+_ 1mm
4.12.7.10	Single leg manometers Scale: -1500 mm water and 1500 mm hg. Static pr. rating : 7 kg/cm ² .	+_ 1mm
4.12.7.11	Decade resistance box	MFR' std.
4.12.7.12	Millimeters	±0.05Mv
4.12.7.13	Potentiometer (Cable of generating and measuring mV)	-
4.12.7.14	Meggers 500V/1000V	-
4.12.7.15	Air hydro pump/hydraulic pump	-
4.12.7.16	Vacuum pump	-
4.12.7.17	Instrument air compressor with filters and Regulators and deoilers.	-
4.12.7.18	Current generator (instrument checker) 4-20mA dc(YEW make or equivalent)	-

4.13.0 LOOP TEST

- 4.13.1 Loop test shall be performed after calibration of all instruments and leak test of signal lines. Loop tests are conducted to check the functional performance of all elements comprising the loop, thereby ensuring proper connections and operations.
- 4.13.2 Before proceeding for loop tests the calibration results of individual elements shall be recorded on the enclosed proforma and shall get it approved by Engineer-in-Charge for correctness of installation, measurements and calibration results.
- 4.13.3 Loop testing for all control loops shall be generally by simulation of process

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conditions and shall fix points namely 0%, 25%, 50%, 75% and 100% of full-scale inputs. Detailed procedure shall be submitted to Engineer-in-charge for approval before proceeding with the loop testing.

In case of shutdown system field/receiver pressure switches are simulated for abnormality by disconnecting the wires at terminal and function of all associated systems are checked.

4.13.5 Performance of individual loops may be accepted for an overall accuracy of $\pm 1.5\%$ where deviations exist, contractor shall recalibrate the instruments, which form part of loop testing wherever required, at no extra cost.

4.13.5.1 After the loop test is complete, the contractor shall connect back any terminations and connections removed for loop test.

4.13.7 A loop shall be considered as handed over only after measurements in that particular loop are complete and certified by Engineer-in-Charge, in addition to loop sheets being duly filled in all respects and approved and accepted by Engineer-in-Charge and client.

4.13.8 In case of loops in which certain instruments of the loops are calibrated by other agency, loop testing shall be performed in coordination with the agency involved. Any defect in the calibration of the instrument in contractor's scope is observed, it shall be rectified to the satisfaction of the Engineer-in-Charge. However, defect in calibration of the instruments in the scope of other agency, same shall be rectified by the agency involved. After the calibration has been rechecked by the other agency/agencies the loop checking would be performed to the satisfaction of Engineer-in-Charge, and this part covers under the scope of the contract.

4.13.9 Final certified loop sheets shall be submitted in 4 copies and one transparency.


5.0.0 DRAWINGS AND DOCUMENTS TO BE SUPPLIED FOR EXECUTION BY OWNER/ENGINEER IN CHARGE

5.1.1 Piping and Instrumentation diagrams.

5.1.2 General layout plan for all units, showing all information like position of field instruments junction boxes indicative routes of cables, main ducts/cable trays.

5.1.3 Cable schedules for alarm, signal, shutdown, power supply and pneumatic cables, earthing guide lines.

5.1.4 Termination details/drawings for connecting at control room end.

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- 5.1.5 Individual Instrument specifications
- 5.1.6 Bill of materials
- 5.1.7 Installation standards/ Hook-up
- 5.1.8 Manufacturers hand book with instructions for installation and calibration wherever necessary for reference.


6.0 DRAWINGS AND DOCUMENTS TO BE PROVIDED BY CONTRACTOR

- 6.1.1 The drawings for materials that are included on their supply and erection scope namely local control panel, junction boxes and local cabinets.
- 6.1.2 The detailed engineering drawing wherever such drawing is assigned.
- 6.1.3 Two sets of layout drawings, standards bill of materials cable schedules etc., duly incorporating the changes/modification carried out during the course of execution of works.
- 6.1.4 Final material appropriation statement for all free issue materials indicating shortages of any in the proforma duly approved by Engineer-in-Charge.

7.1.0 SCRAP AND EXCESS MATERIAL

- 7.1.1 Every month, the contractor shall submit an account for all the materials issued by the Owner in the standard proforma prescribed for this purpose by the Engineer- in-Charge.
- 7.1.2 On completion of the work, the contractor shall submit `Material appropriation' statements for all materials issued by the Owner in the proforma prescribed by the Engineer-in-Charge.
- 7.1.3 The following scrap allowances are permissible.

Length below 0.5 mm	Non-salvageable	Unaccountable
Steel pipes, SS Tubes single pair/ Twocore / Three Core cables.	2%	0.5%

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length below 20 m	Non-salvageable	Unaccountable
Multitube, Multicables	2%	0.5%

8.0 SPECIAL INSTRUCTIONS TO CONTRACTOR:

8.1.4 All excess materials and scrap shall be returned after duly accounting for, to the storage points designated by the Owner. Where materials are to be weighed before return, the contractor shall be responsible for making the necessary section obtained during the course of construction for fabricating temporary supports or other items, without prior permission of the Engineer - in -Charge.

