

TENDER SPECIFICATION FOR SUPPLY OF CNG DECOMPRESSION SKID (DCS)

DOCUMENT NO: IRMEL/TS/DCS/18

(Volume I of II – Commercial) (Volume II of II – Technical)

REVISION NO: 00

IRM ENERGY LIMITED

(A Group Company of Cadila Pharmaceutical Ltd)

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(Volume I of II)

Commercial

IRM ENERGY LIMITED

A Group Company of Cadila Pharmaceuticals Limited

Corporate Office: 4th Floor, 8th Block, Magnet Corporate Park, Nr. Sola Bridge, S.G. Highway, Thaltej, Ahmedabad – 380054, Gujarat, India



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1. INTRODUCTION

IRM Energy Limited (a group Company of Cadila Pharmaceuticals Ltd.) is an integrated value driven energy enterprise developing Natural Gas distribution projects across various districts in the country for industrial, commercial, domestic, and automobile customers. The company is committed towards contributing to the energy need of its consumers. IRM Energy Ltd. is authorized by PNGRB for City Gas Distribution of Natural Gas in Banaskantha, Fatehgarh Sahib, Diu & Gir-Somnath and Namakkal & Tiruchirappalli GA.

2. BRIEF DESCRIPTION OF PROJECT

IRMEL is in process of developing and expanding city gas distribution infrastructure in the authorized GA of Banaskantha, Fatehgarh Sahib, Diu and Gir-Somnath and Namakkal & Tiruchirappalli.

IRMEL intends to invite offer for supply of Decompression Unit (DCU) to various demand centres within the authorized GA.

Scope shall include but not limited to manufacturing, supply, inspection, factory testing, packing & forwarding, transportation, loading and unloading of the DCU as per the SOR, MR and technical specifications specified in this document.

3. DEFINITIONS:

The following words and expressions shall have the meanings assigned to them except where the context otherwise requires:

- a) "COMPANY", "PURCHASER", "OWNER" means IRM Energy Limited (IRMEL) and legal successors to the Company and permitted assignees;
- b) "Contract Price" means the amount of money to be paid to the Vendor by the Company for Work/services rendered by the Vendor pursuant to this Purchase Order. The Contract Price mentioned in the Purchase Order is just for reference and calculation purpose only. The obligation of the company shall only be limited to the callout order issued from time to time during the validity of the Purchase Order.
- c) "Party" means the Company or the Vendor, individually and "PARTIES" means both Company and the Vendor. "Third Party" means any other person or entity as the context requires.
- d) "Purchase Order/Contract/Rate contract/Work Order" means the document with Order No. ______ from the Company awarding the Vendor, the order for supply material as per scope of work mentioned in the purchase order and technical documentation.
- e) "Work" means the goods/materials to be supplied by the Vendor under the Scope of Work, which has been detailed under this Purchase Order. The Doc No: IRMEL/TS/DCS/18 Volume-I of II (Commercial) Page 3 of 32



Vendor shall initiate the execution of work under this purchase order strictly based on the callout notice/order issued by the company as per the project requirement. The company's obligation to make the payment shall be restricted only based on the quantity mentioned in the callout order issued and not otherwise.

f) "Vendor" shall mean supplier for goods and services supplier/manufacturer of equipment or any other vendor or construction contractor appointed/ nominated by the vendor hereunder to provide work/services under this Purchase Order.

4. SCOPE:

Scope of supply includes but not limited to the following:

Supply

Design, Detail Engineering, manufacturing, assembly, calibration of instruments, factory testing / inspection, supply of skid mounted DCU of capacity 100 SCMH and above, inlet pressure 230-250 bar(g) and outlet pressure is 3 bar(g) to 4 bar (g), the skid shall be having heating facilities to ensure the outlet temperature be maintained at 10 - 15 Degree centigrade.

Decompression Skid including packaging, insurance, handling, transportation, loading / unloading at Client's stores / sites to designated site, hookup with SS tubing, associated instruments, electricals and all other related works, trial run, commissioning, performance testing along with all accessories, consumables & commissioning spares for City Gas Distribution Project GA's.

Supply of material at IRMEL's designated site/office in City Gas distribution area of IRMEL.

Material must be as per Technical Specifications & Standards requirements sent along with enquiry email. Before dispatch, the materials Quality Assurance Plan (QAP) must be approved by IRMEL or its representatives.

Supplier will submit QAP for approval of IRMEL on receipt of order. The company authorized TPI will be appointed by IRMEL for inspection as per the approved QAP.

Material inspection will be as per technical documents and in IRMEL scope.

The Vendor shall follow the best modern practices in the manufacture of highquality product notwithstanding any omission in the specifications. The true intent is that Vendor shall in all respects, design, engineer, manufacture and supply the product in a thorough workmanlike manner and supply the same in prescribed time to the entire satisfaction of the Company.

The specification and make as approved by the Company shall be adhered to by the Vendor without any deviation failing which the Company reserves the



right to cancel the delivery of the goods and demand free replacement of the product/material (as per the specification) with no additional cost.

In performing the work under this purchase order, the Vendor shall comply with directions of the Company and/or any other person specifically authorized by the Company in writing. The materials shall be supplied by the Vendor directly to the Company and to such other person as may be specified from time to time by Company in writing. The Company shall at its discretion decide whether to accept or reject Vendor's advice or implement Vendor's advice with modification, but the Vendor shall nevertheless be liable for such advice in accordance with this purchase order.

The Company shall have the right to amend the scope of the work. The Company shall at its sole discretion decide as to which of the quantity of materials it requires the Vendor to supply and the time for such performance. The Company shall also have the right to get such materials from any other Vendor, which may be appointed by the Company from time to time.

Except as otherwise expressly provided in this purchase order, Vendor shall be responsible for providing the facilities, personnel, equipment, software, other items and resources, etc. necessary to complete the scope of work.

The Vendor shall furnish two (2) sets in English language of technical documents, final drawings, test certificates, spare parts catalogues for all equipment to the Company or can provide soft copy in a Compact Disk (CD)/Pen drive.

The vendor shall be responsible for any loss to the Buyer consequent to furnishing of incorrect data/drawings.

Specifications, design and drawings issued to the Vendor along with technocommercial document and purchase order are not sold or given but loaned. These remain property of the Company or its assigns and are subject to recall by the Company. The Vendor and his employees shall not make use of the drawings, specifications and technical information for any purpose at any time except for manufacture against this purchase order and shall not disclose the same to any person, firm or corporate body, without written permission of the Company.

Vendor shall pack, protect, mark and arrange for dispatch of goods as per instructions given by the Company. The goods being supplied by the Vendor shall confirm the technical specifications provided/agreed by the company. The Techno-commercial document, any addendum to this order, technical drawings, technical specifications, etc. shall be an integral part of this purchase order.

Services

Supervision at site, commissioning, performance testing, onsite training of client personnel including hook-up with SS tubing at the battery limit and all other



related works for commissioning & performance testing of 100 SCMH Decompression Skid and above.

The price shall be inclusive of Airfare, Boarding, Lodging, Local Transport, Incidental, Travelling etc. & all other expenses.

Bidders Proposal shall include the following (as minimum):

Bidder's proposal shall include the detailed specifications for all items of filtration, Gas pressure reducing and skids packages and Metering packages. The proposal shall include:

- a) Make, Model number and detailed specification along with technical details and catalogue for each applicable item of skid like filter, Slam shut valve, pilot operated pressure control valve, flow meter, EVC, pressure relief valve, pressure gauges, limit switches, Ball valves, plug valves, Globe valves, Check valves etc.
- b) Slam shut valve, pilot operated pressure control valve details including type, construction material, CV data/ capacity curves, regulation accuracy, set point spring ranges, details of the valve pilots etc.
- c) Sizing calculations and pressure drop calculations for inlet and outlet pipeline, filtration system, slam shut valves, pressure control valve, Flow meters and Pressure relief valves. Calculation for Gas velocities and Pressure drop across slam shut valves at maximum flow and minimum pressure to be submitted. The entire system (including all the components, equipments, Instruments) shall be selected and offered in such a way that the overall pressure drop across the entire skid shall be minimum. Detailed sizing calculation for individual components and pressure drop for entire skid (including diff. Pressure across individual components of skid) to be provided.
- d) Vendor to provide Detailed Noise level calculations (and standards used and assumptions considered, if any) for self-actuated pressure control valves.
- e) All design and performance characteristics.
- f) P&ID for skid shall be as per Bid document attached.
- g) Completely filled Datasheet of all the supplied components/ items of skid with selected single and Model of equipment/ Instrument. (Multiple make/ models shall not be mentioned/ offered).
- h) Overall dimensions of each supplied item.
- i) Overall dimensions of each skid with proposed modules of each skid considered along with estimated dimensions.
- i) Weight of each skid.
- k) Foundation details (suggestive) of skid

All units of measurements in vendor's specification sheets shall be same as those in



purchaser's data sheets.

All material specifications for the various parts in the vendor's specification sheets shall be to the same standard as those in purchaser's data sheets.

Vendor shall enclose catalogues giving detailed technical specifications, selection guide for decoding Model no. of offered equipments/ instruments and other information for slam shut valve, pressure control valves, EVC, pressure relief valve, Ball valves, plug valves, pressure gauges, Modem etc. covered in the bid.

Vendor's proposal including catalogues, drawings, operating and maintenance manuals etc. shall be in ENGLISH language ONLY.

Vendor shall submit the sizing, rating details & specifications of all the instruments, fittings and piping items, make & model, skid details etc., subsequent to award of contract. The relevant catalogue, technical literature shall also be furnished. CLIENT shall review the above and vendor to note that "No post order deviation shall be granted". Vendor shall change the make and/or models of items and specifications to meet the requirement of contract without any price and delivery implications.

It is compulsory 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. Additional information shall be provided in the given data sheets, if necessary. 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.

Vendor shall submit details of the only offered make and model of equipment/instrument along-with the bid. Multiple makes and / or equivalent for any item shall not be mentioned in the bid.

The Bidder shall submit all filled and signed formats including Data sheet, List of items etc.

The Bidder shall provide Type approval for quoted make and model of Slam shut valve and Regulator (PCV).

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.

All such details shall be kept confidential.

5. INSTRUCTIONS TO BIDDERS

A) Cost of Bidding

The bidder shall bear all costs associated with the preparation and submission of the bid, and OWNER (IRMEL) will in no case, be responsible or liable for these costs,



regardless of the conduct or outcome of the bidding process.

B) Bid Document

The bidder is expected to examine all instructions, forms, terms and specifications in the bid document. The Invitation for Bids (IFB) together with all its attachments thereto, shall be considered to be read, understood and accepted by the bidders, unless deviations are specifically stated seriatim by the bidder. 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. Bidder must return the Check List duly filled in, signed and stamped, along-with the un-priced part of bid. This is important.

Bid Document is not transferable. Bids received in the name of whom it is issued shall only be accepted.

C) Clarification of Bid Document

A prospective bidder requiring any clarification of the Bid Document may notify IRMEL in writing or Email at the IRMEL's mailing address indicated in the IFB. The IRMEL will respond in writing to any request for clarification of the Bidding documents, which it receives not later than 10 days prior to the deadline for the submission of bids prescribed. Written copies of the IRMEL's response (including an explanation of the query but without identifying the source of the query) will be sent to all prospective bidders who have received the bidding documents.

In case pre-bid meeting is envisaged, all question/ queries should be referred to IRMEL at least 3 days before the schedule date of meeting.

D) Amendment of Bid Document

At any time prior to the bid due date, the IRMEL may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, modify the bidding documents.

The amendment will be notified in writing or by fax/ e-mail or post to all prospective bidders who have received the bidding documents and will be binding on them.

In order to afford prospective bidders, reasonable time in which to take the amendment into account in preparing their bids, the IRMEL may, at its discretion, extend the bid due date.

E) Language Of Bid

The bid prepared by the bidder and all correspondence/drawings and documents relating to the bid exchanged by bidder and the IRMEL shall be written in ENGLISH language only. Any printed literature furnished by the bidder



may be written in another language so long as accompanied by an ENGLISH translation, in which case, for the purpose of interpretation of the bid, the ENGLISH translation shall govern. Metric measurement system shall be applied.

F) Documents Comprising the Bids

The bid prepared by the bidder shall comprise the following components:

- a) Bid Security
- b) Information and documentary evidence establishing bidder's claim for meeting qualification criteria (as / if stipulated in IFB).
- c) Information and documentary evidence establishing bidder's eligibility to bid and eligibility and conformity of goods to Bid Document.
- d) Bid Form and a Price Schedule completed in accordance with Clauses- 7 & 8
- e) Check List duly filled in.
- f) Any other information/details required as per bid document.

G) BID FORM

The bidders shall complete the Bid Form and the appropriate Price Schedule (Schedule of Rates) furnished in the Bid Document, indicating the goods to be supplied, a brief description of the goods and services, quantity, and prices.

H) BID PRICE

The bidder shall indicate on the appropriate price schedule attached to these documents 'Unit Prices & Total Prices'

Prices shall be quoted, in the prescribed Price Schedule, by the bidder, separately for each item of scope, in the following manner and/or as specified in SOR.

Price shall be inclusive of packing, forwarding, taxes & duties, transportation and other local cost incidental for delivery of goods to the designated site, installation, testing, pre-commissioning, commissioning including transit insurance and all insurance required till commissioning and handover to the IRMEL.

The statutory variation in taxes, duties, levies if any, in case of positive/negative changes to be benefitted/ borne by owner, i.e. IRMEL. The quoted price shall remain firm and fixed without any variation, whatsoever, till completion of the contract.

Bidders' separation of the price components as aforesaid will be solely for the purpose of facilitating the comparison of bids by the IRMEL and will not in any way limit the IRMEL's right to contract on any of the price basis/terms offered



basis.

I) Documents Establishing Goods' Eligibility and Conformity to Bidding Documents

The bidder shall furnish, as part of the bid, documents establishing the eligibility and conformity to the Bidding Documents of all goods and services, which the bidder proposes to supply under the Contract.

The documentary evidence of the goods and services' conformity to the Bid Document may be in the form of literature, drawings or data and shall furnish:

- a) Detailed description of the goods, essential technical and performance characteristics.
- b) A clause-by-clause commentary on the Technical Specification of the Bid document, demonstrating the goods and services' substantial responsiveness to the specifications or a statement of exceptions to the provisions of the Technical Specifications.

For purpose of the commentary to be furnished above, the bidder shall note that standards for workmanship, material and equipment, and reference to brand names or catalogue numbers, designated by the IRMEL in its Technical Specifications are intended to be descriptive only and not restrictive.

J) Bid Security

The bidder shall furnish, as part of his bid, bid security in the amount specified in the Invitation for Bid (IFB).

The bid security is required to protect the IRMEL against the risk of bidder's conduct, which would warrant the security's forfeiture.

The bid security in the form of Bank Guarantee/Demand Draft 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. The bank guarantee for the bid security shall be of INR 10,00,000 for each geographical area.

Any bid submitted without security deposit (through bank guarantee) shall be rejected.

Unsuccessful bidder's bid security will be discharged/returned as promptly as possible, on successful award of contract, but not later than 60 days from the date of bid opening by the IRMEL.

The successful bidder's bid security will be discharged upon the bidder's executing the Contract.

Bid Security should be in favor of IRMEL. The original Bid Security should be



enclosed separately in a sealed cover and submitted along with the UNPRICED BID. Bid Security must indicate the Bid Document number and the item for which the bidder is quoting. This is essential to have proper co-relation at a later date. The Bid Security shall be strictly in the form provided.

K) Period Of Validity of Bid

Bids shall be kept valid for 4 months from the final bid due date. A bid valid for a shorter period shall be rejected by the IRMEL as non-responsive.

The bidder shall not be entitled during the said period bid validity, without the consent in writing of the IRMEL to revoke or cancel its Bid or to vary the Bid given or any term thereof. In case of Bidder revoking or cancelling its Bid or varying any terms in regard thereof without the consent of the IRMEL in writing, the IRMEL shall forfeit the Bid security furnished by Bidder.

The IRMEL may solicit the bidders' consent to an extension of the period of bid validity. The request and the responses thereto shall be made in writing by fax, cable or post. The bid security shall also be accordingly extended. A bidder granting the request will neither be required nor permitted to modify its bid, while confirming extension of bid validity. A bidder may refuse the request without forfeiture of its bid security.

L) Format And Signing of Bid

The bidder shall prepare required number of copies of the bid, clearly marking each "Original Bid" and "Copy of Bid" as appropriate. In the event of any discrepancy between them, the original shall govern.

The original and all copies of the bid shall be typed or written in indelible ink and shall be signed by the bidder or a person duly authorized to bind the bidder to the Contract. The name and position held by each person signing must be typed or printed below the signature. The person or persons signing the bid shall initial all pages of the bid, except for un-amended printed literature.

The complete bid shall be without alterations, interlineations or erasures, except necessary to correct errors made by the bidder, in which case such corrections shall be initialed by the person or persons signing the bid.

M) Preparation & Submission of Bid

One set of Bid Document including Bid form shall be issued to the Bidders. Documents mentioned in the Bid document shall be submitted along with the bid by the Bidders.

Addenda/Corrigenda to this Bid document, if issued, must be signed and submitted along with the Bid Document.

Bidders are advised to submit quotations based strictly on the terms & conditions



and specifications contained in the Bid Document and not to stipulate any deviations.

Each bidder shall submit only one bid. A bidder who submits more than one bid will be rejected. Alternative bids will not be accepted.

Sealing & Marking of Bids

The inner and outer envelopes shall be addressed at the address stated in Invitation for Bid (IFB) & restated below:

IRM Energy Ltd

4th Floor, 8th Block, Magnet Corporate Park, Nr. Sola Bridge, S. G. Highway, Thaltej, Ahmedabad - 380054, Gujarat, India

PH. NO.91-79-66737400.

Fax No. 91-79-66737456

and bear the title of Bid document & Bid Document No. In addition to the information required above, the inner and outer envelopes shall also indicate the name and address of the Bidder.

If the outer envelope is not sealed and not marked, the IRMEL will assume no responsibility for the Bid's misplacement or premature opening.

N) Bid Due Date

Bids must be received by the IRMEL at the address specified in the IFB, not later than the date and time specified in the Bid Document.

The IRMEL may, at its discretion, on giving reasonable notice by fax, telex or email or any written communication to all prospective bidders who have been issued the bid documents, extend the bid due date, in which case all rights and obligations of the IRMEL and the bidders, previously subject to the bid due date, shall thereafter be subject to the new bid due date as extended.

O) Late Bids

Any bid received by the IRMEL after the bid due date and time prescribed in IFB shall be rejected.

Telegraphic/ E-mail offers will not be considered and shall be rejected.

P) Modification And Withdrawal of Bids

The bidder may modify or withdraw his bid after the bid's submission, provided that the modification/withdrawal notice is received by the IRMEL prior to the bid due date & time.

The bidder's modification or withdrawal notice shall be prepared, sealed, marked and dispatched. A withdrawal notice may also be sent by Tele-fax/



email but must be followed by a signed confirmation copy dated not later than the deadline for submission of Bids.

No bid shall be modified subsequent to the deadline for submission of bids.

No bid shall be allowed to be withdrawn in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the bidder on the Bid Form. Withdrawal of a bid during this interval shall result in the bidder's forfeiture of his bid security.

Q) Evaluation of Bids

The IRMEL will examine the bids to determine whether they are complete, whether any computational errors have been made, whether the documents have been properly signed and whether the bids are generally in order.

The Bids without requisite Bid Security and/or not in the prescribed proforma will not be considered and Bids of such bidders shall be rejected.

Qualification of Bidder: The experience details and financial capabilities of the Bidders shall be examined to determine whether the Bidders meet the Qualification Criteria, if mentioned in INVITATION FOR BIDS (IFB) & TECHNICAL SPECIFICATION.

Only Bids determined as meeting the Qualification Criteria, if mentioned, shall be taken up for further evaluation.

Once quoted, bidder shall not make any subsequent price changes, whether resulting or arising out of any technical/commercial clarifications sought regarding the bid, even if any deviation or exclusion may be specifically stated in the bid. Such price change shall render the bid liable for rejection. All responses to request for clarifications shall be in writing.

Unsolicited clarification to the Bid and/or change in price during its validity period would render the Bid liable for outright rejection.

TECHNO-COMMERCIAL EVALUATION OF BIDS

To assist in the examination, evaluation and comparison of bids, the IRMEL may, at its discretion, ask the bidder for a clarification of its bid. The request for such clarification and the response shall be in writing and no change in the price or substance of bids shall be sought, offered or permitted.

Prior to the evaluation and comparison of bids, the IRMEL will determine the substantial responsiveness of each bid to the bidding documents. For purpose of this Clause, a substantially responsive bid is one which conforms to all the terms and conditions of the bidding document without material deviations or reservations. The IRMEL determination of bid responsiveness is to be based on the contents of the bid itself without recourse to the extrinsic evidence.

A bid determined as substantially non-responsive will be rejected by the IRMEL and may not subsequently be allowed by the IRMEL to be made responsive by the bidder by correction of the non-conformity.



Bidder's Bid shall be considered non-responsive and rejected, if ANY deviations are taken to the provisions of Bid Documents by the Bidder:

Bids not confirming to technical specification/requirements as mentioned in Bid Document are likely to be rejected.

Conditional Bids will be rejected.

R) Rejection of Bids

IRMEL requests bidders to accept all terms and conditions stipulated in this document without taking any deviation for speedy decision. Bidders are requested to note that taking deviation or suggesting modifications to the terms and conditions contained in the bid document may result in bids to be considered non responsive.

S) Opening of Price Bids

The price bids of the substantially responsive bidders will only be opened. The price bids of those bidders determined to be not substantially responsive will be rejected. This being a limited domestic bid, bidders will not be called for attending the price bid opening.

T) Comparison of Bids

The IRMEL will evaluate and compare bids.

Arithmetical errors will be rectified on the following basis:

If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity the unit price shall prevail and the total price will be corrected. If there is a discrepancy between the total amount and the sum of total prices, the sum of the total prices shall prevail and the total bid amount will be corrected.

