TABLE OF CONTENTS

I - INVITATION TO BID

(To be typed on OGDC Letter Head)

Date: (Issuance of Invitation)

Subject: **INVITATION FOR BIDS (IFB), SECTION - I**

Dear Sirs,

1. The Qadirpur Field is operated by Oil & Gas Development Co. Ltd. (OGDCL) located in Gotki District near Sukker city in Sindh Province.

   OGDCL intends to construct a surface facility to process raw gas from KPD & TAY and minimize carbon dioxide content and to maximize the recovery of LPG from well gas and condition the gas to meet the specification for entry in to the Sui Southern Gas Company's transmission system.

   For implementation of the project two (02) similar amine based gas sweetening units having capacities of 125 MMSCFD (for each train) will be constructed to process gas having high carbon dioxide content. In this connection, sealed Bids are hereby invited for Design, Fabrication, Supply, Installation Supervision, Complete Testing and Commissioning of Filter Coalescer Package for KPD-TAY Integrated Development Project by OGDCL.

   The Tender Document defines the basis for the bid proposals and consists of following Volumes together with any Addenda that may be issued from time to time:

   - **Volume – I**

     – Section – I : Invitation to Bid
     – Section – II : Instructions to Bidders (ITB)
     – Section – III : Scope & Specifications
     – Section – IV : Form of Contract
     – Section – V : Conditions of Contract

   - **Volume – II**

     –TOR, P&ID and Datasheets, SOW (Mechanical and Electrical & Instruments Specifications)

2. You are required, within one (1) week of receipt of Tender Documents to execute/submit the following, the formats of which are enclosed with this invitation:

   – Letter of Intention to Bid or Declining to Bid
   – Secrecy declaration

3. Your offer must be valid for 180 days from the bid submission date.

4. All bids must be accompanied with a Bid Bond (Bank Guarantee) of an Amount of **US$ 30,000/-** or equivalent Pak Rupees and must be delivered to the OGDCL's office on or before 1100 Hours on _____ 2019.

5. Clarification, or any other information, if required can be obtained by addressing to OGDCL whose addresses are given below:

   Manager (P&P)-South
   Oil & Gas Development Company Limited
   OGDCL House, Jinnah Avenue, Blue Area

Islamabad, Pakistan
Telephone: (92-51) 920023704
Email: muhammad.asghar@ogdcl.com

Dy. Chief Engineer (Mech)
Oil & Gas Development Company Limited
OGDCL House, Jinnah Avenue, Blue Area
Islamabad, Pakistan
Telephone: (92-51) 920024194
Email: saifniazi@ogdcl.com

Junior Engineer (Mech.)
Oil & Gas Development Company Limited
OGDCL House, Jinnah Avenue, Blue Area
Islamabad, Pakistan
Telephone: (92-51) 920022684
Email: ahsan.waqar@ogdcl.com

7. OGDCL reserves the right to reject any or all Bids or cancel the tender at anytime without assigning any reason thereof in line with PPRA rule # 33.

8. Bidders are advised to carefully review and examine the enclosed Tender Documents and site conditions for assessment of work involved. The Tender Documents contains required information necessary for preparation of the Bid. However, it is the sole responsibility of the Bidder to become fully informed about existing and expected conditions that may affect performance of its obligations under the Contract.

9. The Bidder who is formally selected by OGDCL shall be required to enter into Contract with OGDCL, incorporating the provisions stated in this document.

10. The Bids are invited under Two Stage – Two Envelope Bidding procedure i.e. Technical Bid and Commercial Bid. The Bids are required to be submitted in two seperate envelopes sealed and clearly marked as per details given in enclosed Instructions to Bidders.

11. OGDCL reserves the right at the time of award of Contract to increase or decrease the quantities of material specified in the Tender document or give partial order without any change in unit price or other terms and conditions.

Kindly acknowledge receipt of the documents by return telefax to the undersigned.

Thanking you,

Truly yours,
for OIL & GAS DEVELOPMENT COMPANY LTD.

( )

Encls.: As above.

LETTER OF INTENTION TO BID

Oil & Gas Development Company Limited
Islamabad
(Pakistan)

Dear Sir(s)

TENDER DOCUMENT FOR DESIGN, MANUFACTURING, SUPPLY INCLUDING INSTRUMENTATION ALLIED PIPING, MATERIAL ETC, INSTALLATION SUPERVISION, COMPLETE TESTING AND COMMISSIONING OF FILTER COALESCER SYSTEM

Tender Enquiry No. **PROC/FC/CB/P&P/QP-4286/2019**

We acknowledge receipt of the above mentioned Tender Documents.

We confirm that we shall be submitting our Bid complying with the Tender Documents on intimated Bid submission date.

Note: *Bidder must confirm participation in the bidding process along with principal's name at least ten working days before bid submission date on email : irshad_muhammad@ogdcl.com*

Yours faithfully

Signature: _____

Name: _____

Position: _____

Company: _____

LETTER OF DECLINING TO BID

Oil & Gas Development Company Limited
Islamabad
(Pakistan)

Dear Sir(s)

TENDER DOCUMENT FOR DESIGN, MANUFACTURING, SUPPLY INCLUDING INSTRUMENTATION ALLIED PIPING, MATERIAL ETC, INSTALLATION SUPERVISION, COMPLETE TESTING AND COMMISSIONING OF FILTER COALESCER SYSTEM

Tender Enquiry No. **PROC/FC/CB/P&P/QP-4286/2019**

We acknowledge receipt of the above mentioned Tender Documents.

We regret in this instance, that we shall not be submitting the Bid. We are therefore, returning herewith the Tender Documents in full together with duly signed Secrecy Declaration for your record.

Yours faithfully

Signature: _____

Name: _____

Position: _____

Company: _____

_____

SECRECY DECLARATION

Oil & Gas Development Company Limited
Islamabad
(Pakistan)

Tender Enquiry No. **PROC/FC/CB/P&P/QP-4286/2019**

We the undersigned _____ having our principal office at _____ (hereinafter referred to as the Bidder) hereby declare to Oil & Gas Development Company Limited, Islamabad – Pakistan (hereinafter referred to as OGDCL) to accept the following terms and conditions on which OGDCL is prepared to communicate to the Bidder certain Confidential Information as hereinafter defined:

1. **DEFINITIONS**

1.1 The Project shall mean DESIGN, MANUFACTURING, SUPPLY INCLUDING INSTRUMENTATION ALLIED PIPING, MATERIAL ETC, INSTALLATION SUPERVISION, COMPLETE TESTING AND COMMISSIONING OF FILTER COALESCER PACKAGE.

1.2 "Confidential Information" shall mean any knowledge and information in connection with the Project at any time disclosed to the Bidder by or on behalf of the OGDCL in writing, in drawing or in any other form or acquired by the Bidder from the OGDCL, as well as all data derived from such knowledge and information at the time of such disclosure or acquisition is not:

- in the free and lawful possession of the Bidder or
- part of public knowledge or literature.

1.3 "Confidential Record" shall mean all manuals, specifications, drawings, letters, telexes and any other material containing Confidential Information. For the purpose of Clauses 2 and 5 Confidential Information shall include Confidential Record.

1.4 The Confidential Record shall be such information as may be given by OGDCL.

2. **CONFIDENTIALITY**

2.1 **The Bidder**

- shall preserve and cause its employees to preserve the secrecy of all Confidential Information.
- Shall not except with the prior written consent of OGDCL and subject to the conditions contained in Clause 5, for any purpose other than the performance of the contracts for the Project or the preparation and submission of a bid for the Project.
    i) disclose to any third party or enable any third party to note that fact that the Bidder has been invited to submit a bid for the Project and/or, if applicable, the fact that the Project has been entrusted to the Bidder.
    ii) reproduce, copy or use, or disclose to, place at the disposal of or use on behalf of any third party or enable any third party to peruse, copy or use, any Confidential Information

2.2 The undertakings under clause 2.1 above shall continue in so far as the Confidential Information in question has not:

- become part of public knowledge or literature, or
- been disclosed to the Bidder by a third party (other than one disclosing on behalf of OGDCL) whose possession of such information is lawful and who is under no secrecy obligation with respect to the same.

3. **COPYRIGHT**

The copyright in the Confidential Record shall, in the absence of any express provision to the contrary be vested in OGDCL.

4. **RETURN OF CONFIDENTIAL RECORD**

Upon completion of the Project, or if it is decided that the Project will not be entrusted to the Bidder, upon notification to the Bidder of such decision, the Bidder shall return to OGDCL all Confidential Record.

5. **THIRD PARTY**

The Bidder shall ensure that under the terms of this Secrecy Declaration any of the Confidential Information comes to the knowledge and/or in the possession of any third party, the Bidder shall require from such third party that it shall abide by stipulations equivalent to those contained in this Secrecy Declaration.

Agreed and accepted this _____ day of _____.

Signature: _____

Name: _____

Position: _____

II – INSTRUCTIONS TO BIDDERS

TABLE OF CONTENTS

LIST OF ANNEXURES

ANNEXURE – I	:	CORPORATE & FINANCIAL INFORMATION
ANNEXURE – II	:	RELATED PROJECTS BEING EXECUTED
ANNEXURE – III	:	RELATED PROJECTS EXECUTED DURING LAST SEVEN (07) YEARS
ANNEXURE – IV	:	HSE DETAILS
ANNEXURE – V	:	TECHNICAL SUPPORT SERVICES
ANNEXURE – VI	:	BID BOND
ANNEXURE – VII	:	FORM OF TENDER OR BIDDING FORM
ANNEXURE – VIII A	:	INTEGRITY PACT
ANNEXURE – VIII B	:	INTEGRITY & ETHIC UNDERTAKING
ANNEXURE – IX	:	DATA SUMMARY SHEET
ANNEXURE – X	:	BID PRICE SCHEDULE
ANNEXURE – XI	:	THIRD PARTY INSPECTION SCOPE
ANNEXURE – XII	:	DEVIATION FORM
ANNEXURE – XIII	:	PERFORMANCE BOND FORM

1.0 **GENERAL**

1.1 **Project Background and Description**
OGDCL intends to install filter coalescer package at its Qadirpur Field in Sindh Province to prevent water carry over to compressors.

1.2 **Delivery Period**
The timely delivery shall be the essence of the Contract, as OGDCL has to meet its obligations. Accordingly, the Supplier is required to complete the Design, Fabrication and Supply of Filter Coalescer Package within eight (08) months on CFR Karachi Sea Port basis from the date of establishment of supply letter of credit by OGDCL.

A notice shall be given by OGDCL after preparation of site for commissioning services of the package which shall be done within sixty (60) days after establishment of services letter of credit. The bidder/packager shall provide firm mobilization schedule within ten (10) days of issuance of notice by OGDCL which shall ensure mobilization of bidder/packager experts not later than 15 days.

1.3 **Eligibility Requirements**
Bidders must meet the following eligibility requirements:

a) The equipment to be supplied under the Contract must be produced in and supplied from a country maintaining bilateral trade relation with the Islamic Republic of Pakistan.

b) JV arrangement is not acceptable only OEMs or OEMs approved packagers shall submit the bids for the supply of whole package. OEM's approved packagers must submit authorization letter from manufacturer.

c) Eligibility requirements along with marks is detailed below:

Sr. #		Calculation of Marks	Max Marks	Min Qualifying Marks	Remarks
1	Manufacturer /Packager Experience	10 years of experience shall be awarded 20 marks and less than 10 years will be awarded zero marks	30	20	02 points shall be awarded for each year of experience in excess of 10 years.
2	Compliance of Documents TOR, 2895-PB-2101 2895-SP-001~004 2895-DS-001~18	15 Marks	15	15	Complete Compliance to be provided through separate letter otherwise zero marks shall be awarded
3	Completion Certificates for supply of similar size or bigger U-Stamp pressure vessels for last 10 years	05 Completion Certificates shall be awarded 15 marks below that zero marks	25	15	Each completion certificate in excess of 05 will be awarded 05 marks within maximum limit
4	a. Valid ASME U-Stamp b. Valid ASME R Stamp	15 Marks 05 Marks	20	15	Copy to be provided with the bid. However U-Stamp is mandatory requirement otherwise bid will be rejected
5	Valid ISO 9000 Certificate	10 Marks	10	10	Copy to be provided with the bid

Note:

The bidder shall have to obtain a minimum of 75 marks to be considered technically qualified. The Bidder and its engineering staff shall meet all the requirements of Pakistan Engineering Council (PEC)

Act 1976, its by-laws and latest amendments and provide documents to OGDCL to this effect **(where applicable only).**

1.4 **Cost of Bidding**

a) The Bidder shall bear all costs associated with the preparation and submission of its bid, and OGDCL will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

b) The Bidder shall bear all costs of obtaining and submitting Bid Bond, Performance Guarantee and all other documents required as per instructions in the Tender Document.

1.5 **Assurance**

The successful Bidder will be required to give satisfactory assurance of its ability and intention to complete the Design, Fabrication, Supply, Installation Supervision, Complete Testing and Commissioning of Acid Gas Incinerator System, pursuant to the contract within the time set-forth therein.

1.6 **Agents/Representatives**

The Agents/Representatives can collect the tender document and submit the Bid (Including the Bid Bond) on behalf of their principals. However, they shall be required to submit Agency/Representation letter (On Principal's Letterhead) duly signed and stamped with authorization for the subject tender. Further the Agent/Representative can represent only one principal.

2.0 **TENDER DOCUMENT**

2.1 **Description of Tender Document**

2.1.1 The Tender Document comprises the following together with any Addenda that may be issued from time to time.

- **Volume – I**

  - Section – I : Invitation to Bid
  - Section – II : Instructions to Bidders (ITB)
  - Section – III : Scope & Specifications
  - Section – IV : Form of Contract
  - Section – V : Conditions of Contract

- **Volume – II**

  - TOR, P&ID and Datasheets, SOW (Mechanical and Electrical & Instruments Specifications)

2.1.2 The prospective Bidder shall carefully study and examine the Tender Document and Instructions and comply with all requirements of preparation of the Bid. Failure to furnish all information required by the Tender Document or submission of a Bid not substantially responsive to the Tender Document in every aspect will be at the Bidder's risk and may result in the rejection of the Bid.

2.1.3 Appropriate portions of the Technical Bid and Commercial Bid and Addenda or selected sections of the above Tender Document as appropriate will be incorporated in the contract that will be executed with the successful bidder.

2.1.4 Bidders may also make any additional enquiries or investigations necessary to become fully informed of all conditions which may affect the scope of work of Supplier. Failure on the part of the Bidder to diligently investigate any condition which may affect Contractor's scope shall not relieve the Bidder of the responsibility of executing the Contract.

2.2 **Clarifications of Tender Document**

A prospective Bidder requiring any clarification of the Tender Document or require any data may notify to OGDCL at below given addresses:

Manager (P&P)-South
Oil & Gas Development Company Limited
OGDCL House, Jinnah Avenue, Blue Area
Islamabad, Pakistan

Telephone: (92-51) 920023704
Email: muhammad.asghar@ogdcl.com

Dy. Chief Engineer (Mech)
Oil & Gas Development Company Limited
OGDCL House, Jinnah Avenue, Blue Area
Islamabad, Pakistan
Telephone: (92-51) 920024194
Email: saifniazi@ogdcl.com

Junior Engineer (Mech.)
Oil & Gas Development Company Limited
OGDCL House, Jinnah Avenue, Blue Area
Islamabad, Pakistan
Telephone: (92-51) 920022684
Email: ahsan.waqar@ogdcl.com

OGDCL will respond in writing to any request for clarifications of the Tender Document, which it receives not later than ten (10) days prior to the deadline for the submission of bids prescribed in the Tender Document. Written copies of OGDCL's response (including an explanation of the query but without identifying the sources of inquiry) will be sent to all participating Bidders.

2.3 **Amendments to Tender Document**

2.3.1 At any time prior to the deadline for submission of Bids, OGDCL may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify the Tender Document by amendment.

2.3.2 The amendment shall form part of the Tender Document, and shall be notified in writing by fax or e-mail to all prospective Bidders who have received the Tender Document, and will be binding on them. The Bidders are required to acknowledge receipt of any such amendment in the Tender Document.

2.3.3 In order to provide prospective Bidders reasonable time in which to take the amendment into account in preparing their Bids, OGDCL may, at its discretion, extend the deadline for the submission of Bids.

3.0 PREPARATION OF BIDS

3.1 Language of Bid

Bid shall be type written or printed. The Bid prepared by the Bidder and all correspondence and documents (i.e. reports, specifications, standards, drawings) relating to the Bid exchanged by the Bidder and OGDCL shall be written in the English language. Any printed literature furnished by the Bidder may be written in another language, provided that this literature is accompanied by an English translation, in which case, for purpose of interpretation of the Bid, English translation shall govern.

3.2 Documents Comprising the Bid

The Bid to be submitted by the Bidder shall comprise of two separate proposals i.e. "Technical Proposal" and "Commercial Bid/Proposal". Two (02) copies each of Technical Bid/Proposal and Commercial Proposal shall be prepared. One set marked "ORIGINAL" and the other sets marked "COPY". In case of any discrepancy in the copy, the ORIGINAL shall govern.

3.2.1 Technical Bid/Proposal

The technical proposal shall consist of the following:

3.2.1.1 General

The following information shall be submitted, separately, with the Technical Bid:

(i) Corporate & Financial information of Bidder and its consortium/joint venture partners as per format given in **Annexure – I.**

(ii) Provide a comprehensive list and details as per (**Annexure – III)** of vessels executed by the bidder company during the last ten (10) years. Certificates of satisfactory completion by the respective client/ owner should be attached with duly filled Annexure-III. Only those orders/projects whose completion certificates are attached would be considered in experience & track record of the bidder/company

(iii) QA/QC, HSE systems/procedures of your organization as per **Annexure-IV**.

(iv) Details of technical support services as per format given in (**Annexure – V)**.

(v) Original Bid bond for an amount of **US$ 30,000/-** or equivalent in Pak Rs. on the format as given in **Annexure – VI**.

(vi) Confirmation of 180 days as Period of validity of the Bid.

(vii) Form of Tender or Bidding Form **Annexure – VII**.

(viii) Letter of Authorization in favour of Officer signing the Bid.

(ix) Duly initialed and stamped copy of Complete Tender Document (Invitation to Bid, Instructions to Bidders, Scope & Specifications, Form and Conditions of Contract, Data Sheets & P&IDs) along with Integrity pact as per **Annexure- VIII A** and Integrity & Ethic Undertaking as per **Annexure- VIII B.**

(x) A statement of total compliance with the requirement of Tender Document.

(xi) Data Summary Sheet as per format given **Annexure – IX**.

(xii) Un-priced Bid Price Schedule as per **Annexure – X.**

3.2.1.2 Technical Details

The technical proposal shall contain following information/details and documents necessarily;

i) Equipment data sheets and proformas, technical specification and technical literature for the filter coalescer package being proposed as per requirements of Tender Document.

ii) P&ID diagram showing limit of supply prepared by supplier.

iii) Brief Process Narrative

iv) The bidder shall provide performance and data sheets for major equipments at operating points asked for in technical specifications.

v) Drawings showing main equipment & skids general arrangement.

vi) Detail list of equipment/packages clearly mentioning skid mount equipment and ship loose equipment/packages

vii) Detailed list of equipment/packages/material to be supplied on CFR delivery.

viii) Delivery period/schedule: Bidder shall mention firm delivery period and submit schedule with target delivery date(s) with work/delivery schedule starting from the date of establishment of supply L/C.

ix) Statement regarding on time arrangements of expatriate by the bidder required for installation supervision, pre-commissioning, start-up & performance testing activities.

x) Statement that the goods are "Brand New".

xi) Availability of after sales service

xii) List of spares for start-up and commissioning. All spares for commissioning & start-up shall be covered. OGDCL shall not be responsible for any payment over and above the price indicated.

xiii) List of recommended spare parts for two (2) years of continuous operation for the equipment being supplied.

xiv) List of recommended personnel safety equipment to protect maintenance personnel and tools.

All the above mentioned documents are necessarily required along with the technical bid. Any missing information may lead rejection of technical bid and may not be considered for technical evaluation.
The technical proposal shall also contain following information/details and documents:

i) Documentary evidence established in accordance with Instructions 3.3 that the equipment and material to be supplied by the Bidder is eligible equipment and material and conform to the Tender Document.

ii) Pre-commissioning/Commissioning plan

iii) Detailed procedure of how physical progress and percent completion will be measured tracked and reported for each component of the scope of the Supplier.

iv) List showing Scope of Supply & Services

v) Typical installation, commissioning, operation and maintenance manual index.

vi) Availability of spare parts of the equipment being supplied with country of origin alongwith lead time period and maintenance center(s) addresses, focus, e-mail to provide backup support.

vii) Testing & Inspection plan, Spares and tools data.

viii) Preliminary pressure vessel test procedure

ix) Skid sizes.

x) Where drawings and data are called for in the tender Document, Bidder is to include the cost in his quoted price. Bidder must also state the time needed for submission of drawings, data, etc., this time schedule to be based from the date of issuance of purchase order/contract.

xi) Bid should conform in all respects to the applicable specifications, drawings and instructions forming part of the Tender Document.

xii) Detailed list of material and equipment (separate of each category) with following information:
- Sources/country of origin.
- Name & complete address with telephone, fax and e-mail of each original manufacturer (including name of contact person)
- Name and address of major sub-suppliers (including name of contact persons) and details of their capability & relevant creditentials.

xiii) Specific Quality Assurance and Quality Control procedures, which the Bidder intends to adopt/follow for equipment and fabrication/manufacturing etc.

xiv) Interchangeability of parts, if applicable.

xv) Undertaking from the manufacturers for compliance of the warrantee liabilities (back-up guarantee) and other after sale service obligations.

xvi) In case the equipment model becomes obsolete or OEM cease to manufacture the particular model, the supplier/bidder has to apprise well in advance and ensure to supply the spares sufficient for at least ten (10) years.

xvii) Likewise any up gradation in the software(s), the same shall be provided free of cost.