8.1.5 If the contractor fails to return the surplus material as aforesaid, the owner will charge the contractor for such unreturned materials at panel rates, which will be deducted from whatever amount is due to the contractor. In case any material issued by the Owner deteriorates during storage by the contractor, new materials will be issued to him at penal rates, but the delay in procuring such materials will be at the contractor's account only.

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**STANDARD SPECIFICATION
FOR
CABLING**

SPECIFICATION NO.: MEC/S/05/E5/021




**ELECTRICAL & INSTRUMENTATION
(OIL & GAS SBU)
MECON LIMITED
DELHI 110 092**

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PREPARED BY:	CHECKED BY:	APPROVED BY:	ISSUE DATE :
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1.0 SCOPE

This is to define the requirements for supply, wherever applicable, the installation, testing and commissioning of the cabling system.

2.0 STANDARDS

The work shall be carried out in the best workman like manner in conformity with this specification, the relevant specifications, codes of practice of Indian Standards Institution, approved drawings and instructions of Engineer-in-Charge or his authorized representative issued from time to time. In case of any conflict between the standards, the instruction of Engineer-in-Charge shall be binding.

3.0 CABLE SPECIFICATIONS

3.1 Power Cables


Power cables for use on 415 V systems shall be of 1100 Volts grade, aluminium stranded conductor, PVC insulated, PVC sheathed, armoured and overall PVC sheathed. Power cables for 3.3 KV 6.6 KV and 11 KV system shall be aluminium conductor, XLPL insulated, screened, PVC bedded galvanized steel flat armoured and PVC sheathed cable. All L.T. Cables conform to standard specification and relevant sections of IS: 1554 Part-I and H.T. Cables shall conform to IS: 7098 (Part II). Unarmoured cables will be used wherever specified on the cable schedule.

3.2 Control Cables:

Control cables shall be 1100 Volt Grade, 2.5 mm² copper conductor PVC insulated PVC sheathed, single wire armoured with an overall PVC sheath, as per IS: 1554 Pt. Unarmoured cables shall be used wherever specified on the cable schedule.

3.3 Communication cables:

Communication cables shall comprise 1 pair unarmoured, 2-pair, 5-pair and multipair armoured cables of sizes as specified in the cable schedule. Minimum conductor size shall be 0.5 mm telephone system and 0.71 for plant communication system.

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4.0 MISCELLANEOUS MATERIALS SPECIFICATIONS

4.1 Connectors:

Cable terminations shall be made with aluminium / tinned copper crimped type solder less lugs of M/s. Dowell's make or approved equivalent for all aluminium conductors and stud type terminals.

4.2 Cable Identification

Cable tags shall be of 2 mm thick, 20 mm wide aluminium strap of suitable length to contain cable number, equipment no., etc.

4.3 Ferrules

Ferrules shall be of approved type size to suit core size mentioned and shall be employed to designate the various cores of control cable by the terminal numbers to which the cores are connected for ease in identification and maintenance.

4.4 Cable Glands:

Cable glands to be supplied shall be nickel-plated Brass double compression type of approved/ reputed make. Glands for classified hazardous areas shall be certified by CMRS.


4.5 Cable Trays:

This shall be either prefabricated hot dip galvanized sheet steel trays or site fabricated angle iron trays as specified elsewhere. Prefabricated hot dip galvanized sheet steel cable trays shall be used for maximum support span of 2000 mm unless design is approved for larger span. For requirements of larger than 750 mm width two trays shall be run side by side. Cable trays shall be suitable for a cable weight of 50 kg/meter running length of tray. Minimum thickness of sheet steel/galvanizing shall be 2mm/86 microns respectively.

Cable trays fabricated from standard rolled sections shall use 50x50x6 /ISMC 100 Sections for runners for supporting spans limited to 2000 mm/more than 2000 mm respectively. Cross support shall be 32 x 6 mm flat/ 25x25x6 angle for width upto 500 mm/ more than 500 mm respectively.

Vertical supports for both the above type of trays shall be fabricated out of ISMC 100 and horizontal supports with 75 x 50 x 6 angle iron/ ISMC 75 as approved by Engineer-in-Charge.

If unit rate is not included in schedule of rates, then cable trays if required, shall be fabricated and installed at site as per tone rate for electrical structural supports etc.

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5.0 CABLE LAYING

5.1 Cable network shall include power, control, lighting and communication cables, which shall be laid in trenches, cable trays or conduits as detailed in the relevant drawings and cable schedules. Erection of cable trays as required shall be checked after erection and marked in as built drawings. Cable routing given on the layout drawings shall be checked in the field to avoid interference with structures, heat sources, drains, piping, air-conditioning duct etc. and minor adjustments shall be done to suit the field conditions wherever deemed necessary without any extra cost.


5.2 High voltage, medium voltage and other control cables shall be separated from each other by adequate spacing or running through independent pipes, trenches or cables trays, as applicable.

All communication cables (telephones, P.A.S.) RTD Cables shall run on instrument trays/ducts/trenches. Wherever these are not available, cables shall be taken in a separate trench with a minimum clearance of 300 mm away from electrical trench as per the direction of Engineer-in-Charge and Communication cables shall cross power cables at right angles.