The evaluated price of bidders shall include the following or as asked for SOR:

 Total Price shall be inclusive of packing, forwarding, taxes & duties, transportation, and other local cost incidental for delivery of goods to the designated site, installation, testing, pre-commissioning, commissioning including transit insurance and all insurance required till commissioning and handover to the IRMEL.

U) Contacting The IRMEL

No Bidder shall contact the IRMEL on any matter relating to its Bid, from the time of Bid opening to the time the CONTRACT is awarded.

Any efforts by a bidder to influence the IRMEL in the IRMEL'S bid evaluation, bid comparison or contract award decisions may result in the rejection of the bidder's bid.



V) Award Criteria

The Purchaser will award the contract to the successful Bidder whose Bid has been determined to be the lowest evaluated, responsive Bid, provided further that the Bidder is determined to be qualified to satisfactorily perform the Contract.

Award Criteria: Evaluation shall be done based on overall competitive bidder, subjected to bidder is responsive and comply to all tender conditions without any deviations.

W)IRMEL's Right to Accept Any Bid and To Reject Any or All Bids

IRMEL 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(s) or any obligations to inform the affected bidder or bidders, the ground for the IRMEL'S action.

X) Notification Of Award and Discharge of Bid Security

Prior to the expiration of period of bid validity, the IRMEL will notify the successful bidder in writing, to be confirmed in writing through letter or E-mail, that his bid has been accepted. The Notification of Award will constitute the formation of the Contract.

Delivery shall be counted from the date of notification of award (Letter of Intent).

Upon the successful bidder's furnishing of performance bank guarantee, the IRMEL will promptly notify each unsuccessful bidder(s) and will discharge their bid security.

Y) Income Tax Liability

The bidder will have to bear all income tax liability, both Corporate as well as for their personnel, pursuant to award of contract against this enquiry.

Payment under this contract will subject to TDS (if applicable) at rates specified in the laws of taxation in force. The vendor undertakes to issue proper invoice as stipulated under the Excise/services tax/VAT/GST legislations to enable the Company to avail the credit of such taxes, wherever applicable, paid by the Vendor. However, if Company is not able to take the credit due to issuance of defective invoice by Vendor or the invoice is not showing in the GST portal or issuance of invoice not capturing the requirement necessary to enable Company to claim tax credit, then any loss to the Company on his account shall be indemnified by the Vendor. The Company may in its sole discretion decide to recover such loss by way of deduction from payment due to the Vendor or



by invoking the performance bank guarantee.

6. BIDDER QUALIFICATION CRITERIA:

Technical:

Bidder shall be a Manufacturer of Decompression Units and having experience in Design, Detail Engineering, manufacturing, assembly, calibration of instruments, factory testing / inspection, supply of skid mounted DCU of capacity 100 SCMH and above, inlet pressure 230-250 bar(g) and outlet pressure is 3 bar(g) to 4 bar (g) along with heating arrangement to ensure minimum outlet temperature to 10 – 15 Degree centigrade.

Bidder shall have successfully executed the above supply of 3 nos. of DCU and commissioning of two DCU of capacity 100 SCMH or higher capacity in last three years and supplied to City Gas distribution companies.

Bidder shall have ISO - 9001 certification covering the above scope of services.

Financial:

Annual Turnover:

Minimum annual turnover as per the last audited financial results shall be INR 0.90 Cr.

Or

Average turn over during last 03 years shall be 1 Cr.

Net Worth:

Bidder's Net worth shall be positive during last three (03) years.

Note: Bidder shall not have been blacklisted or put on holiday by any CGD entities in India. Self-declaration be submitted to this effect, any wrong information or fabricated proofs submitted shall lead to rejection of bid/workorder at any stage and also legal actions be initiated. Bidders shall furnish all supporting documentary proof meeting the BQC compliance, failing which the bids shall lead to rejection.

IRM Energy reserve the right to cancel the tendering process or reject any bids without assigning and reason.

7. METHODOLOGY FOR EVALUATION AND COMPARISON OF PRICE BIDS:

Evaluation, Comparison and Award shall be done on an overall cost to company basis.

The finalized bidder shall be considered as competitive bidder considering the supply, services and spares cost, if any as per the scope of work and SOR.



IRM Energy reserve the right to split the contract and award to more than one bidder.

8. DELIVERY TERMS AND TIMELINES:

- a. The vendor shall deliver the goods/equipment to the Company's designated site/office within a period of 12 weeks from the date of call out notice. Failure to do so will attract penalties as specified in the purchase order. The delivery shall reckon to complete on receipt of goods at Company's site. However, endeavor shall be made to expedite the delivery period as per mutual understanding.
- b. The Company may, at its sole discretion, grant an extension of time (at the request of Vendor in writing) for a period to be mutually agreed. However, the Company is not bound to accept the request of the vendor in this regard. No additional amount (by whatever name called) shall be payable by the Company to the Vendor such extended period.
- c. If the scope of work is impeded or delayed on account of the Company or his contractors, which the Vendor could not reasonably avoid, the Vendor shall inform the Company of the circumstances and the adverse impact, if any. The vendor shall not be liable for any delay in executing the work for the cases of delay attributable to fault of the Company or its contractor(s). However, the Company shall not be liable to pay any amount (by whatever name called) to the Vendor for such delay.

d. Address of Delivery

Banaskantha GA

IRMEL Store, Jagana (Village), Opp. Government Engineering College, Near Ishdu mill bhagal road, Jagana, Gujrat-385011, India

Contact Person: Mehul Hanavadiya

Contact No: +91 63596 05877

Diu and Gir-Somnath GA

F-1 to 5, Devi Complex,

Dabhor Road, Opposite Ravi Tower,

Veraval-362265

Contact Details: Mr. Gautam Chauhan

(Mo.: +91 93138 09064)

IRM Energy Limited,

IRMEL Warehouse Survey No. 257/3,

Opp. IRMEL CGS, Una - Zundvadli Road, Una, Dist. Gir-Somnath, Gujarat-362560.

Contact Details: Mr. Karshan Ramu (Mo. 93138 06953)

Fatehgarh Sahib GA

IRM Energy Limited,

A – 08, Industrial focal Point,

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Nr. Ajnali Village, Mandi Gobindgarh, Punjab – 147301.

GSTIN: 03AADCI9965Q2ZR

Contact Details: Mr. Devendra Tiwari (M: 63875 17001)

Namakkal & Tiruchirappalli GA

322/1, Village-Sooriyur Taluka-Thiruverumber, Tiruchirappalli, Tamil Nadui-620025,

India

Contact Person: Kishore K
Contact No: +91 92744 14747

9. PERFORMANCE BANK GAURANTEE:

The Vendor shall submit performance bank guarantee (PBG) equivalent to 10% of the purchase order value in prescribed format of the company and issued by any Indian Nationalized / Scheduled bank. The PBG shall be valid for a period of 90 days more than Defect Liability Period (DLP). The PBG shall be submitted within 15 days of the issue of order/call out. At all times, amount PBG shall corresponds to 10% of the total callout order value.

If the performance bank guarantee is not submitted by the contractor / bidder within the stipulated timelines, equivalent amount as above will be retained from the invoices till the required amount is retained as required as per terms of the contract.

10. WARRANTY/DEFECT LIABILITY PERIOD:

- a) The Vendor guarantees that the product/material being supplied under this purchase order is new, free from defects and carries warranty (i.e. Defect Liability Period) for a period of 12 months from the date of commissioning or 18 months from the date of delivery whichever is earlier.
- b) All Goods or Materials or equipment(s) shall be supplied strictly in accordance with the specifications, drawings, data sheets, other attachments and conditions stated in the purchase order. No deviation from such specifications or alterations or of these conditions shall be made without Company's agreement in writing which must be obtained before any work against the purchase order is commenced.
- c) All materials supplied by the vendor pursuant to this purchase order (irrespective of whether engineering, design data or other information has been furnished, reviewed or approved by the Company) are guaranteed to be of the best quality of their respective kinds (unless otherwise specifically authorized in writing by the Company) and shall be free from faulty design, workmanship and materials, 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 this purchase order.

- d) If any trouble or defect, originating with the design, material, workmanship or operating\ characteristics of any material(s) / good(s)/equipment(s), arises at any time prior to twelve (12) months after commissioning of the equipment(s)/good(s) or eighteen (18) months from the date of delivery at Company's site, whichever comes first, and the vendor is notified thereof, vendor shall, at his own expense and as promptly as possible, make such alterations, repairs and replacements as may necessary to permit the material(s)/good(s)/equipment(s) to function in accordance with the specifications and to fulfill the foregoing guarantees.
- e) The Company may, at its option, remove such defective materials, at Vendor's expense in which event Vendor shall, without cost to the Company and as promptly as possible, furnish and install proper materials. Repaired or replaced materials shall be similarly guaranteed by the vendor for a period of not less than twelve (12) months from the date of replacement/repair.
- f) In the event that the material(s)/good(s)/equipment(s) supplied do not meet the specifications and/or not in accordance with the drawings data sheets or the terms of the purchase order and rectification is required at site, Company shall notify the vendor (by e-mail/letter) giving full details of differences. The vendor shall attend the site within seven (7) days of receipt of such notice to meet and agree with representatives of the Company, the action required to correct the deficiency.

11. LIQUIDATED DAMAGE/COMPENSATION FOR DELAY:

Time is the essence of this Contract. In case vendor fail to meet the Delivery schedule as specified in this contract herein for the reasons other than (i) Force Majeure; and/or (ii) reasons attributable to Company alone, Supplier shall be liable to pay Liquidated damages as follows:

- a) If delay in delivery of Goods/ Materials/Equipment occurs beyond the period specified in order herein, Company shall recover, as ascertained, Liquidated Damages (LD) and not by way of penalty a sum equivalent to half percent (0.5%) of the value of delayed goods per week of delay on delayed goods or part thereof, subject to maximum of 5% of the value of the callout order.
- b) In case of delay of more than 12 weeks in supply of material beyond a stipulated completion date, IRM Energy reserves the right to terminate the contract and place order to another vendor at its sole discretion. Any extra expenditure that IRM Energy will have to incur for procurement of the balance material through the other supplier on account of higher rates quoted by the supplier will be recovered from the supplier's retention money, pending bills etc.

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- c) The sum to be deducted shall be worked out on the basis of delivery schedule as defined in the Contract. The decision of Purchaser in regard to the actual delay shall be final and binding on Supplier.
- d) Decision of the Company to levy penalty shall be final and binding on the vendor.
- e) No penalty shall apply for delays attributable to force majeure as set out in this purchase order.

12. PAYMENT MILESTONES:

- a) 100% of the invoice value (based on actual quantity delivered to IRM Energy designated site) shall be paid within 30 days on receipt of Goods/material at designated IRM Energy Site / store along with Original Invoice and upon submission of relevant supporting documents.
- b) All bank charges in connection with the payments shall be to Vendor's account and no interest or other charges for delay in payment, if any, shall be payable by the Company.
- c) The total amount to paid to the vendor shall be calculated by applying the unit rates of the relevant items to the actual supplied quantities. Payment shall be released strictly on payment milestone and as certified by the approving authority/ Person-in charge/TPIA.
- d) Payment under this contract will subject to TDS (if applicable) at rates specified in the laws of taxation in force. The vendor undertakes to issue proper invoice as stipulated under the Excise/services tax/VAT/GST legislations to enable the Company to avail the credit of such taxes, wherever applicable, paid by the Vendor. However, if Company is not able to take the credit due to issuance of defective invoice by Vendor or the invoice is not showing in the GST portal or issuance of invoice not capturing the requirement necessary to enable Company to claim tax credit, then any loss to the Company on his account shall be indemnified by the Vendor. The Company may in its sole discretion decide to recover such loss by way of deduction from payment due to the Vendor or by invoking the performance bank guarantee.

13. FORCE MAJEURE:

- a) Force Majeure shall mean and be limited to the following:
 - acts of God or natural disasters beyond the reasonable control of the Affected Parties which could not reasonably have been expected to occur, including but not limited to storm, cyclone, typhoon, hurricane, flood, landslide, drought, lightning, earthquakes, volcanic eruption, fire or exceptionally adverse weather conditions affecting the implementation of

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the Purpose.

- radioactive contamination, ionizing radiation
- an act of war (whether declared or undeclared), invasion, armed conflict or act of foreign enemy, blockade, embargo, revolution, riot, insurrection, terrorist or military action, nuclear blast / explosion, sabotage or civil commotion
- epidemic, pandemic, outbreaks of infectious disease or any other public health crisis, including quarantine or other employee restrictions; act of authority whether lawful or unlawful, compliance with any law or governmental order, rule, regulation or direction, curfew restriction, expropriation, compulsory acquisition, seizure of works, requisition, nationalization. general labor disturbance such as but not limited to boycott, strike and lock-out, go-slow, occupation of factories and premises; shortage or inability to obtain critical material or supplies to the extent not subject to the reasonable control of the subject Parties
- Orders of any courts or appropriate government authorities
- Any event or circumstances of a nature analogous to any of the foregoing.
- b) The vendor shall advise the Company 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, the Company reserves the right to cancel the purchase order. The Company shall not be liable to pay any amount to the vendor on termination of this purchase order due to force majeure condition. The equipment that are complete and ready for shipment (as per the specification and scope of work as set out in the purchase order) within 15 days after the vendor's receipt of notice of termination shall be purchased by the company at the already agreed terms and prices.
- c) For delays arising out of Force Majeure, the vendor shall not claim extension in completion date for a period exceeding the period of delay attributable to the causes of Force Majeure and neither the Company nor the vendor shall be liable to pay any extra costs.
- d) The Vendor shall also categorically specify the extent of Force Majeure Conditions prevalent in their works at the time of signature of this purchase order.

IN THE EVENT OF ANY FORCE MAJEURE CAUSE, THE VENDOR OR THE COMPANY SHALL NOT BE LIABLE FOR DELAYS IN PERFORMING THEIR OBLIGATIONS UNDER THIS ORDER AND THE DELIVERY DATES WILL BE EXTENDED TO THE VENDOR WITHOUT BEING SUBJECT TO PENALTY CLAUSES MENTIONED IN THE PURCHASE ORDER.



14. INDEMNIFICATION:

- a) The Vendor shall fully indemnify, save harmless the Company from on against any claim, demand, liability, action, preceding, cost or expense in favor of any third party with respect to:
 - Failure of the Vendor, any sub-contractor or any of their respective subcontractors to comply with applicable laws and applicable permits, prudent utility practices and good engineering practices.
 - Failure of the Vendor to make payments of taxes relating to the Vendor's
 or any sub-contractor's or any sub-contractor irrespective of whether they
 are reimbursable or other taxes required to be paid by the Vendor pursuant
 to this Contract irrespective of whether they are reimbursable or to be
 compensated under the terms of this Contract.
- b) Vendor shall indemnify the Company against all third-party claims of infringement of patent, trademark or industrial design rights arising from use of the goods or any part thereof.
- c) Vendor shall also protect and fully indemnify the Company from any claims from Vendor's workmen/employees or their heirs, dependent(s), representatives, etc. or from any other person/persons or bodies/companies etc. for any acts of commissions or omission while executing the Purchase Order.
- d) Vendor shall be responsible for compliance with all requirements under the laws and shall protect and indemnify the Company completely from any claims/penalties arising out of any infringements on its part.
- e) Notwithstanding anything contained in this Contract, Vendor shall be liable to indemnify losses and damages suffered/sustained to the Company on account of or arising out of any omission or negligence on the part of the Vendor not exceeding 5% of the total Contract Price. However, this limitation of liability of 5% is not applicable in any of the following cases:
 - Corrective engineering is required on account of reason attributed to Vendor which shall immediately be undertaken without any additional cost to the Company.
 - The Vendor fails to comply with applicable laws, including but not limited to laws relating to taxation, etc.
 - Gross negligence or willful misconducted by the Vendor.
 - Breach of confidentially obligations by Vendor.
 - Violation of intellectual property rights by Vendor.
- f) Notwithstanding anything contained elsewhere in the contract, neither party shall be liable for consequential and indirect losses.

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15. CONFIDENTIALITY:

- a) None of the Parties, at any time, whether before or after the expiry or on termination of this Purchase Order, without the written consent of the other Party, divulge or permit its officers, employees, agents, affiliates, advisors to divulge to any person (except when it is required to be shared for the execution of work under this Purchase Order) any of the following ("Confidential Information")-
 - Any of the contents of this Purchase Order;
 - Any information or documents (including information about the Company or its projects or business-related information);
 - Any information which, in consequence of the negotiations relating to this
 work order or of party being involved in the business or the Company in any
 manner whatsoever or performing or exercising its rights and obligations
 under this work order, any party may have acquired (whether before or
 after the date of this work order) with respect to the customers, business,
 assets, or affairs of any other party.
- b) The foregoing restrictions on use, discussion and disclosure in respect of Confidential Information shall not apply:
 - To the extent that such Confidential Information is in the public domain other than by breach of this Purchase Order;
 - In so far as it is disclosed to the employees, directors or professional advisers
 of any Party, provided that such Party shall procure that such persons treat
 such Confidential Information with an obligation of confidentiality and nondisclosure;
 - To the extent that any Confidential Information is later acquired by a Party from a source not obligated to any other Party hereto, or its Affiliates, to keep such information as confidential;
 - To the extent that such Confidential Information was previously known or already in the lawful possession of a Party, prior to disclosure by any other Party hereto;
 - To the extent that any information, materially similar to the Confidential Information, shall have been independently developed by a Party without reference to any Information furnished by any other Party hereto;

In the event any Confidential Information requires disclosure in accordance with this Clause XI of this Purchase Order, the Vendor shall intimate the Company of such disclosure at least [5 (five)] days before such disclosure.

c) In the event that for any reason this Purchase Order shall lapse and the transactions contemplated hereby shall not be implemented, all documents



containing proprietary and Confidential Information and all copies made thereof in the Parties' possession shall be returned to the respective Party entitled thereto.

16. COMPLIANCE WITH LEGAL REQUIREMENTS:

Vendor shall comply with all applicable laws as applicable from time to time relating to employment and workers, providing Services, social security with regard to Vendor's employees, competition, trademark, copyrights, patents, health hazards, and taxes and other applicable laws with regard to Vendor's Scope of Work.

Further, the Vendor shall provide to the Company or statutory authorities upon demand evidence of such compliance etc. of all the applicable laws.

17. TERMINATION:

a) Termination for Convenience:

The Company may terminate this purchase order by giving seven (7) days' termination notice to that effect without assigning any reason thereof. After termination the Company shall pay to the Vendor only such portion of the scope of work/supply of jobs which have been completed by the Vendor prior to the date of termination. All jobs whether finished or in progress shall be property of the Company and all related documents shall be handed over to Company as prescribed in this Purchase Order.

b) Termination for Default:

If there are reason/reasons to believe that the vendor is not performing as per the terms and conditions of this purchase order, the Company reserves the rights to terminate the purchase order at any point of time after giving [Seven (7) days] termination notice. In case of termination of the purchase order, the vendor indemnify the Company for any loss occurring on account of termination of this purchase order.

On termination of this purchase order (by whatever reason called), the vendor shall have no claim to any payment or compensation or other issues whatsoever on account of any loss of profit or advantage which it might have derived from the execution of work in full but which it did not derive in consequence of the termination of the purchaser order (in full or part) by the Company.

18. ARBITRATION:

Any dispute arising out of this Purchase Order shall be mutually resolved amicably through negotiations by the Parties. If the dispute cannot be resolved by mutual consultation between the Parties, the same shall be resolved in accordance with



the provisions of the Arbitration and Conciliation Act, 1996 and rules framed thereunder (and as amended from time to time). The Company and the Vendor shall appoint one arbitrator each. The two arbitrators so appointed shall jointly appoint a third presiding arbitrator. The decision of the arbitrators so appointed shall be final and binding upon the concerned Parties. In the event of the failure by any Party to appoint an arbitrator within 30 days from the date of receipt of notice from the other Party/ or failure by the two arbitrators appointed by the Parties to appoint the third arbitrator within a period of 30 days, such arbitrator(s) shall be appointed by the High Court of Gujarat. The language of arbitration shall be English. The place of arbitration shall be Ahmedabad.

19. OTHER TERMS AND CONDITIONS:

a. Copyrights:

- All designs, drawings, specifications, data, computer printouts, documents, reports, studies, manuals, programs, analysis and all other items produced by Vendor and/or provided by the Company or its Affiliates, other contractors, consultants and advisors to Vendor, during the performance of the Scope of Work shall become and remain the property of the Company. The Vendor shall deliver the same (properly sorted and indexed) to the Company in accordance with the provisions of this Contract and in any event upon expiry or termination of this Contract, with Company's prior written approval, Vendor may retain and use for Vendor's internal general know-how, copies of the same.
- In case of standard specifications of Vendor (as specified in the documents by the Vendor), the ownership of such documents shall not be transferred to the Company. However, the Company shall have the right to use the same.

b. Rights and Obligations:

- The Company reserves the right for not executing any or all the Schedule of Rates (SOR) items without any extra financial liability on the Company.
- The Company shall have right to take out any part of the scope from the purview of this purchase order/contract and/or to award the part of this purchase order/contract to other vendor. The vendor shall have no claim to any payment or compensation or other issues whatsoever on account of any loss of profit or advantage which it might have derived from the execution of work in full but which it did not derive in consequence of the removal of full or partial scope of work or on termination of the contract by the Company.
- The vendor shall be responsible for losses or damage caused to the property (incl. furniture, fixtures, electronic appliances, etc) or theft, etc arising out of any act of omission or commission on the part of the vendor or its worker deputed



at the Company's site. The vendor shall make the loss good suffered by the Company on this account.