Any other information as deemed necessary by the Bidder for the intended & scope of the package. All those items for which information requirements are specifically mentioned in the Scope & Specifications.

3.2.2 **Commercial Bid/Proposal**

3.2.2.1 **Contents of Commercial Bid/Proposal**

i) Photocopy of Bid Bond.

ii) Bid Price Schedule as per **Annexure – X**.

iii) Item-wise break-up of all major items of the Filter Coalescer package (where possible).

iv) Item-wise price list of spares for start-up and commissioning. All spares for commissioning & start-up shall be covered. OGDCL shall not be responsible for any payment over and above the price indicated.

v) Item-wise price list of recommended spare parts for two (2) years operation and the equipment being supplied, as an optional item.

vi) The Expenses on shop witness testing/FAT for by OGDCL at Supplier's offices/manufacturers works located outside Pakistan will be quoted on the following basis:

- **FAT**
  - One (01) Visit for a duration of Seven (07) working days
  - Three (03) Professionals

The Contractor shall provide the following facilities for these visits;

- Full Fare economy class Return Air Tickets and support in obtaining visa
- Hotel Room on Single occupancy basis for each person in a four 04 star hotel for duration of stay.

vii) The installation supervision, commissioning, start-up & performance testing of package shall be Supplier's responsibility accordingly; lumpsum charges are to be quoted with involvement of various discipline engineers.

Note: OGDCL will provide boarding/lodging at site to supplier's expatriates/specialists/engineers involved in installation supervision, commissioning, start-up, testing work. The transport will be provided at site from and to nearest civil airport.

viii) OGDCL shall arrange Third Party Inspection. The scope of the pre-shipment inspection by a third party Inspector shall generally cover the following;

- Review the detailed listing of the material & equipment being shipped by the supplier and other relevant documents.
- Match the details given in the supplier's list with other relevant documents.
- Physical inspection of material & equipment being shipped to verify its condition and conformity with the supplier's list & other relevant documents.
- Witness the loading and seal the container.

ix) Supplier shall also be responsible for completeness of supplies.

x)

3.3 **Documents Establishing Equipment Eligibility and Conformity to Tender Documents**

- The Bidder shall furnish, as part of the Bid, documents establishing the eligibility and conformity to the Tender Documents of the equipment, which the Bidder proposes to supply under the

Contract including a clause-by-clause commentary on the Technical Specifications demonstrating the equipment substantial responsiveness to those specifications.

- The documentary evidence of the equipment eligibility shall consist of a statement in the technical proposal about the country of origin of the equipment offered, which shall be confirmed by a certificate of origin issued at the time of shipment.

3.4 **Compliance**

Bidders Proposals shall comply to terms of reference, documents # 2895-PB-2101, 2895-SP-001~004 & 2895-DS-001-0018 and if found, non-compliance in this regard may lead to rejection of bid.

3.5 **Bid Price**

The Contract shall quote on lumpsum fixed price basis with full responsibility for Design, Fabrication, Supply, Installation Supervision, Complete Testing and Commissioning of Filter Coalescer package.

The prices shall be for complete scope and obligations detailed in this Tender Document. The quoted prices shall be firm and fixed for the Contract performance period and shall not be subject to escalation on any account.

The prices shall be quoted by the Bidder shall be in US Dollars.

The prices shall include all duties/taxes and levies payable on equipment, machinery and other items/services being supplied under the Contract in country of origin or exporting country and Supplier will assume full and exclusive liability on this account.

3.6 **Bid Validity**

3.6.1 The bid shall remain valid for one hundred and twenty (180) calendar days after the date of bid opening prescribed by OGDCL. A bid valid for a shorter period may be rejected by OGDCL as non-responsive.

3.6.2 In exceptional circumstances, OGDCL may solicit the bidder's consent to an extension of the period of validity. The request and the response there to shall be made in writing (by telefax or email). The bid bond provided under Instruction 3.7 shall also be suitably extended. A bidder may refuse the request without forfeiting its bid security. A bidder granting the request will not be required nor permitted to modify its bid.

3.7 **Bid Bond**

3.7.1 The Bidder shall furnish, as part of its Bid, a Bid Bond of an amount of **US$ 30,000/-** or equivalent in Pak Rupees.

3.7.2 The Bid Bond is required to protect OGDCL against the risk of Bidder's conduct which would warrant the Bid Bond encashment pursuant to Instructions given in following paragraphs.

3.7.3 The Bid Bond shall be denominated in US$ or equivalent in Pak Rupees, and shall be in form of a bank guarantee issued by a Scheduled Bank in Pakistan or any international bank operating in Pakistan acceptable to OGDCL, in the form provided in the Tender Document and valid for 210 days counting from day of bid opening.

3.7.4 Any Bid not accompanied with the Bid Bond of required amount shall be rejected by OGDCL as non-responsive.

3.7.5 Unsuccessful Bidder's Bid Bond will be discharged/returned as promptly as possible but not later than 30 days after the expiry of the validity period of Bid Bond.

3.7.6 The successful Bidder's Bid Bond will be discharged upon the Bidder's executing the Contract, and furnishing the Performance Bond, pursuant to Instruction 6.5.

3.7.7 The Bid Bond may be encashed:

i) If a Bidder withdraws its Bid during the period of Bid validity specified by the Bidder on the Bid Form; or

ii) in the case of a successful Bidder, if he fails:
   - to sign the contract.
   - to furnish Performance Bond in accordance with the Tender Document.
   - In case documents were found forged etc at any stage

3.7.8 The Bidders must particularly note that in case of submission of forged Bid Bond they will be liable to severe punitive action by OGDCL leading to Black Listing in addition to any other legal action, which shall be initiated against such Bidder.

3.8 **Format and Signing of Bid**

3.8.1 The Bid comprising Technical and Commercial Proposals with accompanying documents and clearly marked 'Original Bid', plus one (01) copy must be received by OGDCL at the date, time and place as specified. In the event of any discrepancy between the original and the copy, the original shall govern.

3.8.2 The original and copies of the Bid shall be typed or written in indelible ink and shall be signed and stamped by a person or persons duly authorized to sign on behalf of the Bidder. All pages of the Bid shall be initialed by the authorized person or persons. Proof of authorization shall be furnished in the form of authorization letter on original letterhead of the Bidder signed by President, Chief Executive/Chief Operating Officer and Managing Director of Company/Corporation.

3.8.3 The Bid shall contain no interlineations, erasures or over-writing except as necessary to correct errors made by the Bidder, in which case such corrections shall be initialed by the person or persons signing the Bid.

4.0 **SUBMISSION OF BID**

4.1 **Sealing and Marking of Bids**

4.1.1 For the submission of Bid as stated earlier in this document a two stage – two Envelope Bidding procedure shall be adopted. Technical and Commercial Bid proposals shall be submitted in separate envelope. Both the envelopes should then be put in one sealed envelope as described below.

4.1.2 The Original Technical and Commercial Bids shall be separately packed in an inner envelope marked as Technical (Original) or Commercial (Original) Bids as the case may be; each inner envelope shall be sealed in an outer envelope, which shall also be marked. Copies of the Technical and Commercial Bids shall be sealed and marked in separate inner and outer envelopes.

4.1.3 The outer sealed envelope shall be addressed to:

General Manager (Supply Chain Management)
Oil & Gas Development Company Limited (OGDCL)
OGDCL House, Jinnah Avenue, Blue Area
Islamabad, Pakistan
Ph No. +92-51-920023539

BID FOR TENDER DOCUMENT FOR DESIGN, MANUFACTURING, SUPPLY INCLUDING INSTRUMENTATION ALLIED PIPING, MATERIAL ETC, INSTALLATION SUPERVISION, COMPLETE TESTING AND COMMISSIONING OF FILTER COALESCER SYSTEM

TENDER ENQUIRY NO. PROC/FC/CB/P&P/QP-4286/2019

DO NOT OPEN BEFORE 1130 HRS, _____, 2019

4.1.4 The sealed envelope shall indicate the name and address of the Bidder to enable the bid to be returned unopened in case it is declared LATE.

4.1.5 OGDCL will not be held responsible for the premature opening or misplacement of any Bid not clearly marked and addressed in accordance with Instruction 4.1.3.

4.2 **Deadline for Submission of Bids**

4.2.1 Bids must be received by OGDCL at the address specified under Instruction 4.1.3 not later than _____ , 2019 at 1100 Hours local standard time.

4.2.2 OGDCL may, at its discretion, extend this date for the submission of Bids by amending the Tender Document in accordance with Instruction 2.3 in which case all rights and obligations of OGDCL and Bidders will extend likewise.

4.3 **Late Bids**

Any Bid received by OGDCL after the _____, 2019 at 1100 Hrs local standard time prescribed by OGDCL, pursuant to Instruction 4.2 shall be rejected and returned unopened to the Bidder.

4.4 **Modification and Withdrawal of Bids**

4.4.1 The Bidder may modify or withdraw its Bid after the bid's submission, provided that written notice of the modification or withdrawal is received by OGDCL prior to deadline prescribed for submission of the Bids.

4.4.2 The Bidder's modifications or withdrawal notice shall be prepared, sealed, marked and dispatched in accordance with the provisions of Instruction 4.1. A withdrawal notice may also be sent by fax or e-mail but followed by a signed confirmation copy, postmarked not later than the deadline for submission of the Bids.

4.4.3 No Bid shall be modified subsequent to the deadline for submission of the Bids.

4.4.4 No Bid shall be withdrawn in the interval between the date for submission of Bids and the expiry of the period of Bid validity specified by the Bidder on the Bid Form. Withdrawal of a Bid during this interval may result in encashment of Bid Bond under Instruction 3.7.7.

5.0 **BID OPENING, CLARIFICATIONS AND EVALUATION**

5.1 **Bid Opening**

OGDCL will first open Technical Bids, in presence of Bidder's representatives who choose to attend, at 1130 Hours on _____, 2014 at the following location:

General Manager (Supply Chain Management)
Oil & Gas Development Company Limited (OGDCL)
OGDCL House, Jinnah Avenue, Blue Area
Islamabad, Pakistan
Ph No. +92-51-920023539

The Bidder's representatives who are present shall sign a register evidencing their attendance.

The Commercial Bids of technically responsive bids will be opened on above location in presence of Bidder's representatives who choose to attend. The date and timings of opening of commercial bids will be intimated to relevant Bidders.

5.2 **Clarifications of Bids**

5.2.1 OGDCL may ask Bidders individually for clarifications of their Bid during the process of examination, evaluation and comparison of Bids under intimation to Procurement Department. The request for clarifications and the response shall be in writing.

5.2.2 If as a result of any clarification sought by OGDCL some changes are made in Scope of Work or technical specifications and/or bidder(s) willing to meet the tender requirement are allowed to submit their revised Technical Proposal and supplementary Commercial Proposal, according to the technical requirement, as per instructions given in Section 4.1 of Instructions to Bidders;

5.2.3 If bidder(s) not willing to conform their technical bid/proposal to the revised/tender technical requirement shall be allowed to withdraw their respective bid(s) without forfeiture of their bid bond;

5.2.4 The additions/deletions will be opened alongwith the base commercial proposal and summation of it will be made the total bid price for commercial evaluation purpose. However, OGDCL will reserve the right during contract negotiation to restrict the lowest evaluated bidder to restrict to its original prices in part/parts or in totality.

5.3 **Evaluation of Bids**

The evaluation of Bids shall be strictly on the basis of information provided in Technical and Commercial Bids. Technical bids shall be evaluated first. After completion of technical evaluation, commercial bids of technically qualified Bidders shall be opened and evaluated. The Technical Evaluation will consist of following stages:

- Summary rejection of Bid
- Technical Evaluation

The following paragraphs present coverage of each evaluation stage

5.3.1 **Criteria for Summary Rejection of Bid**

5.3.1.1 Bid not meeting the following mandatory criteria shall be summarily rejected without right of appeal:

- Bid must be prepared in English language.
- The Bid shall comprise of two separate proposals i.e. "Technical Proposal" and "Commercial Bid/Proposal".
- Bid must be valid for "180" days from the Date of Bid Opening.
- Technical bid must be accompanied by original bid bond in shape of payorder or bank guarantee (bank guarantee should be issued by any bank mentioned in annexure-K).
- Bid must reach at the specified OGDCL address before "1100" Hours on _____, 2019.
- Bid must not be submitted in form of telex or telegram or fax.
- Bid must be on Company's original letter head/pad.
- Bidding Form & Data Summary Sheet as per attached Format.

5.3.3 **Technical Evaluation**
Technical bids will be thoroughly examined and evaluated with the objective of assessing their compliance, completeness, conformity and responsiveness to the requirements stipulated in the tender documents. The minimum technical qualification criterion is tabulated in clause # 1.3 (c).

Note:
For the purpose during evaluation the Bidder(s) may be requested individually to respond to technical queries, and to confirm minimum technical qualification aspects. The objective of this exercise shall also be to bring all the Bids at par and acceptable level of conformity with the Scope of Work and tender requirements.

Only those bids which will clear the Technical Evaluation will be considered for commercial evaluation.

5.3.4 **Commercial Evaluation**
The commercial bids of only technically qualified Bidders will be opened for evaluation. The commercial evaluation and price comparison will be based on the total of the price of the items A as mentioned in the price schedule (Annexure-X) of this document **except two years spares price which is optional.**

In case the technically responsive and financially lowest bidder has also quoted the optional items the optional items will only be included subject to their price rationality and comparability.

The commercial evaluation will cover:

- Arithmetic errors in computation and summation shall be checked. The errors shall be corrected in the following manner:

  a) Where there is a discrepancy between amounts in figures and in words, the amount in words shall govern and
  b) Where there is a discrepancy between the unit rate and the total amount derived from the multiplication of the unit rate and the quantity, the unit rate as quoted shall govern.

5.3.5 **Taxes**

5.3.4.1 All taxes on the income or payments to the contractor arising, accruing or resulting under the contract, whether present or future, assessed or payable inside or outside Pakistan shall be the exclusive responsibility of the contractor or its sub-contractor(s). Company, in order to discharge its responsibilities as withholding agent shall withhold income tax from the payments to the contractor within the contract value at the rates applicable at the time of payments.

5.3.4.2 Sales tax on goods as well as services is applicable in Pakistan under federal/provincial sales tax laws. The contractor being registered with respective federal/provincial revenue authority of Pakistan is entitled to charge applicable sales tax over and above its bid price and will be responsible for the payment of such sales tax to the respective revenue authority as per the prevailing federal/provincial sales tax laws. OGDCL being the withholding agent shall withhold sales tax from the contractor (whether registered or unregistered), as per respective sales tax withholding rules.
Any indirect tax including value added tax, sales tax etc. present or future, applicable outside Pakistan shall be exclusive responsibility of the Contractor.

5.3.4.3 The Contractor shall be responsible for income tax and all other taxes levied on the Contractor's and its sub contractor's expatriate personnel, their social security obligations and contributions regardless of whether such contributions are levied on employer or employee or both in Pakistan or outside Pakistan.

5.3.4.4 The Contractor shall keep OGDCL informed of the steps taken by it to discharge the tax obligations under the Contract and provide supporting documents whenever required by the OGDCL.

5.3.4.5 The Contractor shall indemnify OGDCL against any claim which might occur due to non-compliance by Contractor of any legal obligation regarding taxes, duties, fees, levies, or other charges, including taxes on income and sales tax in Pakistan and any other payments due to the Federal or Provincial Governments, their agencies or any other relevant authority.

5.3.4.5 All clearing and brokerage charges incurred shall be to the account of CONTRACTOR.

5.3.4.6 CONTRACTOR agrees not to sell, transfer or dispose any of its machinery, equipment, spare parts or material imported under this contract within the country without prior written approval from COMPANY and without payment of taxes (including custom duties etc) due to the Government.

5.3.4.7 CONTRACTOR is responsible to settle all COMPANY obligations or guarantees with the customs authorities and to clear COMPANY of all such responsibilities.

5.3.4.8 CONTRACTOR is responsible to obtain all customs approvals and other documentations. COMPANY will endeavor to assist CONTRACTOR in obtaining such approvals and documentation.

5.3.4.9 The above clauses relating to payment of taxes would prevail notwithstanding a contrary expression reflected in any other clause of the contract.

5.4 **Contacting OGDCL**

5.4.1 Subject to Instruction 5.2 no Bidder or his agent shall contact OGDCL on any matter relating to its Bid, from the time of the Bid opening to the time the Contract is awarded.

5.4.2 Any effort by Bidder to influence OGDCL in its Bid evaluation, Bid comparison or Contract award decisions may result in the rejection of the Bidder's Bid.

6.0 **AWARD OF CONTRACT**

6.1 **OGDCL's Right to accept any Bid and to reject any or all Bids**
OGDCL reserves the right to accept or reject any bid or part of a bid and to annul the bidding process and reject all bids at any time prior to award of Contract, without thereby incurring any liability to the affected bidder or bidders.

6.2 **OGDCL's Right to Vary the Scope of Contract**
OGDCL reserves the right at the time of award of Contract to make addition and deletions in any component of scope of work or vary the scope of work given in the Tender Document.

6.3 **Notification of Intent to Award**

6.3.1 Prior to the expiration of the period of bid validity, OGDCL will notify the successful Bidder in writing by fax or courier service its intent to award the contract. The Contract will be executed subject to satisfactory negotiation of the terms and conditions of the Contract.

6.3.2 Upon the successful bidder's furnishing of Performance Bond pursuant to Instruction 6.5, OGDCL will promptly notify each unsuccessful bidder and will discharge its Bid Bond pursuant to Instruction 3.7.5.

6.4 **Signing of Contract**

6.4.1 At the same time as OGDCL notifies the successful Bidder of its intent to award the Contract, OGDCL will send the Bidder the Form and Conditions of Contract (Section – IV & V) provided in the Tender Document, incorporating all agreements between the parties.

6.4.2 Within fifteen (15) days of receipt of the Form and Conditions of Contract the successful bidder will be required to sign the Contract and return it to OGDCL.

6.5 **Performance Bond**

6.5.1 Within ten (10) days of the receipt of notification of intent to award the Contract from OGDCL, the successful Bidder shall furnish a Performance Bond in the Form of Bank Guarantee (**Annexure – XIII**) for an amount of US$ ten (10) percent (%). of the Contract Price as a guarantee for the due and faithful performance of the Contract. The said 100% Performance Bond shall be valid upto twelve (12) months from the date of commissioning of filter coalescer package or Twenty Four (24) months from the date of last shipment, whichever occurs first. The performance Bond shall be issued by a Pakistani Scheduled Bank or an International Bank operating in Pakistan and acceptable to OGDCL as per Annexure-II.

6.5.2 Failure of the successful Bidder to comply with the requirements of Instruction 6.4 or 6.5 shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Bond, in which event OGDCL may make the award to the next lowest evaluated Bidder or call for new Bids.

6.6. **PREFERENCE FOR DOMESTICALLY MANUFACTURED GOODS**

6.6.1 In comparing domestic bids with foreign bids, a margin of preference will be granted to goods manufactured in Pakistan in accordance with the following provisions, provided that the Bidder shall have established to the satisfaction of the Purchaser that the domestic value added is in accordance to the percentage as mentioned in clause No. 6.6.6 of the exfactory bid price of such goods. For application of domestic preference, all responsive bids will first be classified into following three categories:-

CATEGORY-I: Bids offering goods manufactured in Pakistan which meet the minimum domestic value added requirement.
CATEGORY-II: Bids offering other goods manufactured in Pakistan
and
CATEGORY-III Bids offering imported goods.

The purchaser will review each bid to confirm the appropriateness of, or to modify as necessary, the category to which the bid was assigned by the Bidder in preparing it.

6.6.2 The lowest evaluated bid of each category will then be determined by comparing all evaluated bids in each Category among themselves without taking in to account custom duties and other import taxes levied in connection with the sale or delivery, pursuant to the bids, of the goods.

6.6.3 Such lowest evaluated bids shall next be compared with each other and if as a result of this comparison, a bid from category-I or Category-II found to be lowest, it will be selected for the award of contract.

30.4 If, however, as result of the comparison, under paragraph 6.6.3 above the lowest bid is found to be from Category-III , it will be further compared with the lowest evaluated bid from Category-I For the purpose of this further comparison only, an upward price adjustment will be made to the lowest evaluated bid price of Category-III by adding either:-

i) The amount of the custom duties and other import taxes which a non-exempt importer would have to pay for the importations for the goods offered in such Category-III bid or,
ii) Fifteen percent (15%) of the CIF bid price of such goods if the custom duties and import taxes referred to in (i) above exceed 15 % of the CIF bid price.

If after such comparison, the Category-I bid is determined to be the lowest, it will be selected for the award of contract, if not, the lowest evaluated bid from Category-III will be selected for the award.

6.6.5 Bidders applying for the preference shall provide all evidence necessary to prove that the goods offered by them were manufactured in Pakistan and the manufacturing cost of such goods includes a domestic value added is in accordance to the percentage as mentioned in Clause No. 6.6.6 of the ex-factory bid price of the goods.