All cable routes shall be carefully measured and cables cut to the required lengths, leaving sufficient lengths for the final connection of the cable to the terminal of the equipment. The various cable lengths cut from the cable reels shall be carefully selected to prevent undue wastage of cables. The quantity indicated in the cable schedule is only approximate. The contractor shall ascertain the exact requirement of cable for a particular feeder by measuring at site and avoiding interference with structure, foundation, pipelines or any other works. Before the start of cable lying, cable drum schedule; shall be prepared be electrician contractor and get that approved by Engineer-in-Charge to minimize/avoid straight through joints required. Contractor shall work out the actual number of straight through joints required.

5.4 Cables as far as possible shall be laid in complete, uncut lengths from one termination to the other.

5.5 Cables shall be neatly arranged in the trenches/trays in such a manner so that criss-crossing is avoided and final take off to the motor/switchgear is facilitated. Arrangement of cables within the trenches/trays shall be the responsibility of the Contractor. Cable routing between lined cable trench and equipment/motors shall be taken through GI pipe sleeves of adequate size. Pipe sleeves shall be laid at an angle of maximum 45° to the trench wall. In case of larger dia cables, i.e., 50 mm and above, adequately sized pipe with larger bend radius shall be provided for ease of drawing of cable or for replacement. In places where it is not possible, a smaller trench may be provided if approved by Engineer-in-Charge.

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- 5.6 All cables will be identified close to their termination point by cable numbers as per cable schedule. Cable numbers will be punched on aluminium straps (2 mm thick) securely fastened to the cable and wrapped around it. Alternatively cable tags shall be circular in construction to which cable numbers can be conveniently punched.

Each underground cable shall be provided with identity tags of lead securely fastened every 30 m of its underground length with at least one tag at each end before the cable enters the ground. In unpaved areas, cable trenches shall be identified by means of markers as per standard drawing. These posts shall be placed at location of changes in the direction of cables and at intervals of not more than 30 M and at cable joint locations.

- 5.7 All temporary ends of cables must be protected against dirt and moisture to prevent damage to the insulation. For this purpose, ends of all PVC insulated cables shall be taped with an approved PVC or rubber insulating tape. Use of friction type or other fabric type tape is not permitted. Lead sheathed cables shall be plumbed with lead alloy.


- 5.8 RCC cable trenches shall be with removable covers. Cables shall be laid in 3 or 4 tiers in these trenches as indicated on the sectional drawings. Concrete cable trenches shall be filled with sand where specified to avoid accumulation of hazardous gases, RCC covers of trenches in process area shall be effectively sealed to avoid ingress of chemicals etc. The electrical Contractor at no extra cost shall do removal of concrete covers for purpose of cable laying and reinstating them in their proper positions after the cables are laid.

Cables shall be handled carefully during installation to prevent mechanical injury to the cables. Ends of cables leaving trenches shall be coiled and provided with a protective pipe or cover, until such times the final termination to the equipment is connected.

- 5.9 Directly buried cables shall be laid underground in excavated cable trenches where specified in layout drawings. Trenches shall be of sufficient depth and width for accommodation of all cables correctly spaced and arranged with a view of heat dissipation and economy of design.

Minimum depth of buried cable trench shall be 750 mm for low voltage and 900 mm for H.V. Cables, the depth and the width of the trench shall vary depending upon the number of layers of cables.

Cables shall be laid in trenches at depth as shown in the drawing. Before cables are placed, the trenches bottom shall be filled with a layer of sand. This sand shall be levelled and cables laid over it. These cables shall be covered with 150

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mm of sand on top of the largest diameter cable and sand shall be lightly pressed. A protective covering of 75 mm thick second class red bricks shall then be laid flat. The remainder of the trench shall then be back-filled with soil, rammed and levelled.

- 5.10 As each row of cables is laid in place and before covering with sand every cable shall be given an insulation test in the presence of Engineer-in-Charge / Owner. Any cable, which proves defective, shall be replaced before the next group of cables is laid.

All wall openings / pipe sleeves shall be effectively sealed after installation of cables to avoid seepage of water inside building/-lined trench.

Where cables rise from trenches to motor, control station, lighting panels etc., they shall be taken in G.I. Pipes for mechanical protection upto a minimum of 300 mm above finished ground level.

Cable ends shall be carefully pulled through the conduits, to prevent damage to the cable. Where required, approved cable lubricant shall be used for this purpose. Where cable enters conduit the cable should be bent in large radius. Radius shall not be less than the recommended bending radius of the cables specified by the manufacturer.


Following grade of the pipe fill shall be used for sizing the pipe size:

- | | | | |
|----|------------------|---|----------|
| a) | 1 cable in pipe | - | 53% full |
| b) | 2 cables in pipe | - | 31% full |
| c) | 3 or more cables | - | 43% full |
| d) | Multiple cables | - | 40% full |

After the cables are installed and all testing is complete, conduit ends above grade shall be plugged with a suitable weatherproof plastic compound/ 'PUTTI' for sealing purpose. Alternatively G.I. Lidsor PVC bushes shall be employed for sealing purposes. The cost for the same shall be deemed to have been included in the installation of G.I. Pipe and no separate payment shall be allowed.

- 5.11 Where cables pass through foundation walls or other underground structures, the necessary ducts or openings will be provided in advance for the same. However, should it become necessary to cut holes in existing foundations or structures, the electrical contractor shall determine their location and obtain approval of the Engineer-in-Charge before cutting is done.