- On issuance of this order, the terms and conditions contained therein shall take precedence over the vendor's quotation, all previous correspondence and Letter of intent.
- Vendor hereby warrants that the use or sale of the materials delivered to the Company under the Purchase Order will not infringe claims of any patent covering such material. Any usage of patented material or material pending patency shall be done only on a prior written approval of the Company, if the terms of purchase involve or require the payment of any license fee or royalty in addition to the purchase price and do not contain patent indemnification in a form satisfactory to the Company.
- The Vendor agrees to be responsible for and to defend at his sole expense all suits and proceedings against the Company based on any such alleged patent infringement and to pay all costs, expenses and damages which the Company may have to pay or incur by reason of any such suit or proceedings.
- Vendor shall indemnify the Company against all third-party claims of infringement of patent, trademark or industrial design rights arising from use of the goods or any part thereof.
- Vendor shall also protect and fully indemnify the Company from any claims from Vendor's workmen/employees or their heirs, dependent(s), representatives, etc. or from any other person/persons or bodies/companies etc. for any acts of commissions or omission while executing the purchase order.
- Vendor shall be responsible for compliance with all requirements under the laws and shall protect and indemnify the Company completely from any claims/penalties arising out of any infringements on its part.
- Drawings, technical specification sheet, data sheet, manuals, etc shall form an integral part of this Purchase Order. P&ID and Bill of Material shall be approved by the Company before the start of work by the Vendor.

c. <u>Inspection and testing:</u>

- The Company or its representative shall have the right to inspect and/or to test the equipment to confirm their conformity to the purchase order specifications.
- The inspections and tests may be conducted on the premises of the vendor or his sub-contractor(s), at the point of delivery and/or at the point when goods reach final destination. When conducted on the premises of the vendor 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 Company.

- Should any inspected or tested goods fail to conform to the specifications (whether before the dispatch of the equipment or after its arrival at the site), the Company shall have the right to reject the defective goods/equipment and the vendor shall either replace the rejected goods or make all alterations necessary to meet Specifications' requirements, free of cost to the Company. Rejected goods shall be removed and replaced within Fourteen (14) days of the date of communication of rejection from Company at vendor's cost in all respect.
- However, even within Thirty (30) days from the date of intimation of rejection, if the material is not removed, Company will be free to dispose-off the material free of cost to any party and expenses, if any, incurred for disposal shall be payable by the vendor.
- In case of breakage / shortage, claim in respect of the same in any cases shall be referred on the vendor within thirty (30) days from the date of receipt at stores by the Company which shall be replaced / made good by the vendor at their own cost. All risk of loss or damage to the material shall be upon the vendor till it is delivered to the Company.
- Company's right to inspect, test and wherever necessary reject the goods after goods arrival at Company's designated site shall in no way be limited or waived by reason of the goods having previously been inspected, tested and passed by the Company or their representative prior to the goods dispatch at vendor's or its sub-contractor(s) facility.
- Vendor shall advise in writing of any delay in the inspection program, describing in detail the reasons for delay and the proposed corrective action.
- Nothing in this clause shall in any way release the vendor from any warrantee or other obligations under this purchase order.
- If, the goods are not of required specification, the Company shall be entitled to reject the goods/material or part thereof and ask free replacement from the Vendor within reasonable time, failing which, the Company shall obtain such requirements from elsewhere at Vendor's cost and risk.
- Submission of Documents for owner's approval/inspection-
 - Vendor shall submit QAP / Technical Documents, if applicable for approval
 of Owner within 7 working days after receipt of this order and production
 can be start only after receipt of approved QAP from Company.
 - Third party inspection charges shall be borne by vendor and vendor is requested to kindly nominate the TPI Agency and take approval of the Company.



- The material shall be inspected (i) At consignee end by Company (ii) At factory premises of the Supplier by Company or Third party duly approved by Company. The vendor shall extend all necessary cooperation to Company/ Third party inspection agency (TPI) in carrying out the inspection.
- In case if the vendor offers the material for inspection and the same fails the testing, then third party re-inspection costs as per Purchase Order terms will be borne by the vendor.

Invoicing instructions:

- Invoice shall be made out to IRM Energy Ltd. (Company) and delivered in Original for payment process along with Excise Invoice (ORIGINAL for BUYER copy), as applicable, with a photocopy of Lorry / Courier Receipt to Purchaser Head Office at Ahmedabad immediately on material dispatch (Excise Invoice 'Duplicate for Transporter' must be sent with the materials only).
- Invoices should contain our Purchase Order Number & date, packing list, challan No., LR No. & name of Transporter, etc. showing complete dispatch particulars. Invoice shall be signed by the authorized signatory and digital signature is not valid for the purpose of Central Excise & Service Tax Rules.
- Supplier shall submit the bill (Invoices) within 30 days from the date of supply
 of goods, failing which Company shall exercise the right of deducting 33%
 of Invoice value on account of "Tax Loss" to Company.

d. Suspension:

- The Company may at any time and from time to time and for any reason, by written notice of [Five (5)] days to Vendor, suspend further performance of the work/Services. Any notice of suspension shall specify the date of suspension and the estimated duration of the suspension. Upon the date specified in any such notice of suspension, Vendor shall promptly care for and protect all aspects of Services in progress and all the property of the Company, which is subject to the supervision of the Vendor in whatever state. The Vendor shall promptly deliver to the Company details of all such services in progress and all such property under protection of the Vendor.
- The Company may at any time terminate the suspension by written notice of [Two (2)] days to Vendor specifying the effective date of termination, and Vendor shall within [Two (2)] working days upon receipt of notice from Company for resumption of work, resume performance of its obligations pursuant to this Purchase Order.
- Costs and Consequences of Suspension by Company:
 - In case the suspension requested by Company is more than 90 days,



Company shall reimburse Vendor for reasonable, proper, verified and unavoidable costs incurred by the Vendor as a direct result of such suspension, unless such suspension is solely attributable to a default or act or omission of the Vendor. The Vendor shall make best endeavor to minimize and avoid costs and expenses during such period for the benefit of the Company. The cost reimbursable shall be subject to written approval and consent of Company. Such cost shall be limited to 0.15% of the unexecuted/remaining/balance Contract Price or balance call out order price.

- The Vendor shall not be entitled to any change in the total Contract Price on account of suspension declared under this clause except escalation if any as provided in this Purchase Order.
- In case the suspension of services continues to remain in force for a consecutive period exceeding 6 months from the date of such suspension, in that event, the Parties may mutually discuss on further action.

e. No Assignment:

- The vendor shall not waive the agreement or transfer it to third party(ies), whether in part or in whole, nor waive any interest that is included in the purchase order without prior written permission of the Company.
- Any attempted assignment or delegation in contravention of the above shall be void and ineffective unless accepted by the Company expressly in writing.
- Company has the right to assign the order to its subsidiary/joint venture (JV) companies for execution of the scope of work without prior consent of vendor. Information will be communicated to vendor within seven (7) days of such assignment. Vendor should raise all future correspondence and invoice to such new assignee. Bank guarantees shall be reissued in the name of new assignee.
- This purchase order shall not be assigned by the vendor to any other party or agency or any other person without prior written permission of the Company.

f. Amendments and variations:

No amendment or variation in this purchase order shall be valid unless agreed to in writing by both the parties.

g. Conflict of Interest:

- Unless otherwise agreed in writing by the Company, the Vendor and his personnel shall have no interest in nor receive remuneration in connection with the Scope of Work except as provided for in this Purchase Order.



- The Vendor shall not engage in any activity or provide any service to any other third party, involved directly or indirectly in the Scope of Work, which might conflict with the interests of the Company under this Purchase Order.

h. Company's Representative:

Company shall nominate its representative(s) who shall be entitled to act on behalf of Company with respect to any decision it is empowered to make.

i. Vendor's Representative:

Vendor shall nominate a qualified and experienced person between Company and Vendor for the performance of the Contract. The nomination shall be done within [Five (5)] days from the award of work. The representative shall be entitled to act on behalf of Vendor with respect to any decisions to be made under the Contract.

j. Governing Laws:

The laws of India will govern the rights and obligations of the Company and the Vendor under this Purchase Order. The place of jurisdiction shall be Ahmedabad, Gujarat.

k. Publication:

Vendor, either alone or jointly with others, cannot publish material relating to the Contract without a prior written approval of the Company.

I. Notices:

All notices shall be in writing and will take effect from the date of receipt at the communication address. Suitable proof of delivery like speed post acknowledgement receipt, registered AD acknowledges receipt, hand delivered acknowledges are acceptable mode of acknowledgement.

In case of speed post and registered AD notices, a copy of notice is required to be sent for acknowledgement of content and acknowledgement on this copy of notice by which will be returned to Vendor & shall be considered as valid acknowledgement of notice.

20. ORDER ACCEPTANCE CRITERA:

On award of the order to the successful bidder, this techno-commercial document shall constitute the complete work order. All terms and conditions, scope of work as described in the order and this document shall be governed as per the same.

21. SOR:

Refer Annexures

Annexure-1 SOR of DCS



Annexure-1

Sr.	Annexure- I				
No.	Description	UOM	Qty	Unit Rate	Amount
A.	Supply, Design, Engineering, manufacturing, fabrication, assembly, testing / inspection of CNG Decompression Skid including packaging, insurance, handling, loading and transportation at IRMEL Stores / sites. The scope also includes Supervision services for installation, testing & commissioning, on-site training to IRMEL's representative and handover of Decompression Skid.				
A.1	CNG Decompression Skid with flow of 100 SCMH (max.): Inlet pressure of 15-250 Kg/cm2 (g) and Outlet pressure of 4 Kg/cm2(g) with/without electrical heating system/ Electrical Water Bath Heating / With Gas Fired Heating System / Catalytic Heater System.	Nos.	1		
A.2	CNG Decompression Skid with flow of 250 SCMH (max.): Inlet pressure of 15-250 Kg/cm2 (g) and Outlet pressure of 4 Kg/cm2 (g) with/without electrical heating system/ Electrical Water Bath Heating / With Gas Fired Heating System / Catalytic Heater System.	Nos.	4		
A.3	CNG Decompression Skid with flow of 450 SCMH (max.): Inlet pressure of 15-250 Kg/cm2 (g) and Outlet pressure of 4 Kg/cm2 (g) with electrical heating system/ Electrical Water Bath Heating / With Gas Fired Heating System / Catalytic Heater System.	Nos.	6		
A.4	CNG Decompression Skid with flow of 1000 SCMH (max.): Inlet pressure of 15-250 Kg/cm2 (g) and Outlet pressure of 4 Kg/cm2 (g) with electrical heating system/ Electrical Water Bath Heating / With Gas Fired Heating System / Catalytic Heater System.	Nos.	1		
В	AMC of Decompression Skid				
B.1	Mandays charges for servicing/repair/ maintenance/overhauling of De-compression skid	Per Man- day	36		
С	ARC of Spare Kits of Decompression Skid				
C.1	Annual rate contract of Spare kits (100 SCMH) – Vendor to specify and quote recommended minimum quantity of spares for filter cartridge, studs, gaskets, Heating system, PRV, SSV and CRV	Nos.			
C.2	Annual rate contract of Spare kits (250 SCMH) – Vendor to specify and quote recommended minimum quantity of spares for filter cartridge, studs, gaskets, Heating system, PRV, SSV and CRV	Nos.			



C.3	Annual rate contract of Spare kits (450 SCMH) – Vendor to specify and quote recommended minimum quantity of spares for filter cartridge, studs, gaskets, Heating system, PRV, SSV and CRV	Nos.		
C.4	Annual rate contract of Spare kits (1000 SCMH) – Vendor to specify and quote recommended minimum quantity of spares for filter cartridge, studs, gaskets, Heating system, PRV, SSV and CRV	Nos.		

Note:

- a) Vendor to provide complete list of spares included in the spare kit along with material code.
- b) The Company reserves the right to place a repeat order for the same item(s) at the same quoted rates, terms, and conditions. The quoted rates shall remain valid for a period of twelve (12) months from the date of issuance of the original Purchase Order.
- c) The AMC and ARC rates shall be valid for a period of 3 years (36 Months), after which an annual escalation of 5% will apply for the remaining operational life of the DCU.



TENDER SPECIFICATION FOR SUPPLY OF CNG DECOMPRESSION SKID (DCS)

Doc. No: - IRMEL/TS/DCS/18

(Volume II of II)

Technical

IRM ENERGY LTD

A Group Company of Cadila Pharmaceuticals Ltd

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1. TECHNICAL SPECIFICATION FOR CNG DECOMPRESSION SKID

1.1 GENERAL

IRM Energy Limited would like to invite tender for supply of CNG Decompression Skid (DCS) on Annual rate contract basis for City Gas Distribution Project in Geographical areas: Banaskantha GA, Fatehgarh Shaib GA, Diu & Gir-Somnath GA and Namakkal & Tiruchirappalli GA. Quantities of DCS in individual GA will be provided in respective Callout Notices issued separately during ARC contract.

The intent of this specification is to establish minimum requirements for manufacturing and supply of DCS required for regulating natural gas for City Gas Distribution project.

The supplier shall comply with local statutory regulations of Legal metrology of 2009 and Legal Metrology (Enforcement) rules, 2011 of the respective States (where these DCS may be installed – Gujarat, Punjab, Union Territory of Diu, and Tamil Nadu).

Third-Party Inspection from the PNGRB empaneled TPIAs (T4S of CGD) shall be compulsory. As the work is executed on Annual Rate Contract Basis, inspection has to be done for each callout notices issued under ARC and during the contract validity period.

Materials will be accepted based on reviewing of test reports, material compliance and other documents as per approved QAP by IRMEL. The testing documents & materials compliance certificate as per approved QAP has to be submitted for review to client /TPIA for issuing of Inspection waiver or release certificate.

During the inspection, all the test instruments / measuring instruments must have valid calibration certificate issued by NABL accredited lab / traceable recognized calibration & testing agency.

QUALITY ASSURANCE AND QUALITY CONTROL

The Supplier will provide details of their quality assurance procedures during the assembly of the units, hydro testing and for final inspection as per the respective Inspection Plan.

Client reserves the right to visit the Supplier's facilities without prior notice, and inspect test records and witness assembly, hydro testing and testing in progress.

WARRANTY / GUARANTEE PERIOD

The devices shall be guaranteed against malfunction and degradation through corrosion or faulty workmanship as per respective clause of the contract. Client also reserves the right to charge the supplier all costs incurred by (Client) for rectifying or replacing defective units within the guarantee period.

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INSTRUCTION TO BIDDER

- a) The Supplier is required to submit to (Client) the details of the items to be supplied, including the manufacturing standards, model number, performance curve & accuracy specifications, GAD, P&ID & BOM along with bid for our technical evaluation of bid. All the technical documents / catalogs, etc., to be submitted along with technical bid shall be in English Language only.
- b) This is a "No deviation" tender; however, for any specify deviation or variations in offer from specified standard & acceptance as per contract shall be at the sole discretion of client. Any deviations from the specification should be highlighted and vendor may also quote advanced / latest models to reduce overall cost as an alternate.
- c) The data sheet should be filled up completely and should be enclosed with the Technical Bid.
- d) Compliance with Technical Specifications will be taken for granted if deviations are not specifically mentioned.

DEVIATION SCHEDULE

A typical format of Deviation Schedule is attached. Bidder shall categorically specify the deviation they have on the entire material requisition in above format and sign & stamp each sheet and submit it along with the bid. In case the Bidder has no deviation, even then they should write "No Deviation" on this deviation schedule and submit it along with the bid. This is an essential requirement; the bid should accompany Deviation Schedule.

DEVIATIONS TO THE SPECIFICATION

Sr No	Clause no.	Tender Specification	Deviation Taken	Reason for deviations/Remarks

Certified that only the above-mentioned deviations have been taken against this tender

Name of the Bidder

Signature & Seal of the Company

ENCLOSURE

Following Documents (in English language only) to be submitted with technical bid:

- a) Approval certificates against specified standard duly verified by TPI.
- b) Details of manufacturers' quality plan, QA / QC procedure and ISO



Certification.

- c) Process data, P&ID, GAD, Filter drawing & data sheet, BOM, FAT, Painting specifications, Piping specifications, Data sheet of PRV, CRV & PSV, Data sheet of Pressure gauge, Differential Pressure gauge & Temperature gauge, O&M Manual, Heater specifications, etc.
- d) Sample QAP for the inspection (only for the information purpose; final QAP will be approved during detailed engineering for successful bidder / supplier.

1.2 SCOPE OF WORK

IRM Energy Limited (IRMEL) is intended to supply PNG to customers, where there is no regular supply through pipelines. For this IRMEL is planning to install a CNG Decompression unit, which will reduce the pressure from 250 bar (g) (CNG Cascades) to 3-5 Bar (MDPE Pipeline network). The scope of work is limited to the CNG Decompression skid, which is consisting of Twin stream Regulators, Slam shut valves, Isolation Valves, Piping/Tubing, etc. The detailed scope of work is as follows:

The scope includes supply, design, detail engineering, manufacturing, fabrication, assembly, calibration of instruments, testing / inspection of CNG Decompression Skid including packaging, insurance, handling, loading and transportation at IRMEL Stores / sites. The scope also includes trial run, supervision services for installation, testing & commissioning, on-site training to IRMEL's representative and handover of Decompression Skid.

The size of the skid shall be designed in such a way that the skid requires minimum area. The details of the scope are as follows:

- Gas receiving from 250 Bar(g) to 15 Bar(g)
- Pressure Reduction unit to reduce the pressure from 250 Bar(g) to 15 Bar(g) to an outlet pressure of 3-5 Bar(g) with the help of Pressure Regulators along with Slam Shuts.
- Electrical heating system Electrical /Water Bath/Catalytic Heater (Heat Tracing Option)/ Electrical Water Bath heating/ With Gas Fired Heating System Inter connecting Piping of Regulators and equipment. The vendor is to design the skid with or without electrical heating system as per the specified process parameters. Vendor shall provide the Power/Gas requirement calculations for Gas Heating system.
- Instrumentation and controls.
- Electrical items including local panel.

The components and equipment being installed shall be of a reputed make and the equipment shall conform in all respects to high standards of engineering, design, workmanship and shall meet all requirements as per the relevant standards. All the components and equipment should also meet the Technical Standards/Specifications notified by Petroleum Natural Gas Regulatory Board



(PNGRB).

The Bidder shall submit all Design calculations to the client for information/approval. Inspection, testing and performance testing as per specifications. The performance test to be conducted at vendor's works as well as at site in the presence of IRMEL or his representative.

The bidder has to submit all the technical details of all the components. Bidder has to submit the operation & maintenance manuals of the skid.

1.3 DEFINITIONS

Subject to the requirements of the context, the terms (hereafter listed in alphabetical Order) used in this specification are given the following meaning:

AGREEMENT: Designates the agreement concluded between

the CLIENT and the SUPPLIER, under which the latter undertakes to the former the GOODS and/or SERVICES according to the stipulations which are

agreed and specified in the form of an order.

CLIENT / OWNER: Designates the purchaser of the GOODS and/or

SERVICES, which are the subject of the AGREEMENT.

IRMEL: Stands for IRM Energy Limited.

CONTRACTOR/SUPPLIER: Designates the individual or legal entity with whom

the order has been concluded by the CLIENT. The term "CONTRACTOR/SUPPLIER" may be used

indifferently for a supplier, a manufacturer, an

erection CONTRACTOR / SUPPLIER, etc.

DAYS - WEEKS - MONTHS: Specify the number of calendar days, weeks or

months and not of working days, weeks or months.

CLIENT'S REPRESENTATIVE: Designates the individual or legal entity to which

the CLIENT has entrusted various tasks in relation

with the carrying out of his PROJECT

GOODS and/or SERVICES: Designate, depending on the case, all or part of

the drawings or documents, substances, materials, materiel, equipment, structures, plant, tools, machinery, to be studied, designed, manufactured, supplied the by CONTRACTOR/SUPPLIER under the AGREEMENT, including all the studies, tasks, works and services specified by the order. The Terms GOODS or SERVICES may by indifferently used one for the

other as required by the context.

PROJECT: Designates the aggregate of GOODS and/or

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SERVICES to be provided by one or more

CONTRACTOR/SUPPLIERS.

CUSTOMER: Party or Individual that engages owner for PNG

supply service.

1.4 CODES & STANDARDS

S 2534

S 670

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.3 – Orifice Metering of Natural Gas. Report No.7 - Measurement of Gas by Turbine Meter / RPD Meters. 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. ANSI/FCI American National Standards Institute/Fluid Controls Institute API American Petroleum Institute RP 521 Guide for pressure relieving and depressurizing systems P 526 flanged steel safety relief valves. Seat tightness of pressure relief valves. RP 527 **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.

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Meter / RPD Meter systems.

Measurement of liquid hydrocarbons by Turbine

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.		
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 Convertor.		
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 60584-2	Thermocouples - Tolerances		
IEC 60584-3	Thermocouples extension and compensating cables, tolerances and Identification system.		
IEC 60751	Industrial platinum resistance thermometer sensors		
IS-5	Colors 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.		

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IS-1554-	PVC insulated (heavy duty) electric cables-working Part I voltage up to 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.
IS-7358	Specifications for Thermocouples
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 crosssection conduits.
NEC	National Electric Code.
NFPA	National Fire Protection Association.
NFPA-496	Purged and pressurised enclosures for electrical equipment.
EN	European Standard
EN334	European standard for pressure regulators upto 100 bar
EN12186	Gas Pressure Regulating Stations for Transmission and distribution
EN14382	Safety systems for Gas distribution



1.5 GAS SPECIFICATION

Following Gas composition has been considered for design and engineering of DCS:

General Natural Gas Composition			
Component	Design		
Methane (mol%)	85-90		
Ethane (mol%)	2-6		
Propane (mol%)	0-0.9		
i-Butane (mol%)	0-0.1		
n-Butane (mol%)	0.0.1		
i-Pentane (mol%)	0.01		
n-Pentane (mol%)	0-0.02		
Nitrogen (mol%)	0.1-0.3		
GCV (Kcal/Sm3)	9500-10500		

1.6 DESIGN PARAMETERS OF DECOMPRESSION SKID

1.6.1 Process Data

Fluid	Compressed Natural Gas	
Flow	100/250/450/1000 SCMH	
Inlet Temperature	Nominal 30 °C to Maximum 50 °C	
Outlet Temperature	15 ℃	
Inlet Pressure	15 Bar(g) to 250 Bar(g)	
Outlet Pressure	3 to 5 Bar (g)	
Design Pressure	275 Bar (g)	
Design Temperature	(-10 to 65 °C)	
Inlet Size	Vendor to Specify	



Outlet Size	Vendor to Specify
-------------	-------------------

1.6.2 Design Velocity

- Filter Upstream Designing of pipeline size before filter, velocity to be considered 15-20 m/s.
- Filter Downstream & Before Regulators Velocity to be consider 30 m/s
- After Regulator Velocity to be consider 30 m/s

1.6.3 Site Conditions

The entire instrumentation system shall be designed for the following site conditions:

Max. /Min. temperature : 50 / -5 ° C

Design Temperature : -10 °C to 65 ° C

Relative Humidity : 100%

Hazardous Area classification : Zone 1, Gas group IIA / IIB, Temp.