6.6.6 As per SRO No. 827(I) 2001 dated 13/12/2001 (Annex-G) sub. Section (I) of section 3 of the Imports and Exports (control) Act 1950 (XXXIX of 1950) price preference in Rupees will be accorded to the bidders tendering for engineering goods produced in Pakistan up to a specified percentage (in proportion to the value addition) of the lowest quoted landed cost of an item of foreign origin with similar specification as mentioned in the tender.

i. Provided that:-

(a) The saving in foreign exchange is not less than the amount of price preference and
(b) It is ensured that in each case of such preference, the total import requirements for producing the supplied tendered for locally manufactured items has been duly indicated by the bidders.

ii. Price preference shall be allowed as under:-

(a) Having minimum of twenty percent value addition through indigenous manufacturing, price preference shall be fifteen percent;
(b) Having over twenty percent and up to thirty percent value addition through indigenous manufacturing price preference shall be twenty percent; and
(c) Having over thirty percent value addition through indigenous manufacturing, price preference shall be twenty five percent.

6.6.7 If the local supplier / manufacturer becomes the lowest evaluated bidder after Price Preference, order will be placed at the prices (Landed Price) quoted by the lowest evaluated international bidder. In case the local bidder does not accede to the request of OGDCL for matching their rate at par with those received from international bidder for particular item (s) then the order will be placed on the lowest evaluated international bidder.

LIST OF ANNEXURES

ANNEXURE-I

FORMAT OF CORPORATE & FINANCIAL INFORMATION

PART – I
GENERAL INFORMATION

1. Name (Full Company Name):

   - Postal Address :
   - Telephone:
   - Facsimile:
   - e-mail:
   - Website Address:

   1.1 Has the Company operated under any other name? If yes please give name, date of change and reason for change.

2. Type of Entity/Firm:
   - Corporation/Stock Company
   - Public Limited
   - Private Limited
   - Partnership
   - Proprietorship

3. Shareholders information/pattern with names and addresses of majority shareholders.

4. Place of Incorporation/Registration:

5. Year of Incorporation/Registration:
   (Please provide copies of Incorporation/Registration Certificates and Memorandum & Articles of Association)

6. Company's National Tax No.

7. Company's Core Business Areas and their annual sales revenue/earnings during last five (5) years.

8. Name & Address of Owners/Directors

PART – II
FINANCIAL STRENGTH

1. Provide details with regard to the financial standing of the applicant including copies of last three (3) years Audited profit & loss account and balance sheet. Also, please fill the financial summary as per below table;

S. No.	Description	Years		
		2011	2012	2013
1	Sales Revenue			
2	Paid Up Capital			
3	Profit Before Tax			
4	Profit After Tax			
5	Current Assets			
6	T. Asset			
7	Owner Equity			
8	Long Term Debt			
9	Current Liability			
10	Total Liabilities			

2. Bank(s) credit worthiness certificates (Latest Period) of applicant organization and available credit ceiling/limits with Account Number/Title.

3. Detail record with regard to litigation/arbitration proceedings or any other dispute related to project undertaken/being undertaken by the Bidder their Sub-Contractors and Suppliers (Specially with OGDCL it Joint Venture Partners or other public and private organizations working in the Oil & Gas sector of Pakistan) during past five (05) years.

4. Any information including brochures, references and other documentary evidence of technical qualification, capability and experience of the Applicant to execute the Project.

The undersigned on behalf of _____ hereby declare that the statements made and the information provided official herewith is complete, true and correct in every detail

_____
Signature

Official Seal of the Company

Oil & Gas Development Company Limited

List of Banks allowed for Bank Guarantees

Sr. No.	Bank Name
1	ALLIED BANK
2	ASKARI BANK
3	BANK AL HABIB
4	BANK ALFALAH LTD
5	DUBAI ISLAMIC BANK
6	FAYSAL BANK
7	HABIB BANK LTD
8	HABIB METROPOLITAN BANK
9	MEEZAN BANK LIMITED
10	MCB BANK
11	NATIONAL BANK OF PAKISTAN
12	STANDARD CHARTERED BANK
13	UNITED BANK LTD

ANNEXURE – III

RELATED PROJECTS BEING EXECUTED DURING LAST TEN (10) YEARS

Sr. No.	Name, Description & Capacity of the Project	Name & Address of Client	Country & Year	Project Completion Period		Contract Value*			Detailed Description of Work, Scope & Responsib-ibilities**	Details of Equipment Supplied (Including nature/type of equipment, its value* and origin/source)	Name of JV and their responsibilities	Reason for Delay in Project Comple-tion, if applicable
				Planned	Actual	Foreign Currency	Local Currency	Total				

(*) Please indicate name and unit of currencies.

(**)For example design engineering, procurement, manufacturing and commissioning.

ANNEXURE - IV

HSE DETAILS

1- Do you have a formal written Safety Policy? YES NO

If yes, please attach a copy(s)

Is safety policy distributed to all employees and posted at the offices? YES NO

2- Do you have a safety program manual ? YES NO

If yes, please state scope

_____

_____

3- Do documented procedures exist to support the safety manual? YES NO

If no, how is your safety program implemented?

_____

_____

4- Do you operate a formal review/audit of the safety program? YES NO

How are review/audit results identified, documented and implemented?

_____

_____

5- Do you hold regular safety meetings for all employees YES NO

If yes, how frequently do you hold these meetings ?

Weekly _____

Fortnightly _____

Monthly _____

Others _____ When? _____

_____

6- Do you hold regular safety inspection ? YES NO

If yes, please provide details.

_____

_____

_____

7- What Type of employee training programs are in place?

_____

_____

_____

Is training delivered to subcontractors / vendors ?	YES	NO
Is training delivered to clients ?	YES	NO

8- How are accidents investigated and reports circulated to management? Give a copy of any report if available.

_____

_____

_____

ANNEXURE – VI

BID BOND

Oil & Gas Development Company Limited,
OGDCL House, Jinnah Avenue,
Blue Area, Islamabad.

Dear Sir,

In consideration of M/S_____
herein after called "THE BIDDER" having submitted the accompanying Bid and in consideration of value received form (the Bidder above), we hereby agree to under take as follows:-

1. To make unconditional, immediate and forthwith payment of the sum of US$_____ (United States Dollars …….. only) or Equivalent in PKR_____ (Pak Rupees……..only) upon your FIRST and SIMPLE written demand without further recourse, question, query, deferment, contestation or reference to the bidder, account party or any other person in the event of the withdrawal of the aforesaid bid by the BIDDER before the end of the period specified in the Bid after the opening of the same for the validity thereof or if no such period be specified, within 150 days after the said opening or if the Bidder, having been notified of the acceptance of his bid by the Company during the period of bid validity:

   a) Fails, refuses or delays to execute the Contract in accordance with the instruction to Bidders, or
   b) Fails, refuses or delays to furnish Performance Bond in accordance with the instruction to Bidders.

2. To accept written intimation(s) from you as conclusive, sufficient and final evidence of the existence of a default of non-compliance, breach or default as aforesaid on the part of the BIDDER and to make payment immediately and forthwith upon receipt of your FIRST and SIMPLE written intimation.

3. No grant of time or other indulgence to, or composition or arrangement with the BIDDER in respect of the aforesaid Bid with or without notice to us shall affect this Guarantee and our liabilities and commitments hereunder.

4. This is an independent and direct obligations guarantee and shall be binding on us and our successor in-interest and shall be irrevocable.

5. The Guarantor Bank warrants and represents that it is fully authorized, empowered and competent to issue this guarantee.

Yours faithfully,

(B A N K E R S)

ANNEXURE – VII

FORM OF TENDER OR BIDDING FORM

Dated: _____

TENDER ENQUIRY NO**. PROC/FC/CB/P&P/QP-4286/2019**

To

Oil & Gas Development Company Limited
Islamabad
Pakistan

Gentlemen,

1. Having examined the Conditions of Contract and specifications, the receipt of which is hereby acknowledge, we, the undersigned, offer to Design, Fabrication, Supply & Commissioning and testing of Filter Coalescer System for Qadirpur Field.

2. If our Bid is accepted we shall undertake – Design, Fabrication and Supply of Filter Coalescer System for Qadirpur Field within _____ months from the date of establishment of letter of credit by OGDCL.

3. If our Bid is accepted we shall obtain the Guarantee from a Scheduled Bank to jointly and severally bind us equivalent to ten percent (10%) of estimated Contract price for due performance of the Contract under the Terms of Performance Bond (Guarantees) as approved by you.

4. We agree to abide by this Tender for the period of one hundred and twenty (180) days from the date fixed for opening the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

5. Until a formal Contract is prepared and executed, this Bid, together with your written acceptance thereof, shall constitute a Binding Contract between us.

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

7. Our bid proposal do not contain any deviation or exceptions from the terms & conditions enunciated in the tender documents.

Dated this _____ day of _____, _____

Signature _____ in the capacity of _____

_____ duly authorized to sign tender for and on behalf of:

_____

(NAME OF THE FIRM IN BLOCK CAPITALS)

Complete Address: _____

Telephone No. _____

Telex/Fax No. _____

Signature: _____

Witness:

_____

_____

ANNEXURE – VIII A

INTEGRITY PACT

DECLARATION

…..…… *[the Contractor]* hereby declares its intention not to obtain or induce the procurement of any contract, right, interest, privilege or other obligation or benefit from Government of Pakistan or any administrative subdivision or agency thereof or any other entity owned or controlled by it (GoP) through any corrupt business practices.

Without limiting the generality of the foregoing, …..……*[the Contractor]* represents and warrants that it has fully declared the brokerage, commission, fees etc. paid or payable to anyone and not given or agreed to give and shall not give or agree to give to anyone within or outside Pakistan either directly or indirectly through any natural or juridical person, including its affiliate, agent, associate, broker, consultant, director, promoter, shareholder, sponsor or subsidiary, any commission, gratification. bribe, finder's fee or kickback, whether described as consultation fee or otherwise, with the object of obtaining or inducing the procurement of a contract, right, interest, privilege or other obligation or benefit in whatsoever form from' GoP, except that which has been expressly declared pursuant hereto.

…..…… *[the Contractor]* certifies that it has made and will make full disclosure of all agreements and arrangements with all persons in respect of or related to the transaction with GoP and has not taken any action or will not take any action to circumvent the above declaration, representation or warranty.

…..…… *[the Contractor]* accepts full responsibility and strict liability for making any false declaration, not making full disclosure, misrepresenting facts or taking any action likely to defeat the purpose of this declaration, representation and warranty. It agrees that any contract, right, interest, privilege or other obligation or benefit obtained or procured as aforesaid shall, without prejudice to any other rights and remedies available to GoP under any law, contract or other instrument, be voidable at the option of GoP.

Notwithstanding any rights and remedies exercised by GoP in this regard, …… *[the Contractor]* agrees to indemnify GoP for any loss or damage incurred by it on account of its corrupt business practices and further pay compensation to GoP in an amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or kickback given by …..…… *[the Contractor]* as aforesaid for the purpose of obtaining or inducing the procurement of any contract, right, interest, privilege or other obligation or benefit in whatsoever form from GoP.

for

Contractor :

By :
Title :

ANNEXURE – IX B

(On official letter head of the bidder)
To be signed by the
Chief executive of the
Bidding Company or a representative
Duly Authorized by board resolution.

INTEGRITY AND ETHICS UNDERTAKING FOR BIDDING

Dated: _____

We hereby commit and undertaking to observe the following principles during our participation in the tender process and during the contract execution.

1. That we, will not directly or through any other person of firm, officer promise or give to any of the employees of OGDCL involve in the tender process or execution of the contract any gain, pecuniary benefit of facilitation payment in order to obtain in exchange any advantage of any kid whatsoever during the tender process or during the execution of contracts.

2. That we have not and will not enter with other bidders into any undisclosed agreement or undertaking either formal or informal to restrict competitiveness sort to cartelize in the bidding process.

3. That we will ensure that the remuneration of agents (if engaged) is appropriate and for legitimate services only.

4. That we will not use subcontracts, purchase orders or consulting agreements as means of channeling payments to employees of OGDCL.

5. That we will commit any offence under the Pakistan Penal Code Prevention of Corruption Act or National Accountability Ordinance to achieve any advantage, gain or benefit during the tender process or the execution of the contract.

We further understand and acknowledge that any violence if transgression of the above mentioned principles will attract disqualification from the tender process and may also result in permanent exclusion from further contract award process.

We also accept and undertake to respect and uphold OGDCL's absolute right in resort to and impose such disqualification, debarment or execution.

For and on Behalf of _____

Tender No. **PROC/FC/CB/P&P/QP-4286/2019**

ANNEXURE – IX

DATA SUMMARY SHEET

Following information regarding each item must be stated categorically:

NAME AND ADDRESS OF MANUFACTURER _____
_____
_____
_____

NAME AND ADDRESS OF LC BENEFICIARY _____
_____
_____
_____

COUNTRY OF ORIGIN _____

PORT OF SHIPMENT/DESTINATION _____

VALIDITY OF BID _____

DELIVERY PERIOD (From the date of L/C establishment)

- CFR Karachi Sea Port (in months) _____

AMOUNT OF BID BOND _____

ADDRESS OF BANKER WITH ACCOUNT NO. _____
_____

NAME AND ADDRESS OF LOCAL AGENT
IN PAKISTAN (IF ANY) _____

CHECK LIST:

1.	CONFIRMATION THAT QUOTED PRICED IS FIRMED/FIXED AND NOT BASED ON ANY PRICE ADJUSTABLE FORMULA/ANY ESCALATION.	YES	NO
2.	HAVE YOU QUOTED PRICE ON BOTH FOB/CFR BASIS	YES	NO
3.	HAVE YOU COMPLETED THE BID PRICE SCHEDULE	YES	NO

ANNEXURE - X

BID PRICE SCHEDULE - DESIGN, MANUFACTURING, SUPPLY INCLUDING INSTRUMENTATION ALLIED PIPING, MATERIAL ETC, INSTALLATION SUPERVISION, COMPLETE TESTING AND COMMISSIONING OF FILTER COALESCER SYSTEM

Tender Enquiry No. PROC/FC/CB/P&P/QP-4286/2019

SR. NO.	BID ITEM	QUANTITY	UNIT PRICE (FOB basis) US$	TOTAL PRICE (FOB basis) US$	UNIT PRICE (CFR Karachi basis) US$	TOTAL PRICE (CFR Karachi basis) US$
	SUPPLY SCOPE					
A.	**Design, Fabrication & Supply of Filter Coalescer System** (Please provide detail of main equipment with completion specifications)	1 Package				
A1.	**Price for extra Set of Coalescer Filters Elements**	1 Set				
B.	**Supply of Start-up and Commissioning Spares** (Please provide separate item-wise priced list however three sets of filter elements are manadatory requirement)	1 Set				
C.	**Supply of two years recommended spare parts (Optional will not be part of financial evaluation)** (Please provide separate item-wise priced list)	1 Set				
D.	**The Expenses on FAT** (As per details stipulated in Section-II (ITB), section 3.2.2.1 vi)	Lumpsum				
E.	**Total Supply**	Lumpsum				
	SERVICES SCOPE					
F.	**Lumpsum charges of Installation supervision, commissioning, start-up & Performance testing (Hourly Rates are not acceptable)**	Lumpsum				
	GRAND TOTAL					

Note:

1. OGDCL reserve the right at the time of award of contract to increase or decrease the quantities of material specified above without any change in unit price (FOB or CFR) or other terms and conditions.

2- The Commercial Evaluation will be based on the total of the price of the item listed above as A, A1,B, D, E, & F

ANNEXURE – XI

SCOPE OF THIRD PARTY INSPECTION FOR FILTER COALESCER PACKAGE

TERMS OF REFERENCE

The scope for Open Box Pre-shipment inspection of Filter Coalescer Package to be carried out by third party inspector is outlined below:

- Coordinate with OEM for finalizing the Date and Place of inspection.

- Review the detailed listing (will be provided by OEM) of the equipment, materials, tools, accessories, spare parts, and all other relevant parts being shipped, Material Test approved design document, Manufacturing Data Record (MDR), Certificates, Purchase Order and other relevant documents.

- Each equipment of Filter Coalescer Package shall contain following information with unwashable paint.
  a) Oil & Gas Development Company Ltd, KPD-TAY Development Project.
  b) Oil & Gas Development Company Ltd, Islamabad Pakistan.
  c) Contract No._____
  d) L/C No._____
  e) Equipment No._____
  f) Case No._____
  g) Storing and handling instructions for fragile and perishable items.
  h) Gross Weight (in metric tons)
  i) Dimensions (length*width*height in metric Package)
  j) Place of Origin

- Verify the completeness of whole Filter Coalescer Package based on the final Packing List provided by OEM.

- Compliance check for safety standards of transportation/ shipment for Filter Coalescer Package.

- Physical check for any damages of whole Filter Coalescer Package.

- Instructions necessary for the storage of Filter Coalescer Package to maintain its integrity at site and before startup.

- Integrity of exterior paint must be checked and ensured. Make sure that paint does not contain Lead or chromates.

- All exterior surfaces except for corrosion resistant material shall be coated with rust preventive material.

- All interior surfaces shall be physically checked to ensure that no dust, oily particles, welding spatters and other damaging particles reside there and those surfaces shall be coated for rust prevention.

- All the flanges must be closed with some standard procedure.

- All the threaded openings must be secured with steel plugs and openings beveled for welding shall be secured to prevent entrance of any moisture contents or dust.

- Centre of Gravity and lifting points must be marked clearly on all the equipments/skids of Filter Coalescer Package.

- All the connections whether piping, component or electrical shall be thoroughly inspected for their integrity.

- All the components being shipped separately shall be tagged with item and serial number of the equipment for which it is intended.

- All the equipment and components of Filter Coalescer Package to be shipped shall comply with Occupational Health and Safety Standards.

- Any connections dismantled for shipment purpose shall be match marked for ease of assembly.

- Copy of installation manual, vendor technical literature and catalogue must be shipped along with the equipments of Filter Coalescer Package.

- Preparation of report in light of above inspection, applicable codes/ standards and clearly identify the acceptance criteria and same shall be produced to client / comment prior to shipment of material.

The above scope covers the minimum requirement, any other check whether visual or any other inspection procedure required to confirm the completeness of the Filter Coalescer Package will be the responsibility of the 3rd party inspector.

ANNEXURE – XIII

PERFORMANCE BANK GUARANTEE

Oil & Gas Development Company Limited
OGDCL House, Jinnah Avenue, Blue Area,
Islamabad, (Pakistan)

Dear Sir,

Ref; our Bank Guarantee No._____ in the sum of _____ Account_____ in consideration of you having entered into Contract No._____Dated_____with_____Called Contractor and in consideration for value received from CONTRACTOR. We hereby agree and undertake as followings:

1. To make unconditional payment to you as called upon of (10%) ten percent of the Contract value of the contract price mentioned in the said contract, on your written FIRST and SIMPLE demand without further recourse, question or reference to CONTRACTOR or any other person in the event of default, non-performance or non-fulfillment by CONTRACTOR of his obligations, liabilities, responsibilities under the said contract of which you shall be the sole judge.

2. The accept written intimation from you as conclusive and sufficient evidence of the existence of the default or breach as aforesaid on the part of CONTRACTOR and to make payment immediately and forthwith upon receipt of your FIRST and SIMPLE written demand.

3. d) This Performance Bond shall remain valid and in full force and effect upto _____ or issue of statement of discharge by your authorized representative or return of original guarantee whichever is earlier.

4. DEMURRAGE DUE TO DELAY IN RECEIPT / NEGOTIATION OF ORIGINAL SHIPPING DOCUMENTS.

   If clean documents are not negotiated within Negotiation Period allowed in Letter of Credit or documents are with held by Bank on account of any discrepancy:

   - If the Demurrage, if any incurred due to late negotiation of the Clean Documents and paid by OGDCL will be realized from the beneficiary of L/C, by encashing this Performance Bond to the extent of demurrage amount. In case demurrage amount exceeds the total value of this Performance Bond the balance amount will be payable by the beneficiary.

5. That no grant of time or other indulgence to, amendment in the terms of the Contract by Agreement between the parties, or imposition or Agreement with CONTRACTOR in respect of the performance of his obligations under the said Agreement, with or without notice to us, shall in any manner discharge or otherwise affect this Guarantee and our liabilities and commitments there under.

6. This is an independent and direct obligation guarantee and shall be binding on us and our successors interest and shall be Irrevocable.

7. This guarantee shall not be affected by any change in the constitution of the Guarantor Bank or the constitution of the Contractor.

8. The Guarantor Bank Warrants and represents that it is fully authorized, empowered and competent to issue this guarantee.

(B A N K E RS)

TERMS OF REFERENCE;

1. All the specifications / dimensions should be as per following documents;

Equipment's Description	Document No.
FEED GAS FILTER COALESCER	2895-PB-2101 2895-SP-001~004 2895-DS-001~18

Design Basis:

Inlet Pressure: Min 70Psi Max: 250Psi

Flow Rate: 280 MMSCFD

Inlet Temp: Min 100F Max 125F

Water Content: 70 lb/MMSCFD

Gas Composition Dry Basis

C1	Mol% 79.653
C2	Mol% 0.87
C3	Mol% 0.23
iC4	Mol% 0.07
nC4	Mol% 0.07
iC5	Mol% 0.03
nC5	Mol% 0.02
nC6	Mol% 0.13
N2	Mol% 12.369
CO2	Mol% 6.549
H2S	Mol% 0.008

The vendor is to size all internals and guarantee the following:

- 99.99% removal of liquid droplets 0.3 μ (microns), and greater
- 100% removal of liquid droplets 3 microns, and greater.
- 99.5% removal of solid particles with diameter > 5μ.
- Separator pressure loss less than 5 psi (dirty).

2. The vessel should be vertical skid mounted with all necessary required instrumentation as per P&ID and mechanically. The said vessel should be equipped with the well reputed brands of coalescers.
3. Bidder/ Packager will be responsible for design as per provided parameter.