- 5.12 At road crossing and other places where cables enter pipe sleeves adequate bed of sand shall be given so that the cables do not slack and get damaged by pipe ends.

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5.13 Drum number of each cable from which it is taken shall be recorded against the cable number in the cable schedule.

5.14 Cables installed above grade shall be run in trays, exposed on walls, ceilings or structures and shall be run parallel or at right angles to beams, walls or columns.

Cables shall be so routed that they will not be subjected to heat from adjacent hot piping or vessels.

5.15 Individual cables or small groups which run along structures/walls etc. will be clamped by means of 10 SWG GI saddles on 25x6 mm saddle bars. The cost of saddle and saddle bars shall be deemed to have been included in the installation of cables and no separate payment shall be made on this account. Alternatively small group of cables can be taken through 100 mm slotted channel/ISMC 100.

They shall be rightly supported on structural steel and masonry, individual or in groups as required, if drilling of steel must be resorted to, approval must be secured and steel must be drilled where the minimum weakening of the structure will result.


Cables shall be supported so as to prevent unsightly sagging. In general distance between supports shall be approximately 300 mm for cables up to 25 mm diameter and maximum 450 mm for cables larger than 25 mm dia.

5.16 All G.I. Pipes shall be laid as per layout drawings and site requirements. Before fabrication of various profiles of pipe by hydraulically operated bending machine (which is to be arranged by the contractor), all the burrs from the pipes shall be removed. GI Pipes with bends shall be buried in soil/concrete in such way that the bends shall be totally concealed. For G.I. Pipes buried in soil, bitumen coating shall be applied on the buried lengths. Installation of G.I. Pipes shall be undertaken well before paving is completed and necessary co-ordination with paving agency shall be the responsibility of Electrical Contractor. The open ends of pipes shall be suitably plugged with G.I. Plugs after they are laid in final position. The Contractor at no extra cost shall supply G.I. Plugs.

5.17 Cable laid on supporting angle in cable trenches, structures, columns and vertical run of cable trays shall be suitably clamped by means of G.I. Saddles/Clamps, whereas cable in horizontal run of cable trays shall be tied by means of nylon cords.

5.18 Supporting steel shall be painted before laying of cables. The painting shall be done with one coat of red lead paint and two coats of approved bituminous aluminium paint unless otherwise specified.

6.0 TERMINATION

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6.1 All PVC cables up to 1.1 KV grade shall be terminated at the equipments by means of double compression type cable glands. They shall have a screwed nipple with conduit electrical threads and check nut.

All Cable entries shall be through bottom only and top entry terminations are made only after getting approval of Engineer-in-Charge.

6.2 Power cables wherever colour coding is not available shall be identified with red, yellow and blue PVC tapes. Where copper to aluminium connections is made, necessary bimetallic washers shall be used. For trip circuit identification additional red ferrules shall be used only in the particular cores of control cables at the termination points in the Switchgear/Control panels and Control Switches.

6.3 In case of control cables all cables shall be identified at both ends by their terminal numbers by means of PVC ferrules or Self-sticking cable markers. Wire numbers shall be as per schematic/ wiring /inter- connection diagram. Bidders shall have the samples of PVC ferrules/cable markers approved before starting the work. All unused spare cores of control cables shall be neatly bunched and ferruled with cable tag at both ends.


6.4 Where threaded cable gland is screwed into threaded opening of different size, suitable galvanized threaded reducing bushing shall be used of approved type, at no extra cost. All switchgear and control panels shall have undrilled gland plate.

Contractor shall drill holes for fixing glands wherever necessary at no extra cost. Gland plate shall be of non-magnetic material/aluminium sheet in case of single core cables.

6.5 The cable shall be taken through glands inside the panels or any other electrical equipment such as motors. The individual cores shall then be dressed and taken along the cable ways (if provided) or shall be fixed to the panels with polyethylene straps. Only control cables of single strand and lighting cables may be directly terminated on to the terminals.

In case of termination of cables at the bottom of a panel over a cable trench having no access from the bottom close fit hole should be drilled in the bottom plate for all the cables in one line, then bottom plate should be split in two parts along the centre line of holes. After installation of bottom plate and cables it should be sealed with cold setting compound. Cables shall be clamped over the open armouring to connect it to earth bus.

6.6 Cable leads shall be terminated at the equipment terminals, by means of crimped type solder less connector as manufactured by M/s. Dowell Electro

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works or approved equivalent.

Crimping shall be done by hand crimping hydraulically operated tool and conducting jelly shall be applied on the conductor. Insulation of the leads should be removed immediately before the crimping. Conductor surface shall be cleaned and shall not be left open.

6.7 Cable accessories for H.V. Systems

6.7.1 The 11, skilled and experienced jointers duly approved by the Engineer-in-Charge shall do 6.6 and 3.3 KV cables terminations joints. Termination including supplying of jointing kit shall be threaded in Contractor scope unless specified otherwise.


6.7.2 The termination and straight thro' joint kit. For use on high voltage system shall be suitable for the type of cables red by the contractor or the type of cables issued by owner for installation. The materials required for termination and straight through joints shall be supplied in kit form. The kit shall include all insulating and sealing materials apart from conductor fitting and consumables items. An installation instruction shall be included in each sheet.