Class T3

1.7 INSPECTION

The final inspection of the equipment/FAT shall be carried either by client or by Third party agencies appointed by the clients as per approved QAP.

1.8 SALIENT POINTS:

- Outlet Temperature of the skid shall be 15 °C.
- ESD is required at the inlet of heating system.
- Heater shall be started if temperature drops below 15 °C & shall be closed if it exceeds beyond 35 °C. Heater shall be designed accordingly.
- Upstream velocity of gas shall be 20 m/s of the Regulating System and that downstream is 30 m/s.
- Inlet Size ANSI B 16.5 Class 2500#

Outlet size - ANSI B 16.5 Class 150#/300#

- Over Pressure / Under Pressure Slam shuts are required to meet regulations.
- Meter is in the scope of Vendor (RPD with bypass arrangement).
- Power supply (230V, 1 phase/3 phase, 50 Hz) up to Junction Box (JB)
- All electrical equipment shall be PESO approved.
- Bidder to submit P&ID & GAD at the time of bid submission.
- All customer interface connections, gas Inlet & outlet piping connections shall be brought out to approximately 3.0 m from the skid edge and terminated with flange connection. Hookup with the customer interface connections, gas inlet



and outlet piping connections with companion flange and isolation valves are included in bidder's scope.

• Water is not available as utility and the package shall be provided with selfsufficient heating system, as applicable, with suitable make up tank. However, water for make-up purpose can be made available.

1.9 VENDOR'S SCOPE OF WORK AND SUPPLY

- ➤ The VENDOR scope of work and supply covers design, engineering, fabrication, FAT (Factory Acceptance Test), supply including loading and unloading at site, commissioning, supply of documentation of Pressure Regulating Skids comprising of complete assembly, NDT report, and other accessories as specified in this document for natural gas supply to domestic, commercial & industrial consumers.
- > All type of valves is in the scope of vendor.
- ➤ Vendor shall provide differential pressure gauge (DPG), meter accessories like flow conditioner, conical strainer, flow restrictor, etc.
- VENDOR also shall impart training to IRMEL representatives.
- VENDOR shall take single point responsibility for the design, engineering, and supply to the designated delivery point and performance testing of DCS as per the data sheet and specification furnished and taking into consideration successful operation, safety as per the established international standards.
- VENDOR shall submit following documents before fabrication for approval of IRMEL:
 - P&ID
 - GAD
 - Isometric Drawing
 - Acceptance/Deviation of Technical Datasheet
 - Sizing Calculation
 - Operation & Maintenance Philosophy Document
 - Quality Assurance Plan (QAP)
 - Datasheet of all equipment's
 - > VENDOR shall be responsible for replacement/repairing of skids if any equipment of skid is found damaged during unloading at site or store.
 - ➤ VENDOR shall provide all TC's and certificates for pipe, pipe fittings, equipment in line with technical datasheet.
 - > VENDOR shall provide companion flanges with skid inlet and outlet valve.



- ➤ VENDOR shall design a skid in such a way that all equipment of the assembly shall be easily accessible and O&M.
- > VENDOR shall provide additional items that are used at the time of commissioning if required and same will be considered as a part of order and no additional cost will be paid by IRMEL.
- ➤ VENDOR shall provide noise suppression treatment to limit the noise level, in case noise level is ≥ 85 dbA.
- Any soft material used shall be able to retain its functional properties for minimum period of 3 years.
- > VENDOR shall submit below copies unless noted otherwise of each of the following:
 - Inspection & test reports for all mandatory tests duly certified by IRMEL authorized TPI/representative after review/witness as per the applicable code as well as test reports for any supplementary tests, in nicely bound volumes.
 - Material test certificates (physical property, chemical composition, make, heat treatment report, etc.) as applicable for items in nicely bound volumes.
 - Statutory test certificates, as applicable.
 - 2 No's of dossier documents to IRMEL and 1 No along with DRS at site. Soft copy shall be forwarded to IRMEL with all details.
- > VENDOR shall provide all testing report as mentioned in Quality Assurance Plan (QAP) for review during FAT. Also, all tests to be certified out during FAT shall be witnessed by TPI/IRMEL representative.
- VENDOR shall provide WPS & PQR before commencement of fabrication job for approval.
- ➤ VENDOR shall responsible for the submitting of all drawing and technical documents including QAP to IRMEL for approval within 1 week after placement of order.
- > VENDOR shall submit activity wise completion schedule (Bar Chart), within two weeks of placement of order.
- > VENDOR shall provide Purchase orders of bought out items along with all TCs.
- Vendor shall provide proper support for all vent lines.
- > VENDOR shall adopt standard operating policy for fabrication of skids.
- > All piping, pipe fittings & fasteners to be used are hot dip galvanized.
- Vendor shall provide Copper jumper plate at all flange joints of the skid.
- > Vendor shall provide 02 No's earthing provision at Base frame of the skid.



- ➤ VENDOR shall provide proper packing of all equipment, piping, appurtenances and styrene packing to safeguard all components of the skid during transportation.
- > VENDOR shall quote rates for supply of skids in line with given SOR.
 - Without Canopy
- Vendor to quote AMC rates on man-day basis as per the relevant SOR. Vendor shall provide the recommended maintenance frequency along with the list of activities performed during maintenance.
- Vendor to quote spares rates for necessary equipment as per the relevant SOR.
- > Spare Kit for DCS to be provided by vendor. Recommended spare kits with description shall be provided by bidder.
- > Supply of all other accessories not specifically mentioned herein but nevertheless necessary for completion of job.

1.10 PREVENTIVE MAINTENANCE DURING WARRANTY PERIOD

- 1.11.1 VENDOR shall carry out free preventive maintenance activities during the warranty period and also for 3 years after warranty period as per the rates quoted in SOR (attached as Annexure-1 in Volume-I).
- 1.11.2 VENDOR shall carry out free activities (including travelling, boarding & lodging) for preventive maintenance as per the standard procedure of IRMEL for planned maintenance of DCS.
- 1.11.3 WARRANTY periods are defined as 12 Months from the date of commissioning of DCS (or) 18 months from the date of delivery of DCS.

Note:

- No additional charge will be paid during warranty period for free preventive maintenance services.
- Non-compliance to the periodicity mentioned against scheduled maintenance during warranty period as well as 3 years of non-comprehensive AMC will be liable for penalty as per applicable penalty terms of PO.
- ➤ IRMEL EIC/Representative shall give planning through written communication (e-mail) for preventive maintenance of DCS under warranty period well in advance. Preventive maintenance to be carried out within 15 days from the due date of preventive maintenance. In case there is delay in executing the maintenance, penalty of 10,000 INR will be levied by IRMEL. Any further delay of 7 days beyond 15 days is liable for additional penalty of 500 INR/day.



Vendor shall provide the procedure for planned maintenance of DCS to site EIC for approval.

1.11 VENDOR SCOPE FOR AMC OF DCS

Warranty Period:

- 18 Months from the date of delivery or 12 months from the date of commissioning, whichever is earlier.
- Vendor shall provide service along with the required spares without any charges.
- IRMEL shall provide the schedule for the AMC to vendor.

Out of warranty period (non-comprehensive):

- Vendor shall ensure to provide the AMC of DCS for 3 Years (36 months) after the warranty period.
- IRMEL shall provide the schedule for the AMC to vendor.
- Vendor shall ensure that the AMC is carried out within schedule provided by IRMEL representative.
- OWNER shall pay spare charges if replaced during the AMC as per the WO placed. Vendor shall provide the list of all spares related to DCS.

Note: Any additional visit subsequent to the non-comprehensive AMC required due to the malfunctioning of DCS has to be at the cost of VENDOR.

1.12 VENDOR SHALL ENSURE THE BELOW PRECAUTIONARY MEASURES WHILE EXECUTING THE AMC OF DCS

- Ensure at least one DCP type fire-extinguisher is placed near the DCS with valid date while carrying out the AMC.
- Ensure that the area surrounding DCS is barricaded.
- Ensure only authorized & permitted person are allowed in the barricaded area.
- Ensure that personnel are wearing required PPE's during AMC of DCS.
- Ensure proper Tools & Tackles are available at site locations.
- Ensure that Risk Assessment is done before the AMC of DCS to avoid any damage.
- Ensure trained personnel authorized by O&M are doing the AMC of DCS.
- Ensure necessary emergency arrangements before work is executed if the same is to be concluded as confined space is undertaken.



1.13 PAINTING SPECIFICATION

1. General

Carbon Steel - Valves, Interconnecting Piping, Supports, Pressure Vessels:

The general specifications to be adhered to by manufacturers for painting of mechanical equipment and associated piping shall meet the below mentioned minimum requirements.

A. SURFACE CLEANING:

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 short blasting as applicable. Minimum acceptable standard in case of powder tool cleaning shall be \$1.3 (Surface preparation Grade) and in case of blast cleaning shall be \$a 2½ as per Swedish Standard \$IS 0055900.

B. PAINTING PROCEDURE:

For general environment:

Energy PAINTING			١T	ING SPECIFICATION	
SUR	RFACE CLEANING				
1	Sand Blasting as Pe	r	:	SA 2½	
2	Sand Blasting Standard		:	ISO 8501-1; IS-1477-1971; SIS 0055900	
3	Finish		:	Near White Metal / Light Grey	
4	Procedure		Very thorough blast cleaning. Mill scale, rust and foreign matter shall be removed to the extent that the only traces are remaining as slight attains in the form of spots or strips. Finally, the surface is cleaned by vacuum cleaner or clean by compressed air or a clean brush.		
PAI	NT TYPE As Per IS 356	& IS 6	69	2	
5	Туре			Primer-Two Pack Epoxy Zinc phosphate primer, MIO- Two Pack Epoxy system, finish-Two packs Aliphatic PU	
6	Make		:	Asian Paints, Grand Polycoats, Jutun & Berger	
СО	COLOR CODE				
7	Piping		:	Golden Yellow, Color Code - (IS 356)	
8	Supporting Structur	е	:	Smoke Grey, Color Code - (IS 692)	
9	Cartridge Filter			Smoke Grey , Color Code - IS 692	
10	Regulators			Oxford Blue, Color Code – IS 105	
11	SSV, PCV		:	Oxford Blue, Color Code – IS 105	
12	CRV, PSV		:	Fire Red, Color Code – IS 536	
13	All valve		:	Oxford Blue, Color Code – IS 105	
14	Canopy		:	Smoke Grey , Color Code - IS 692	

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C. COAT THICKNESS:

I. Primer: Zinc Phosphate - 65-75 microns (min) thick.

II. Intermediate Coat: Polyamide Epoxy- 125-150 microns (min) thick.

III. Finish Coat: Acrylic Polyurethane - 50-75 microns (min) thick.

IV. Total DFT: 240-300 microns (min) approx.

1.14 FACTORY ACCEPTANCE TEST PROCEDURE

INTRODUCTION:

This document defines procedure for Factory acceptance Test (FAT) to be carried out for Filtration & Pressure Reduction skid (DCS). The purpose of carrying out FAT is to check functionality of entire DCS with respect to agreed technical documents.

SCOPE:

The FAT will confirm the compliance of DCS with the project specifications. All the equipment / instruments/ items shall be installed (as far as possible) for functionality demonstration during FAT. In case some of the items cannot 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.

REFERENCE DOCUMENTS:

- 1. P&ID
- 2. GAD
- 3. Quality Assurance Plan

ORIENTATION WITNESSES:

All Representatives shall be briefed on operating principles of the DCS package before commencing the FAT.

TEST CERTIFICATES:

Upon completion of the tests mentioned in this document, Test Certificate should be filled with the results and signed/stamped by representatives of all the parties (Vendor and TPI/Client).

A. VISUAL INSPECTION OF SKID

SKID REVIEW:

The skid will be inspected for installation of all the components as per approved P&ID and G.A. Drawing and other related documents. Dimensional checking shall be done as per approved G.A. drawing. The Skid will be inspected for proper support with rubber pads/ clamps for the major equipment/ Instruments and pipes, Blinds (for Drains/ Vent / End Flange), Jumpers Platforms, crossovers. Etc.,

Stud & nuts with minimum 2 to 3 threads shall fall beyond the nut on both sides,



Copper jumper plate on each flange joint.

B. 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.

C. FACTORY ACCEPTANCE TEST

PNEUMATIC LEAK TEST:

Pneumatic leak test is carried out on completely erected skid using compressed air.

PRESSURE REGULATION SYSTEM:

This Section describes the procedure for checking the working of Pressure Regulators.

- 1. Close outlet ball valves of pressure regulation system.
- 2. Open inlet ball valve of main pressure regulation system.
- 3. Pressurizing will make upstream pressure of SSV and PCV to an inlet pressure which is higher than the PRV set pressure so that simulation can be done.
- 4. Check the set point of each regulator. If required reset the set points and lock it. Note the set points in FAT report.
- 5. SSV Limit switches feedback signal shall be checked for continuity by multimeter.
- 6. DCS Stream change over shall be demonstrated.
- 7. Functional test is to be performed in order to provide evidence that equipment is in working order. Functional tests are to be performed to ensure the continuity of supply of gas and/or to prevent system over pressurization.
- 8. Sequence of pressure setting for regulating devices of stream in DCS during functional test is given below:
- 9. Pressure setting is started from;

1st - SSV

2nd - CRV

3rd - 1st Stage PRV

4th - 2nd Stage PRV

10. Following steps are to be performed at factory location to carry out the functional test of DCS.

Functional Test of DCS: -

1. Functional test of each stream should be carried out by safe venting of gas from venting line of each stream.



- 2. For functional test of current standby line, isolate the downstream by closing the outlet valve. Ensure current working line is functioning during testing.
- 3. For functional test of current working line, isolate the downstream by closing the outlet valve. Ensure the standby line which was converted as working stream is opened and functioning during testing.
- 4. Fully open (No pressure in downstream) the both PRVs (Active & Monitor) & full tight the nut of CRV to make bypass for setting of SSV.
- 5. Functional test of SSV, CRV and PRVs in line order to be done as per steps given below.

Functional test of SSV: -

- 1. Make the PRV-A full tight (Max. downstream pressure) allow to pressure increased by PRV-M for functional checking of SSV at set pressure.
- 2. Slowly increase the line pressure by adjusting pilot valve of Monitor PRV till line pressure reaches at the predefined set pressure of SSV.
- 3. Adjust SSV pilot valve for tripping on set point.
- 4. If SSV is tripped at set point then lock the nut of SSV pilot.
- 5. Reset SSV that was tripped for further operation.

Functional test of CRV: -

- 1. After setting of SSV, slowly reduce the line pressure through pilot valve of Monitor PRV till line pressure reaches the set point of CRV. Adjust the CRV till gas starts slowly passing from venting line at the set point.
- 2. Lock the CRV nut at set point of pressure.

Functional test of 1st Stage PRV.

Should be functioning on predefined pressure set point.

Functional test of 2nd Stage PRV.

Should be functioning on predefined pressure set point.

PAINTING:

Painting shall be checked as per Painting procedure.

DOCUMENTS REVIEW:

After completion of all tests, Documents like material test certificates, Radiography test, Hydro - test certificate for pipe spools, calibration/ test reports etc. for Ball valves, PSV/CRV, SSV and PCV etc. shall be reviewed as per approved QAP for the equipment / instruments. Calibration reports for PG, TG and DPG shall be reviewed.



1.15 LIST OF VENDORS FOR BOUGHT-OUT ITEMS

I. PRESSURE REGULATOR AND SLAM SHUT VALVE

- M/s Pietro Fiorentini S.P.A. (Italy)
- M/s Emerson Process Management (Fisher / Tartarini)
- AutoMeter's Energitec Limited,

formerly: RMG Autometers Gas Technologies Ltd.

• M/s Nirmal Industrial Controls (India)

II. CONTROL AND SIGNAL CABLES

- M/s ASSOCIATED CABLES
- M/s ASSOCIATED FLEXIBLES
- M/s DELTON Cables Ltd, India
- M/s Finolex Cable
- M/s Polycab Wire Pvt. Ltd.
- M/s KEI Industries Ltd INDIA
- M/s Suyog Electricals Ltd, India
- M/s Thermo Cables Ltd
- M/s Cable Corporation of India Ltd.

III. CARTRIDGE FILTER

- M/s Nirmal Industrial Controls (India)
- M/s Filtration Technique India Pvt Ltd
- M/s Filter Concept private limited
- M/s Controlplus Oil & Gas solution PVT LTd
- M/s Autometer Energy Tech Limited
- M/s Emerson Electric Co

IV. BALL VALVES

- M/s Microfinish Valves
- M/s Larsen & Toubro Ltd. (Audco India Limited, Chennai)
- M/s Flowchem Industries
- M/s Petro Valves
- M/s JC Valves Pvt. Ltd.



V. PLUG VALVES

- Breda Energia Sesto Industria Spa, Italy
- Fisher Xomox Sanmar India Ltd., New Delhi
- Larsen & Toubro Ltd. (Audco India Limited, Chennai)
- Nordstrom Flowserve Valves Inc., USA
- Serck Audco Valves, UK

VI. GLOBE VALVE

- M/s BDK Valve Private Limited
- M/s L & T, New Delhi
- M/s Petro Valves Pvt. Ltd.
- M/s Niton valve (Mumbai)
- M/s NECO Valves
- M/s Ornate valves(Mumbai)
- M/s Panchvati valves(Mumbai)

VII. CHECK VALVES

- M/s Petro Valves Pvt. Ltd.
- M/s Flow Chem Industries
- M/s BDK Engineering India Ltd. Hubli, Karnataka
- M/s Neco Schubert & Salzer Ltd. New Delhi
- M/s BHEL, OFE & OE Group New Delhi
- M/s Precision Engg. Co., Mumbai
- M/s Leader Valves Ltd., Jalandhar
- M/s Niton Valves Industries (P) Ltd., Mumbai
- M/s L & T Audco Valves. (Audco India Limited, Chennai)

VIII. PRESSURE GAUGES, D. P. GAUGES & TEMPERATURES GAUGES

- M/s Ashcroft India Pvt Ltd, India
- M/s Baumer Technologies India Pvt Ltd, India
- M/s Wika Instruments India Pvt Ltd, India
- M/s Precision Mass Products Private Limited, India
- M/s H Guru Industries, India
- M/s Manometer (India) Pvt Ltd, India



IX. RTD

- M/s General Instruments Ltd., Mumbai
- M/s Toshniwal Industries
- M/s Tempsens
- M/s Pyro Electric

X. TEMPERATURE SWITCH

- M/s Wika
- M/s General Instruments Ltd.
- Switzer
- Ashcroft

XI. LEVEL GAUGE

- M/s Pune Techtrol
- M/s General Instruments Ltd.
- M/s Waree
- M/s Chemtrol
- M/s Gauge Bourdon

XII. LEVEL SWITCH

- M/s Dag Process Instruments India
- M/s Pune Techtrol
- M/s Baumer
- M/s E&H
- M/s Wika
- M/s MSW Controls UK

XIII. THERMOSTAT

- M/s Wika
- M/s Honeywell
- M/s Verma Trafag
- M/s General Instruments

XIV. SS VALVES, SS TUBE & SS TUBE FITTINGS

- M/s Parker (USA)/ M/s Swagelok (USA)/ M/s Hoke/ M/s SSP -SS fittings
- M/s Sandvik, Sweden, M/s Tubacex –SS tubes
- M/s Parker, M/s Swagelok –SS valves



XV. JUNCTION BOXES AND CABLES GLANDS

- M/s EX-PROTECTA
- M/s FLAMEPROOF CONTROL GEARS
- M/s BALIGA
- M/s FLEXPRO ELECTRICAL

XVI. RPD METER

- M/s ELSTER-INSTROMET INDIA PVT. LTD (HONEYWELL)
- M/s DRESSER UTILITIES SOLUTION
- M/s ROMET
- M/s PIETRO FIORENTINI INDIA PVT. LTD.

XVII. CRV

- M/s PIETRO FIORENTINI INDIA PVT. LTD.
- M/s ITRON INDIA PVT LTD
- M/s EMERSON ELECTRIC CO
- M/s TARTARINI TECHNOLOGIES
- M/s NIRMAL INDUSTRIAL CONTROLS PVT LTD
- M/s MEKASTER ENGINEERING LTD
- M/s ELSTER-INSTROMET INDIA PVT. LTD

XVIII. CARBON STEEL PIPE- Seamless (ASTM A106 Gr. B & A333 Gr.6)

- M/s HEAVY METAL & TUBES LTD., MEHSANA
- M/s ISMT LIMITED
- M/s JINDAL SAW LTD.
- M/s MAHALAXMI METAL CORPORATION
- M/s SAINEST TUBES PVT. LTD.
- M/s RATNADEEP METAL & TUBES LTD.
- M/s JCO GAS PIPE LTD, CHHINDWARA
- SHRI BAJRANG POWER AND ISPAT LIMITED, RAIPUR (up to 12.75" OD X 12.7 mm Thickness)

Notes:

- 1) For items listed above, the successful bidders shall supply from the approved makes only.
- 2) For any other item(s) for which the vendor list is not provided, bidders can supply those item(s) from reputed vendors/ suppliers who have earlier supplied same



item(s) for the intended services in earlier projects and the item(s) offered is in their regular manufacturing/ supply range is acceptable.