4. Material specifications: strictly as per documents# 2895-DS-001~18, Compliance of the material with NACE-MR-0175 (sour gas service).
5. Radiography: as per document# 2895-SP-001
6. Applicable code:
    - API Specification 12J.
    - ASME Boiler and Pressure Vessel Code, Section VIII, Division I.
    - American Society for Testing and Materials (ASTM).
    - ASME IX, Welding and Brazing Qualifications.
    - ASME V, Non-Destructive Testing.
    - ASME II, Material Specifications.
    - ASME B16.5 - Pipe Flanges and Flanged Fittings.
    - ASME B31.8 Natural Gas Piping.
    - ASME B31.3 Liquid Piping.
    - ASME B16.20, Ring Joint Gaskets and Grooves for Steel Pipe Flanges.
    - N.A.C.E. Standard MR-0175 / ISO Standard 15156.
7. Only U-stamp authorized manufacturers will be considered for technical evaluation. Documents to be provided to prove validity.
8. Bidder should submit the isometric view of complete package along with the technical bid, without isometric layout the bid will not evaluated.
9. Bidder/ Packager must have experience of 10 years (2008~2018) for supply of similar type high pressure vessels packages and must submit a list of his clients to whom equipment of similar nature has been supplied most recently also attach. **The previous purchase orders of completed projects in last 10 years should be attached with technical bid.**
10. Material should be of American / European / Japanese origin preferably and MTC to be provided during fabrication phase.
11. Minimum three (03) set of Elements and one set of other internals should be provided for commissioning and one set shall be provided as spare.
12. Man-way, Inlet & Outlet Flange Gaskets for commissioning and one set as spare should be provided.
13. Civil drawings for construction of foundation will be in bidder scope & will be provided 04 months prior to shipment date.
14. Bidder/ Packager will supply all studs for connection within battery limits with following specifications;

a) Stud with 02 Nuts, Stud: SA193 (B7) Nuts: A194 (2H), Floro polymer coated.

15. Guarantee / warranty shall be remain valid for a period of twelve (12) months from the date of commissioning of Filter Coalescer or Twenty Four (24) months from the date of shipment, whichever occurs first
16. If bidder/ packager required any clarification, **it should be cleared prior to ten (10) days from bid opening date**.
17. Certificate should be submitted that the installed instrumentation is brand new and their model and spares will not be obsolete in next 10 years.
18. Packaging and shipment procedures. Shipment is in bidder scope.
19. Bidder/ packager will provide assistance in installation and commissioning of package at Qadirpur Plant.
20. Execution Plan of Project should be submitted along the technical bid.
21. Hydrotest/ functional test will be witnessed by the three OGDCL engineers at packager/ manufacturer works on the cost of bidder.
22. Delivery period: 8 months after establishment L/C.
23. Kick of meeting for design review and finalization shall be done after establishment of supply LC at OGDCL site/ Head Office. No extra charges shall be paid for any visit to the bidder/packager in this respect.
24. Bidder should arrange factory acceptance test at manufacturer/ packager's works. Factory acceptance test shall be witnessed by three OGDCL engineers. All cost including air tickets, boarding, lodging, local transportation at destination will be in bidder scope. All other arrangements, test equipment's, documentation for FAT will also be in bidder scope.
25. Third party pre shipment inspection (Nominated by OGDCL) will be carried out in the facility of packager on the cost OGDCL.
26. Bidder/ Packager will share team movement plan 48 Hrs prior to departure for necessary arrangements.
27. In case of foreigner experts, bidder/ Packager will responsible for their security clearance and security arrangement from any airport to Qadirpur Site and site to airport.
28. Shipment will CFR Karachi by sea.

Note: For strict compliance bidder should clarify each point before submission of tender document through email or can visit Qadirpur Plant. Pre-bid meeting may be arranged on bidder request, bidder will inform 01 week prior to suggest meeting date.

OIL & GAS DEVELOPMENT COMPANY
PAKISTAN

SPECIFICATIONS

Consultant:

PETROCHEMICAL ENGINEERING CONSULTANTS

OIL & GAS DEVELOPMENT COMPANY LTD

SPECIFICATION FOR
FEED GAS FILTER COALESCER

DOCUMENT NO. : 2895-SP-001

Consultant:

PETROCHEMICAL ENGINEERING CONSULTANTS

Rev.	Date	Description	Prepared By	Checked By	Approved By
1	08-04-18	Issued for review	MT	AJ	AJ

Table of Contents

1.0 INTRODUCTION

1.1 General

This specification outlines the minimum requirements for Feed Gas Filter Coalescer of the COMPANY.

1.2 Definitions

Terms used in this specification have the following meanings:

"Purchaser" shall mean "OGDCL"

"Supplier' shall mean the entity with whom the Purchaser has placed an order for the material covered by this requisition.

1.3 Errors Or Omissions

Review and comment by the Purchaser of any Supplier drawings, procedures or documents shall only indicate acceptance of general requirements and shall not relieve the Supplier of its obligations to comply with the requirements of this specification and other related parts of the Contract Documents. Any errors or omissions noted by the Supplier in this Specification shall be immediately brought to the attention of Purchaser.

1.4 Deviation

All deviations to this Specification, other related specifications or attachments shall be brought to the knowledge of the Purchaser in the bid. All deviations made during the procurement, design, manufacturing, testing and inspection of the Works shall be with written approval of the Purchaser prior to execution of work. Such deviations shall be shown in the documentation prepared by the Purchaser.

1.5 Conflicting Requirements

In the event of any conflict, inconsistency or ambiguity between the Contract scope of work, this Specification, Codes & Standards referenced in this Specification or any other documents, the Supplier shall refer to the Purchaser whose decision shall prevail.

1.6 Reporting Procedure

A reporting and documentation system shall be agreed between the Purchase and the Supplier for the status of procurement, design, manufacturing, inspection, testing and shipment of the equipment/material to be supplied under this specification. Supplier's manufacturer shall provide reports and summaries for production performance and testing operations in conformance with a manufacturing schedule approved by Purchaser.

Weekly, monthly and run summaries of all major aspects of the production process shall be provided as reports to the Purchaser.

1.7 Unit Responsibility

The Supplier shall be responsible for the complete design, manufacture supply, fabrication, installation/erection, inspection and testing of the vessels, including full compliance with all applicable design codes, and standards, including those listed in Section 2.2 of this document and with the requirements of the independent certifying authority, where applicable.

1.8 Scope Of Supply

This specification defines the requirements for Filter Coalescer complete with all instruments, piping and associated facilities, to be installed at OGDCL Qadirpur. The Package shall be skid mounted and instrumentation, piping accessories platform, ladders, etc. shall be grouped on the same skid from which supports the main equipment.

2.0 PACKAGE OVERVIEW

This requisition defines the requirements for Filter Coalescer to be installed at inlet of PRCP compressors at Qadirpur Gas Field, complete with all instruments, piping and associated facilities. The package skid, which support the equipment, shall also support all other accessories, piping, instruments, access platform, ladders, etc.

TAG NO.	REF. DATA SHEET	REF. P & ID	TYPE	UNIT
FC-101	2895-DS-001	2895-PB-2101	Two Phase	One package

2.1 Purchaser Intention

It is the intention of Purchaser to procure equipment package based on Data Sheet and P&ID. Supplier is required to size the vessel, procure material, perform mechanical design of vessel and piping, fabricate, paint, test and prepare for shipment.

The Supplier shall arrange vessel, pipe work and related instrumentation according to good industry and well-recognized practices, which facilitates operation and maintenance.

The Supplier shall submit equipment general arrangement drawing for Purchaser approval prior to finalization of design.

The Equipment are to be furnished as complete package. Supplier shall supply all necessary items shown within 'equipment package limit' in attached P&ID.

All instruments, controls, control valves, connecting piping with valves, electric components and structural platform/ladders shall be included as required. All inlet and outlet piping shall terminate at the skid edge with appropriately rated flanges (Refer Piping Specification)

Electrical and instrument connection shall be wired to junction box within skid boundary for further hook up by Purchaser, as shown in P&ID.

The Supplier shall ensure that all the components to form parts of the package are NEW.

2.2 Codes, Standards & Purchaser's Specifications Requirements

Purchaser requirements to meet specific industry accepted codes are listed below. The Supplier should list other codes and standards to which his proposed design complies. The Supplier shall ensure compliance with Purchaser's supplied procurement specification for designing of the package.

The Supplier's bid shall clearly identify any areas where the proposed equipment would not meet these requirements.

ASME Codes

Section VIII	Division I & Division II (Pressure Vessels)
Section IX	Welding Qualifications
Section V	Non-destructive Examination
Section II	Materials
Section II, (Part C)	Welding Rods, Electrodes and Filler Materials

ANSI Standards (Latest Editions)

B16.5	Steel Pipe Flanges
B.16.20	Metallic Gasket for pipe Flanges
B16.9	Factory Made Wrought Steel Butt-Welding Fittings
B36.10	Wrought Steel Pipes
B36.19	Stainless Steel Pipes

A58.1 Building Code Requirement for Minimum Design Loads in Building and Other Structures.

MSS SP-44 or	Steel pipe line flanges for dia > 24"

ANSI B16.47

Steel Structures Painting Council Specification for Surface Preparation and Painting System;

In addition to the requirements of this specification, all requirements of the governing authority, i.e. the country and/or its sub-divisions, where the vessel is to be installed shall be met;

Pressure vessels shall be fabricated in accordance with ASME code by `U' stamp fabricator. Supplier to confirm the name of fabricator in the bid and provide his `U' stamp certification from ASME. Waiver from any requirement mentioned in data sheet must be obtained from COMPANY.

3.0 INFORMATION REQUIRED WITH THE BID

1. Price breakup of all the main components of the equipment package.
2. Complete instrument and equipment data sheets.
3. Comments or exceptions/technical deviations to this requisition and other relevant codes and standards.
4. List of major Sub-supplier.
5. Schedule of Deliveries.
6. Schedule of element changeover as per operating condition.
7. Skid Sizes and Weights.
8. Description of Supplier’s engineering and manufacturing capabilities to undertake the scope under consideration.
9. Origin of all the main components offered for required package.
10. All those items for which information required are specially mentioned anywhere in this requisition, data sheets, specification, etc. to be also included in this list.

4.0 SUPPLIER'S SPECIFIC RESPONSIBILITIES

This requisition covers the design, testing, supply, CIF delivery of Filter Coalescer. The package shall be furnished with all necessary commissioning spares (where applicable) and six (06) sets of documentation in the form of operating manuals, equipment dossier and other necessary spares and repair/maintenance procedures.

The Supplier's scope of work for the equipment packages shall also include the following as a minimum:

1. Provision of all necessary documentation.
2. Provision of spares for two years of normal operation.
3. Indication of all technical deviation/exception to this requisition and notifying Purchaser such deviation/exceptions.
4. Supplier will also provide the schedule for changing of filter element.
5. Equipment supply including design covering process & mechanical requirements as indicated in this requisition.
6. Preparation of equipment packaging and consideration of shipping arrangement for ease of delivery in view of local transportation limitations.
7. Provision of overall package guarantee, warranties and all required material certification.
8. Testing (hydraulicetc.) of equipment and piping. All Instruments shall be calibrated. All electrical/instrument systems shall be checked for functional operation.
9. Protective coating/painting including preparation for shipment.
10. Any other activity not specified above, but essential to make the equipment package safe and operational.

5.0 PACKAGE REQUIREMENTS

5.1 General Mechanical Requirement

Material of Construction should be as per feed analysis and other process parameters.

Unless otherwise specified in drawings or data sheets, materials for shell/heads shall be as under:

- Material for warm service pressure vessel shell/heads shall be:

  ASTM A-515 for Intermediate & High Temperature Service;

  ASTM A-516 for Moderate & Lower Temperature Service;

- Material for cold service pressure vessel shell/heads shall be:

  ASTM A-516 for Pressure Vessel having Design Temperature upto -46°C with impact test.

  ASTM A-203 Gr. D for Pressure Vessel having Design Temperature upto -101oC with impact testing corresponding to vessel design temperature.

  ASTM A-240 Gr. 304 for Pressure Vessel having Design Temperature upto -178°C without impact testing.

Radiography		Contractor recommendation
Stress Relief		As per code.
Corrosion Allowance		3.2 mm
Code:	–	ASME Section VIII Div.1 & 2
	–	ASME Section IX Welding Qualification.

– ANSI-B16.5 (1971) issue for pressure temperature rating of flanges, 1983 issue for flange facing finish).

High pressure separators head shall be semi-ellipsoidal (2:.1)

Pressure vessel opening 60.3mm and large shall be flanged.

Vessel shall be provided with drain valve.

Vessel internal shall be easily removable.

All valves and instrument shall be easily accessible for operation and maintenance.

5.2 Pressure Vessel

Separator vessel should generally be designed and fabricated in accordance with ASME-SECTION VIII. DIV.1

The purchaser's specific requirements have been mentioned in the data sheet# 2895-DS-001. In the event of any conflict between purchaser's specification and the applicable codes/standards, the same should be brought into the notice of the purchaser's prior to taking any action in this regard.

5.3 Piping & Valves

All the pipe work shall be designed, tested and fabricated according to the ASME Code B 31.3. The design should facilitate ease of operation and maintenance. The Supplier shall ensure that all the pipe work is free from any stress by carrying out Piping Flexibility Analysis using renowned computation software (e.g. CAESARII & TRIFLEX, etc.).

The Supplier shall use Purchaser's specification for Piping.

Piping shall be well supported on skid. The pipe supports shall be designed considering dead loads, live loads, dynamic loads due to flow induced vibration and or pulsation, wind, shipping, etc. Pipe supports shall be so designed to accommodate pipe movement due to thermal and pressure

stresses and be positioned such that piping structure (pipe rack, etc.) have a mechanical natural frequency above 30Hz.

The NDE and Inspection shall be submitted by Supplier and agreed upon by Purchaser prior to its finalization. Following are the minimum requirement for NDE for pipe work anticipated by the Supplier:

1. Radiographic examination shall be in accordance with code.
2. UT/PT/RT/MPI for all other type of joints shall be in accordance with code.

5.4 Safety and Relief Valves

Supplier shall provide PSV. The PSVs shell be in accordance with ASME Boiler's and Pressure and shall be sized considering maximum relieving load based on the fire case.

5.5 Instrumentation

The Supplier shall be responsible for the size, selection, supply and installation of all instrumentation items as indicated in the P&IDs and the Specification for Instrumentation (2895-SP-003) shall be followed during the course of work. Any of the items, if necessary, can be shipped loose for its protection during transportation.

5.6 Hazardous Area Classification

The entire package area shall be considered as Class I, Div. 1, Group C&D (Zone 2,Gas Group IIA, Temperature Class T4) as a minimum.

5.7 Structure & Lifting

The Supplier shall be responsible for the supply and structural design of the skid base of package. All calculations to prove compliance with the specific requirements and standard shall be held by the Supplier and available for audit by Purchaser. The subject structures shall be designed to include all dead load, live loads, equipment vibration, pipe load, pipe expansion (thermal

and friction), wind load, seismic load, impact and erection loads and forces and any other loads.

Skid base frames shall be covered with the gratings. The Supplier shall submit with his bid, details of the structural materials that are proposed. The material to be used shall comply with ASTM or equivalent standards.

Full penetration welds on lifting attachments shall be subjected to 100% UT & 100% MPI/DPI as appropriate. All welds directly associated with lifting equipment shall be subject to 100% MPI/DPI after load test.

The package should be suitable for handling with mobile crane using a single point lift at the construction site, where it is necessary to use special lifting beams, slings, shackles, etc. these shall be provided by Supplier.

Detail designing of holding down bolts shall be the responsibility of Supplier. It will be necessary to accurately locate their positions.

5.8 Painting & Corrosion Protection

The Supplier must ensure that all equipment, piping, structures, etc. shall be adequately protected from the prevailing atmosphere by means of correct material selection, painting or coating and/or suitable insulation to prevent galvanic corrosion.

SSPC (Steel Structures Painting Council) manuals shall be followed for the preparation of surface before painting and application of painting.

DFT (Dry Film Thickness) of the painting system shall be checked by elkometers, which shall be as per specification. Surface preparation, prior to application of painting, shall be subjected to inspection as per SSPC-SP-5.

Color coding for equipment and piping etc. shall be finalized after approval by Purchaser.

5.9 Equipment Tagging, Labeling & Nameplates

The supplier's choice of equipment, instrumentation tag nos., etc has been indicated in the relevant P&ID's and the data sheets. Supplier must indicate these numbers on all design documents.

All tagged items shall have corrosion resistant nameplates or labels permanently attached, which shall include Supplier's standard identification and together with the Purchaser's tag number. All other control and indication devices that operators will need to access/maintain shall have corrosion resistant identification/duty labels permanently attached.

5.10 Packing, Preservation and Transportation of Material & Equipment

Packing and Preservation shall be suitable for transportation of material and equipment during their handling, inland transportation, shipment through sea or by air and storage at site for upto 6 months in an uncovered and unheated location. Packing shall account for the fragility and physico-chemical/ mechanical damages of items.

Purchaser has considered seaworthy packing of all the equipment and packages. Following criteria can be considered as a minimum:

Tall Vertical Vessels/Columns	:	in horizontal positions on non returnable saddles
Skids	:	in ocean type case enclosed in sealed plastic sheet
Steel structures	:	in crates covered with plastic sheet
Loose material	:	in ocean type case

Loose piping material, valves, instruments, etc. shall be properly tagged to allow easy identification/site assembling.

Nozzle openings shall be protected with steel cover and rubber gaskets. Nitrogen blanketing will not be required.

Packing and rust prevention shall be suitable for transport and 6 months outdoor storage in a very hot and humid climate.

Supplier should take account the fact that roads with hard coatings are available between Karachi and Hyderabad, where packages/skids up to 150 tons may be transported. Limits can be brought down to 50 – 60 tons for the portions, where only tracks are available. Purchasers preferred maximum skid/equipment dimensions are as per following:

Width : 12 ft.

Length : 40 ft.

Height : 12 ft.

It is anticipated that the packages or equipment shall be such requiring no special transport and lifting arrangement. If so, the supplier shall notify well in advance to the purchaser regarding such requirements. The details of the special arrangements shall be provided by the Supplier.

5.11 Inspection & Testing

5.11.1 General

Inspection and testing shall generally comply with the requirements as detailed in the requisition documentation and in the other referenced specifications.

5.11.2 Inspection

The Supplier shall provide free access to his works and that of sub-vendors for the authorized representative of the Purchaser and the certifying authority (if required). All necessary certification on materials, shop test data etc., shall be made available to verify that the requirements of the purchase order are being met. No equipment surface shall be painted until all inspection is completed.

5.11.3 Fabrication & Welding

Supplier shall notify Purchaser at least fifteen working days prior to the:

a) Start of fabrication.

b) Scheduled time of hydrostatic testing.

5.11.4 Inspection Methods and Acceptance Criteria

All examination methods shall be per ASME Code, Section VIII, Division I, augmented by the following:

a) Purchaser reserves the right to approve the radiographic method and requirement for stress relieving employed.

5.12 Hydrostatic Tests

All pressure vessels and piping shall be hydro tested in accordance with the appropriate code requirements.

Process piping or tubing shall be tested with water after shop fabrication into sub-assemblies.

The normal test pressure for piping shall be 1.5 times the adjusted cold pressure rating of the valves, fitting, expansion joints or other limiting elements in the line. Pressure testing shall be maintained long enough to permit complete inspection but shall not be less than 60 minutes.

A shop hydrostatic test for vessels shall be applied as per Paragraph UG-99C, ASME Code, Section VIII, Division I.

Test requirements are:

a) No testing shall be performed before postweld heat treatment.

b) No pre-testing shall be performed before the Code hydrostatic test.

c) Time period of testing shall be 1 hour per inch of greatest thickness with a minimum of 1 hour.

d) Minimum test water temperature and metal temperature shall be 70ºF, except if the design temperature is below 70ºF.

e) Test fluid for carbon steel vessels shall contain a maximum of 500 ml/m³ (500 ppm) chlorides.

f) All cover plate hinge pins shall be in place during the test and shall not bind on the hinges.

g) Service bolting to be furnished with the assembly may be used for shop tests. Any material damaged during testing and all types of gaskets shall be replaced by Supplier with new material. Gaskets used for tests shall be of the same material and design as those to be furnished with the vessel.

h) The hydrostatic test pressure shall be based on the fully reinforced, uncorroded shell, except as may be otherwise limited to nozzle flange rating established for the design condition.

5.12.1 Assembled Skid Testing

The complete pipe work assembled on the package shall be subject to a low pressure (1.0 barg) leak test at Supplier works to verify integrity of all joints.

The complete assembly shall be given a full functional test including instrumentation and electrical equipment at Supplier's works. During the test all alarms, shutdown and remote signals shall be simulated. The Supplier shall be required to submit a full testing procedure at least 3 weeks prior to the commencement of testing and covering the full extent of testing on the completed assembly.

The testing procedure shall be approved by the Purchaser prior to the commencement of testing and shall be complete with all equipment procedures and check lists. The Supplier shall be responsible for providing all necessary utility services to conduct the tests.

5.13 Functional Tests

The Supplier shall be responsible for ensuring all calibration and test equipment has valid certification.

All instrument functions shall be verified by using water or instrument quality air as a substitute for the process liquid/gas to prove the integrity of the control equipment/ instrumentation.

Bidder should arrange factory acceptance test at manufacturer/ packager's works. The factory acceptance test shall be witnessed by three OGDCL engineers. All cost including air tickets, boarding, lodging, local transportation at destination will be in bidder scope. All other arrangements, test equipment's, documentation for FAT will also be in bidder scope.