6.7.3 The termination kits shall be suitable for termination of the cables to indoor switchgear or to a weatherproof cable box of an outdoor mounted transformer motor. The terminating kits shall preferably be of the following types:

- a) TAPLEX' of M-seal make using non-linear resistance material fortress grading.
- b) `PUSH-ON' type of CCI make using factory - moulded silicone rubber insulators.
- c) `TROPOLINK' type of CCI makes.
- d) Heat-shrinkable sleeve type of M/s. Raychem.

For outdoor installations, weather shields/sealing ends and any other accessories required shall also form part of the kit.

6.7.4 The straight thro jointing kits shall be suitable for underground-buried installation

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with uncontrolled backfill and possibility of flooding by water. The jointing kit shall be one of the following types.

- a) `TAPLEX' of M-seal make
- b) `TROPOLINK' type of CCI make
- c) Heat-shrinkable sleeve type of M/s. Raychem.


6.7.5 Makes of kits other than those specified in 6.7.3 and 6.7.4 may be considered provided the Contractor furnishes type test certificates, along with the offer.

6.7.6 Type tests are to be carried out at manufacturer's works to prove the general qualities and design of a given type of termination/jointing system. The type tests shall include the following tests conforming to the latest IEC 502.2, 466 and VDE 0278 specifications. The Contractor along with the offer for the jointing system considered shall submit the type test certificates.

- a) A.C. Voltage withstand dry test for 1 minute
- b) Partial discharge test - Discharge magnitude shall be less than 20 p.c.
- c) Impulse voltage withstand test with 10 impulses of each polarity.
- d) A.C. high voltage test following load cycling test with conductor temperature at 95°C.
- e) Thermal short circuit test of 250°C for 1 second.
- f) DC Voltage withstand test for 30 minutes.
- g) Humidity test.
- h) Dynamic short circuit test.
- i) Salt log test
- j) Impact test

7.0

TESTING:

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7.1 Before energizing, the insulation resistance of every circuit shall be measured from phase to phase and from phase to ground.

7.2 Where splices or termination are required in circuits rated above 600 volts, measure insulation resistance of each length of cable before splicing and or/ terminating. Repeat measurement after splices and/or terminations are completed.

7.3 Measure the insulation resistance of directly buried cable circuits before cable trenches are back-filled. Repeat measurement after back- filling.

For cables up to 1.1 KV grade, 1KV Megger and for H.V. Cables 2.5 KV/5 KV, 2.4 KV/4.9 KV Megger shall be used

7.4 D.C. High Voltage Test shall be conducted after installation on the following and test results are recorded.

- a) All 1000volts grade cables in which straight through joints have been made.
- b) All cables above 1100 V grade.

For record purposes test data shall include the measure values of leakage current versus time.


The D.C. High Voltage test shall be performed as detailed below in the presence of the Engineer-in- Charge or his authorized representative only.

Cables shall be installed in final position with the entire straight through joints complete. Terminations shall be kept unfinished so that motors, switchgears, transformers etc. are not subjected to test voltage.

The test voltage shall be as under: -

- | | | |
|------|-------------------------|------------|
| i) | For cables 3.3 KV grade | 5.4 KV DC |
| ii) | For cables 6.6 KV grade | 10.8 KV DC |
| iii) | For cables 11 KV grade | 18 KV DC |

7.5 All cables shall be tested as per standard test Performa available with site

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engineer.


- 7.6 Cable schedule and layout drawings must be marked for AS BUILT conditions during the installation work and shall be approved by Site Engineer.

SPECIFICATION FOR EARTHING AND LIGHTNING PROTECTION

SPECIFICATION NO. MEC/S/05/26/23A




(ELECTRICAL SECTION)
MECON LIMITED
DELHI 110 092

MECON LIMITED REGD. OFF: RANCHI (JHARKHAND)		PROCESS & PIPING DESIGN SECTION NEW DELHI	STANDARD SPECIFICATION	
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- 2.0 STANDARDS
- 3.0 EARTHING CONDUCTOR/ELECTRODE
- 4.0 EARTHING NET WORK
- 5.0 INSTALLATION OF EARTH ELECTRODE
- 6.0 CONNECTION
- 7.0 TESTING
- 8.0 TEST PROFORMA

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1.0 SCOPE:

The intent of this specification is to define the requirements for the supply, installation, testing, and commissioning of the Earthing System.

2.0 STANDARDS:

The work shall be carried out in the best workmanlike manner in conformity with this specification, the relevant specifications/codes of practice of Indian Standard Institution, approved drawings and instructions of the Engineer-in-Charge or his authorized representative issued from time to time. In case of any conflict between the standards, the instructions of Engineer-in-Charge shall be binding.

3.0 CONDUCTOR ELECTRODE:


The main grid conductor shall be hot dip galvanized G.I. Flat or PVC insulated aluminum conductor/copper conductor. Sizes for main conductors shall be marked on the drawings. Thickness of hot dip galvanizing shall not be less than 75 microns.