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2. TECHNICAL SPECIFICATION OF SS TUBES

2.1 SCOPE OF WORK

The scope of the tenderer will include manufacture/ supply, inspection / Testing / marking/ packaging/ handling and dispatch of SS Tubes, as indicated in the Bill of Quantities meeting all the requirements as per ASTM A269.

All codes and standards for manufacture, testing, inspection etc. shall be of latest edition.

Purchaser reserves the right to delete or order additional quantities during execution of order, based on unit rates and other terms & conditions in the original order.

2.2 CODES & STANDARDS

Items Applicable Codes and Standards

Tubes ASTM A269, ANSI B31.3

2.3 PRECEDENCE

In case of any conflict between this job specification and other document, the following order of precedence shall apply: -

Job Specification

International Standards/ Codes Applicable

2.4 DEVIATION

Deviations if any required by Bidder shall be separately furnished against each clause giving reasoning for each deviation. Bidder to note that except the deviations furnished by them, Tenderer's offer shall be deemed to be in total conformity with the enquiry specifications.

2.5 SAFETY

All tubes shall be designed as per applicable code & standards.

All part/ component shall meet the requirement for the specified area's classification.

Area classification shall be Class-I, Division-I; Group-D as per NEC or Zone-I Group IIA/ IIB as per IS/ IEC Specification or equivalent specifications.

2.6 SPECIFICATION

All the items shall be suitable for compressed natural gas service and meet following specifications.

- i. Tube material shall be stainless steel as per ASTM A269 (Grade TP 316).
- ii. Tubing material shall have minimum molybdenum content 2.5%, carbon content of max. 0.030%.



- iii. Tube shall be bright annealed.
- iv. Tube shall be seamless.
- v. Tube hardness shall be less than Rb 80. Tubes shall be NACE MR 0175 certified for hardness. Hardness test shall be carried out on each tube.
- vi. Each tube shall be hydrotested as per requirement of ASTM A 450 clause 22.3, at a hydrotest pressure of 350 kg/cm2(g). However, it shall be ensured that the test pressure does not result in stresses exceeding the yield strength at test pressure.
- vii. All S.S. tubes shall be online 100% eddy current Tested as per ASTM A450.
- viii. Tolerance on outer diameter shall be ± 0.005".
- ix. Tube shall be of 5 to 6 meter in length.
- x. Minimum thickness shall be as per following table.

Tube OD	Minimum Wall Thickness	Maximum Allowable Working Pressure psig
1"	0.120"	4700
3/4"	0.095"	4700
1/2''	0.083"	4700
3/8"	0.065"	4800
1/4"	0.035"	4800

- xi. Following documents/ certificates to be submitted.
 - Chemical composition for heat
 - Chemical composition for products
 - Tensile test
 - Hardness test

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- Flaring test
- Leak test
- Visual inspection and dimensional check
- xii. Tubing should be clearly marked with the specifications given in the inspection Certificate with heat code, lot code, outer diameter and wall thickness with inspection certificate number.
- xiii. Tubes should be supplied with both ends plugged.



2.7 DOCUMENTATION

- i. All document shall be furnished in English language only.
- ii. At the time of bidding, bidder shall submit following documents.
 - a) Reference list of previous supply for similar item, giving following details.
 - Name of the customer.
 - Specification of the item i.e., size and pressure & temperature rating.
 - Service
 - Quantity
 - Year of supply
 - Copy of ISO:9000 certification for supplier/ manufacturer.
 - Manufacturer Quality Control Plan.
 - b) Clause wise deviations to the specification.
 - c) Following test certificates shall be furnished along with shipment.
 - Test certificate of visual, chemical, mechanical testing (incl. tensile, hardness, flaring and leak test).
 - Manufacturers standard shop inspection & test report for all items.
 - The test report for specified tests.
 - d) Third party inspection report as applicable to meet the requirements of specified codes & standards as applicable.

2.8 PACKING & SHIPMENT

- i. All the items shall be suitably wrapped and packaged to with stand rough handling during ocean shipment and inland journey. Tubes should be supplied with both ends plugged.
- ii. The item shall be properly tagged and package separately to facilitate easy identification.
- iii. Items shall be wrapped and packaged in such-a-way that they can be preserved in original as new condition.

2.9 GUARANTEE

- i. Manufacturer shall guarantee that the design, materials, manufacturing and testing of tubes conform to the requirement of this specification. Manufacturer shall replace all tubes free of costs which fail during field pressure testing or do not perform satisfactorily due to inadequate engineering, substandard material and poor workmanship.
- ii. The manufacturer shall guarantee against any defect, failure or malfunctioning occurring during 12 months from the date of commissioning or 18 months from the date of supply whichever is earlier.



3. TECHNICAL SPECIFICATION FOR SS FERRULE FITTINGS

3.1 SCOPE OF WORK

The scope of this specification covers the requirement of design, manufacture/inspection/testing at works/marking/packaging/and supply of high-pressure SS Ferrule Fittings.

3.2 CODES & STANDARDS

The latest edition of the following standards is referred to in this specification.

Items : Applicable Codes and Standards

Bar Stock : ASME SA-479-316 or DIN 4401 or BS:970-316-S31

Forging : ASME SA-182-316 or DIN 4401 or BS:970-316-S31

Thread: NPT ANSI B 1.20.1

3.3 PRECEDENCE

In case of any conflict between this job specification and other document, the following order of precedence shall apply:

Job Specification.

International Standards/ Codes Applicable

3.4 DEVIATION

Deviations if any required by Bidder shall be separately furnished against each clause giving reasoning for each deviation. Bidder to note that except the deviations furnished by them, Tenderer's offer shall be deemed to be in total conformity with the enquiry specifications.

3.5 SPECIFICATION

All the items shall be suitable for compressed Natural Gas service and meet following specifications.

Materials

Fittings shall be manufactured from the following materials: -

Bar stock shall be as per BS:970-316-S31, DIN 4401 or ASME 479- 316 but with carbon content less than 0.05% to provide increased resistance to corrosion.

Forgings shall be as per BS:970-316-S31, DIN 4401 or ASME SA-182-316.

- The fittings end connections shall be compatible to tube of hardness Rb80.
- All component parts of the fittings shall be of the same material.
- The ferrule material shall be able to withstand an atmosphere of Natural Gas, oil



and moisture without rusting.

Design & Manufacture

- All fittings shall be designed in conformance with the requirements of ASME B31.3
 and applicable standards. Area classification applicable for all items shall be
 Class-1, Division-1, Group-D as per NEC or Zone-1 Group IIA/ IIB as per IS/ IEC
 specification or equivalent specification. all fittings shall be designed so that all
 parts/ components meet the requirements for the specified area classification.
- The SS fittings shall be of flareless design and four-piece construction, consisting of front and rear ferrules, nut and body suitable for use on SS tubes conforming to ASTM A269 TP316.
- Fittings shall be rated for at least the design pressure as stipulated in the material requisition. The design of fittings shall ensure that they shall be capable of holding full tube burst pressure after only one and a quarter turn pull up of the nut.
- The threaded ends of fittings shall be NPT as per ANSI B1.20.1.
- The fittings shall hold the tube with collecting action producing a firm grip on the tube without substantially reducing the tube wall thickness.
- Fittings shall not torque the tubing during original or subsequent make-up of the connection and should use geometry for inspection before and after make up the fittings shall not require disassembly for inspection before or after makeup.
- All tube fittings shall be gaugeable for sufficient pull up after one and a quarter turn. All where the shoulder meets the neck of the fitting body.
- The gap inspection gauge shall be easily insertable at finger tight position of nut. The gap inspection gauge shall not be insertable between the nut and shoulder of the fitting after completing only one and a quarter turn pull up of the nut.
- The tube seat counter bore in the body shall be faced flat 90° to the axis of the tubing to minimize tube expansion and subsequent galling.
- The sealing and gripping power of the fitting shall be controlled such that the action between ferrules will overcome commercial variations in tubing wall thickness, hardness, diameter and installer skill.
- The seal contact areas of the fittings body shall have a machined finish of 32 Ra or better.
- The fittings body shall have no machined stop or shoulder to preclude additional tightening in subsequent make-up.
- Front Ferrule
 - i) The front ferrule shall effect a long, smooth repeatable seal by contact with body and a grip hold on the tube surface.
 - ii) The front ferrule shall always remain in a sprung condition to compensate for thermal stresses and to accomplish repeated make and break.



• Rear Ferrule

- i) The rear ferrule shall collect the tubing surface, improving the performance of the tubing in systems of high impulse or vibration.
- ii) The rear ferrule shall have a machine recess on the inside diameter and shall have complete surface hardening so as to substantially reduce the required pull up torque. Both the requirements i.e. complete surface hardness and machined recess shall be met for all rear ferrules.
- Nuts shall have silver plated threads to act as a lubricating agent to avoid galling and to reduce tightening torque.

Inspection and Testing

- The manufacturer shall submit typical type test reports for the following test carrier out on random samples of two ferrule fittings:
 - i) Hydraulic burst pressure test.
 - ii) Helium leak test under 0.0002 PSIA negative pressure, leaks into assembly greater than 4.0×10 -9 atm-cc/sec being unacceptable.
 - iii) Gas pressure test for 25 remarks at 5000 Psig. No leakage should be detectable even after 25 remarks.
 - iv) Impulse & vibration testing by "rotary beam method" for 5,00,000 impulse cycles and 20 million vibration cycles with no detectable leakage at full working pressure throughout till the end of the test.

Test Reports and Certificates

- The manufacturer shall supply material compliance certificates conforming that the raw material for fittings conforms to the requirements of ASME Section-II and ASME Section-III sub section NB, NC and ND.
- The manufacturer shall furnish test procedure and typical test reports of all tests conducted on fittings as per the requirements mentioned above.

3.6 MARKING, PACKING & SHIPMENT

Heat code traceability number shall be stamped or etched on both body and nut of each fitting.

Replacement nuts and ferrules shall be packaged in a manner so as to allow safe and simple replacement.

All the items shall be suitably wrapped and packaged to with stand rough handling during ocean shipment and inland journey.

Item shall be properly tagged and package separately to facilitate easy identification.

Items shall be wrapped and packaged in such-a-way that they can be preserved in original as new condition.



3.7 DOCUMENTATION

All document shall be furnished in English language only.

At the time of bidding, bidder shall submit following documents:

- i. Reference list of previous supply for similar item, giving following details:
 - a) Name of the customer.
 - b) Specification of the item i.e., size and pressure & temperature rating.
 - c) Service
 - d) Quantity
 - e) Year of supply
- ii. Test procedure and typical certificates to be submitted as per clause 5.3 and 5.4 of this specification.
- iii. Manufacturer Quality Control Plan and sampling plan.
- iv. Copy of ISO:9000 certification for supplier/ manufacturer.

Following test certificates shall be furnished along with shipment.

- i. Test certificate of chemical, mechanical testing.
- ii. Manufacturers standard shop inspection & test report.
- iii. The procedure and certificates to be submitted

3.8 GUARANTEE

Manufacturer shall guarantee that the design, materials, manufacturing and testing of fittings comply with the requirement of this specification and applicable codes and standards. Manufacturer shall replace all fittings which should result defective or fail during field pressure testing or fail to perform satisfactorily due to inadequate engineering, substandard material and workmanship.

The manufacturer shall guarantee against any defect, failure or malfunctioning occurring during 12 months from the date of commissioning or 18 months from the date of supply whichever is earlier.



4. TECHNICAL SPECIFICATION FOR SS BALL VALVES

4.1 SCOPE OF WORK

The scope of this specification includes design, manufacture/supply, inspection/testing/marking/packaging/handling and dispatch of SS Ball Valves as per relevant codes.

Purchaser reserves the right to amend quantities during execution of order, based on unit rates and other terms & conditions in the original order.

4.2 CODES & STANDARDS

Items Applicable Codes and Standards

Valves MSS-SP-99

4.3 PRECEDENCE

In case of any conflict between this job specification and other document, the following order of precedence shall apply:

Job Specification.

International Standards/ Codes Applicable.

4.4 DEVIATION

Deviations if any required by Vendor shall be separately furnished against each clause giving reasoning for each deviation. Vendor to note that except the deviations furnished by them, Vendor's offer shall be deemed to be in total conformity with the enquiry specifications.

4.5 MATERIALS

- The valve body shall be made of material conforming to ASTM A479 Type 316.
- Material of construction of ball shall conform to ASTM A276 Type 316.
- Material of construction of seat springs shall be Alloy X-750.

4.6 DESIGN & MANUFACTURE

All ball valves shall be designed in conformance with the requirements of ASME B31.3, MSS-SP-99 and other applicable code and standards. Area classification applicable for all items shall be Class-1, Division-1, Group-D as per NEC or Zone-1 Group-IIA/ IIB as per IS/ IEC specification or equivalent specification. all fittings shall be designed so that all parts/components meet the requirements for the specified area classification.

Valves shall be rated for a maximum working pressure of 5000 psig and shall be capable of operation between a temperature range of (-40) °C to 120 °C.

Valves shall have spring loaded PEEK seats allowing seal-ability over the full pressure range at any port and low operating torque over the full range of pressures and temperatures.



Elastomeric seals, which require no packing adjustment, shall be used.

Valves stem shall be of bottom loaded and blow out proof design.

Ball shall be blow out proof and trunnion mounted.

Valves shall have positive wrench/ handle stops, Phenolic black wrench / handle shall be provided. Wrench/ handle shall indicate the direction to flow. In the case of three way valves the stem shall also provide a visual indication of flow direction if the handle is removed.

4.7 INSPECTION AND TESTING

The valve manufacturer shall submit typical type test reports for the following test carrier out on similar valves: -

- i. Hydrostatic seat leak test shall be carried out with de-ionised water. There shall be no detectable set leakage at 1.1 times the rated pressure of the valve.
- ii. Gas pressure test for seat and shell shall be carried out with nitrogen at 1000 psig. There shall be no detectable external leakage. Maximum allowable seat leakage shall be 0.1 atm-cc/min.

4.8 OTHER REQUIREMENTS

Manufacturer should confirm that valves are approved by ANSI/ AGA NGV 3.1 1995, CAN/ CGA-12.3-M95 "Fuel Systems Components for Natural Gas-Powered Vehicles" by "Canadian Standard Association".

Spares and Accessories

- i. If required, manufacturer shall furnish a list of recommended spares and accessories for valves required during start up and commissioning.
- ii. If required, manufacturer shall furnish a list of recommended spares and accessories required for two years of manual operation and maintenance of valves.
- iii. Manufacturer shall quote for spares and accessories as per the material requisition.

4.9 TEST REPORTS & CERTIFICATES

The manufacturer shall supply material compliance certificates.

The valve manufacturer shall provide test procedure and valve inspection and test report for type tests carried out on similar valves as per the requirements of clause 4.7.

4.10 MARKING, PACKING & SHIPMENT

Heat code shall be marked on valve body to facilitate tractability.

All the items shall be suitably wrapped and packaged to with stand rough handling during ocean shipment and inland journey.



Each item shall be properly tagged and package separately to facilitate easy identification.

All items shall be wrapped and packaged in such-a-way that they can be preserved in original as new condition.

4.11 DOCUMENTATION

All document shall be furnished in English language only.

At the time of bidding, bidder shall submit following documents:

- i. Reference list of previous supply for similar item, giving following details:
 - Name of the customer.
 - Specification of the item i.e., size and pressure & temperature rating.
 - Service
 - Quantity
 - Year of supply
- ii. Test procedure and typical certificates
- iii. Copy of ISO:9000 certification for supplier/ manufacturer.
- iv. Manufacturer Quality Control Plan and sampling plan.
- v. Technical descriptive catalogue of manufacturer.
- vi. General arrangement/ assembly drawing of valve showing all features.
- vii. Sectional drawing showing major parts with reference number and material specification.

Prior to shipment, manufacturer shall submit following test certificates and documents.

- i. Test certificate of chemical, mechanical testing.
- ii. Manufacturers standard shop inspection test.
- iii. Manufacturers standard shop inspection and test reports.
- iv. The procedure and certificates to be submitted as per the requirements of clause 4.8 of this specification.
- v. Manual for installation, erection, maintenance and operating instructions including a list of recommended spares for valves.

4.12 GUARANTEE

Manufacturer shall guarantee that the design, materials, manufacturing and testing of fittings comply with the requirement of this specification and applicable codes and standards. Manufacturer shall replace all fittings which should result defective or fail during field pressure testing or fail to perform satisfactorily due to



inadequate engineering, substandard material and workmanship.

The manufacturer shall guarantee against any defect, failure or malfunctioning occurring during 12 months from the date of commissioning or 18 months from the date of supply whichever is earlier.



5. INSTRUMENTATION SPECIFICATIONS

- I. Vendor shall take single point responsibility for the engineering, design, certification, procurement, inspection, testing, supply & performance of the CNG Decompression skids 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) Design Sizing of self-actuated Pressure control valves, Safety Shut Off (Slam Shut) valves.
 - b) Set points for Pressure Regulators and slam shut valves.
 - c) Instrument ranges to meet the Process operating and design conditions.
 - d) Noise calculations for Regulator. Vendor to provide detailed Noise calculation and standard used and any assumption considered.
 - e) All the instruments/ equipment to be procured as per the approved vendor list of CLIENTS.
 - f) Instruments and connection ratings considering the process pressure.
- II. Typical instrument data sheets for Pilot operated control valves (PCVs), Slam shut valves, pressure gauges, temperature gauges and accessories indicating materials for body, internals etc. is provided in this specification. 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 the regulators, slam shut valves and accessories are vendor's responsibility.
- III. All the major items like valves (Plug & Ball), Pressure control valves, Slam shut valves, Pressure and Temperature instruments etc. shall be supplied from the vendor list attached elsewhere and the offered model of equipments shall have proven track record of successful operation for at least 6 months till bid submission date.
- IV. Quantities of instruments indicated for each skid on the P&IDs and Datasheets are tentative and minimum. Vendor shall recommend additional quantities in their offer, if required for successful and safe operation of the unit.

5.1 EQUIPMENT/INSTRUMENT DESIGN CRITERIA

- a) 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.
- b) The Equipment and instrumentation selected for the skids shall be rugged in design and must be well proven in the hydrocarbon industry. Prototype design

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or equipment of experimental nature or design undergoing testing etc. shall not be selected and supplied. Following criteria must be applied before selecting a particular instrument item: "The instruments as being offered/supplied should have been operating satisfactorily in hydrocarbon industry like Refinery, Petrochemical and Gas Processing Plant under similar process conditions for at least 4000 hrs. from the bid due date."

- c) All the connections in the skid having design rating of 300# and above shall be of welded type only.
- d) Hole tight / leak tight should not be used on threaded / flange joints. Stud nuts only are to be provided on flange joints.
- e) 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.
- f) Flanges made of cast iron, ductile iron and non-ferrous materials (brass or bronze) shall not be used. All stud bolts and nuts shall be hot dipped galvanized as per ASTM A 153 or equivalent.
- g) All the instruments shall be suitable for outdoor mounting and weatherproof to protect instruments from direct rain & sunlight.

5.2 Statutory Approvals

- a) Bidder shall be responsible for obtaining all statutory approvals, as applicable for all instruments, equipments, calibration gas cylinders and control systems.
- b) In addition, equipments/instruments/systems located in the hazardous area shall be certified by the local statutory authorities for their use in the area of their installation. In general, following certification shall be given:
 - For all intrinsically safe/explosion proof/flameproof equipments/ instruments/systems or equipments with any other type of protection allowable as per this package which are manufactured abroad and certified by any statutory authority like BASEEFA, FM, UL, PTB, LCIE etc. should also have the approval of Chief Controller of Explosives (CCOE).
 - For all flame proof equipments manufactured locally (indigenously), the
 testing shall be carried out by any of the approved test house like
 CMRI/ERTL etc. The equipment shall in addition bear the valid approval
 from Chief Controller of Explosives and a valid BIS license.
 - For all intrinsically safe equipment manufactured locally (indigenously), the
 testing shall be carried out by any of the approved test house like
 CMRI/ERTL etc. The equipment shall in addition bear the valid approval
 from Chief Controller of Explosives.
 - CCOE certificate for the foreign items shall be submitted during detailed engineering, however Appropriate approval certificates from the country of origin shall be provided with the bid.



- 5.3 All instruments in the skid shall be certified for IEC Zone 1 Gas Group IIA/IIB, T3.
- 5.4 Junction boxes/local control panels shall be flame proof/explosion-proof
- 5.5 Single / multiple pair cables between instrument and Local Control Panel shall be through perforated trays. Cable glands shall be provided at instrument end and panel end. Supply of interconnected Cables is in bidder's scope.

5.6 TESTING AND INSPECTION

Vendor to carry out 3.1 certification for the complete supplied items.

Requirements of non-destructive testing like radiography, magnetic particle test, hardness test, hydro-test, Charpy test for slam shut valves shall be carried out strictly as per following specification.

- 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.
- 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.
- 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.

Inspection of Slam Shut Valves, Pressure Regulators includes:

- Testing to demonstrate set point accuracy and actuation time for Slam shut valves
- Seat tightness test for PCVs and Slam shut valves (shall be conducted at manufacturer's shop and certificates shall be submitted)



6. PIPING MATERIAL SPECIFICATION FOR DCS

6.1 GENERAL NOTES

This specification describes the minimum requirements for the design, furnishing of the materials, fabrication, inspection and testing of the pipes, fittings and valves.

All materials shall confirm to ASTM, API or BS Standards. Design and fabrication shall confirm to ASME for pressure piping, ASME B 31.3 – Chemical Plant and Petroleum Refinery Piping, and ASME B 31.8 – Gas Transmission and Distribution Piping System.

6.2 DEFINITIONS

This verbal form indicates requirements strictly to be followed in

Shall : order to confirm to the standards and from which no deviation is

permitted.

This verbal form indicates that among several possibilities one is

Should: particularly suitable without mentioning or excluding others or that

a certain course of action is preferred but not necessarily required.

May

This verbal form indicates a course of action permissible within the

limits of this standard.

Can : This verbal form is used for statements of possibility & capability,

whether material, physical or casual.

6.3 CODES AND STANDARDS

The latest revision of the following shall be considered as part of this specification.