6.0 OTHER REQUIREMENTS

6.1 Civil Design

Designs of equipment foundation, etc. are included in supplier's scope. The Supplier shall be responsible for the provision of necessary foundation design data including but not limited to size and location of all anchor bolts, static and dynamic loading conditions for foundation design. Supplier shall also indicate on his drawings required elevation of equipment foundation from ground level. SUPPLIER MUST PROVIDE THE FOUNDATION DRWING COMPLETE IN ALL ASPECT.

6.2 Installation/Erection Works

Installation works are excluded from the Supplier's Scope. However, the Supplier will give detailed description of the site activities related to the package installation and erection/installation of all the loose items.

6.3 Package Cleaning

Prior to shipment and after hydrotesting, the package shall be subject to through cleaning by the supplier. The supplier shall give recommendation for the package cleaning. The package cleaning program shall be agreed with the purchaser. As a general rule the supplier shall clean the package internals in the workshop prior to preparation for shipping. Supplier shall ensure that the equipment is free from any foreign material, dirt, etc.

7.0 GUARANTEES

Supplier shall guarantee that the equipment furnished is free from fault in workmanship, and material and is of proper material to fulfill satisfactorily the operating conditions specified. Should any defect in material, workmanship or operating characteristics develop during the first year of operation after commissioning at Qadirpur Plant , but not later than 24 months after shipment from Supplier's plant, the Supplier shall have to make all necessary or desirable alterations, repairs, and replacements of defective equipment, free of charge, and shall pay all transportation involved to and from the Purchaser's plant. If the defect or failure to function cannot be corrected, the Supplier shall replace promptly, free of charge said equipment or to remove the equipment and refund the full purchase price.

8.0 SPARES

Supplier shall recommend and provide spare parts needed for start-up and for two (2) years operation. Recommended spares parts list should be provided with technical bid and should take into account related factors of item's reliability, effect to equipment downtime upon production or safety, costs of parts, and availability of equipment service facilities.

All spare parts furnished by Supplier shall be wrapped and packaged so that they will be preserved in original as-new conditions of storage to be anticipated and shall be properly tagged and coded so that later identification as intended equipment usage would be facilitated. They shall be packaged separately, clearly marked as "Spare Parts", and shipped at the same time as the equipment. Packing lists shall be furnished so that the parts can be handled without uncrating if desired.

9.0 QA/QC & CERTIFICATION

9.1 Quality Assurance & Control

9.1.1 Quality Management System

The Supplier shall operate an independently verified Quality Management System that satisfies the applicable provisions of BS-EN-ISO 9000 (series), or agreed equivalent standard, commensurate with the goods and services to be provided. Current details of registration, approval of other demonstration of the status and efficient operation of the Quality System shall be provided with the bid submission. Further information may be requested at the PO stage.

The Supplier, as part of their own Quality Management System, will be expected to demonstrate the QA competence of any Sub-supplier. The Purchaser reserves the right to require the Supplier to implement addition controls, where a satisfactory level of competence cannot be demonstrated in this regard, and/or exercise additional controls not detailed in this requisition.

The Purchaser reserves that right to visit the premises of the Supplier and any Sub-supplier for the purpose of undertaking Quality Audits relating to the equipment and services covered by this requisition, the extent of which will be discussed with the Supplier before, PO award. Prior notice of five working days will be given to the Supplier of any such Audits. A copy of the Audit report will be forwarded to the Supplier on completion. Any findings resulting from such Audits shall necessitate the implementation of appropriate corrective actions based on a time scale to be agreed with the Purchaser.

9.1.2 Quality Control

It is the Purchaser’s intention to determine his involvement in the inspection of materials and activities at the Supplier’s and Sub-Suppliers’ work dependant on the equipment complexity/criticality and the effectiveness of the Supplier’s QA/QC procedures. The Supplier shall provide their standard format Quality Control Plan, relating to the scope of work for review at the bid submission. This should include those activities, which have been sub-contracted and provision made for Purchaser design review/inspection.

Regular inspection visits by the Purchaser for the purposes of surveillance and documentation review will not be carried out as a matter of course. However, should it become apparent that the Supplier's or Sub-suppliers' agreed Manufacturing Quality Control Plan is either inadequate or not being implemented, the Purchaser reserves the right to increase the level or frequency of his Quality Control activities or request the supplier to revise his working practices, as necessary.

To assist the Supplier in evaluating the expected level of Purchaser involvement applicable to this requisition, the following activities in Quality Control Level by Purchaser have been identified:

a. QC Plan review/markup
b. Surveillance of main Supplier
c. Surveillance of major Sub-suppliers
d. Certification and manufacturing data review

9.1.3 Material Traceability & Certification

The Supplier shall advise their proposed material traceability system by which material are assured to be fit-for-purpose and identified throughout the manufacturing process, as part of the bid submission. The Supplier should note that material certification is to be provided for all pressure containing and load bearing components.

9.2 Certification & Manufacturing Records

9.2.1 Inspection and Certification Records

The Supplier shall ensure that all inspection, test and certification records for equipment and materials, procured by the Supplier and test and inspection records for the Supplier's assemblies and fabrications, required by legislation, codes, standards and specifications or otherwise required are provided, safely stored and available on request.

9.2.2 Certification and Manufacturing Data Requirements

Certification and manufacturing data requirements consist of a collection of original and type test certification, inspection and test records and final release documentation generated during the approval, manufacture and testing of the equipment or material. All Certification and Manufacturing Data (2 sets) is to be issued to the Purchaser.

10.0 DOCUMENTATION

10.1 Document Preparation Requirements

The Purchaser will supply, at the time of PO/Contract award, tables and front sheets for all documents and drawings. The Supplier shall then electronically impose these details on their agreed deliverables to the Purchaser. The label/front sheet shall be used to convey to the Supplier the Purchaser's acceptance, or otherwise, of the document in accordance with the code detailed on the label/front sheet.

Labels shall be affixed to all A3 (and larger) documents in the bottom right hand corner, as close to the title block as practicable. For A4 documents, the A4 front sheet shall be attached to the document itself. The Supplier shall complete all label details on initial and subsequent issues, as required.

10.2 Transmittals

All documents submitted to the Purchaser shall be accompanied by a transmittal completed by the Supplier. A format will be supplied to the purchaser at the PO/Contract award stage. All transmittals will be sequentially numbered.

10.3 Use of the English Language

All documents shall be written in the English Language.

10.4 Document Sizes

Sizes A1, A2, A3, A4 shall be used.

NB. *A0 size drawings are NOT acceptable.*

10.5 Scale Ratios

Except where stated, all drawings will be supplied in imperial units and using one of the following scales 1:1, 1:2, 1:5, 1:10, 1:20, 1:25, 1:50, 1:100, 1:250,

1:500, 1:1000, 1:33 ⅓ may be used for Piping General Arrangement drawings only.

10.6 Quantities of Documents Required

- A4 Size: 4 Copies (for review & approval)
- A3 Size: 4 Copies (for review & approval)
- A2, A1 Size: 4 folded size for A4 size prints
- Manuals (Startup & Operation Manuals, Job Books, Equipment Dossier, etc.): 2 copies for review. 6 copies at final issue
- Certification & Manufacturing Data Records: 2 copies at final issue

10.7 Electronic Data

Supplier shall also submit electronic/soft copies of all design data, documents, drawing in auto cad format, transmital etc. This also includes design details by Supplier's Sub-vendors. The Supplier shall transmit final documentation on CDs.

All drawings shall be prepared in AutoCAD 2012 format. All documentation shall be prepared in MS Office 2010.

10.8 Manuals

Manuals shall be submitted in clearly labeled 4 ring white hard cover binders. All documents smaller than A4 shall be inserted into A4 pre-punched, top-opening plastic wallets (if original certification, etc.) or attached to A4 sheets. Documents larger than A4 shall be folded to A4 size and inserted into A4 pre-punched, top-opening plastic wallets with the project document number/title block clearly visible to the front.

10.9 Document Numbering

The Purchaser shall advise the Supplier at the time of P.O his preference for document, line numbers, instrument, equipment and drawing numbering. These requirements shall be strictly adhered to during the course of the work.

OIL & GAS DEVELOPMENT COMPANY LTD

SPECIFICATION FOR
UNFIRED PRESSURE VESSEL

DOCUMENT NO. : 2895-SP-002

Consultant:

PETROCHEMICAL ENGINEERING CONSULTANTS

Rev.	Date	Description	Prepared By	Checked By	Approved By
1	08-04-18	Issued for review	MT	AJ	AJ

Table of Contents

1.0 INTRODUCTION

1.1 General

This specification is a standard specification for Unfired Pressure Vessels and outlines the minimum requirements of the PURCHASER.

1.2 Definition

Terms used in this specification have the following meanings:

“Purchaser” shall mean “OGDCL”

“Supplier’ shall mean the entity with whom the Purchaser has placed an order for the material covered by this requisition.

1.3 Errors Or Omissions

Review and comment by the Purchaser of any Supplier drawings, procedures or documents shall only indicate acceptance of general requirements and shall not relieve the Supplier of its obligations to comply with the requirements of this specification and other related parts of the Contract Documents. Any errors or omissions noted by the Supplier in this Specification shall be immediately brought to the attention of Purchaser.

1.4 Deviation

All deviations to this Specification, other related specifications or attachments shall be brought to the knowledge of the Purchaser in the bid. All deviations made during the procurement, design, manufacturing, testing and inspection of the Works shall be with written approval of the Purchaser prior to execution of work. Such deviations shall be shown in the documentation prepared by the Purchaser.

1.5 Conflicting Requirements

In the event of any conflict, inconsistency or ambiguity between the Contract scope of work, this Specification, Codes & Standards referenced in this Specification or any other documents, the Supplier shall refer to the Purchaser whose decision shall prevail.

1.6 Reporting Procedure

A reporting and documentation system shall be agreed between the Purchase and the Supplier for the status of procurement, design, manufacturing, inspection, testing and shipment of the equipment/material to be supplied under this specification. Supplier's manufacturer shall provide reports and summaries for production performance and testing operations in conformance with a manufacturing schedule approved by Purchaser.

Weekly, monthly and run summaries of all major aspects of the production process shall be provided as reports to the Purchaser.

1.7 UNIT RESPONSIBILITY

The Supplier shall be responsible for the complete design, manufacture supply, fabrication, installation/erection, inspection and testing of the vessels, including full compliance with all applicable design codes, and standards, including those listed in Section 2.0 of this document and with the requirements of the independent certifying authority, where applicable.

2.0 REFERENCE CODES & STANDARDS (LATEST EDITIONS)

ASME Codes

Section VIII	Division I & Division II (Pressure Vessels)
Section IX	Welding Qualifications
Section V	Non-destructive Examination
Section II	Materials
Section II, (Part C)	Welding Rods, Electrodes and Filler Materials
	ANSI Standards (Latest Editions)
B16.5	Steel Pipe Flanges
B.16.20	Metallic Gasket for pipe Flanges
B16.9	Factory Made Wrought Steel Butt-Welding Fittings
B36.10	Wrought Steel Pipes
B36.19	Stainless Steel Pipes
A58.1	Building Code Requirement for Minimum Design Loads in Building and Other Structures.
MSS SP-44 or	Steel pipe line flanges for dia > 24"
ANSI B16.47	

Steel Structures Painting Council Specification for Surface Preparation and Painting System;

In addition to the requirements of this specification, all requirements of the governing authority, i.e. the country and/or its sub-divisions, where the vessel is to be installed shall be met;

Pressure vessels shall be fabricated in accordance with ASME code by `U' stamp fabricator. Bidder to confirm the name of fabricator in the bid and

provide his `U' stamp certification from ASME. Waiver from any requirement mentioned in data sheet must be obtained from Purchaser.

3.0 SCOPE

3.1 GENERAL

This specification sets forth the minimum acceptable standards governing the design, fabrication, material requirements, inspection, testing, identification and preparation for shipping of unfired pressure vessels.

3.2 Material, Workmanship And Suitability

All materials and parts included in the construction of the specified vessel shall be new, unused and of the highest grade being free from all defects or imperfections likely to affect their performance.

4.0 GENERAL REQUIREMENTS

4.1 Purchaser/ Company's Requirements

The design life of equipment shall be 25 years.

Requests for substitutions of any kind shall be complete with all pertinent engineering information required for the Purchaser's evaluation of the proposed substitution.

Vessel outline drawings and/or data sheet sketches submitted to the SUPPLIER are not intended to cover complete details. The SUPPLIER shall make detailed calculations for the design of the pressure vessels and shall prepare detailed shop drawings.

The SUPPLIER shall concurrently submit to the PURCHASER, fabrication drawings, weld procedures and detailed calculations for approval. Shop work shall not start until the SUPPLIER have received drawings and weld procedures approved by the PURCHASER. No subsequent revision may be issued to the fabrication shop unless it is approved by the PURCHASER.

4.2 Earthing

Each vessel shall be supplied with a minimum of two earthing bosses suitable for termination of 70 sq. mm earth cable.

4.3 Tolerances & Dimensions

SUPPLIER shall comply with the requirements as per ASME VIII.

4.4 Nozzle Projection

Unless specified otherwise, the nozzle projections shall comply with the requirements as per ASME VIII.

5.0 DESIGN

5.1 Design Conditions

The design pressure shall be in accordance datasheet 2895-DS-001.

5.2 Design Loadings

The Vessel(s) shall be self-supporting and designed to withstand a wind loading based on the projected area of curved surfaces. The area of ladders, platforms and pipework shall be assumed as equivalent to one and one-half times the wind loading of the insulated vessel.

Pressure vessel components, their supports and anchorages, shall be designed to withstand the results of the following combinations of loads and forces within the limits of stress set by the code, and the deflections set by Section 5.4 of this specification:

- Erection Condition (The empty weight plus the weight of any internals present during erection).
- Initial Site Test Condition (The empty weight plus weight of water to fill the vessel).
- Operating and Design Conditions (The empty weight plus the weight of all internals packing, insulation and operating liquid);
- Hot Shut down Condition (As for the Operating and Design Condition, but excluding the operating liquid);
- Transportation/Dynamic Loading Condition;
- Continuous monitoring of vessel conditions by mechanical testing during operation conducted by operating and maintenance team after start-up and handing over;
- Any other condition, which would affect the safety of the vessel e.g. cyclic loading;

5.3 Design Stress

Allowable Stress

Shall be the maximum stresses permitted by the basic design code.

Test Condition

The allowable general membrane stress shall be the maximum of 90 percent of the minimum specified yield or proof stress of the material of construction.

Anchorages

Foundation bolts for vessels shall have a maximum allowable tensile stress of 110 N/mm^2.

5.4 Deflection Limits Due To Applied Loads

The static deflection of vertical vessels in the corroded condition due to the full wind load shall be limited to 1 in 200 of the vessel length. The deflection due to applied load and self weight of distributors, gratings, etc. and their supports, in the corroded condition, shall be limited to 1 in 500 of their span. Vertical vessels with a ratio of overall height to diameter exceeding 15 shall be designed for dynamic stability under wind induced vibrations.

5.5 Nozzle Loading

Nozzle Size	Resultant Force (N)	Resultant Moment (RN)
2”	1435	380
3”	2930	1140
4”	4100	2080
6”	7000	5230
8”	10190	9800
10”	13950	16510
12”	16500	22820
14”	17500	26110
16”	19350	32310
18”	21000	38310

20”	22450	44260
24” – 30”	24750	54880

The above table gives the resultant forces and moments induced from pipework systems, which are to be allowed. SUPPLIER shall consider the force acting radially together with the moment acting either in a longitudinal or circumferential direction. The above table does not apply to equipment nozzles within packaged units where actual loading conditions should be applied. SUPPLIER shall ensure that the above nozzle loadings will not induce unacceptable stress levels in the vessel shell or head, in compliance with the relevant vessel design code.

5.6 Drawings & Calculations

Shop details shall be complete with all dimensions, thicknesses and details of construction, including dimensional location of circumferential and longitudinal seams, and all nozzle locations and orientations. All material thicknesses shall be shown, including spherical radius and knuckle radius of heads. All welds shall be detailed or fully described by notes or weld symbols, and annotated to the relevant weld procedure specification.

The assembly drawings shall contain all pertinent information relating to the standards, codes and specifications used in the design, fabrication, inspection and testing of the vessel, including the materials used, plus the total weight of the vessel empty, operating and full of water.

A detail of the skirt, base ring and chairs for vertical vessels or saddles for horizontal vessels shall be provided, complete with all dimensions and descriptions of material, including number, diameter, and location of anchor bolt holes. If this information is furnished by the PURCHASER it shall be checked by the SUPPLIER and so noted on the appropriate drawing. Foundation loading data shall also be provided by SUPPLIER. SUPPLIER shall submit detailed calculations establishing the compliance of design with the requirements of this specification, the certifying authority if applicable and all statutory regulations. Methods of calculations which are not in accordance with the relevant code or established procedures shall be subject to approval by the PURCHASER for its applicability to the design.

All calculations shall be complete, giving all references and showing all working methods. Computer printouts will not be accepted without the program flow chart, input data and complete printout, and then only by prior written agreement with the PURCHASER at the quotation stage. Review of drawings, calculations and other documents by the PURCHASER, does not relieve the SUPPLIER of his responsibility for the correctness of the design to suit the stated conditions.

6.0 MECHANICAL REQUIREMENTS

6.1 Minimum Thickness

After forming, the minimum thickness of shell and head shall, for carbon steel and low alloy steel vessels, be as follows:

Vessel I.D.	**Min. Thickness with Corrosion Allowance**
1500 mm & below	6 mm
1501 – 2500 mm	8 mm
2501 mm	10 mm

Minimum thickness of materials other than carbon steel shall be based on the structural stability of the vessel in addition to the requirements of pressure and other mechanical loading. However, the minimum thickness of high alloy (austenitic) steel vessels and their components shall not be less than 6mm. Minimum wall thicknesses of carbon steel and low alloy nozzle necks, including corrosion allowance, shall be the greater of the code requirement or the following:

- 2" through 6" - Sch. 80.
- 8" through 24" - Std. Wall

Skirts shall be designed for load conditions, but shall not be less than 6mm wall thickness. Minimum thickness of internal carbon steel attachments shall not be less than 6mm excluding corrosion allowance.

6.2 Corrosion Allowance

Unless otherwise specified on the data sheet, carbon steel vessels and internals shall have 3mm corrosion allowance applied to all pressure retaining parts and all surfaces of non-removable internals exposed to the process fluid. Removable internals shall have half the specified corrosion allowance on all surfaces exposed to process fluid.

No corrosion allowance is required on stainless steel materials or materials protected by stainless steel unless otherwise specified. When corrosion

allowance is provided by a corrosion resistant metallic lining, a minimum thickness of 3mm of lining material shall be used.

Vessel parts, which are subjected to erosion e.g. due to impingement by the process stream, shall be protected with wear plates, or impingement baffles. Flaked glass lining may be provided on the inner surface of inlet separator vessels to avoid erosion due to high velocity inlet fluid, which may contain abrasives/solid particles etc. and also to avoid corrosion effect in water boot section.

6.3 Heads

Vessel heads shall be one-piece semi-ellipsoidal (ratio 2:1) unless otherwise specified.

Torispherical and hemispherical heads may be used provided all pertinent dimensions and information is submitted to the PURCHASER for approval before the heads are ordered.

Heads shall have straight flange of not less than 50mm or two times the thickness, whichever is greater. All heads, which have been formed cold or below final tempering temperature. Heads produced from more than one plate shall have the welds 100% radiographed after forming.

6.4 Supports

Horizontal vessels shall be supported on two steel saddles only. Saddles shall be furnished by CONTRACTOR / SUPPLIER. There shall be two (2) ½" NPT tapped tell-tale holes at outer extremities in each saddle pad. Saddle pads shall have rounded corners. Saddles shall provide support for at least 120° arc at the circumference of vessel shell (As per ASME VIII).

Calculations shall be provided for the effect of support saddles on the vessel shell and heads. Vertical vessels shall be supported on steel skirts. Small vertical vessels less than 1200mm Inside Diameter may be supported on structural legs, or lugs, where advantageous to plant layout. Skirts are

however mandatory for all vertical vessels with a height to diameter ratio greater than 5.

All vessels shall be designed to be self-supporting without benefit of guys or braces. Vessel skirts shall be of the height required to provide a clearance not less than 480mm between the bottom of the head and the deck/foundation. All vessels provided with skirts shall have a reinforced access opening of 400mm minimum diameter. Skirts for vessels smaller than 920mm nominal diameter shall be provided with at least one 200mm access opening. Desired orientation of openings shall be shown on the vessel drawing, or affixed on CONTRACTOR / SUPPLIER's approval drawings.

Vessel skirts shall be provided with 3" diameter reinforced vent holes at approximately 920mm intervals on the circumference, located as near the vessel head as permitted by insulation or other attachments. No skirts shall have less than two such vent holes. The following joint factors should be applied to vessel skirts:

- Circumferential seams - 0.7
- Skirt to shell joint - 0.55
- Skirt to base ring joint - 1.0

6.5 Manholes, Nozzles & Inspection Openings

Manholes, handholes, cleanout openings and end flanges shall be provided as required for operation and maintenance and to meet Code requirements for inspection.

Cleanout openings shall be 4" minimum inside diameter, and shall be complete with blind flanges, bolting and gaskets and hinged, if not accessible to ground or a platform, for ease in maintenance. Where inspection openings are required the minimum size shall be 4" nominal. Trayed or packed towers shall be served by adequate internal and external access openings and shall have at least a top and bottom manhole. Packed towers shall have a manhole above the top level of the packing and below each support grid. A minimum 12" nominal opening shall be provided above each grid to permit removal of packing. Where the centreline of the lowest manhole is more than 1525mm

above the vessel bottom, ladder access shall be provided to the interior vessel bottom.