4.0 EARTHING NETWORK:

4.1 The earthing installation shall be done in accordance with the earthing drawings, specifications and the standard drawings of reference attached with this document. The entire earthing system shall fully comply with the Indian Electricity Act and Rules framed thereunder. The contractor shall carry out any changes desired by the Electrical Inspector or the owner, in order to make the installation conform to the Indian Electricity Rules at no extra cost. The exact location on the equipment shall be determined in field, in consultation with the Engineer-in-Charge or his authorized representative. Any changes in the methods, routing, size of conductors etc. shall be subject to approval of the Owner/Engineer-in-Charge before execution.

Excavation and refilling of earth, necessary for laying underground earth bus loops shall be the responsibility of the contractor.

4.3 The earth loop impedance to any point in the electrical system shall have a value which will ensure satisfactory operation of protective devices.

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4.4	The main earth loop shall be laid at a depth of 500 mm below grade level. Wherever cable trenches are available, the earth lead shall be laid in the trenches and shall be firmly cleared to the walls of concrete lined trenches. The earthing strip shall be protected against mechanical damage.			
4.5	In process unit areas, the earthing cable shall be run along cable trays wherever specified in the layout drawings. The earthing cable shall be suitably cleated and electrically bonded to the cable tray at regular intervals.			
4.6	Joints and tapping in the main earth loop shall be made in such a way that reliable and good electrical connections are permanently ensured. All joints below grade shall be welded and suitably protected by giving two coats of bitumen and covering with Hessian tape. All joints above ground shall be by means of connectors/lugs as far as practicable. Tee connectors shall be used for tapping, earth leads from the main earth loop wherever it is installed above ground. Earthing plates shall be provided for earthing of two or more equipment at a place from earth grid. Where aluminum cable risers are to be connected to the underground GI earth bus, the aluminum cable riser shall be taken to the nearest earth pit and terminated through a bolted joint. If this is not practicable, then a G.I. risers shall be brought above grade and a bolted joint shall be made between this GI riser and the aluminum cable termination. This G.I. Riser shall be protected applying two coats of bituminous paint/bitumen on the exposed portion.			
4.7	Conduits in which cables have been installed, shall be effectively bonded and earthed. Cable arm ours shall be earthed at both ends.			
5.0	<u>EARTH ELECTRODES:</u>			
5.1	Earth pipe electrodes shall be installed as shown in the earthing layout drawings and in accordance with the standard drawings of reference and IS:3043. Their location shall be marked to enable accurate location by permanent markers.			
5.2	All earth electrodes shall preferably be driven to sufficient depth to reach permanently moist soil. Electrodes shall preferably be situated in a soil which has a fine texture and which is packed by watering and ramming as tightly as possible. Wherever practicable, the soil shall be dug up, all lumps broken and stones removed from the immediate vicinity of the electrodes.			

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5.3 All earth electrodes shall be tested for earth resistance by means of standard earth test meter. The tests shall take place in dry months, preferably after a protracted dry spell. If necessary, a number of electrodes shall be connected in parallel to reduce the earth resistance. The distance between two electrodes shall not be less than twice the length of electrode.

5.4 The electrodes shall have a clean surface, not covered by paint, enamel, grease or other materials of poor conductivity.

5.5 The exact location and number of earth electrodes required at each location shall be determined in the field in consultation with the owner/Engineer-in- Charge, depending on the soil strata and resistivity, to meet the ohmic values prescribed in clause 5.3. Earth Electrodes shall be located avoiding interference with road, building foundation, column etc. Individual earth electrode shall be provided for each lightning arrester and lightning mast. The electrodes shall be so placed that all lightning protective earths may be brought to earth electrode by a short and straight a path as possible to minimize surge impedance.

5.6 The disconnect facility shall be provided for the individual earth pits to check their earth resistance periodically. All the earth electrodes shall be suitably numbered and this should be indicated in as built drawings.


6.0 CONNECTION:

6.1 All electrical equipment is to be doubly earthed by connecting two points on equipment to a main earthing ring. The earthing ring will be connected via links to several earth electrodes. The earth grid formed shall be a closed loop as shown in the drawing with earth electrodes connected to the grid with double strip connection. The cable armour will be earthed through the cable glands.

6.2 In hazardous areas all major process equipments shall be connected to the earthing ring by means of anti- loosening connections and all pipelines will be bonded and earthed on entering the battery limit of the process area.

6.3 The following shall be earthed.


1. Transformer neutrals, CT/PT neutrals.
2. Neutral Grounding Resistors.

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3. Transformer Housing.
4. Lightning Arrestors.
5. All switchgear and their earth buses, bus duct.
6. Motor Frames.
7. Non-current carrying metallic parts of electrical equipment such as switchgear, switch racks, panel boards, motor control centers, lighting, power and instrument panels, push button stations, cable trays, pipes, conduits, terminal boxes, etc.
8. All fences, gates/enclosures, housing electrical equipment
9. All steel structures, rails etc. including bonding between sections.
10. Shield Wire
11. Structural steel and Columns.
12. Loading racks.
13. Lighting Mast, poles.
14. Lighting rods (Mast).
15. Tanks and vessels containing flammable materials.
16. Rotating parts of the agitators, pumps etc. through spring loaded brushes of suitable grade.
17. Earth continuity conductor shall be provided for flanges.