ASME B 16.5 : Steel Pipe Flanges and Flanged Fittings

ASME B 16.9 : Factory made Wrought Steel Butt welding Fittings

ASME B 16.10 : Face to Face/End to End dimension of valves.

ASME B 16.11 : Forged steel fittings, including socket weld and threaded

type

ASME B 16.20 : Metallic Gaskets for Pipe Flanges

ASME B 16.21 : Non-Metallic Flat Gasket for Pipe Flanges

ASME B 16.25 : Butt welding ends

ASME B 16.34 : Valves- Flanged, Threaded and welding ends

ASME B 16.47 : Large Diameter Steel Flanges (26" throu 60")

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ASME B 31.3 : Process Piping

ASME B 31.4 : Pipeline Transportation system for Liquid hydrocarbons &

other Liquids

ASME B 31.8 : Gas Transmissions and Distribution Piping System

ASME B 36.10 : Welded and Seamless Wrought Steel Pipe

ASME B 46.1 : Surface Texture

API 5L : Line Pipe

API 6D : Pipeline Valves

API 590 : Steel Line Blank

API 600 : Steel Gate Valves Flanges and Butt-welding Ends

API 602 Steel Gate, Globe, and Check Valves for Sizes NPS 4 (DN 100)

and Smaller for the Petroleum and Natural Gas Industries

MSS SP 44 : Steel Pipe line Flanges

MSS SP 75 : Specification for High Test Wrought Butt Welding Fittings

MSS SP 97 Integrally Reinforced Forged Branch Outlet Fitting - Socket

Welding, Threaded and Butt welding Ends

ASTM A 105 : Forging, Carbon Steel for Piping Components

ASTM A 193 : Alloy Steel and Stainless-Steel bolting Materials for High temp

Service

ASTM A 194 : Carbon and Alloy Steel Nuts for Bolts for High Pressure and

High Temperature Service

ASTM A 320 : Standard Specification for Alloy Steel and Stainless-Steel

Bolting Materials

ASTM A 216 : Steel Casting, Carbon, Suitable for Fusion Welding, for High

Temperature Service.

ASTM A 234 Piping Fittings of Wrought Carbon Steel and Alloy Steel for

Moderate and Elevated Temperature

ASTM A 285 : Pressure vessel plates, Carbon steel, low and intermediate

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Tensile strength.

Forging, Carbon and Alloy Steel, for Pipe Flanges, Fitting,

ASTM A 694 Valves and Parts for High Pressure Transmission Service.

ASTM A 333 : Low temperature service seamless pipe.

ASTM A 350 Forged Carbon and Low Alloy Steel requiring Notch

Toughness Testing for Piping Components

ASTM A 420 : Piping Fittings of Wrought Carbon Steel and Alloy Steel for

Low Temperature Service.

ASTM A 860 Standard Specification for Wrought High Strength Low Alloy

Steel Butt Welding Fittings

ASTM A 350 Forged Carbon and Low Alloy Steel requiring Notch

Toughness Testing for Piping Components

ASTM A 420 Piping Fittings of Wrought Carbon Steel and Alloy Steel for

Low Temperature Service.

ASTM A 860 : Standard Specification for Wrought High Strength Low Alloy

Steel Butt Welding Fittings

6.4 ABBREVIATIONS

Flange Facing

RTJ - Ring Type Joint

FF - Flat Face

RF - Raised Face

Fittings

PE - Plain End

BE - Bevel End

BW - Butt Weld

PBE - Plain Both End

POE - Plain One End



TBE - Threaded Both End

TOE - Threaded One Ended

LR Long Radius

- Short Radius SR

Connections

BW - Butt-Weld

FLGD - Flanged

SCRD - Screwed

SO - Slip-on

SW - Socket Weld

THRD - Threaded

WN - Weld Neck

Wall Thickness

SCH - Schedule in accordance with ASME B 36.10 or B 36.19

STD - Standard Weight Wall Thickness

XS - Extra Strong Wall Thickness

XXS - Double Extra Strong Wall Thickness

Valve Description

BC - Bolted Cap

ВВ - Bolted Bonnet

- Extension Stem ES

FB - Full Bore

MO - Motor Operated

GO - Gear Operated



NRS - Non-Rising Stem (with inside screw)

OS&Y - Outside Screw and Yoke

RB - Reducer Bore

RS - Rising Stem

SC - Screwed Cap

UB - Union Bonnet

UC - Union Cap

WB - Welded Bonnet

Pipes Description

BE - Beveled End

CS - Carbon Steel

ERW - Electric Resistance Welded

EFW - Electric Fusion Welded

FS - Forged Steel

HFI - High Frequency Induction

KCS - Killed Carbon Steel

KFS - Killed Forged Steel

OH - Open Hearth

SAW - Submerged Arc Welded

SMLS - Seamless

PIPING CLASSES DESCRIPTION

Piping Classes assigned for the project are based on the following 3-digit system.

First Digit

Letter, denoting the basic system rating or flange class i.e.

A = ASME Class 150

B = ASME Class 300



D = ASME Class 600

E = ASME Class 900

Second Digit

Numerical, denoting the material

- 1- Carbon Steel
- 2- Low temperature carbon steel
- 3- Alloy Steel
- 4- Stainless Steel
- 5- Fiberglass Reinforced plastic/epoxy (FRP)
- 6- Galvanized
- 7- PVC
- 8- Plastic (PEHD)

Third Digit

Sequential letter to differentiate two or more piping classes of the same rating and same material but presenting some difference related to the handled fluid.

Notes

- Flanges to be kept Minimum
- Pipe joints: 1.5° & below, use SW Couplings.
- All Temperature connections shall be 1.5" flanged.
- Pressure connections shall be 0.75" SW nipples with valve.
- Drain & Vents shall be 0.75" or as per P & ID. Whichever is higher in size.



PIPING SPECIFICAITONS		IRM EN	NERGY L	TD		RATING	G 150#	(b) IRM			
A1A	TEMPE	RATURE RA	ANGE (-	10 to 65	5) °C	CODE A	NSI B31.8	Energy			
TEMPERATURE-	TEMP. (°C)	-29.00	38.00	93.00	149.00	204.00	260.00	BASIC MATERIAL C.S			
PRESSURE RATING	PRESSURE (Barg)	19.63	19.63	17.91	15.85	13.78	11.71	CORROSION ALW-			

Service: Non corrosive / flammable / Nonflammable/ non-lethal Process & Hydro carbons, Natural Gas, Ammonia, Steam and Condensate (non-IBR), Instrument Air, Plant Air, Nitrogen, Carbon dioxide, Water, Closed Blow Down.

	SHORT	SIZE		RATING/SCHEDULE/	DIMENSION		
ITEMS	CODE	(inch)	DESCRIPTION	MIN THICKNESS	STANDARD	MATERIAL	REMARKS
		0.5" to 1.5"	PE, SEAMLESS	SCH80	ASME B36.10	ASTM A106 Gr.B /ASTM A 333 Gr 6	
		2"	BE, SEAMLESS	SCH80	ASME B36.10	ASTM A106 Gr.B /ASTM A 333 Gr 6	
PIPES	Р	3"	BE, SEAMLESS	SCH80	ASME B36.10	ASTM A106 Gr.B /ASTM A 333 Gr 6	THICKNESS AS PER T4S
		4"	BE, SEAMLESS	Min. thickness 6.4mm	ASME B36.10	ASTM A106 Gr.B /ASTM A 333 Gr 6	
		6" and above	BE, SEAMLESS	SCH40	ASME B36.10	ASTM A106 Gr.B /ASTM A 333 Gr 6	
ELBOWS/BENDS	E	0.5" to 1.5"	SW	3000#	ASME B16.11	ASTM A105	
90 LR		2" and above	BW, 1.5D, 3D	М	ASME B16.9	ASTM A234 Gr. WPB	
ELBOWS/BENDS	E 4.5	0.5" to 1.5"	SW	3000#	ASME B16.11	ASTM A105	
45 LR	E45	2" and above	BW, 1.5D, 3D	М	ASME B16.9	ASTM A234 Gr. WPB	
REDUCERS CONCENTRIC	RC	2" and above	BW- ASME B16.25	MxM	ASME B16.9	ASTM A234 Gr. WPB	
REDUCERS ECCENTRIC	RE	2" and above	BW- ASME B16.25	MxM	ASME B16.9	ASTM A234 Gr. WPB	
TEES EQUAL	т	0.5" to 1.5"	SW	3000#	ASME B16.11	ASTM A105	SWRF
TEES EQUAL	T	2" and above	BW	М	ASME B16.9	ASTM A234 Gr. WPB	WNRF
TEES DED	TD	0.5" to 1.5"	SW	3000#	ASME B16.11	ASTM A 105	
TEES RED	TR	2" and above	BW	MxM	ASME B16.9	ASTM A234 Gr. WPB	
SOCKOLET	S	0.5" to 1.5"	SW	3000#	MSS SP 75	ASTM A105	
WELDOLET	W	2" and above	BW- ASME B16.25	M×M	MSS SP 75	ASTM A105	
CAPS	С	0.5" to 1.5"	SCRF	3000#	ASME B16.11	ASTM A 350 GR LF2	SWRF

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ITEMS	SHORT CODE	SIZE (inch)	DESCRIPTION	RATING/SCHEDULE/ MIN THICKNESS	DIMENSION STANDARD	MATERIAL	REMARKS	
		2" and	BW	М	ASME B16.9	ASTM A 350		
		above				GR LF2		
NIPPLES	NA	0.5" to 1.5"	PBE SEAMLESS	М	ASME B36.10	ASTM A 350 GR LF2		
FULL		0.5" to			ASME B16-	ASTM A 350		
COUPLINGS	FC	1.5"	SW	3000#	11	GR LF2		
HALF	НС	0.5" to	SW	3000#	ASME B16-	ASTM A 350		
COUPLINGS	пС	1.5"	344	3000#	11	GR LF2		
		0.5" to	RF 125 AARH	150#	ASME B16-	ASTM A 350	SWRF	
\A/\\	E\A/	1.5"			5	GR LF2 CI-1		
WN FLANGES	FW	2" and	DE 10E A A DI I	150#	ASME B16-	ASTM A 350	WNDE	
		above	RF 125 AARH	150#	5	GR LF2 CI-1/ ASTM A 105	WNRF	
		0.5" to			ASME B16-	ASTM A 350		
		1.5"	RF 125 AARH	150#	5	GR LF2 CI-1	SWRF	
BLIND FLANGES	FB					ASTM A 350		
		2" and	RF 125 AARH	150#	ASME B16- 5	GR LF2 CI-1/	WNRF	
		above				ASTM A 105		
		0.5" to	RF 125 AARH	150#	ASME B16-	ASTM A 350	SWRF	
EL 4 \ 1 \ 0 \ E \ 0		1.5"	11. 120 / 0 1111	10011	48	GR LF2 CI-1		
FLANGES	FF	2" and		1.50#	ASME B16-	ASTM A 350	WNIDE	
		above	RF 125 AARH	150#	5	GR LF2 CI-1/ ASTM A 105	WNRF	
						ASTM A 103 ASTM A 350		
SPCR & BLND	FSB	2" and	RF 125 AARH	150#	ASME B16-	GR LF2 CI-1/		
01 011 01 010	105	above	120 7 0 1111	100%	48	ASTM A 105		
						Bolts: ASTM		
						A320 Gr L7, B		
		0.5"				18.2, Nuts:		
STUDS & BOLTS	В	and	Hot Dip		ASME B18.2	ASTM A194		
	_	above	Galvanized			Gr 4,B 18.2		
						ASTM A153 (Hot Dip		
						Galvanized)		
						SS316 spiral		
						wound with		
GASKETS		0.5"	Spiral		ASME	CNAF filler +		
SPIRAL WOUND	G	and	wound with	150#	B16.20	SS316 &		
31 110/12 77 00110		above	CNAF filler		ASME B16.5	OUTER RING		
						AS PER ASME		
						B16.20		
						Body: ASTM A105/A350	Full bore, fire	
						LF2, Ball:	safe, lever	
		0.5" to	SW ASME	800#	BS 5351	SS316/ASTM	operated,	
BALL VALVES		1.5"	B16.11			A351	floating type	
	BLV					CF8M+80	ball valve	
-						micron ENP		
			BW ASME			BODY: ASTM	Full bore, fire	
		2" to	B16-25/	150#	API 6D	A216 Gr.	safe, lever	
		3"	" FLGD RF	150#	API 6D	WCB, BALL:	operated,	
			ASME B 16.5			SS316	floating type	

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ITEMS	SHORT	SIZE (inch)	DESCRIPTION	RATING/SCHEDULE/ MIN THICKNESS	DIMENSION STANDARD	MATERIAL	REMARKS
	0001	(iiieii)		7,1110,111200			ball valve
		4"-12"	BW ASME B16-25/ FLGD RF ASME B 16.5	150#	API 6D	BODY: ASTM A216 Gr. WCB, BALL: SS316, BODY SEAT: SS316	Full bore, fire safe, Trunion Mounted, Double block & Bleed 6" above Quarter turn worm type gear operated Sealant injection lines on 8" & above
GLOBE VALVE		0.5" to 1.5"	SW ASME B16.11	800#	BS 5352	BODY: ASTM A105/A350 LF2/A352 LCB, TRIM: ASTM A182 F6a/SS 316 stellited/13% Cr Steel	Handwheel operated
GLOBE VALVE	GLV	2" and above	BW ASME B16.25, Flanged RF ASME B16.5	150#	BS 1873 / API 602	BODY: ASTM A216 Gr.WCB/A352 LCC, TRIM: ASTM A182 F6a/SS 316 stellited/13% Cr Steel	Handwheel operated
LIFT Check Valve		0.5" to 1.5"	SW ASME B16.11, Lift check valve	800#	ASME B16.10/ BS5352	BODY: ASTM A105, TRIM: ASTM A182 F6a/SS 316 stellited/13% Cr Steel	Horizontal installation
SWING Check Valve	NRV	2" and above	Flanged RF ASME B16.5, Swing check valve	150#	API 6D, API 594	BODY: ASTM A216 Gr.WCB/A352 LCB, TRIM: ASTM A182 F6a/SS 316 stellited/13% Cr Steel	Horizontal installation Vertical installation flow upwards
PLUG VALVE	PV	0.5" to 1.5"	SW ASME B16.11	800#	ASME B 16.34	BODY: ASTM A105 PLUG: ASTM A 479 SS 316/ 105+	

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ITEMS	SHORT CODE	SIZE (inch)	DESCRIPTION	RATING/SCHEDULE/ MIN THICKNESS	DIMENSION STANDARD	MATERIAL	REMARKS
						80 MICRON ENP	
		2" and above	BW ASME B16.25, Flanged RF ASME B16.5	150#	API 6D	BODY: ASTM A216 Gr. PLUG: SS 316 STEM: SS316	

NOTE: M= THICKNESS TO MATCH PIPE WALL THICKNESS

LOCATION CLASS 4 SAFTY FACTOR 0.4

LEGEND

H - HALF COUPLING-HC

T - TEE

S - SOCKOLET-SW

W - WELDOLET - BW

R - PIPE TO PIPE REINFORCED

P - PIPE TO PIPE

eg S/H FOR SERVICES UNDER ASME B31.8/ OTHER SERVICES

BRANCH TABLE

BRANCH SIZE

				1											
	1/2"	3/4"	1"	1/2"	2"	3"	4''	6"	8''	10"	12"	14"	16"	1	
1/2"	T														
3/4"	T	T													
1"	T	T	T												
1 (0"	Т	T	T	т											1
1/2"				T	_										
2"	S/H	T	T	T	T										
3"	S/H	S/H	S/H	S/H	T/P	T									
4''	S/H	S/H	S/H	S/H	T/P	T/P	T								
6"	S/H	S/H	S/H	S/H	W/R	T/P	T/P	T							
8"	S/H	S/H	S/H	S/H	W/R	W/R	T/P	T/P	T						
10"	S/H	S/H	S/H	S/H	W/R	W/R	T/P	T/P	T/P	T/P					
12"	S/H	S/H	S/H	S/H	W/R	W/R	W/R	T/P	T/P	T/P	T				
14"	S/H	S/H	S/H	S/H	W/R	W/R	W/R	T/P	T/P	T/P	T/P	T			
16"	S/H	S/H	S/H	S/H	W/R	W/R	W/R	T/P	T/P	T/P	T/P	T/P	T		

HEADER SIZE



PIPING SPECIFICAITONS		IRA	A ENERG	Y LTD	RATII	NG 300#	(b) IRM		
B1A	TE	MPERATUR	E RANG	E (-10 to	65) °C		CODE	ANSI B31.8	Energy
TEMPERATURE- PRESSURE	TEMP. (°C)	-29.00	38.00	93.00	149.00	204.00	260.00	BASIC MATE	ERIAL C.S
RATING	PRESSURE (Barg)	50.94	50.94	46.50	45.13	43.75	41.34	CORROSIO	N ALW 1.5 MM

Service: Non corrosive / flammable / Non flammable/ non lethal Process & Hydro carbons, Natural Gas, Ammonia, Steam and Condensate (non-IBR), Instrument Air, Plant Air, Nitrogen, Carbon dioxide, Water, Closed Blow Down.

ITEMS	SHORT	SIZE (inch)	DESCRIPTION	RATING/SCHEDULE/ MIN THICKNESS	DIMENSION STANDARD	MATERIAL	REMARKS					
		0.5" to 1.5"	PE, SEAMLESS	SCH80	ASME B36.10	ASTM A106 Gr.B/ ASTM A 333 Gr 6						
		2"	BE, SEAMLESS	SCH80	ASME B36.10	ASTM A106 Gr.B /ASTM A 333 Gr 6	A/G-					
PIPES	Р	3"	BE, SEAMLESS	SCH80	ASME BI6.9 ASTM A105 ASME BI6.11 ASTM A105 ASME BI6.9 ASTM A234 Gr. WPB ASTM A234 G	PRIMARILY SEAMLESS						
		4''	BE, SEAMLESS	Min. thickness 6.4mm								
		6" and above	BE, SEAMLESS	SCH40								
		0.5" to 1.5"	SW	3000#		ASTM A105						
ELBOWS/BENDS		2"- 6"	BW, 1.5D, 3D	М								
90 LR	E	8''	BW, 1.5D, 3D	М	ASME B16.9	MATERIAL ASTM A106 Gr.B/ ASTM A 333 Gr 6 ASTM A106 Gr.B /ASTM A 333 Gr 6 ASTM A106 Gr.B SME ASTM A106 Gr.B SME ASTM A105 EB16.9 ASTM A234 Gr. WPB EB16.9 SP75WPHY42 EB16.9 ASTM A234 Gr. WPB						
		12"	BW, 1.5D, 3D	М	ASME B16.9 ASM							
	F.45	0.5" to 1.5"	SW	3000#		ASTM A105						
ELBOWS/BENDS		E45	F.4.F	E45	E 4 E	E45 -	E45 -	2"- 6"	BW, 1.5D, 3D	М	ASME B16.9	
45 LR	E45	8''	BW, 1.5D, 3D	М	ASME B16.9							
		12"	BW, 1.5D, 3D	М	ASME B16.9							
		2"- 6"	BW- ASME B16.25	MxM	ASME B16.9							
REDUCERS CONCENTRIC	RC	8''	BW- ASME B16.25	MxM	ASME B16.9							
		12"	BW- ASME B16.25	MxM	ASME B16.9							
		2"- 6"	BW- ASME B16.25	MxM	ASME B16.9							
REDUCERS ECCENTRIC	RE	8"	BW- ASME B16.25	MxM	ASME B16.9	MSS						
		12"	BW- ASME	MxM	ASME B16.9	MSS						

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ITEMS	SHORT CODE	SIZE (inch)	DESCRIPTION	RATING/SCHEDULE/ MIN THICKNESS	DIMENSION STANDARD	MATERIAL	REMARKS
			B16.25			SP75WPHY52	
		0.5" to 1.5"	SW	3000#	ASME B16.11	ASTM A105	
TEES EQUAL	т	2"- 6"	BW	М	ASME B16.9	ASTM A234 Gr. WPB	
TEES EQUAL	T	8"	BW- ASME B16.25	MxM	ASME B16.9	MSS SP75WPHY42	
		12"	BW- ASME B16.25	MxM	ASME B16.9	MSS SP75WPHY52	
		0.5" to 1.5"	SW	3000#	ASME B16.11	ASTM A105	
TEES RED	TR	2"- 6"	BW	MxM	ASME B16.9	ASTM A234 Gr. WPB	
ILLS KLD	IK	8"	BW- ASME B16.25	MxM	ASME B16.9	MSS SP75WPHY42	
		12"	BW- ASME B16.25	MxM	ASME B16.9	MSS SP75WPHY52	
SOCKOLET	S	0.5" to 1.5"	SW	3000#	MSS SP 75	ASTM A105	
WELDOLET	W	2" and above	BW- ASME B16.25	M×M	MSS SP 75	ASTM A105	
	С	0.5" to 1.5"	SCRF	3000#	ASME B16.11	ASTM A105	
CAPS		2"- 6"	BW	MxM	ASME B16.9	ASTM A234 Gr. WPB	
CAFS		8"	BW- ASME B16.25	MxM	ASME B16.9	MSS SP75WPHY42	
		12"	BW- ASME B16.25	MxM	ASME B16.9	MSS SP75WPHY52	
NIPPLES	NA	0.5" to 1.5"	PBE SEAMLESS	М	ASME B36.10	ASTM A106 Gr.B	
FULL COUPLINGS	FC	0.5" to 1.5"	SW	3000#	ASME B16- 11	ASTM A105	
HALF COUPLINGS	HC	0.5" to 1.5"	SW	3000#	ASME B16- 11	ASTM A105	
WN FLANGES	FW	0.5" to 1.5"	RF 125 AARH	300#	ASME B16- 5	ASTM A105	SWRF
WINTEAINOES	1 **	2" and above	RF 125 AARH	300#	ASME B16- 5	ASTM A105	WNRF
BLIND FLANGES	FB	0.5" to 1.5"	RF 125 AARH	300#	ASME B16- 5	ASTM A105	SWRF
DELIND I LANGES	טו	2" and above	RF 125 AARH	300#	ASME B16- 5	ASTM A105	WNRF
EL A NICES	FF	0.5" to 1.5"	RF 125 AARH	300#	ASME B16- 48	ASTM A105	SWRF
FLANGES	ГГ	2" and above	RF 125 AARH	300#	ASME B16- 5	ASTM A105	WNRF
SPCR & BLND	FSB	12"	RF 125 AARH	300#	ASME B16- 48	ASTM A105	