Manholes shall be at least 480mm clear inside diameter, and are to be complete with blind flanges, bolting, gaskets, and davits or hinges. No bolts smaller than M 16 diameter may be used. The minimum connection size welded into a vessel shall be 2" NB, swaged if required to the specific line size and terminating with a flanged connection. Alternatively, an appropriate long welding neck forging may be used for the connection provided it has a 2" or greater diameter hub. The only exception to the above shall be nozzles for vessels in water, air and steam (if applicable) service in which the pressure does not exceed 13.50 barg and the temperature does not exceed 160°C.

Full penetration welds shall be used for all body flange, nozzle and manhole attachments. Other attachment weld details are not acceptable without specific approval of the PURCHASER. All flanges for external nozzles and manholes of 24" diameter and smaller shall be in accordance with ANSI B16.5 and shall be raised face unless otherwise shown on the individual vessel data sheets and/or drawings. Pressure-temperature ratings of ANSI B16.5 shall apply for the design condition. Flanges over 24" diameter shall be in accordance with MSS Standard Practice SP-44. Non-standard size flanges shall be calculated in accordance with ASME Code Rules. Raised face flanges for use with spiral wound or soft metal jacketed asbestos gaskets shall have a smooth finish (125 RMS). Raised face flanges for use with compressed asbestos gaskets shall have contact surfaces as follows:

- Nominal size 12" and smaller - A continuous spiral groove generated by a 1.8mm radius round-nose tool at a feed of approximately 0.9mm per revolution.
- Nominal size above 12" - A continuous spiral groove generated by a 3mm radius round-nose tool at a feed of approximately 1.3mm per revolution All nozzles shall be flush with inside of vessel wall unless otherwise indicated on vessel data sheets.

Where two or more openings are provided for installation of equipment, such as gouge glasses, level controls, etc. they shall be set with a Jig to prevent tolerance from being additive. No threaded connections shall be screwed directly into any part of the vessel except for tell-tale holes in reinforcing pads.

All bolt holes in manholes, handholes and nozzles and anchor bolts on supports shall straddle the normal vessel centreline unless otherwise specified. Pad type nozzles, handholes etc. shall not be used unless written approval is obtained from the PURCHASER. Nozzles may be either integral forgings or fabricated from seamless pipe and welding neck flange joined by full penetration welds. Other type built-up nozzles are not acceptable without approval of PURCHASER.

Flanges for internal nonpressure piping may be slip-on-type. Set-on type nozzles shall only be used with prior agreement from the PURCHASER and provided that 100% Ultrasonic Examination of the shell plate is carried out adjacent to the opening. Examination is to be in accordance with ASTM A-435 to cover a minimum of two times the opening diameter.

6.6 Reinforcement

Reinforcement of nozzles and manholes shall be designed to provide 100% compensation for the as built thickness of the shell/head, in accordance with the specified design code. The reinforcement for openings shall be provided by either self reinforcing type nozzles or built-up, seamless pipe and WN flange with pad reinforcement as necessary.

Reinforcing pads when applied shall have a minimum width of 2" or three times the pad thickness, whichever is greater. Reinforcing pads shall be made in one piece if possible. Large reinforcing pads may be made from two pieces provided that written approval is obtained from the PURCHASER. Integral reinforcement of openings shall be provided for vessels in the following categories. Reinforcing pads shall not be used in these instances:

- Vessels in lethal service;
- Vessels designed for temperatures below 0°C;
- Vessels with shell thickness exceeding 50mm;

All rectangular reinforcing pads when used for external or internal attachments shall be radiused 25mm minimum.

6.7 Internal Attachments

The vessel fabricator shall furnish and install all internal support rings, down comer supports, bars, gratings, grating supports, tray lifting, tray leveling device, vortex breakers, piping and all other internals as and where required by the appropriate drawings. Internals shall be fixed by bolting to cups or rings for ease of maintenance.

Mitred joints shall not be used, unless otherwise specified on drawings and agreed by the PURCHASER. Major internal piping shall be flanged for ease of removal through vessel manholes. All removable internals shall be fabricated so as to pass through the vessel manholes. Support and fixed internals welded to shell/head, shall be seal welded to prevent crevice corrosion. Seal and strength welds shall carry the appropriate corrosion allowance.

All internal crevices where supports and fixed internals are welded to the shell/heads shall be seal welded to exclude process fluids. Seal and strength welds shall carry the appropriate corrosion allowance.

6.8 External Attachments

Vessel fabricator shall furnish and attach all insulation support rings, external pressure stiffeners, lifting lugs, ladder and platform lugs, and pipe supports unless otherwise specified. Reinforcing pads shall be continuously welded to vessel beneath all attachments where the welding of such attachments would cause excessive concentration of stress on vessel at those points. Each pad shall contain at least one ½" NPT tapped tell-tale hole.

All vessels greater than 3600mm installed height shall be fitted with a full length ladder, Platforms for maintenance shall be provided as necessary for safe access to manholes, relief valves, control valves, controllers, etc. Sample connections, thermometers, thermowells, gauges and control instruments shall be accessible from a platform or a ladder. Tower davits shall be provided as necessary for proper maintenance. All attachments shall be continuously welded. All vessels, vertical or horizontal, shall be furnished with a minimum of two lifting lugs, which shall be designed for a load equal to two times the shipping weight.

6.9 Vibration Analysis

A dynamic wind analysis shall be performed for all towers taller than 100 ft (30 m) with a height-to-diameter ratio greater than 15. The following conditions shall be met:

- Vessel diameter (d) shall be the predominant outside shell diameter of the top one-third of the vessel.

- Vessel height (H) shall be the total height of vessel from base of skirt to top of head.

- The maximum single amplitude (deflection) at the top of the vessel due to dynamic wind load, including rotation of the concrete foundation or structure, shall not exceed 0.5 percent of H.

7.0 ADDITIONAL REQUIREMENTS FOR FLANGED GIRTH JOINTS

1. Flanged girth joints shall be designed for through bolting. Proposals for alternative joint design shall be submitted to the PURCHASER for approval.

2. Flanges for girth joints shall conform to the following:

- Flanges shall be according to ASME B16.5, ASME B16.47 Series B, or designed according to ASME SEC VIII D1 with allowable stresses determined according to that code.

- Welding neck flanges shall be used where the pressure-temperature design conditions require an ASME Class 300 or greater flange.

- Slip-on flanges shall not be used if any of the following conditions are exceeded:

  - Pressure-temperature design conditions require an ASME Class 300 or greater flange.

  - Design temperature exceeds 750°F (400°C).

  - Specified corrosion allowance for the vessel is greater than 1/8 in. (3 mm).

  - The vessel is in hydrogen service.

- Girth flanges larger than NPS 24 that are not in accordance with ASME B16.47 Series B shall be designed to meet the flange rigidity recommendations in ASME SEC VIII D1.

- Unless otherwise specified, gasket contacts surfaces shall have a finish in accordance with reference Codes and Standards.

- Allowable flatness tolerances of gasket contact surfaces for the appropriate service condition shall be as per reference Codes and Standards.

- For confined joint construction (peripheral gasket confined on OD):

  - Nubbins, if provided, shall be located on the female (grooved) flange.

  - The clearance between flanges after assembly shall be not less than 3/16 in. (5 mm). This clearance shall extend from the periphery of the flange to within the bolt circle.

8.0 MATERIALS

8.1 General Specification

Materials of construction for pressure parts shall be in accordance with the design code. Alternative materials may be used if advantageous with the approval of the PURCHASER. Proposed substitutions must be clearly defined:

- Vessels having design temperature below 0°C are considered as cold vessels.
- Vessels having design temperature over 0°C considered as warm vessels.

8.2 Shell / Heads

Unless otherwise specified in drawings or data sheets, materials for shell/heads shall be as under:

- Material for warm service pressure vessel shell/heads shall be:

  ASTM A-515 for Intermediate & High Temperature Service;

  ASTM A-516 for Moderate & Lower Temperature Service;

- Material for cold service pressure vessel shell/heads shall be:

  ASTM A-516 for Pressure Vessel having Design Temperature upto -46°C with impact test.

  ASTM A-203 Gr. D for Pressure Vessel having Design Temperature upto -101oC with impact testing corresponding to vessel design temperature.

  ASTM A-240 Gr. 304 for Pressure Vessel having Design Temperature upto -178°C without impact testing.

8.3 Supports & Miscellaneous Parts

Any material welded directly to the pressure retaining parts shall be of similar quality as the vessel plate, including impact requirements if any, for a length measured from the vessel wall of at least 150mm. The material of such items beyond this point may be structural quality A283 Gr. C, or equal.

ASTM A-203 Gr. D or ASTM A-240 Gr. 304 shall be used for cold vessels.

8.4 Bolting

Bolts and nuts shall be furnished by the SUPPLIER for all cover plates, manholes, blind flanges and bolted attachments supplied with vessels. Bolts and nuts shall be new.

External bolting shall be alloy steel stud type and selected for maximum and minimum design temperatures.

For warm vessels; all external bolting shall be cadmium plated to ASTM A-193 Gr. B8 Class 2 c/w ASTM A-194 Gr. 2H nuts.

For cold vessels; all external bolting shall be cadmium plated to ASTM A-320 Gr. L7 c/w ASTM A-194 Gr. 7 nuts.

All internal bolting to be stainless steel;

Flange bolting of nominal size 1½" and above shall be subject to bolt tensioning. SUPPLIER to supply flange stud-bolts over length by one nut thickness and complete with 3 nuts to facilitate bolt tensioning for all flanged connections for which SUPPLIER supplies a mating flange, bolt tensioning will be carried out on site by Contractor.

8.5 Flanges

Flange material shall be of a similar quality to the vessel shell including impact properties where applicable. Forgings shall be supplied in the normalized condition.

For warm vessels; all flanges material shall be ASTM A-105. For cold vessels; all flanges material shall be ASTM A-182 Gr. 316 for Stainless Steel Vessels or ASTM A-350 Gr. LF2 for Carbon Steel (with impact test) Vessels.

8.6 GASKETS

Gaskets shall be furnished by the SUPPLIER for all bolted attachments i.e. cover-plates, manways, and blind flanges supplied with vessels. Unless otherwise specified, gaskets shall be in accordance with ANSI B16.5 as follows:

- For Flat Face, 150 LB ANSI flange: Full Face, 1.6mm thick compressed non-asbestos.

- For Raised Face, 150 LB ANSI flanges: thick compressed Spiral wound stainless steel, non-asbestos filled with spacer rings.

- For Raised Face, 300 & 600LB ANSI flanges: Spiral wound stainless steel, non-asbestos filled with spacer rings.

- For Ring Joint, 900, 1500 and 2500 LB ANSI flanges: Oval Ring per ANSI B16.20, Armco soft iron or equal. (90 Brinell Max).

Gasket material for nozzles connected to external pipework and valving shall be in accordance with the Project Specification for Piping Design and Materials.

8.7 Impact Test Requirements

Charpy V-notch impact testing is required in accordance with the code except that this shall apply to all vessels with a design temperature below 0°C. These vessels shall meet the requirements of ASME Section 11 Part A, SA20 and Clause UG-84 of ASME VIII Division 1.

9.0 FABRICATION

9.1 Start Of Fabrication

No manufacture may begin until SUPPLIER has received written approval of his detailed fabrication drawings from the PURCHASER or their authorized representative.

The SUPPLIER shall notify the PURCHASER or their authorized representative in reasonable time before actual fabrication begins.

9.2 Forming

Shell plates shall not be formed until actual head dimensions are known. Plates shall be formed in the same direction as the final roll given in manufacture.

9.3 Welding

All welding shall be in accordance with the code, standard and welding specification for this project. The SUPPLIER shall submit proposed weld procedures and weld details for the PURCHASER'S review and approval prior to commencing any production welding.

Submerged arc welding is preferred on all vessel seams. For materials with yield strength exceeding 330 N/mm2 and/or thickness exceeding 20mm, consumables for manual metallic arc welding shall be of the basic low hydrogen type. SUPPLIER shall establish a procedure for maintaining proper control of welding consumables.

Low hydrogen electrodes shall be dried or baked at the temperature level and times specified by the manufacturer, and shall be used within 8 hours when stored in quivers. Electrodes stored in quivers, but not used within the specified times, shall be restored in ovens.

No electrodes shall be left lying about the site, or in workshops. Electrodes so left shall be scrapped. Submerged arc flux shall be stored in moisture-proof

containers in a dry location, at a temperature of above 20°C. Submerged arc consumables shall be withdrawn from store only when required for immediate use. Used consumables shall be returned to store on completion of the welding operation.

Submerged arc flux may be recycled but shall be free from fused flux, mill scale, dirt or other foreign matter. The SUPPLIER shall provide proof to the satisfaction of the PURCHASER'S Inspector that the welder has been using the process for which he is qualified within the previous 3 months. If not, then the welder shall be required to re-qualify. Backing rings shall be used only with approval of the PURCHASER.

Adjacent longitudinal seams shall be staggered to give between seams a minimum of 60° orientation or 2000mm whichever is greater. Shell seams shall be located to miss long internal attachment welds (trays, downcomers, etc.) and all nozzles and manhole openings and their reinforcing pad.

Longitudinal and circumferential seams in shells and all seams in heads shall be full penetration single or double butt-welds of the 'V' or 'U' type. Lap welds are not permitted. All weld procedure numbers shall be shown on drawings. All welding without subsequent postweld heat treatment is prohibited on the following:

- Materials and thickness criteria defined within the design code.
- Chrome-moly alloy steels containing more than 2% Cr or more than 0.6% Mo.

Production test plates shall be conducted on longitudinal shell seams and head seams (if any) where run-off tabs shall be used. This shall apply to vessels with a design temperature below 0°C and thickness greater than 25mm. One production test plate shall be provided per vessel for each weld procedure and shall be subject to full mechanical testing in accordance with ASME IX. Production control test plates shall be post-weld heat treated with the vessel where applicable.

The weld ligament, i.e. the distance between the edges of weld preparations for any two nozzle welds, or between nozzle welds and seam welds and attachment welds, shall be twice the shell/head thickness plus 25mm. No

welding shall be allowed after PWHT. All attachments including ladder and platform clips must be welded before PWHT. All fillet welds shall be continuous.

9.4 Weld Repairs

All repairs welding shall be in accordance with procedures previously approved by the PURCHASER. The repaired weld shall be subjected, as a minimum requirement, to the same testing and inspection as the original weld. The cost of all repairs and subsequent inspection shall be the responsibility of the CONTRACTOR / SUPPLIER. Weld repairs shall take place before hydrotesting and care shall be taken to ensure that the wall thickness is not reduced below the specified minimum design thickness. Surface defects, and areas of weld resulting from the removal of temporary attachments shall be ground smooth and the area subjected to 100% crack detection.

9.5 Welding Procedure Qualification Record (WPQR)

Each weld procedure shall be covered by a suitable procedure qualification tested in accordance with the requirements of ASME IX.

9.6 Preheat Requirements

The minimum preheat for ferritic steels shall be in accordance with Appendix R of ASME VIII DIV I. Calculations of preheat temperature to suit particular combined plate thickness, chemical composition, heat input, consumables and restraint can however be made by reference to the following:

Welding Steels without Hydrogen Cracking, international Institute of Welding 1973;

Note: This guide is primarily suitable for carbon, carbon manganese fine grain and carbon molybdenum steel with less than 0.6% Mo.

The required preheat temperature shall be established before commencing welding, and held until welding is complete. Preheat temperatures shall be controlled by temperature indicating crayons or contact pyrometer.

9.7 Post Weld Heat Treatment Requirements

Vessels shall be post-weld heat treated when required by the design code depending on the combination of material, thickness and design temperature. All vessels in lethal service shall be post-weld heat treated. Post-weld heat treatment shall also be considered for vessels subjected to large amounts of welding and where pressure parts have been formed from thick plate into tight radii.

Field post-weld heat treatment procedures must be reviewed by the PURCHASER. The SUPPLIER shall include in his material sub-order(s), how many heat treatments are likely to be carried out during fabrication, and he shall ensure that he receives a guarantee from the mill that the steel supplied can be heat treated as proposed, without detrimental effect on the minimum guaranteed mechanical properties.

The use of manually operated gas torches or gas rings shall not be permitted for PWHT. During PWHT, a minimum of six thermocouples per furnace load shall be used to ensure that uniform temperature is achieved throughout the heat treatment cycle. The thermocouples shall be used to record metal skin temperature.

If welded repairs are made to a vessel, which has been heat treated, the vessel shall again be heat treated. This treatment shall form part of the repair procedure. All heat treatments shall be recorded and documented by a temperature recording chart. The welding and associated heat treatment of stainless steels shall take into account the ease with which this material can be sensitized and its corrosion resistant properties thereby impaired.

10.0 INSPECTION, TESTING AND CERTIFICATION

10.1 General

All non-destructive examination shall be carried out in accordance with the design code as a minimum. All personnel involved in non-destructive testing shall be qualified to a nationally recognized standard.

Inspection and testing shall be carried out at the CONTRACTOR / SUPPLIER'S works and shall be witnessed by the PURCHASER'S authorized representatives and/or the certifying authority if applicable.

The responsibility for inspection rests with the PURCHASER. However, the PURCHASER reserves the right to inspect vessels at any time during fabrication to ensure that materials and workmanship are in accordance with this specification, and/or the approved drawings.

The SUPPLIER shall provide a projected shop schedule with appropriate fabrication stages at the time drawings are submitted for approval, to highlight the inspection activity schedule. The approval of any work by the PURCHASER or their authorized representative and the release of a vessel for shipment shall in no way relieve the SUPPLIER of any responsibility for carrying out the provisions of this specification.

The SUPPLIER shall inform the PURCHASER at the time of placing the order of any tests, which cannot be adequately performed.

10.2 Radiographic Inspection

Except where amplified in this specification the extent of radiography shall be in accordance with the design code. When 100% radiography is specified for all welds, including flange butt welds and nozzle to shell connecting welds, shall be fully radiographed. Where radiography is considered to be impractical ultrasonic inspection may be substituted with prior approval of the PURCHASER.

For vessels requiring radiography where heat treatment is required, the radiography must be carried out after heat treatment. The SUPPLIER may at his discretion carry out radiography prior to heat treatment. The PURCHASER'S appointed inspector shall see all radiographs and shall be advised of any defects found in any welds.

10.3 Ultrasonic Inspection

Ultrasonic inspection may be substituted for radiography with prior approval of the PURCHASER in areas that are inaccessible for radiography.

For vessels requiring U/T examination where heat treatment is required, the examination must be carried out after heat treatment. The SUPPLIER may, at his discretion carry out U/T examination prior to heat treatment.

10.4 Magnetic Particle & Dye Penetrant Inspection

All magnetic particle and Dye Penetrant inspection shall be performed in accordance with the design code.

As. a minimum, the following applies at all nozzles, manways, and reinforcing pads:

- Load bearing fillet welds shall be checked at root runs and finished welds by magnetic particle or dye penetrant method.

- All full penetration attachment welds shall be magnetic particle inspected at the bock-chipped surface and on all finished weld surfaces.

Crack detection of finished welds shall be carried out after hydrotest and PWHT (where applicable). Magnetic particle inspection is preferred particularly after post-weld heat treatment. Vessels of low chrome alloy with plates over 50mm thick shall receive this inspection of all weld seams after post-weld heat treatment.

10.5 Acceptance Criteria

The acceptance standard for Non-Destructive examination of welds shall be in accordance with the design code.

10.6 Support & Reinforcing Pod Inspection

Welds of reinforcing pads shall be tested to 1 barg with dry air after fabrication (but prior to the hydrostatic test of the vessel) using suitable materials for the detection of leaks.

10.7 Hydrostatic Tests

Hydrostatic tests shall be carried out in presence of the PURCHASER appointed inspector and a representative of the certifying authority, when applicable.

Hydrostatic testing shall be in accordance with the design code. Fresh water only shall be used for testing. For vessels manufactured from stainless steel the chloride ion content of the test water shall not exceed 30ppm. During testing the temperature of the vessel and test water shall not be lower than 7°C and not more than 25°C. Adequate support shall be provided for vertical vessels tested in the horizontal position to ensure that they are not subjected to excessive local loadings and bending stresses. Hydrotest pressure shall be held for a minimum of 60 minutes, irrespective of design code requirements.

10.8 Test Bolting

After the successful completion of the hydrostatic test, the bolting used during testing shall be replaced. Service bolts; nuts and gaskets furnished by the SUPPLIER shall not be used for testing. The test bolts shall form part of the total equipment supply.

10.9 Nameplate

10.9.1 General

Each complete vessel shall be provided with a type 316 stainless steel nameplate securely attached to the vessel shell and located so that it is clearly visible after installation. Nameplates shall be rivetted to a bracket welded on the vessel and the inspection authority then over stamps one rivet. Insulated vessels shall have nameplate brackets with enough projection to clear insulation by at least 25mm

10.9.2 Stamped Data

The following information shall be stamped on the nameplate:

- Manufacturer's Name;
- Manufacturer's Serial Number;
- Tag Number;
- Purchase Order Number;
- Equipment Title;
- Maximum allowable working pressure (Hot and Corroded) barg at °C;
- Maximum test Pressure (Corroded) in barg;
- Year Built;
- Size I.D./O.D. x T to T in mm;
- Service;
- Corrosion Allowance in mm;
- Design Code/Code Symbol showing degree of radiography and/or stress relieved and type of construction;

- Weight empty/operating/hydrotest in kg;
- Inspection authority and date of inspection;
- Code symbol showing if the unit is x-rayed and stress relieved;
- Design temperature and pressure;
- Operating temperature and pressure;

10.10 Report & Acceptance Certificates

With regard to witnessed tests the SUPPLIER shall prepare a report on the tests and the results, these shall be included in the 'Certification Data Books'. All Data Books produced shall be complete and copies submitted to the PURCHASER for review not later than 4 weeks after the date of completion of the tests.