Conductor size for connection to various equipments shall be as indicated on Earthing Layout Drawings.

- 6.4 Two distinct conductors directly connected to independent earth electrodes, which in turn, shall be connected to the earth too, shall earth system.

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The earth connection shall be properly made. A small flexible aluminum cable loops to bridge the top cover of the transformer and the tank shall be provided to avoid earth fault current passing through fastening bolts when there is a lightning surge, high voltage surge or failure of the bushings.

6.5 Each Lightning Arrestor shall be connected to a separate electrode located as close as possible to it and within the fenced area for each set of arrestors. The three nos. electrodes for each set of arrestors shall be spaced about 5 meters apart so that they are all within the enclosing fence. Each of these electrodes shall be connected to the main earth grid.


6.6 The shield wire shall be connected with the main grid solidly and not through supporting steel structures.


6.7 All paint, scale and enamel shall be removed from the contact surface before the earthing connections are made.

6.8 All earthing connections for equipment earthing shall be preferably from the earth plate mounted above ground. In case of G.I. Earth Loop all underground "T" connections shall be of the same size as main loop however in case of PVC insulated aluminum conductor loops underground joints shall be completely avoided. Connections to motors from earth plate or main loop conductor brought above ground shall not be less than following:

- i) No.8 SWG G.I. Wire upto 3.7 KW motors.
- ii) 3/8" DIA G.I. FINE WIRE ROPE for all motors above 3.7 KW upto 30 KW with tinned copper lug at both ends or 35 mm² PVC insulated stranded aluminum conductor with crimped lug.
- iii) 5/8" DIA G.I. FINE WIRE ROPE OR 70 mm² PVC insulated aluminum stranded conductor for motors above 30 KW upto 75 KW terminated as described above.
- iv) For all motors above 75 KW conductor size shall be same as that of loop conductor with equivalent size flexible, if required.


Anchor bolts or fixing bolts shall not be used for earthing connection.

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6.9	All hardware used for earthing installations shall be hot dip galvanized or zinc passivated. Spring washers shall be used for all earthing connections of equipment.			
6.10	Lighting fixtures shall be earthed through the extra core provided in the lighting cable for this purpose.			
7.0	<u>TESTING:</u> Earthing systems/connections shall be tested as follows:			
7.1	Resistance of individual electrodes shall be measured after disconnecting it from the grid.			
7.2	Earthing resistance of the grid shall be measured after connecting all the electrodes to the grid. The resistance between any point on the metallic earth grid and the general mass of earth shall not exceed 1 ohm.			
7.3	The resistance to earth shall be measured at the following:			
	a) At each electrical system earth or system neutral earth.			
	b) At each earth provided for structure lightning protections.			
	c) At one point on each earthing system used to earth electrical equipment enclosures.			
	d) At one point on each earthing system used to earth wiring system enclosures such as metal conduits and cable sheaths or armor.			
	e) At one point on each fence enclosing electrical equipment.			
	Measurement shall be made before connection is made between the ground and the object to be grounded.			

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8.0 LIGHTNING PROTECTION

- 8.1 Lightning protection system shall generally comprise lightning finials (air terminals), roof conductors, down conductors, test links, and earth electrodes. the number, types, materials and sizes shall be in accordance with the drawings.
- 8.2 Air terminals shall be mounted on top of buildings or structure as required. All air terminals shall be inter-connected with roof conductors, pipes, hand rails or any other metallic projection above the roofs shall also be bonded to the roof conductors.
- 8.3 Down conductors from air terminals or from roof conductors shall be routed as directly as possible to the test links on earth buses, with minimum bends.
- 8.4 All provisions regarding connections of conductors for equipment earthing system shall also apply to lightning protection system.
- 8.5 In corrosive atmospheres, plumbing metal for corrosion protection shall cover lightning finials or air terminals.

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9.0

TEST PROFORMA

(INSTALLATION TESTING REPORT EARTHING INSTALLATIONS)

1. Earth system data

Type of electrode :

Total number of electrodes :

Main grid size :

Material :

2. General checks Put Tick \checkmark if O.K.; otherwise give details.

Construction of earth electrodes as per Standard.

Size of earth conductor for various equipment O.K. as per Standard.

Minimum distance kept between two electrodes.

Cleanliness and tightness of connectors.
Inspect bolted & clamped connectors.


3. TESTS

3.1 Measured earth resistance
of each electrode in ohms

- No. 1
2
3
4
5

3.2 Measurement of earth grid resistance
(with all electrodes connected to grid)

- a) At each electrical system earth or system neutral earth. :
- b) At each point provided for structure lightning protection :
- c) At one point on each earthing systems used to earth electrical equipment enclosure :
- d) At one point on each earthing systems used to earth wiring systems such as metal conduits etc. :
- e) At one point on each fence enclosing electrical equipment. :

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4. Remarks:

PROJECT:		UNIT:	
TESTED BY	WITNESSED BY		DATE
CONTRACTOR	MECON	OWNER	

PRICE SCHEDULE

PROJECT : CITY GAS DISTRIBUTION PROJECT AT EAST & WEST GODAVARI DISTRICTS

ITEM : District Regulatory Skid (DRS)