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ITEMS	SHORT CODE	SIZE (inch)	DESCRIPTION	RATING/SCHEDULE/ MIN THICKNESS	DIMENSION STANDARD	MATERIAL	REMARKS
STUDS & BOLTS	В	0.5" and above	Hot Dip Galvanized		ASME B18.2	Bolts: ASTM A193 B7, Nuts: ASTM A194 Gr 2H, ASTM A153 (Hot Dip Galvanized)	
GASKETS SPIRAL WOUND	G	0.5" and above	Spiral wound with CNAF filler	300#	ASME B16.20 ASME B16.5	SS316 spiral wound with CNAF filler + SS316 & OUTER RING AS PER ASME B16.20	
	S BLV	0.5" to 1.5"	SW ASME B16.11	800#	BS 5351	Body: ASTM A105/A350 LF2, Ball: SS316/ASTM A351 CF8M+80 micron ENP	Full bore, fire safe, lever operated, floating type ball valve
		2" to 3"	BW ASME B16-25/ FLGD RF ASME B 16.5	300#	API 6D	BODY: ASTM A216 Gr. WCB, BALL: SS316	Full bore, fire safe, lever operated, floating type ball valve
BALL VALVES		4"-12"	BW ASME B16-25/ FLGD RF ASME B 16.5	300#	API 6D	BODY: ASTM A216 Gr. WCB, BALL: SS316, BODY SEAT: SS316	Full bore, fire safe, Trunion Mounted, Double block & Bleed 6" above Quarter turn worm type gear operated Sealant injection lines on 8" & above
GLOBE VALVE	GLV	0.5" to 1.5"	SW ASME B16.11	800#	BS 5352	BODY: ASTM A105/A350 LF2/A352 LCB, TRIM: ASTM A182 F6a/SS 316 stellited/13% Cr Steel	Handwheel operated



ITEMS	SHORT CODE	SIZE (inch)	DESCRIPTION	RATING/SCHEDULE/ MIN THICKNESS	DIMENSION STANDARD	MATERIAL	REMARKS
		2" and above	BW ASME B16.25, Flanged RF ASME B16.5	300#	BS 1873 / API 602	BODY: ASTM A216 Gr.WCB/A352 LCB, TRIM: ASTM A182 F6a/SS 316 stellited/13% Cr Steel	Handwheel operated
LIFT Check Valve		0.5" to 1.5"	SW ASME B16.11, Lift check valve	800#	ASME B16.10/ BS5352	BODY: ASTM A105, TRIM: ASTM A182 F6a/SS 316 stellited/13% Cr Steel	Horizontal installation
SWING Check Valve	NRV	2" and above	Flanged RF ASME B16.5, Swing check valve	300#	API 6D, API 594	BODY: ASTM A216 Gr.WCB/A352 LCB, TRIM: ASTM A182 F6a/SS 316 stellited/13% Cr Steel	Horizontal installation Vertical installation flow upwards
PLUG VALVE	PV	0.5" to 1.5"	SW ASME B16.11	800#	ASME B 16.34	BODY: ASTM A105 PLUG: ASTM A 479 SS 316/ 105+ 80 MICRON ENP	
		2" and above	BW ASME B16.25, Flanged RF ASME B16.5	300#	API 6D	BODY: ASTM A216 Gr. PLUG: SS 316 STEM: SS316	

NOTE: M= THICKNESS TO MATCH PIPE WALL THICKNESS

LOCATION CLASS 4 SAFTY FACTOR 0.4

LEGEND

H - HALF COUPLING-HC

T - TEE

S - SOCKOLET-SW

W - WELDOLET - BW

R - PIPE TO PIPE REINFORCED

eg S/H FOR SERVICES UNDER ASME B31.8/ OTHER SERVICES



BRANCH TABLE

BRANCH SIZE

				1										
,	1/2"	3/4"	1"	1/2"	2''	3"	4''	6''	8''	10''	12"	14"	16"	
1/2"	T													
3/4"	T	T												
1"	T	T	T											
1														
1/2"	T	T	T	T										
2''	S/H	T/H	T/H	T	T									
3"	S/H	S/H	S/H	S/H	T	T								
4''	S/H	S/H	S/H	S/H	T	T	T							
6''	S/H	S/H	S/H	S/H	W/R	T/R	T/R	T						
8''	S/H	S/H	S/H	S/H	W/R	W/R	T/R	T/R	T					
10"	S/H	S/H	S/H	S/H	W/R	W/R	T/R	T/R	T	T				
12"	S/H	S/H	S/H	S/H	W/R	W/R	W/R	T/R	T/R	T/R	T			
14"	S/H	S/H	S/H	S/H	W/R	W/R	W/R	T/R	T/R	T/R	T/R	T		
16"	S/H	S/H	S/H	S/H	W/R	W/R	W/R	T/R	T/R	T/R	T/R	T/R	T	

HEADER SIZE



7. ENCLOSURES

7.1 DATASHEETS

> Piping Material Specification Carbon Steel – 600#

	RM				S MA	TERIA	AL SPE	ATION	I CAR	BON	STEE	L-600#	:			
CLIENT: IR	M ENERGY LI	D														
CONSULTA	NT:-															
TEMP.(°C)	-29 TO 38	50	60	65												
PRESSURE (Barg)	102.1	100.2	98.8	98.1												
				LINI	1 /0"	2/4"	1"	1 ["	0"	3"	1 4"	711	0"	1.0"	1.0"	14"
	NOMINAL S	IZE		IN	1/2"	3/4"	I	1.5"	2"		4"	6"	8"	10"	12"	
				mm	15	20	25	40	50	80	100	150	200	250	300	350
	SCHEDULE				SCH-80 SCH-40											
	MATERIAL				ASTM A 106 GR.B, SEAMLESS/ ASTM A 333 Gr 6											
PIPES	ENDS					PLAIN			BEVELED							
	PIPE TO PIP				SOCKET WELD BUTT WELD											
	DIMENSION	1 STAND	ARD		ASME B 36.10											
	TYPE			S. W . R. F.					W. N. R. F.							
FLANGES	RATING					600 #			600 #							
FLANGES	MATERIAL				AS	TM A 1	05		ASTM A 105							
	DIMENSION	N STAND	ARD		ASME B 16.5 ASME B 16.5											
	TYPE									R.I	F.					,
DIINDC	RATING									600) #					
RIIND2	MATERIAL									ASTM .	A 105					
	DIMENSION STANDARD									ASME I	B 16.5					
FITTINGS	TYPE					S. W.						BL	JTT WEI	LD		



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	SCHEDULE / RATING	3000#		SCH 80	SCH-40
	MATERIAL	ASTM A 105		AS	TM A234 Gr. WPB
	DIMENSION STANDARD	S.W ASME B 16.11		В	S.W ASME B 16.9
	TYPE	S. W. / NPT(F)			B.W
"O" LET	SCHEDULE / RATING	3000#		SCH 80	SCH 40
FITTINGS	MATERIAL	ASTM A105			ASTM A105
	DIMENSION STANDARD	MSS SP 97		MANUF	ACTURER STD.
	TYPE	BOTH END THRD - NPT(M)	NOTE	S	
HEX NIPPLES	SCHEDULE / RATING	3000#	1	PIPE JOINT: 40 NB FITTING	& BELOW:3000# SOCKET WELD
NIFFLES	MATERIAL	ASTM A 105	2	PIPE JOINT: 50 NB	& ABOVE:BUTT WELDED.
	DIMENSION STANDARD	ASME B 16.11	3	INSPECTION & TES	STING:
	TYPE	ONE / BOTH END THRD - NPT(M)	4	A) RADIOGRAPH	y of weld joint : As per Qap
AUDDI EC	SCHEDULE	SCH 80	1	B) HYDROTEST: AS	S PER QAP
NIPPLES	MATERIAL	A 106 GR. B	1	C) PNEUMATIC TE	EST : AS PER QAP
	DIMENSION STANDARD	ASME B36.10	5	SERVICE-NATURA	L GAS
	TYPE	SPRIAL WOUND	6	CS- CARBON STEE	EL
	THICKNESS	4.5 MM THK	7	CORROSION ALL	OWANCE-1.6 MM
GASKETS	MATERIAL	SPIRAL WOUNDED SS304, PTFE FILLED + CS INNER & OUTER RING OF 3.2 mm THK.			
	DIMENSION STANDARD	ASME B 16.20	1		
	STUD	FULL THREADED	1		
	MATERIAL	ASTM A 193 GR. B7	1		
	DIMENSION STANDARD	ASME B 18.2.1	1		
FASTENRS	NUT	HEAVY HEXAGONAL NUT	1		
	MATERIAL	ASTM A 194 GR. 2H	7		
	DIMENSION STANDARD	ASME B 18.2.2			

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BRA	ANCH C	CONNECTION	S											BWT		350	14"
	SWT	SOCKET WELD EQUAL / UNEQUAL TEE										BWT	RT		300	12"	
	BWT	BUTT WELDE	D TEE									BWT	RT	RT		250	10''
	S/T	SOCKOLET /	/ THRED	OLET							BWT	RT	RT	RT	,,	200	8"
	RT	REDUCING :	REDUCING TEE							BWT	RT	RT	RT	RT	SIZES	150	6"
	WL	WELDOLET					BWT	RT	RT	RT	WL	WL	エ	100	4''		
							_	BWT	RT	RT	WL	WL	WL	WL	Š	80	3"
					BWT	RT	RT	WL	WL	WL	WL	WL	RA	50	2"		
						SWT	RT	RT	RT	S/T	S/T	S/T	S/T	S/T	В	40	1.5"
					SWT	SWT	S/T	S/T	S/T	S/T	S/T	S/T	S/T	S/T		25	1"
				SWT	SWT	SWT	S/T	S/T	S/T	S/T	S/T	S/T	S/T	S/T		20	3/4"
			SWT	SWT	SWT	SWT	S/T	S/T	S/T	S/T	S/T	S/T	S/T	S/T		15	1/2"
								HEAD	DER SIZE	-							
			1/2"	3/4"	1"	1.5"	2"	3"	4''	6"	8"	10''	12"	14"		IN	
			15	20	25	40	50	80	100	150	200	250	300	350			mm



> Ball Valve Floating Type Flanged End - 150#



BALL VALVE FLOATING TYPE FLANGED END - 150#

1	Type of Valve	:	Carbon Steel Ball Valve
2	Make		Vendor to specify
3	Governing Specification	:	API 6D
4	Valve Location and Function	:	Above Ground Installation and Main Line Isolation
5	Service	:	Natural Gas
6	Nominal Valve Size (Inch)	:	2" And above
7	Valve Pressure Class	:	150#
8	Design Pressure	:	19 Barg
9	Operating Pressure	:	4 Barg
10	Service Temperature	:	15°C
11	Design Temperature		0 °C TO 72 °C
12	<u>Material</u>	:	
	Body & cover	:	ASTM A216 Gr. WCB
	Ball	:	SS304/SS316
	Stem	:	SS304/SS316
	Bolting	:	ASTM A193 Gr. B7 and ASTM A194 Gr.2H
	Seal	:	PTFE/Grafoil
	Seat	:	PTFE / RPTFE / MFG STD.
13	Shut off Class	:	VI
14	Valve Design	:	a. Two Piece Construction / Bolted
		•	a. Bie-directional
		:	b. Full Bore

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		:	c. Floating Ball Design
		:	d. Blowout Proof Stem
		:	e. Anti-Static Design
		:	e. Long Pattern
15	Type of Valve Operation	:	Lever Operated
16	Ball position indicator	:	Open & Close Indicator required
17	Support & Lifting Device	:	Not Applicable
18	Pneumatic Test Pressure	:	As per API 6D
19	Hydrostatic Test Pressure	:	Body: API 6D specification (Latest); Seat: API 6D specification (Latest)
20	Fire Test	:	As per API 607
21	Testing	:	As Per API 598
22	Type of End Connection	:	Raised face (serration 125-250 AARH) as per ANSI B16.5
23	Inspection Instruction	:	Test Certificates shall be reviewed by Client / TPIA as per approved QAP
24	RT	:	NA

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> Ball Valve Floating Type Flanged End - 600#



BALL VALVE FLOATING TYPE FLANGED END - 600#

1	Type of Valve	:	Carbon Steel Ball Valve
2	Make		Vendor to specify
3	Governing Specification	:	API 6D
4	Valve Location and Function	:	Above Ground Installation and Main Line Isolation
5	Service	:	Natural Gas
6	Nominal Valve Size (Inch)	:	1" And above
7	Valve Pressure Class	:	600#
8	Design Pressure	:	98 Barg
9	Operating Pressure	:	40 Barg
10	Service Temperature	:	30 °C TO 50 °C
11	Design Temperature		0 °C TO 72 °C
12	Material	:	
	Body & cover	:	ASTM A216 Gr. WCB
	Ball	:	SS304/SS316
	Stem	:	SS304/SS316
	Bolting	:	ASTM A193 Gr. B7 and ASTM A194 Gr.2H
	Seal	:	PTFE/Grafoil
	Seat	:	PTFE / RPTFE / MFG STD.
13	Shut off Class	:	VI
14	Valve Design	:	a. Two Piece Construction / Bolted
		:	a. Bie-directional

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		:	b. Full Bore
		:	c. Floating Ball Design
		:	d. Blowout Proof Stem
		:	e. Anti-Static Design
		:	e. Long Pattern
15	Type of Valve Operation	:	Lever Operated
16	Ball position indicator	:	Open & Close Indicator required
17	Support & Lifting Device	:	Not Applicable
18	Pneumatic Test Pressure	:	As per API 6D
19	Hydrostatic Test Pressure	:	Body: API 6D specification (Latest); Seat: API 6D specification (Latest)
20	Fire Test	:	As per API 607
21	Testing	:	As Per API 598
22	Type of End Connection	:	Raised face (serration 125-250 AARh) as per ANSI B16.5
23	Inspection Instruction	:	Test Certificates shall be reviewed by Client / TPIA as per approved QAP
24	RT	:	NA

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> BALL VALVE 1" & BELOW FLOATING TYPE

	RM nergy	BALL	VALVE 1" & BELOW FLOATING TYPE
1	Type of Valve		Carbon Steel Ball Valve
2	Make	 	Vendor to specify
3	Governing Specification		API 6D/ BS 5351
4	Valve Location and Function		Above Ground Installation and Main Line Isolation
5	Service	1:	Natural Gas
6	Nominal Valve Size (Inch)	:	1 " & below
7	Valve Pressure Class	:	800#
8	Design Pressure (Barg)	:	125 Barg
9	Operating Pressure	:	4 Barg
10	Service Temperature	:	15 °C TO 80 °C
11	Design Temperature	:	100 °C
12	Material	:	
	Body & cover	:	ASTM A105
	Ball	:	SS 316/SS304
	Stem	:	SS 316/SS304
	Bolting	:	ASTM A193 Gr. B7and ASTM A194 Gr.2H
	Seal	:	PTFE/Grafoil/MFG STD.
	Seat	:	PTFE/MFG STD.
13	Shut off Class	:	VI
14	Valve Design	:	a. Two Piece Construction / Bolted
		:	a. Bie-directional
		:	b. Full Bore

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		:	c. Floating Ball Design
		:	d. Blowout Proof Stem
		:	e. Anti-Static Design
15	Type of Valve Operation	:	Lever Operated
16	Ball position indicator	:	Open & Close Indicator required
17	Support & Lifting Device	:	Not Applicable
18	Pneumatic Test Pressure	:	As per API 6D
19	Hydrostatic Test Pressure	:	Body : API 6D specification (Latest); Seat: API 6D specification (Latest)
20	Fire Test	:	As per API 607
21	Testing	:	As Per API 598
22	Type of End Connection	:	SOCKET WELD with 100 mm Pups. (SCH.80)
23	Inspection Instruction	:	Test Certificates shall be reviewed by Client / TPIA as per approved QAP
24	RT	:	NA



> 3/4" Stainless-Steel High-Pressure Ball Valve

W II	RM nergy 3/4" S	TAINLE	SS-STEEL HIGH-PRESSURE BALL VALVE
1	Type of Valve	:	Stainless Steel Ball Valve
2	Make	:	Vendor to specify
3	Model No.		Vendor to specify
4	Valve Location and Function	:	Above Ground Installation and Main Line Isolation
5	Service	:	Natural Gas
6	Nominal Valve Size	:	3/4" tube
7	Valve Pressure Class	:	2500#
8	Design Pressure	:	275 Barg
9	Operating Pressure	:	250 Barg.
10	Service Temperature	:	30°C TO 65°C
11	Design Temperature	:	0 TO 72 °C
12	CV Value	:	Vendor to Specify
13	Material	:	
	Body & cover	:	SS 316
	Ball	:	SS 316
	Handle /Handle cover	:	SS 316 with PVC sleeve
	Seal	:	Vendor to Specify
	Seat	:	Vendor to Specify
14	Valve Design	:	A. Valve Orifice: Vendor to Specify
		:	B. Floating Ball Design
15	Type of Valve Operation	:	Lever Operated
16	Type of End Connection	:	3/4" Union O.D (Tube fitting connection)
17	Inspection Instruction	:	Test Certificates shall be reviewed by Client.
18	Actuator	:	Not Applicable

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> Electrical Water Bath Heater

IRM Energy	ELECTRICAL WATER BATH HEATER
GENERAL	
MAKE	Vendor to specify
TYPE	ELECTRICAL WATER BATH HEATER
QTY / SYSTEM	Vendor to specify
TOTAL QTY	Vendor to specify
PROCESS DATA	
Fluid	Natural Gas
FLOW RATE	100 SCMH & Above
Gas Inlet Pressure	15 to 250 Bar (g)
Inlet Temp	5 TO 45 °C
Outlet Temp of PRS	5 TO 15°C
Design Pressure (TUBE)	275 Barg
Specific Gravity	0.60
Water Bath Operating Temp.	80 TO 85 °C
HEATER VESSEL	
Shell Size & Thickness	Vendor to Specify
Shell Material	SA516 Gr. 60/70
Mounting	Horizontal
Vessel Design Pressure	2 Barg
ELECTRIC HEATER	Vendor to Specify

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Type	'U' Shape tubular type
Rating / Qty.	Vendor to Specify
No. of Load Banks	Vendor to Specify
Tube Sheath	Nickel-chrome steel tube (SS304 ERW)
ACCESSORIES ON HEATER	
RTD	Vendor to Specify
Level Switch	Displacer Type
Temperature Gauge	Bimetallic type direct reading
Temperature Switch	Vapor filled temperature switch
Level Gauge	Side mounted Tubular type level gauge
Thermostat	For heater element skin temperature safety (Range : 50 to 300°C)
HEATER TERMINAL BOX	Weather proof type protection class IP 65 or better, and flameproof type suitable to Zone 1
	Gas group IIA & IIB, CIFMR Certified
HEATER CONTROL PANEL	
Type Of Control	ON-OFF Type
Power Feeder	Vendor to Specify
Outgoing Feeder	Vendor to Specify
Location	Vendor to Specify



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Y-Type Strainer

Energy	Y-TYPE STRAINER					
GENERAL						
TAG No.	Ven	dor to Specify				
Service	Filtra	ıtion				
Make	Ven	dor to Specify				
Model no		dor to Specify				
Type	"Y" 1	Гуре				
SERVICE CONDITION		NI - I I	<u></u>	11.11		
Fluid State		Natural		Unit		
Flow Rate- MIN/OP/MAX	1.5	450		SCMH		
Inlet/Line Pressure-Min/Op/N		То	250	Barg		
Temperature - MIN/OP/MAX						
Sp. Gravity/Mol.wt.	0.8					
VALVE & ACTUATOR CONSTR	UCTION					
Body Size	3/4"					
End Connection		Screwed With NPTF				
Rating		2500#				
Filtration Size	100 /	100 MESH				
Impulse Connection	NA	NA				
Impulse Size	NA	NA				
Leakage Class	Clas	Class VI				
MATERIAL						
Body		A479 Gr. 304				
Bottom		A479 Gr. 304				
MESH	CC20	SS304				

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"O"-Ring	Nitrile
Bolt	A193 Gr. B8
WASHER	SS304

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> Shut-Off Valve

Energy	SHUT-OFF VALVE					
GENERAL						
TAG No.	Vendor to	Specify				
Service	Shut Off					
Make	Vendor to	Specify				
Model no	Vendor to	Specify				
Туре	Globe					
SERVICE CONDITION						
Fluid State		CNG		Unit		
Flow Rate- MIN/OP/MAX		450		SCMH		
Inlet/Line Pressure-Min/Op/Ma	ax 15	То	250	Bar(g)		
Temperature - MIN/OP/MAX	30	То	50	°C		
Signal Pressure		25		Barg		
DP Shut off		250		Barg		
Sp. Gravity/Mol.wt.			0.8			
Set Signal Pressure		25		Barg		
Set Pressure Range		23 to 35		Barg		
VALVE SIZING DATA						
Regulation	Shut off	Shut off				
	•					
VALVE & ACTUATOR CONSTRU	ICTION					
Body Size	3/4"	3/4"				
End Connection		Screwed To NPT(F)				
Rating	2500#	2500#				
Impulse Connection	External	External				
Impulse Size	½" NPTF	½" NPTF				

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Leakage Class	Class VI	
MATERIAL		
Body	SS304	
Bonnet	SS304	
Diaphragm	Nitrile	
"O"-Ring	Nitrile	
Piston	SS316	
Spring	Spring Steel	
Spring Casing	C.S	
Cap	Aluminium	



> Self-Actuated Downstream Pressure Control Valve (2500#)