10.11 Certification Documents

The PURCHASER shall store in good order all material certificates, fully catalogued and indexed NDT test records, mechanical test certificates, welding qualification certificates, heat treatment certificates and hydrostatic test certificates for a minimum of 5 years after acceptance of the complete and fully certified vessel by the PURCHASER.

All certificates shall be available for counter signature by the certification authority.

11.0 PAINTING AND PREPARATION FOR SHIPMENT

11.1 Painting & Protective Coatings

Painting, protective coatings and the procedures used for the preparation of surfaces shall be as specified in the Project Specification for Painting and Protective Coatings.

Where painting is specified, the entire vessel shall be painted, including inside of skirt, outside of bottom head, entire base ring and all skirt attachments. Nozzles shall be painted on the flange edges, inside bolt holes, and up to the gasket surface.

Fireproofed/Insulated surfaces shall be shot blasted and given one coat of primer only. The SUPPLIER shall stencil in a prominent position in 50mm high characters the dry lifting weight of the vessel and for stress relieved vessels the words "NO WELDING PERMITTED".

11.2 Preparation Of Shipment

After the final hydrostatic test, the vessel shall be dried and cleaned thoroughly of all grease, loose scale, rust, flux and weld spatter, both internally and externally. All machined surfaces and threaded connections shall be protected by coating with rust preventative. Flanged openings shall be protected with steel plate covers attached by proper bolting or strapping and sealed with a plastic compound. Screwed connections shall be protected with threaded forged steel plugs.

The SUPPLIER shall be responsible for loading and anchoring vessels to prevent any damage during shipment.

When shipped loose, all instruments, valves, parts, etc., of a vessel shall be tagged with vessel number and purchase order number to facilitate match-up with appropriate vessel in the field. Tags and wire shall be stainless steel. All such items shall be boxed and where possible attached to the inside of the skirt or saddle.

SUPPLIER shall state in the proposal his recommendations for long term storage (up to 12 months) for both indoor and open-air storage in a marine environment.

12.0 SPECIFIC REQUIREMENTS FOR CLAD VESSELS

12.1 Design

Design calculation shall be based on the nominal thickness of the base material i.e. shall not include any allowance for the cladding thickness. The thickness of corrosion resistant linings applied to nozzles shall not be less than the thickness specified for the vessel.

The principle shall be satisfied that the design of a cladding or lining accounts for the effect of differential thermal expansion and has sufficient ductility to accommodate any strain likely to be imposed during service.

12.2 Materials

Pressure vessel parts constructed of integrally clad plate, and vessel parts fully or partially lined by welding after forming, shall satisfy the requirements of ASME Section VIII DIV I Part UCL.

The use of linings other than those obtained by using integrally clad plate or overlay weld deposits shall be avoided and requires special approval of the PURCHASER. Integrally clad plate shall be of the homogeneously clad type as obtained by roll cladding or explosive bonding. The clad plates shall conform to ASTM A-263, ASTM A-264 & ASTM A-265, as applicable, irrespective of the design calculation method used. Integrally clad plate shall be ultrasonically tested to check the quality of the bond in accordance with the requirements of ASTM A579, acceptance level S6. The branches in clad vessels shall be cut from tubing or fabricated from clad plate. Alternatively, the branches may be protected by corrosion resistance weld overlays.

Solid alloy nozzles may be offered as on alternative to clad nozzles in the smaller sizes where it is considered to be advantageous. Flange facings on clad vessels shall be provided with an overlay weld deposit protection unless otherwise specified by the PURCHASER. Overlay weld deposits of austenitic stainless steel weld metal on carbon and lowalloy steels shall be applied in a minimum of two layers. For the first layer type 309 weld material shall be used, and the top layer as specified.

12.3 Fabrication

Weld overlay deposits on clad vessels shall be performed in accordance with procedures qualified to ASME IX. The proposed procedure for relevant application shall be submitted with the bid. The procedure for PWHT shall be submitted to the PURCHASER for approval. It shall be demonstrated that no deleterious effects on the corrosion resistance of the cladding or weld overlay will occur during PWHT.

12.4 Inspection & Testing

Clad plate formed into dished ends shall be ultrasonically retested for soundness after forming. Linings applied by overlay weld deposit, shall be ultrasonically examined for gross lack of fusion in accordance with ASTM A578 acceptance level S6. This also applies to clad restoring of welds in clad plate, where a bond of 50mm on each side of the weld shall be examined.

Vessels protected with a cladding or lining of stainless steel, or having stainless steel internals shall be hydrostatically tested as if they were of solid stainless steel, refer to clause No. 6 of this specification.

13.0 DRAWINGS AND DATA REQUIRED

SUPPLIER information shall be supplied in accordance with the PURCHASER's procurement documentation and shall include, as a minimum, the following:

- Completed data sheets;
- General arrangement and cross-sectional drawings, complete with parts list, materials and equipment description;
- Materials and thickness of principal parts, not covered by the data sheet;
- Itemized weights, including maintenance weights, plus withdrawal dimensions;
- Foundation Loading Data;
- SUPPLIER connection drawings complete with detailed nozzle schedule;
- Itemized list of CONTRACTOR / SUPPLIER's deviations from Specification. SUPPLIER shall advise separate prices for the following:
  - Supply & installation of additional nozzles, rated as per data sheet, with and without reinforcement for the following nominal bores:

    2", 3", 4", 6", 8", 10", 12", 14" & 16";

    20" & 24" Manways complete with blind flanges, bolting, gasket and davit;

    Per kg of all support clips and lugs;
- Proposed test procedure and erection details;
- Priced list of recommended commissioning spares;

- Priced list of spare parts for two years operation;
- Priced list of special tools;

OIL & GAS DEVELOPMENT COMPANY LTD

SPECIFICATION FOR
PACKAGED INSTRUMENTATION

DOCUMENT NO. : 2895-SP-003

Consultant:

PETROCHEMICAL ENGINEERING CONSULTANTS

Rev.	Date	Description	Prepared By	Checked By	Approved By
1	08-04-18	Issued for review	MT	AJ	AJ

Table of Contents

1.0 PACKAGE INSTRUMENTATION

1.1 Introduction

This Specification states the minimum requirements for instrumentation and controls supplied as part of packaged units and equipment skids.

The Vendor shall be responsible for the complete design, manufacture and testing of the instrumentation equipment in the packaged unit in accordance with this Specification plus compliance with applicable codes, standards, specifications and regulations issued by the organizations listed in Section 2.

1.2 Vendor Responsibility

The Vendor shall:

- Define all instrumentation systems and controls required to ensure satisfactory continuous operation for the conditions stated on the process equipment data sheet(s). This shall include all instrumentation systems required for satisfactory start-up and shutdown of the equipment.
- Ensure that adequate instrumentation is provided for demonstrating the guaranteed performance of the packaged equipment.
- Ensure that all instrumentation within his scope is suitable for the service conditions.

1.3 Limits of Supply

The instrumentation supplied by the Vendor shall include all instruments mounted on the equipment skid completely electrically and mechanically connected to the process. The instrument signals (analogue and digital) shall be fully connected to junction boxes on the skid edge or to the skid-mounted control panel (where applicable).

2.0 TECHNICAL REQUIREMENTS

2.1 General

Instrumentation shall be designed for minimum local manning and operator attention, with facilities for local shutdown, start-up and shall drive to DCS.

2.2 Hazardous Area Instrumentation

Instruments in hazardous areas shall be certified for use in the zone concerned. The preferred methods of protection are, in order of preference:

- Ex "d" Flameproof
- Ex "e" Increased Safety
- Ex "n" Non-sparking (Zone 2 only)
- Ex "i" Intrinsically Safe (IS)

Other methods, such as Ex "s", Ex "m" or Ex "q", may be used in appropriate circumstances, particularly in combination with other forms of protection. Pressurisation by instrument air involves a continuous utility requirement and hence shall not be allowed. All other applications shall be approved by Purchaser.

2.3 Instrumentation Certification

Wherever possible instrumentation shall be certified by the Standard Association of Australia. Other acceptable authorities are:

BASEEFA	British Approvals Service for Electrical Equipment
CENELEC	Comitè Europèen de Normalisation Electrotechnique
PTB	Physikalish - Technische Bundesanstalt
CSA	Canadian Standards Association

2.4 Units of Measurement

Standard International (SI) units shall be used unless specified otherwise on the relevant data sheet.

3.0 FIELD INSTRUMENTATION

3.1 Transmission Signals

Signal transmission between field instruments and remote control equipment shall generally be electric, as follows:

Analogue:	2-wire, 4-20 mA d.c., generally from a "Smart" transmitter supporting HART protocol.
Analogue (Temperature):	3-wire RTD to BS 1904 with a "Smart" 4-20 mA transmitter supporting HART protocol.
Analogue (Position):	3-wire variable resistance with a 4-20 mA transmitter.
On/Off Valve Position:	2-wire magnetic proximity hermetically sealed adjustable switches.
On/Off control:	2-wire, 24V d.c.
On/Off from a volt free contact:	2-wire, rated for 24V 5A d.c.

Signals from field devices shall be wired using dedicated cables to local junction boxes and then via multicore / multipair cables to the DCS location.

Note that the above mention signal transmission are prescribed but it may vary if at site vendor package requirements differ.

3.2 Local Instruments

Instruments and materials of construction shall be suitable for the environment in which they are located and application for which they are selected.

Pressure and temperature ratings of the process mounted instrument components shall conform as a minimum to the ratings of the process system to which they are connected.

Instruments shall be located in positions where they are easily accessible for maintenance and orientation of housings shall permit operators to observe scales whilst adjusting related instruments.

3.3 Flow Instruments (If Required)

The Vendor shall propose flow measurement methods appropriate to the process, subject to the constraints given below.

For orifice plate meter runs, the calculation of orifice diameter, manufacture of primary element and meter tubes, and the straight lengths of these meter runs shall be in accordance with AS 2360. The Beta Ratio shall be in the range 0.2 to 0.75.

Differential Pressure (DP) transmitters shall generally be used for local and remote indication of flow.

Vendor shall provide complete flow measuring instruments according to the P&IDs & Client Standards / Specification.

All differential pressure transmitters shall be of the "Smart" electronic type supporting HART protocol.

3.4 Level Instruments

The installation shall permit the removal and replacement of the level instruments while the vessel remains in service. For pressurised vessels and those containing hazardous, noxious or toxic materials, externally mounted instruments shall be used. For unpressurised vessels containing benign or low-hazard materials (such as diesel or water) top mounted instruments with internal stilling wells shall be the first choice of instrument, but attention must be paid to the need for clearance space for their removal.

3.4.1 Liquid Level Indicator / Level Gauge

Magnetically coupled float liquid level gauge with switches (High & Low) shall be fitted in float chambers. Floats shall be adequately protected from collapse and deformity due to rapid changes of pressure in the vessel and also from buildup of greasy/waxy deposits.

Reflex type gauge glasses of the high pressure type shall be used where “Magnetic flipper” type are not suitable, in those instances Reflex type maybe used on all services except:

- dirty liquids,
- interface between two liquids,
- lubrication oil reservoir level,

in which case transparent or through-vision glasses shall be used.

Vendor shall provide complete level measuring instruments (Vibronic type Level Switch) according to the P&IDs & Client Standards / Specification.

3.5 Pressure Instruments

For local measurement of pressure, bourdon tube type pressure gauges shall be used.

Pressure indicator transmitter shall be used for remote & local indication of pressure.

Ranging of all sensing elements shall be with normal operating pressure at approximately 60% of maximum range or such that the normal operating range is within the middle third of the selected range. Over range protectors shall be fitted to pressure elements where abnormal maximum pressures exceed the normal maximum operating range.

3.6 Temperature Instruments

All temperature elements, except for surface temperature measurement, shall be installed in a thermowell, unless otherwise stated or agreed by the Purchaser.

Bimetal type thermometers with hermetically sealed stainless steel case with heavy duty glass are preferred. Thermometer ranges shall be chosen such that the normal operating range is within the middle third of the gauge range.

Resistance bulb (RTD) thermometers shall be used for centralised control, indication and recording of temperature.

Transmission of resistance bulb signals shall generally be achieved by means of a "Smart" electronic 4-20mA transmitter located as close to the element as possible. Head mounted types are preferred. Smart electronics shall use HART protocol

3.7 Controllers, Recorders and Receiver Instruments (If Required)

Local instruments shall be large case and weatherproof (IP 66).

Local panel instruments shall be large case and weatherproof (IP 66).

3.8 Position Switches (If Required)

Position switches shall be of the adjustable magnetic proximity type and shall sense the valve stem position for remote indication of valve open and closed status. Proximity switches shall be rated at 0.5A at 24 VDC minimum.

3.9 Control Valves

All parts of the valve which are exposed to the surrounding atmosphere shall have a corrosion resistant and protective coating.

The flow direction shall be clearly indicated on all valves by means of an arrow cast on the body.

The valve opening shall be shown on a stationary scale by a moving pointer attached to the stem (globe valves or similar) or the shaft (rotary type valves).

Cv calculations shall be based on ANSI/ISA-75.01 or IEC-534. Predicted noise level calculations shall be based on ANSI/ISA-75.17. The Vendor shall present all calculations to the Purchaser for review and comment.

3.10 Actuators

Control valve actuators shall generally be pneumatic diaphragm or piston type, with spring return.

3.11 Control Valve Accessories

Current to Pneumatic (I/P) converters, where required, shall generally be mounted on the valve. All I/P converters shall have output range with a 4-20mA input range.

Valve positioners shall be electropneumatic with two or three gauges as appropriate. They shall generally be provided on control valves, except those in on-off service or where system analysis clearly indicates a positioner is not required. A valve positioner shall be furnished for control valves that:

- have a body size of 150mm or larger, or
- have extension bonnets, or
- are in split range service, or
- have a spring range other than 20 to 100 kPag, or
- are used for temperature control, or
- are used for level control of vessels with residence time greater than 5 minutes, or
- the manufacturer requires a positioner, or requires the use of springless piston actuators.

3.12 Electrical Limit Switches (If Required)

Limit switches shall be fitted to all actuated ball, blowdown globe valves, gate and plug valves. Switch contact action shall be arranged to close at the indicated end of travel position. The switches shall be magnetic proximity hermetically sealed type, operated by an adjustable magnet holder arm attached to the valve stem, not to the actuator. Rating shall be 2 Amp minimum at 24V d.c. Switches shall be set to operate at the fully open and fully closed extremes of travel.

3.13 Solenoid Valves

Solenoid valves shall be stainless steel with 3-port bodies.

3.13.1 Electrical Requirements:

Solenoid coils shall operate on 24V d.c. (nominal) with coil "pull-in" at 15 Volts. Class F insulated coils shall be provided, any deviation requires the Purchaser's approval.

3.14 Alarm Systems

Alarm systems shall be electronic, based on solid state or microprocessor/PLC logic.

OIL & GAS DEVELOPMENT COMPANY LTD

SPECIFICATION FOR PAINTING

DOCUMENT NO. : 2895-SP-004

Consultant:

PETROCHEMICAL ENGINEERING CONSULTANTS

Rev.	Date	Description	Prepared By	Checked By	Approved By
1	08-04-18	Issued for review	MT	AJ	AJ

TABLE OF CONTENT

1.0 PAINT WORK

1.1 GENERAL

1.1.1. This specification defines the requirements for surface preparation, selection and application of paints on external surfaces of equipment, piping, etc.

When a particular part of work is being carried out. the painting system should be chosen in accordance with the environment in which the material to be painted will be located. Indeed, the degree of aggressiveness of the atmosphere that will be encountered in the environment of the work can range from an environment, which is not very aggressive to an extremely aggressive environment, depending on whether the location is in a rural area. a non-industrial built-up area, ventilated workshops, in the vicinity of the sea, at chemical plants, in humid rooms or in the vicinity of sources of cold or heat.

1.2 CODES & STANDARDS

The following codes and standards shall be followed for the work covered by this contract.

BS 4232	: Specification for Painting requirement, surface preparation
SSPC –Pittsburg. U.S.A.	: Good Painting Practice and Surface specification SP 1 to 10 Manual volume-1
DIN Standard 55928	: Specification for paint requirement for field painting work
BS 4593 sec.4	: Specification for Inspection of finished painting.

1.3 CONDITIONS OF DELIVERY

a) Packaging

Every recipient will be fitted with a hermetically-sealed lid with an opening that is sufficiently large to allow the contents to be stirred: the outside and inside are protected against oxidation, and, like the lid, are marked with a strip of colour identical to the contents.

1.4 COMPOSITION OF THE PAINT PRODUCTS USED

a) Quality

The composition and quality of the products may not differ from batch to batch. A batch is all of the products of a specified manufacture. If the analyses of products bring to light that the composition does not conform to the specifications of the paint manufacturer, the Employer / Owner's Engineer may refuse to use this batch of products. The paint products must comply with the following conditions:

- They must have the viscosity necessary for the described use and the established condition ; use of the brush – paint roller (spray gun for special cases and in the workshop)

b) Quality control - Sampling

While the works are in progress on the construction site, the Employer / Owner's Engineer may carry out sampling on the paint being used for the purpose of checking conformity. The paint products must be made available free of charge to the laboratory or the approved supervisory body in sufficient quantities so that all the tests can be carried out on the same batch.

If the analyses reveal a non-conformity in the composition of the products used (tolerance of +3 % of the dosage of every component), the Employer / Owner's Engineer may refuse application of the product under consideration, halt the work / and have the non-conforming product already applied removed.

Before proceeding with the work a product data sheet with its test certificates & batch certificate is to be submitted to Employer / Owner's Engineer's approval stating that products offered is conform to the required specification. The only Purpose of the analyses is to reveal any nonconformity of the composition of the products. Their purpose is therefore not to assess the quality of the different components. The analyses concerned are not acceptance tests of the products supplied and in no way affect the obligations of the Contractor specified in the contract towards the Employer / Owner's Engineer.

1.5 IDENTIFICATION

Every recipient will bear the following information:

- Name of the manufacturer;
- Date and number of manufacturer;
- Name of the product type;
- Batch no. with Test certificate

- Net weight of the product or the contents of the recipient;
- Date of the expiry.

At the time of delivery, this packaging must be bear labels in conformity with the legal stipulations in force.

After completion of a job a general clean up shall be carried out by the Contractor to remove all debris, materials or irregularities that his work has brought to the site so that it is left tidy.

The restoration work includes among other things:

- the removal of abrasives;
- the removal of the different protective coverings;
- the Contractor will make the required repairs to any damage after refitting the supports;
- the removal of paint and cleaning of the stains on the floor.

1.6 SURFACE PREPARATION STANDARDS

Following standards shall be followed for surface preparations. :

1 Swedish Standard Institution- SIS-05 5900-1967

2 Steel Structures Painting Council, U.S.A. (Surface Preparation Specifications (SSPC-SP)

3 British Standards Institution (Surface Finish of Blast-cleaned for Painting) BS- 4232.

4 National Association of Corrosion Engineers, U.S.A. (NACE).

a) The contractor shall arrange, at his own cost to keep a set of latest edition of above standards and codes at site.

b) The paint manufacturer's instruction shall be followed as far as practicable at all times. Particular attention shall be paid to the following:
   - Proper storage to avoid exposure as well as extremes of temperature.
   - Surface preparation prior to painting.
   - Mixing and thinning.
   - Application of paints and the recommended limit on time intervals between coats.

c) Any painting work (including surface preparation) on piping or equipment shall be commenced only after the system tests have been completed and clearance for

taking up painting work is given by the Employer / Owner's Engineer, who may, however, at his discretion authorize in writing, the taking up of surface preparation or painting work in any specific location, even prior to completion of system test.

1.7 PREPARATION OF THE SURFACES

1.7.1 General Specifications

The cases that occur in practice on building sites, with regard to painted surfaces, can be broken down as follows:

- material of which the oxide content disappears by natural oxidation;
- material that has already been covered with a layer of paint in the workshop;
- material that is covered with old paint layers that show different degrees of weathering.

Good preparation of the surface is the best guarantee for good anti-corrosion protection.
Paintwork shall never begin until the surface to be treated is dry and is independent of the base coat and cleared of dirt, dust, rust, scale, grease, salt attack, cement powder, cement mud-scale, sand, oil, etc.

The method of preparation of the surface will be implemented in accordance with the preparation methods described below:

- cleaning (bright blast-cleaning):
- mechanical cleaning;
- manual de-rusting.

The Contractor should have the required material at his disposal to clean the surfaces to be coated thoroughly in accordance with the preparation methods. regardless of the form or the condition of such surfaces. The cleaning devices that might be damaged during the surface preparation shall be screened off by the Contractor.

1.7.2 Sandblasting

The blasting grits or sand to be used for blasting operation shall be tested for chloride content or the Contractor / manufacturer shall issue the certificate showing there is no chloride content in the product.

Before beginning cleaning by blasting. the person carrying out the work will take the following measures:

- clear the steel surface of oil and/or grease;
- ensure that each flange collar (section where the sealing is applied) is properly screened off against the blasting and the subsequent works;
- check that no blasting grains can get into the pipes during this process. Any openings not sealed off must be screened off;
- where there are valves, regulators and other devices, the manufacturer's identification plate will be dismantled so that all surfaces can be treated. The plate will then be put back again or if removal of above is not possible then these items shall be covered & protect so that application of paint on main unit doesn't spoil above said parts.
- screen off all non-metal structures such as rubber where there is a filter;
- with valves operators and other devices care should be taken to ensure that no metal filings or paint get into the apparatus:

To prevent rust forming quickly as the result of humidity on the blasted surface, cleaning by blasting may only be carried out when the temperature of the steel surface is at least 3°C higher than the dew point of the ambient air.