Bid Document No. MEC/23TS/01/51/S2/DRS/SU/0003

CLIENT : GODAVARI GAS PRIVATE LIMITED

Item Nos.	DESCRIPTION	Unit	QTY	Harmonized System Nomenclature (HSN) code	Unit Price (INR)						Total FOT - delivered at site, price per unit including Packing & forwarding, GST, Inland transportation charges, transit insurance, unloading, stacking etc.		
					Unit Ex-works Price including Packing & Forwarding but excluding Inland Transportation upto FOT site	Unit Inland transportation charges upto FOT delivered at site including transit insurance, unloading & stacking at site etc. & other costs incidental to delivery of goods	GST (CGST & SGST/UTGST or IGST) on the finished goods and inland transportation etc. Applicable on Col. (6 +7)		Unit FOT - delivered at site, price per unit including Packing & forwarding, GST, Inland transportation charges, transit insurance, unloading, stacking etc.		Total FOT - delivered at site, price per unit including Packing & forwarding, GST, Inland transportation charges, transit insurance, unloading, stacking etc.		
					(INR)	(INR)	%	(INR)	Amount (INR)	Amount in words (INR)	Amount (INR)	Amount in words (INR)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) (a)	(8) (b)	(9) = (6 + 7 + 8(b))	(10)	(11) = (4 x 9)	(12)	
I	Design, engineering, manufacturing, testing, name plate marking, painting, inspection, calibration, supply and unloading up to FOT site, RPD meter based DRS with inbuilt battery operated EVC and its accessories, consumables, compulsory spares and commission spares including assistance in configuration, interfacing, integrated testing & commissioning as per job specification and special instructions enclosed.												
1.0	DRS of 5000 SCMH capacity (Ref P & ID No.: MEC/23TS/01/E5/D2/DRS/TE/0001) and Mandatory spares as per TS	Nos.	3										
2.0	DRS of 2500 SCMH capacity (Ref P & ID No.: MEC/23TS/01/E5/D2/DRS/TE/0001) and Mandatory spares as per TS	Nos.	4										
3.0	DRS of 1500 SCMH capacity (Ref P & ID No.: MEC/23TS/01/E5/D2/DRS/TE/0001) and Mandatory spares as per TS	Nos.	3										
4.0	DRS of 1000 SCMH capacity (Ref P & ID No.: MEC/23TS/01/E5/D2/DRS/TE/0001) and Mandatory spares as per TS	Nos.	5										

Item Nos.	DESCRIPTION	Unit	QTY	Services Accounting Codes (SAC)	Unit Price (INR)					Total Price including GST	
					Unit rate excluding GST	GST (CGST & SGST/UTGST or IGST) Applicable on Col. (6)		Unit Price including GST		Amount (INR)	Amount in words (INR)
						(INR)	%	Amount (INR)	Amount (INR)		
(1)	(2)	(3)	(4)	(5)	(6)	(7) (a)	(7) (b)	(8) = (6+7(b))	(9)	(10) = (8 x 4)	(11)
	Supervision in installation, testing and commissioning of DRS skid at respective site, consisting of filtration, pressure reduction, metering through RPD meter, inbuilt battery operated inbuilt EVC. The price shall be inclusive of airfare, boarding, lodging, local transport, incidental, travelling etc. & all other expenses.										
5.0	DRS of 5000 SCMH capacity (Ref P & ID No.: MEC/23TS/01/E5/D2/DRS/TE/0001) and Mandatory spares as per TS	Lumpsum per skid	3								
6.0	DRS of 2500 SCMH capacity (Ref P & ID No.: MEC/23TS/01/E5/D2/DRS/TE/0001) and Mandatory spares as per TS	Lumpsum per skid	4								
7.0	DRS of 1500 SCMH capacity (Ref P & ID No.: MEC/23TS/01/E5/D2/DRS/TE/0001) and Mandatory spares as per TS	Lumpsum per skid	3								
8.0	DRS of 1000 SCMH capacity (Ref P & ID No.: MEC/23TS/01/E5/D2/DRS/TE/0001) and Mandatory spares as per TS	Lumpsum per skid	5								
9.0	TOTAL PRICE OF DRS of 5000 SCMH capacity ITEM (1.0 + 5.0)	(In Figure)									
		(In Words)									
10.0	TOTAL PRICE OF DRS of 2500 SCMH capacity ITEM (2.0 + 6.0)	(In Figure)									
		(In Words)									
11.0	TOTAL PRICE OF DRS of 1500 SCMH capacity ITEM (3.0 + 7.0)	(In Figure)									
		(In Words)									
12.0	TOTAL PRICE OF DRS of 1000 SCMH capacity ITEM (4.0 + 8.0)	(In Figure)									
		(In Words)									

- Note:**
- The OWNER will not issue 'C' form
 - The Bidder to indicate the Harmonized System Nomenclature (HSN) code / Services Accounting Codes (SAC) against each item.
 - Price Schedule filled with price should be submitted with the PRICE BID only
 - Refer TIME OF COMPLETION clause no. 4 of SCC.
 - If any of the above is left blank, the same will be considered as included in the Total amount.
 - EVALUATION AND COMPARISON OF BIDS WILL BE AS PER SECTION 1.2 of PART 1

Bidders Signature:	
Company's Name	
Seal:	