SELF AC	TUATED DO	WNSTRE	AM PI	RESSI	URE CONTROL VALVE
GENERAL					
TAG No.	Vendor	to Specify	,		
Service	Pressure	Regulation	n		
Make	Vendor	to Specify	′		
Model no	Vendor	to Specify	′		
Type	Globe				
SERVICE CONDITION		CNC			11
Fluid State		CNG	450		Unit
Flow Rate- MIN/OP/MAX	15	100/250/	450 25	^	SCMH Bar(a)
Inlet Pressure Min/Op/Max	13	To	25	U	Bar(g)
Outlet Pressure-Min/Op/Max	30	20		Bar(g) °C	
Temperature - MIN/OP/MAX DP Shut off	30	1 .0 1 00			
Sp. Gravity/Mol.wt.		20 Barg		0.8	
Set Pressure		20			Barg
Set Pressure Range		17 to 25			Barg
or ressere kange		17 10 25 Baily			
VALVE SIZING DATA					
Regulation	Downstr	Downstream			
Calculated Cv	Vendor	Vendor to specify			
Selected Cv	Vendor	Vendor to Specify			
Predicted Noise Level dBA-at 1m	< 85 dba	< 85 dba			
VALVE & ACTUATOR CONSTRUCTIO	N				
Body Size	3/4"	3/4"			
End Connection	Screwed	Screwed To NPT(F)			

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Rating	2500#
Impulse Connection	Internal
Impulse Size	NA
Leakage Class	Class VI
MATERIAL	
Body	SS304
Bonnet	SS304
Trim	SS316
Disc	Nylon
Diaphragm	Nitrile
"O"-Ring	Nitrile
Set Screw	SS 304
Spring	Spring Steel
Spring Casing	C.S
Сар	Aluminium



> Pilot Operated Downstream Pressure Control Valve (300#)

Energy	PILOT OPERATED DOWNSTREAM PRESSURE CONTROL VALVE					
GENERAL						
TAG No.		Vend	or to Sp	pecify		
Service				julating/Shu	ut-off	
Make			or to Sp			
Model no			or to Sp			
Туре		Pilot (Operat	ed		
SERVICE CONDITION	N					
Fluid State	<u> </u>		CNG		Unit	
Flow Rate- MIN/O	P/MAX	10	0/250/	450	SCMH	
Inlet Pressure-Min/			20		Bar(g)	
Outlet Pressure-Mi			4		Bar(g)	
Temperature - MII	V/OP/MAX	30	То	50	°C	
DP Shut off			16 Barg		Barg	
Sp. Gravity/Mol.w	†.		0.8		0.8	
VALVE SIZING DAT	ΓΔ					
Regulation		Dowr	nstream	<u> </u>		
Calculated Cg			or to Sp			
Selected Cg			Vendor to Specify			
Predicted Noise L	evel dBA-at 1m		< 85 dba			
VALVE & ACTUATO	OR CONSTRUCTION					
Body Size		1"	1"			
End Connection		Flang	Flanged RF, SERR			
Rating			ANSI B 16.5, 300#			
Hydro Test Pressur	e For Body		72 Barg			

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Certification	EN 334
Impulse Connection	External
Impulse Size (PRV)	Vendor to Specify
Impulse Size (SSV)	Vendor to Specify
Leakage Class	Class VI
MATERIAL	
Body	A352 Gr. LCB
Top Cover	SA516 Gr.70.
Plug Rod	A479 Gr.316
Trim Stem	A479 Gr.316
Polymer	Nitrile
Casing (Top & Bottom)	A350 GR.LF2
Spring	Spring Steel
Pilot Body	AL ALLOY 6061-T6
Plug (SSV)	A479 Gr.316



> Creep Relief Valve (600#)

Energy	CREEP RELIEF VALVE					
GENERAL						
TAG No.	Vendor to Specify					
Service	Creep Relief					
Make	Vendor to Specify					
Model no	Vendor to Specify					
Type	Vendor to Specify					
SERVICE CONDITION						
Fluid State	CNG Unit					
Line Pressure	20 Barg					
Temperature - MIN/OP/MAX	30 To 50 °C					
Sp. Gravity/Mol.wt.	(0.8				
Set Pressure	23	Barg				
Set Pressure Range	16 to 25	Barg				
VALVE SIZING DATA						
Regulation	Upstream					
VALVE & ACTUATOR CONSTRUCT	ION					
Body Size	1/2"					
End Connection	1/2" SCREWED TO NPTF					
Rating	600#					
Impulse Connection	NA					
Impulse Size	NA					
Leakage Class	Class VI	Class VI				
MATERIAL						

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Body	A 479 Gr.304
Plug	SS316
Diaphragm	Nitrile
Actuator/Spring Casing	SS304
Spring	Spring Steel
Set Screw	A193 Gr.B8

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> Creep Relief Valve (300#)

Energy	CREEP RELIEF VALV	'E
GENERAL		
TAG No.	Vendor to Specify	
Service	Creep Relief	
Make	Vendor to Specify	
Model no	Vendor to Specify	
Type	Vendor to Specify	
SERVICE CONDITION		
Fluid State	CNG Un	
Line Pressure	4 Ba	
Temperature - MIN/OP/MAX	30 To 50 °C	
Sp. Gravity/Mol.wt.		0.8
Set Pressure	4.5	Barg
Set Pressure Range	1 to 5	Barg
VALVE SIZING DATA		
Regulation	Upstream	
VALVE & ACTUATOR CONSTRUCTI		
Body Size	1/2"	
End Connection	1/2" SCREWED TO NPTF	
Rating	300#	
Impulse Connection	NA	
Impulse Size Leakage Class	NA Class VI	
	I (`las \/I	

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Body	A 479 Gr.304
Plug	SS316
Diaphragm	Nitrile
Actuator/Spring Casing	SS304
Spring	Spring Steel
Set Screw	A193 Gr.B8

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Bourdon Pressure Gauge

IRM Energy	BOURDON PRESSURE GAUGE
GENERAL	
Make	Vendor to specify
Model	As per mfg. standard
Туре	Bourdon
Conforming Standard	AS PER EN 837
Accuracy	± 1.00% OF FSD
Temperature Limit	80 °C
Over Pressure Limit	130 % OF FSD
Dial Size	100 mm
Mounting	Local
MATERIAL	
Sensor / Socket	SS 316
Movement	SS 304
Case & Ip Class	SS304 + IP 65 or better
Window	Toughened Glass/Shatterproof Glass
Pointer	Black Aluminium, Balanced
Dial Colour	White With Black Graduations
Bezel Ring	Bayonet Lock Type, Ss 304
End Connection	1/2" NPTM
Connection Location	Bottom
Blow Off Disc	Required



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> Temperature Gauge

(Energy	TEMPERATURE GAUGE
GENERAL	
Make	Vendor To Specify
Model	As Per Mfg.
Туре	Direct Reading
Sensor	Bimetallic, Every Angle
Accuracy	± 1% Of FSD
Over Temperature Limit	125 % Of FSD
Dial Size	100 Mm
Mounting	Local
MATERIAL	
Stem	SS 316 - Adjustable Union
Stem Type	Every Angle
Movement	SS 304
Case	SS 304
Bezel	SS 304
Window	Shatterproof Glass
Pointer	Black Aluminium
Dial Colour	White with Black Graduation
Bezel Ring	Bayonet Lock Type
Stem Od	10 mm
End Connection	1/2" NPTM
Enclosure	Weather Proof to IP67



THERMOWELL DETAILS:	
Material	SS316
Туре	BAR STOCK DRILLED
Thermowell Id	Vendor to Specify
Thermowell Od	Vendor to Specify
Process Connection	Vendor to Specify
Flange Material	Vendor to Specify
Instrument Connection	1/2" NPTF



Level Gauge

Energy	LEVEL GAUGE
GENERAL	
Make	Vendor to specify
Model	Vendor to specify
Type:	Tubular
Material	
Chamber	CS
Glass	Glass Tube
Cover Plate	CS
Studs	SA 193 B7
Nuts	SA 194 2H
Gaskets	PTFE
Cocks	
Туре	Off-set with Integral Ball check
Body of cock	A105
Trim of cocks	SS 304
Ball Checks	Yes
Closing	Quick
Type of Conn.	
Connection of Gauge	Side-Side
Process Connection	Flanged, RF



Size & Rating	3⁄4", 150#
Vent	1/2" NPT(F) with plug
Drain	1/2"NPT(F) with valve & plug
Bonnet Type	NA
C-C Distance	Vendor to Specify
Temperature Range	(25-100) °C
Marking Scale	YES-SS304



Differential Pressure Gauge

Energy	DIFFERENTIAL PRESSURE GAUGE
GENERAL	
Make	Vendor to specify
Model No.	As per mfg. standard
Accuracy	± 3% FSD
Sensing element	Magnetic piston with compression spring
Wetted parts	SS 316, SS 302 compression spring, seal, ceramic magnet
Case material	SS316
Dial size in (mm)	100 mm
Mounting	Local
Max. working pressure (Static)	400 bar
Max. process temperature	80 °C
Case & IP Class	SS316 + IP 65 or better
Window	Toughened
Connection	1/4" NPTF
Porting	In-line In-line
Seals	Buna-N
Over range protection	Up to the max. working pressure from high & low side
Additional Requirement	NA
Accessories	3 VALVE MANIFOLD - R TYPE, SS 316 (By Nirmal)
Documentation	INTERNAL TEST & CALIBRATION REPORT
Range	0 to 1000 mbar

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Temperature Switch

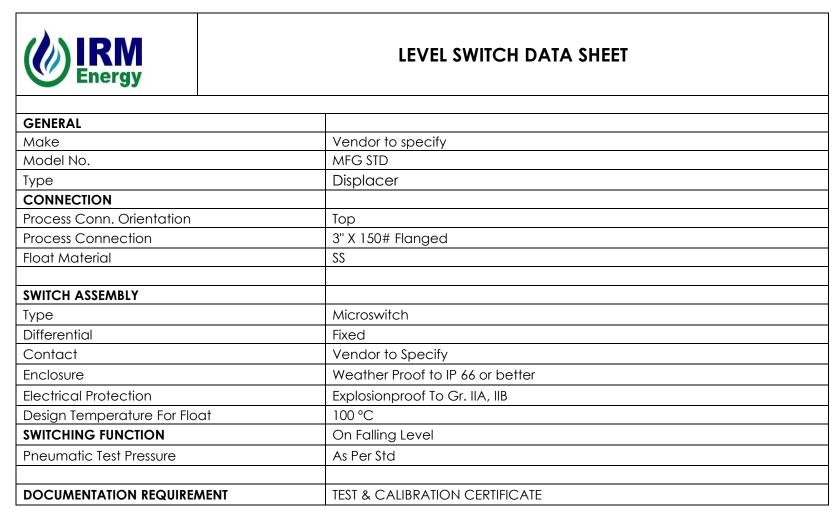
Energy	TEMPERATURE SWITCH
GENERAL	
Tag No.	Vendor to Specify
Make	Vendor to specify
Туре	Vapor Filled
Repeatability	± 2% OF FSD
Pressure	ATM to 0.5 BARG
Mounting	Bottom, Local
Process Connection	1/2" NPTM
Wetted Parts	SS 316
Contact	1 SPDT MICROSWITCH
Rating	Vendor to Specify
Protection	IP65 or better
Enclosure	Flameproof To ZONE1. Gr. IIA & IIB / CLASSI DIV1 Gr. C & D
Cable Entry	1/2" NPTF
THERMOWELL	
Material	SS316
Process Connection	3/4" NPTM
Instrument Connection	1/2" NPTF
U Length	Vendor to Specify
Thermowell Id	MFG STD



Thermowell Od	Vendor to Specify	
DDO OFFIC COMPLETION		
PROCESS CONDITION		
Pressure	atm - 0.5 Bar(g)	
Temperature	80 °C	
Fluid	Water	
Set Point	90 ℃	
Set Range	0 - 120 °C	



Level Switch





> Resistance Temperature Detector

Energy	RESISTANCE TEMPERATURE DETECTOR						
GENERAL							
Make	Vendor To Specify						
Model	As Per Mfg. Standard.						
Sensor	Vendor to Specify						
Service	Natural Gas						
Accuracy	As Per DIN EN 60751						
Configuration	3 Wire						
Head	Explosion Proof To IIA/IIB						
Head Cover Type	Screwed Cap with SS Chain						
Material	Cast Aluminium						
Cable Entry	1/2" NPTF						
End Connection	1/2" NPTM						
Sheath Material	SS 316						
Sheath Dia	6 Mm						
Terminals	Spring Loaded & Mineral Insulated						
THERMOWELL DETAILS:							
Material	SS 316						
Туре	Bar Stock Drilled						
U - Length	Vendor to Specify						
Thermowell ID	Vendor to Specify						
Thermowell OD	Vendor to Specify						
Process Connection	3/4" NPTM						
Flange Material	NA						



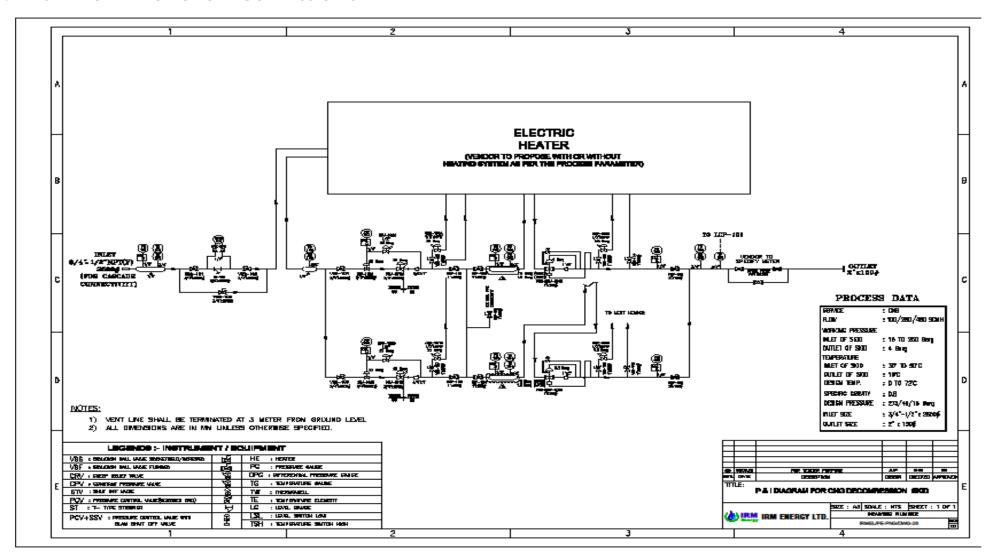
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INSTRUMENT CONNECTION	1/2" NPT(F)

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7.2 P&I DIAGRAM FOR CNG DECOMRESSION SKID





7.3 QUALITY ASSURANCE PLAN FOR CNG DECOMRESSION SKID

QUALITY ASSURANCE PLAN FOR DECOMPRESSION SKID



Sr	Description	Description Characteristic	Type of Check Extent/Quantum of Check	D. f.		/	Scope			
No					Reference	Acceptance Criteria	Record/Formats	Vendor	TPIA	Client
1	Drawing & Calculations									
1.1	P&ID, GAD, BOM, QAP, Material Datasheet, Instrument datasheet, FAT	Complete Skid	Submittals	100%	IRMEL's Technical Specifications, Datasheet	Approved Datasheet	Manufacturer format	Р	RF	A
2	Incoming Material Identifi	ication of Brought out	Items							
			Chemical Test	Per Heat No	IRMEL's Technical Specifications, Datasheet	Approved Datasheet			R	
	Isolation ball valves & strainers	valves (Ter Eld	Physical Test (Tensile, Yeild, Elongation, Hardness Test)	Per Heat No		Approved Datasheet		Р		R
2.1		Dimension- Size Rating, End connections	Visual Measurement	100%	As per IRMEL datasheet	Approved Datasheet	Manufacturer's Inspection	Р	R	R
		Body Hydro Test as per standard	Leak Test	100%	As per IRMEL datasheet & Manufacturing Std	As per IRMEL datasheet & Manufacturing Std	Report	Р	R	R
		Seat Test ss applicable	Leak Test	100%	As per IRMEL datasheet & Manufacturing Std	As per IRMEL datasheet & Manufacturing Std		Р	R	R
2.2	Pressure Gauge, Differential Pressure Gauge, Temp. Gauge, Level gauge	Calibration, Accuracy, range, size, dimension & End connection	Visual, Measurement	100%	Approved datasheet	Approved datasheet	Manufacturer's Inspection Report	Р	R	R

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Sr	Description	Ch	Type of Check	Extent/Quantum of Check	Reference	Acceptance Criteria	Record/Formats			
No		Characteristic						Vendor	TPIA	Client
2.3	Pressure Switch, Temperature Switch & Level Switch	Verification of serial no w.r.t MFR TC, Calibration report, visual & modal no	Visual, Measurement	100%	Approved datasheet	Approved datasheet	Manufacturer's Inspection Report	Р	R	R
2.4	Electric Heater	Verification of serial no w.r.t MFR TC, visual & modal no	Visual, Measurement	100%	Approved datasheet	Approved datasheet	Manufacturer's Inspection Report	Р	R	R
2.5	Pipe, Pipe fittings, Flanges for interconnecting piping,	Material TC, size & dimension	Chemical Test, Physical Test (Tensile, yield, elongation, hardness test), Impact Test	Per Heat No	Piping material specification	Piping material specification	Manufacturer's Inspection Report	Р	R	R
3	Equipment (Heater Vessel)							u l	
	Heater Vessel	Pipes, Plates, Flanges, Fasteners, Fittings & other Bought Out Items	Chemical Test Mechanical Test	Per Heat No	Material Spec & Standard	Material Spec & Standard	Manufacturer's Inspection/ Lab Test Report	Р	R	R
		WPS & PQR	Welders Qualification & Welding	100%	As per ASME Sec. IX	As per ASME Sec. IX	WPS/PQR from record	Р	R	R
3.1		In process inspection	Fit Up, All joints	100%	Approved Drawing	Approved Drawing & Standards	Manufacturer's Inspection Report	Р	R	R
		DP test on fillet welds	Surface Defects	100%	As per ASME Sec V	As per ASME Sec VIII DIV 1	Manufacturer's Inspection Report	Р	W	R

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Sr	Description		Type of Check	Extent/Quantum of Check	Reference	A	Record/Formats	Scope			
No		Characteristic				Acceptance Criteria		Vendor	TPIA	Client	
		Radiography after final weld	Internal Defects	100%	As per ASME Sec V	As per ASME Sec VIII DIV 1	Manufacturer's Inspection Report	Р	W	R	
		Visual & Dimension Checking of Filter	Surface finish, dimensions	100%	Approved Drawing	Approved Drawing	Manufacturer's Inspection Report	Р	w	R	
		Hydro Test Pressure- 1.3 times Design Pressure (Hold time 30 min)	Strength of weld joints	100%	Approved drawing	ASME SEC VII Div 1 UG- 99	Manufacturer's Inspection Report	Р	W	W	
		Hydro Test Pressure- of Heater coil as per Drawing	Strength of weld joints	100%	Approved drawing	Approved drawing	Manufacturer's Inspection Report	Р	W	W	
4	Interconnecting piping										
4.1	WPS/PQR & WPQ	WPS/PQR & WPQ	Welders Qualification & Welding	100%	ASME Sec IX/ ASME Sec 31.8	WPS & PQR meeting requirements and duly approved with test results of test coupons	WPS/PQR & WPQ from record	Р	R	R	
4.2	DPT of fillet weld joints after final welding	Dye Penetration Test	To identify external surface defects	100% of total Joints	ASME Sec V, Clause No 344.6	ASME B 31.3	Manufacturer's Inspection Report	Р	W	R	
4.3	Radiography Test of Butt weld joint	To identify internal surface defects	Radiography test	100% of total Joints	ASME Sec V, Clause No 344.5	ASME B 31.3	Manufacturer's Inspection Report	Р	W	R	

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Sr		scription Characteristic	IVDA OT CDACK	Extent/Quantum	Reference		Record/Formats			
No	Description			of Check		Acceptance Criteria		Vendor	TPIA	Client
4.4	Hydrotesting of interconnecting Piping	Hydro Test	Strength	100%	1.5 times of design pressure for 30 min	ASME B 31.8 & IGE/TD/13	Manufacturer's Inspection Report	Р	W	w
5	Mfg. of PCV+SSV, PSV, CR	V & FA for Valves					1			
5.1		Material TC for Body & Trim	Chemical Test & Physical Test	100%	IRMEL's Technical Specifications, Datasheet			Р	R	R
5.2	PCV+SSV, PSV, CRV	Dimension-Size, Rating, End Connection	Visual, Measurement	100%		Approved Data Sheet	Manufacturer's TC & Reports	Р	R	R
5.3		Body Hydro Test as per standard	Leak Test	100%				Р	R	R
5.4		Set Point	Visual				Р	R	R	
6	Final Inspection Test of Ski	d Assembly								
6.1	Final Dimension/ Visual Inspection	Complete Skid	Visual Inspection	100%	Approved P&ID, GAD, Drawing of Canopy, Platform, Filter Element	Approved Document	Reports	Р	W	٧
	Paint of Skid (Valve, PRV, SSV, Filters, Piping, PSV & CRV		Visual & Final		Surface Preparation as per 3.0	As per ISP 8501-1		Р	R	R
6.2			100%	Visual & DFT check as per approved painting specs	Approved paint procedure	Inspection report	Р	٧	٧	

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Sr	Description	Characteristic	Type of Check	Extent/Quantum of Check	Reference	Acceptance Criteria	Record/Formats	Scope		
No		Characteristic						Vendor	TPIA	Client
6.3	Factory acceptance test	Set point test of PRV+ SSV, Pneumatic test of flange joints of skids at 7 Barg upto inlet of PRV & at regulating pressure at Outlet of PRV.	Performance test	100%	Approved FAT procedure	Approved FAT procedure	FAT Report	Р	W	W
7	Final Documentation									
7.1	Design & Calculation, material compliance report, Calibration certificate, GAD & P&ID, Final FAT report, NDT report, Hydro & pneumatic report	History docket	Verification Records	100%	Approved specification	As per approved specification	History Docket	Р	R	R