Blasting may not be carried out if the relative degree of humidity exceeds 80%. The choice of the type of blasting medium used depends on local circumstances such as the possible presence of gas and the material to be blasted - e.g. INOX (stainless steel)., The abrasive to be used must conform to the local law i.e. it may contain no carbon and less than 1% free silicon dioxide. The Sa 3 will always be requested and must at least reach Sa 2½ during the initial stage of the paintwork. For blasting followed by metallization, the surface preparation degree to be achieved is always Sa 3. The degree of cleanliness to be obtained will be inspected in accordance with the Swedish standard SVENSK STANDARD ISO 8501-1-1988 SS 05.5900.

- Sa 3: surface blasted down to the bare metal; when the surface is inspected with a magnifying glass, scale, rust and foreign bodies must be completely removed and it should be possible to raise a metallic -shine on the treated surface, the surface roughness shall be at least 75 µ.
- Sa 2 1/2: blasted very carefully. Scale, rust and foreign bodies must be removed in such a way that anything left behind will only be visible as nuances (shading) or strips.

The blast-cleaning will be carried out by means of compressed air free of water and oil. After the blasting and before painting, the surface should be completely cleaned of blasting material and so forth with a soft brush, a dry cloth or dry compressed air.

1.7.3 Mechanical cleaning

If sandblasting is not permitted or if the metal structures are not easily accessible for blasting or blasting for one reason or another is technically unfeasible, mechanical de-rusting can be used instead. With mechanical cleaning by means of chipping, rotating steel brushes and sanding discs, a degree of cleanliness St 3 should be reached.

- St.3 : removal of the old paint layers of which the adhesion leaves something to be desired and / or of which the paint layer no longer fulfils the requirements.

If parts are present that are so corroded that St 3 is difficult to achieve, this should be notified to the Employer / Owner's Engineer prior to the start of the works.

N. B :

St 3 : means removal of every old paint layer. Retouching means local polishing with St 3 or Sa 3 followed by application of the desired painting system.
After mechanical cleaning, the surface should be made dust-free with a cloth or a so brush. washed with an organic solvent and thoroughly dried off with a dry clot (e.g. with 1.1.1. Tricloroethane such as Solvethane, Chlorothene NU).

1.7.4 Manual de-rusting

Manual de-rusting with the aid of scrapers, steel brushes; sandpaper etc. shall only be permitted in exceptional cases for local repairs. Any deviation there from must be requested from the Employer / Owner's Engineer.

With manual de-rusting, a surface preparation degree St 3 must be obtained. The length of the handles of the equipment used may not exceed 50 cm.

1.7.5 Preparation of a surface covered with a layer of paint in the workshop.

This layer is in general applied by the manufacturer for example on valves, Regulators etc. Layers of this kind will be checked for their proper adhesion in accordance with ASTM D3359, method A. The adhesion should be at least 4A.

If the paint layer shows less adhesion or is incompatible with the rest of the system it should be completely removed. If the paint layer is not removed, the Contractor

accepts, it in the state in which the coating is found and the guarantee remains in force.

The Contractor, who must provide for the protection on the construction site. Must therefore obtain the information regarding the treatment of the surface and the quality of the paint that was used and must, moreover, examine the adhesion of the layer on the construction site, the percentage of damage and weathering as well as the value of the preparation of the surface in the workshop together with the thickness thereof that must be supplemented if necessary.

a) Galvanized surfaces

Galvanized surfaces, both old and new will be carefully roughened up. Every foreign body (concrete splatters, chalk marks, grease and oil stains, etc.) will be removed. Thereafter, rub the surfaces with abundant water and, if necessary, with cleaning products.

To this end, nylon brushes will be used for every kind of dirt as well as for removing zinc salt residue. Thereafter, the surfaces will be treated in accordance with system 21. Where the zinc layer is lacking, it will be de-rusted manually to a degree of cleanliness St 3, after which a Primer coat will be applied in accordance with system 22.

b) Metalized surfaces treated with an impregnation layer

- Degrease with the desired degreasing product:
- Clean under high pressure or with a product prescribed by the paint supplier.

If the paint layer adheres well and is applied on a clean base, the painting system described may be continued. If the percentage of damage and weathering does not exceed 5 % / m. retouching may be considered. These partial repairs will be carried out.

If on the other hand, the percentage of damage does exceed 5 %/m or if the layer applied in the workshop comes loose, the Contractor must draw the attention of the Employer / Owner’s Engineer to this and carry out the complete application system.

1.7.6 Preparation of surfaces covered with earlier paint layers that show different degrees of weathering.

If the surfaces do not show deep weathering limited to the spread of rust by small pitted areas or non-penetrative rust in spots, it will very often be sufficient to clean the surfaces with abrasives or with an abrasive disc. Then to rub them down with steel

wool, remove the dust and wash off. If thick rust appears, in spots scale rust and active rust canker, this should be removed with needle hammers or stripped away directly by blasting, removing the dust and washing off.

1.7.7 Preparation of concrete or cement plaster surfaces

Remove unsound paint layers and loose components with scrapers, blades or rotating steel brushes, Thoroughly clean the entire surface with water containing ammonia. Thoroughly remove moss, algae and fungal growths. Where these growths have been removed, treat the area with a fungicide in accordance with the instructions for use.

Once the entire area is completely dry, brush off the dead residue of moss, algae and fungus with a hard brush. In the case of reinforcement steel that has been laid bare, remove as rust. dust and grease as possible and treat with a primer coat. When painting concrete surfaces. they must first be checked for cracks. Cracks larger than 0.3 mm Must be repaired with an appropriate system in accordance with the type and extent of the repairs (e.g. injection with epoxy mortar). Repair damage such as cracks and bursts to concrete parts with a two-component mortar or preferably with micro-mortars. Finally, check the alkalinity of the surface with the aid of litmus paper and neutralize it if necessary.

1.7.8 Use of solvents

It is sometimes necessary to use solvents when the surfaces to be painted are streaked with grease or oil. In this case a suitable organic solvent should be applied. The operation should be carried out with the aid of clean brushes or rags and clean solvent.

All the legal specifications in connection with solvents etc. must be adhered to. The Employer / Owner’s Engineer shall be informed in advance of any toxicity or flammability. All measures must be taken to prevent any risk of fire and to rule out any Possibility of poisoning (ventilation). The Contractor will provide drip collectors to keep the environment free of pollution.

1.7.9 Condition of the metal after stripping

The Contractor must call in Employer / Owner’s Engineer for checking the condition of the metal during stripping and inform Employer / Owner’s Engineer immediately of any damage that he might have noticed.

- Deep corrosion of the plates – rivets – bolts

- Faulty welding
- Fittings that appear to be dangerous because of their age.

1.7.10 Removing coating from surface pipelines

The Contractor must have the equipment necessary for the removal of asphalt from the pipe without damaging the latter (scratching, impact, etc,). The Contractor undertakes to carry out the work in accordance with an approved procedure.

1.8 CARRYING OUT THE PAINTWORK

1.8.1 Conditions for carrying out paintwork

Painting may not be carried out in unsuitable conditions.

All preparatory work and painting may only be carried out in dry weather and at a minimum temperature of 10ºC, except for special cases requested by the Employer / Owner's Engineer.

Unless otherwise stipulated in the specifications of the paint supplier, application of the paint is forbidden if it is forecast that the temperature will fall to below 0°C before the paint is dry. The temperature of the surface to be painted must be at least 3°C higher than the dew point of the ambient air. Application of the paint is also not permitted if there is a danger that the coat of paint will not be dry before dew or condensation sets in.

The work must be stopped:

- If the temperature of the surface to be painted is higher than that described by the supplier:
- If it is raining, snow, mist or fog or when the relative humidity is higher than 80 %.

Coats that have not yet dried and have been exposed to frost, mist, snow or rain and might thereby be damaged must be removed after drying and the surfaces must be repainted at the expense of the Contractor.

Working in direct sunlight or in hot weather must be avoided.

The first coat of paint must be applied maximum 3, hours after the preparation of the surface if the relative humidity of the air is between 50 % and 80 %. This time span may be increased to 6 hours if the relative humidity is less than 50 % in all cases, the

preparation of the surface must exhibit degree Sa 3 and at the very least the appearance of degree Sa 2½ at the time of painting.

The coats of paint may only be applied on carefully cleaned surfaces that must be dry and free of grease and dust.

1.8.2 Special conditions

Painting may be carried out when the Contractor can be sure that the instructions of the paint supplier have been scrupulously followed with regard to the parameters in the following (non-exhaustive) list:

- Ambient temperature
- Surface temperature
- Relative humidity
- Dew point
- Drying times

The Contractor must in this respect be able to produce the instructions for the paint on the site.

In addition, the paintwork may only be carried out to a minimum ambient temperature of 5°C and / or to a maximum relative degree of humidity of 85 %. Application of the paint is also not permitted if there is a danger that the coat of paint will not be dry before dew or condensation sets in.

Hand mixing of the paint shall be permitted for up to 5 liters only, the large quantity shall mixed by mechanical agitators and shall be maintained continuously during paint work to avoid quick pigment separation.

1.8.3 Paint Materials

Manufacturers shall furnish the characteristics of all paints indicating the suitability for the required service conditions. Paint material should withstand lower up to -10°C. Primer and finish coats shall be of class-I quality and shall conform to the following:

a) Primer (P-1)

Redoxide Zinc Chromate Primer

Type and Composition: Single pack. Modified phenolic alkyd medium pigmented with redoxide and zinc chromate.

Volume solids 30 – 35%

DFT	25 microns/coat (min)
Covering capacity	12-13 M2/Lit/coat

b) Primer (P-2)

High build chlorinated rubber zinc phosphate primer

Type and Composition: Single pack, Chlorinated rubber medium plasticized with unsaponifiable plasticiser pigmented with zinc phosphate

Volume solids	35- 40%
DFT	50 MICRONS/COAT (MIN)
Covering capacity	7-8 M2/Lit/Coat

c) Primer (P-3)

High build zinc phosphate primer

Type and Composition: Single Pack, Synthetic medium. pigmented with zinc phosphate.

Volume solids	40-45%
DFT	35-50 microns/coat
Covering capacity	10-12 M2/LIT/coat
Heat resistance	Upto 100 C (dry)

d) Primer (P-4)

Etch Primer/ Wash Primer

Type and Composition: Two pack Poly vinyl butyral resin medium cured with phosphoric acid solution pigmented with zinc tetroxy chromate.

Volume solids	7-8%
DFT	8-10 microns/coat
Covering capacity	7-8 M/lit/coat

e) Primer (P-5)

Epoxy Zinc Chromate Primer

Type and Composition: Two pack, Polyamide cured epoxy resin medium pigmented with zinc chromate.

Volume solids	40%(min)

DFT	35 microns/coat(min)
Covering capacity	11-12 M/lit/Coat

f) Primer (P-6)
Epoxy Zinc Phosphate Primer

Type and Composition: Two pack, Polyamide cured Epoxy resin medium pigmented with zinc phosphate.

Volume solids	40%
DFT	35 microns/coat (min)
Covering capacity	11-12 M / lit/coat

g) Primer (P-7)

Epoxy high build M10 Paint (Intermediate Coat)

Type and composition: Two pack. Poly Polymide cured epoxy resin medium pigmented with micaceous iron oxide.

Volume solids	7- 8%
Volume Solids	50%
DFT	100 microns/coat (min)

Covering capacity 5.0 M/lit/coat

h) Primer (P-8)

Epoxy Red Oxide zinc phosphate primer

Type and Composition: Two pack, Polyamine cured epoxy resin pigmented with Red oxide and Zinc phosphate.

Volume solids	42%
DFT	30 microns/coat (min)
Covering capacity	13-14 M/lit/coat

i) Primer (P-9)

Epoxy based tie coat (suitable for conventional alkyd based coating prior to application of acrylic polyurethane epoxy finishing coat)
Type and Composition:Two pack , Polyamide cured epoxy resin medium suitably

pigmented.

Volume solids	50-60%
DFT	50 microns/coat (min)
Covering capacity	10-12 M/lit/coat

j) Finish Coats (F-1)

Synthetic Enamel

Type and Composition: Single pack, Alkyd medium pigmented with superior quality water & weather resistant pigments.

Volume solids	30-40%
DFT	20-25 microns/coat
Covering capacity	16-18 M/lit/coat

k) Finish coat (F-2)

Acrylic Polyurethane paint

Type and Composition: Two pack , Acrylic resin and isocyanate hardener suitably pigmented.

Volume solids	40% (min)
DFT	30-40 microns/coat
Covering capacity	10-12 M / lit / coat

l) Finish Coat (F-3)

Chlorinated Rubber Paint

Type and Composition: Single pack, Plasticized chlorinated rubber medium with chemical & weather resistant pigments.

Volume solids	30%
DFT	30 microns / coat (min)
Covering capacity	1 0.0 M / lit /coat

m) Finish Coat (F-4)

High build chlorinated rubber M10 paint.

Type and Composition: Single pack Chlorinated rubber based high build pigmented with micaceous iron oxide.

Volume solids	40-50%
DFT	65-75 microns/coat
Covering capacity	6.0-7.0 M / lit / coat

n) Finish coat (F-5)

Chemical Resistant Phenolic based Enamel

Type and Composition: Single pack phenolic medium suitably pigmented.

Volume solids	35-40%
DFT	25 microns/ coat
Covering capacity	15.0 M /lit/ coat

o) Finish Coat(F-6)

Epoxy High Building Coating

Type and Composition: Two pack. Polyamide cured epoxy resin medium suitably pigmented.

Volume solids	60-65%
DFT	100 microns/coat (min)
Covering capacity	6.0-6.5 M / lit / coat

p) Finish Coat (F-7)
High build Coal Tar Epoxy

Type and Composition: Two pack, Polyamine cured epoxy resin blended with Coal Tar.

Volume solids	65% (min)
DFT	100-125 microns/coat
Covering capacity	6.0-6.5 m / lit / coat

q) Finish Coat (F-8)

Self priming epoxy high build
coating (complete rust control coating)

Type and Composition: Two pack. Polyamide-amine cured epoxy resin suitably pigmented. Capable of adhering to manually prepared surface and old coatings.

Volume solids	65-80%
DFT	125-150 microns/coat
Covering capacity	4-5 M / lit / coat

r) Finish Coat (F-9)

Inorganic Zinc Silicate coating

Type and Composition: Two pack , Self cured Ethyl silicate solvent based Inorganic Zinc coating.

Volume solids	60% (min)
DFT	65-75 microns/coat
Covering capacity	8-9 M / lit / coat

s) Finish coat (F-10) High build Black

Type and Composition: Single pack. Reinforced bituminous composition phenol based resin.

Volume solids	55-60%
DFT	100 microns/coat (min)
Covering capacity	5.50-6.0 M / lit / coat

t) Finish Coat (F-11)

Heat Resistant Aluminum Paint Suitable up to 250°C.

Type and Composition: Duel container (paste & medium). Heat resistant spec varnish medium combined with aluminum flakes.

Volume solids	20-25%
DFT	20 microns/coat (min)
Covering capacity	10-12 M / lit/ coat

u) Finish Coat (F-12)

Heat Resistant Silicon Paint suitable up to 400º C.

Type and Composition: Single pack Silicone resin based with aluminum flakes.

Volume solids	20-25%
DFT	20 microns/coat (min)
Covering capacity	10-12 M/lit/coat

v) Finish Coat (F-13)

Synthetic Rubber Based Aluminum Paint Suitable up to 150º C.

Type and Composition: Single Pack, Synthetic medium rubber medium combined with leafing Aluminum,

DFT	25 microns/coat
Covering capacity	9.5 M /lit/ coat

Notes

1. Covering capacity and DFT depends on method of application. Covering capacity specified above are theoretical. Allowing the losses during application, min specified DFT should be maintained.
2. All paints shall be applied in accordance with manufacturer's instructions for surface preparation, intervals, curing and application. The surface preparation quality and workmanship should be ensured.
3. Selected chlorinated rubber paint should have resistance to corrosive atmosphere and suitable for marine environment,
4 All primers and finish coats should be cold cured and air-drying unless otherwise specified.
5. Technical data sheets for all paints shall be supplied at the time of submission of quotations.
6. In case of use of epoxy tie coat, manufacturer should demonstrate satisfactory test for inter coat adhesion. In case of limited availability of epoxy tie coat (P-9) alternate system may be used taking into the service requirement of the system.
7. In case of F-6, F-9, F-11 & F-12 Finish Coats, No Primer is required.

The paints shall conform to the specifications given above and Class-I quality

Painting material

Type	Designation
1. Inorganic zinc, silicate	Ameron Dimetcote 11 or approved equivalent
Thinner	Ameron A65 or approved equivalent
2. High-build polyamide epoxy	Ameron A383HS or approved equivalent
Thinner	Ameron A65 or approved equivalent
3. Acrylic silicone	Ameron 1999 or approved equivalent
Thinner	Ameron 65 or approved equivalent
4. Silicone aluminium	Ameron A878 or approved equivalent
Thinner	Ameron A65 or approved equivalent
5. Epoxy primer-1	Ameron 71Tc or approved equivalent
Thinner	Ameron A65 or approved equivalent
6. Epoxy finish aluminium	Ameron 72 or approved equivalent
Thinner	Ameron 9HF or approved equivalent

Notes:

(a) Amercoat 65 or an approved equivalent thinner shall be used for cleaning stainless steel surfaces prior to printing.

(b) Amercoat 12 or an approved equivalent thinner shall be used for cleaning tools and equipment used for painting in accordance with this specification.

STORAGE

All paints and painting material shall be stored only in rooms to be provided by contractor and approved by Employer / Owner's Engineer for the purpose. All necessary precautions shall be taken to prevent fire. The storage building shall preferably be separate from adjacent, building. A signboard bearing the words ' PAINT STORAGE No NAKED LIGHT highly -inflammable shall be clearly displayed outside.

COLOUR CODE FOR PIPING

i) For identification of pipelines, the colour code as per Table -1 shall be used.

ii) The colour code scheme is intended for identification of the individual group of the pipeline. The system of colour coding consists of a ground colour and colour bands superimposed on it

iii) Colours (Ground) as given in Table-2 shall be applied throughout the entire length of un-insulated pipes, on the metal cladding & on surfaces, ground colour coating of

minimum 2m length or of adequate length not to be mistaken as colour band shall be applied at places requiring colour bands. Colour band(s) shall be applied as per approved procedure.

IDENTIFICATION SIGN

i) Colours of arrows shall be black or white and in contrast to the colour on which they are superimposed.

ii) Product names shall be marked at pump inlet, outlet and battery limit in a suitable size as approved by Employer / Owner's Engineer.

iii) Size of arrow shall be either of the following.

a) Colour Bands

Minimum width of colour band shall be as per approved procedure.

b) Whenever it is required by the Employer / Owner's Engineer to indicate that a pipeline carries a hazardous material, a hazard marking of diagonal stripes of black and golden yellow as per IS:2379 shall be painted on the ground colour.

IDENTIFICATION OF EOUIPMENT

All equipment shall be stenciled in black or white on each verses, column, equipment after painting as per approved procedure.

INSPECTION AND TESTING

i) All painting materials including primers and thinners brought to site by contractor for application shall be procured directly from manufactures as per specifications and shall be accompanied by manufacturer's test certificates. Paint formulations without certificates are not acceptable.

ii) The painting work shall be subject to inspection at all times. In particular, following stage wise inspection will be performed and contractor shall offer the work for inspection and approval of every stage before proceeding with the next stage.

In addition to above, record should include type of shop primer already applied on equipment e.g. Red oxide zinc chromate or zinc chromate or Red lead primer etc.

Any defect noticed during the various stages of inspection shall be rectified by the contractor to the entire satisfaction of Employer / Owner's Engineer before proceeding further. Irrespective of the inspection, repair and approval at intermediate stages of work, Contractor shall be responsible for making good any defects found

during final inspection / guarantee Period / defect liability period as defined in general condition of contract. Dry film' thickness (DFT) shall be checked and recorded after application of each coat and extra coat of paint should be applied to make-up the DFT specified without any extra cost to Employer.

PRIMER APPLICATION

i. The contractor shall provide standard thickness measurement instrument with appropriate range(s) for measuring.
Dry film thickness of each coat, surface profile gauge for checking of surface profile in case of sand blasting. Holiday detectors and pinhole detector and protector whenever required for checking in case of immerse conditions.

ii. At the discretion of Employer / Owner’s Engineer, contractor has to provide the paint manufacturer's expert technical service at site as and when required. For this service, there should not be any extra cost to the Employer.

iii. Final Inspection shall include measurement of paint dry film thickness, check of finish and workmanship. The thickness should be measured at as many points / locations as decided by Employer / Owner’s Engineer and shall be within + 10% of the dry film thickness.

iv. The contractor shall produce test reports from manufacturer regarding the quality of the particular batch of paint supplied. The Employer / Owner’s Engineer shall have the right to test wet samples of paint at random for quality. Batch test reports of the manufacturer's, for each batch of paints supplied shall be made available by the contractor.

PAINT SYSTEMS

i. The paint system should vary with type of environment envisaged in and around the plants. The types of environment as given below are considered for selection of paint system. The paint system is also given for specific requirements.

a) Normal Industrial Environment, Table 2.

b) Corrosive Industrial Environment, Table3

c) Coastal & Marine Environment, Table 4

Notes 1. Primers and finish coats for any particular paint systems shall be from same manufacturer in order to ensure compatibility

Table – 1 (Colors of Top Coats)

The colors of top coats in accordance with this specification shall be as follows:

Transmission line block valve accessories		
1.	Above ground valves	:Off White / Blue
2.	Above ground pipes	:Off white
3.	Valve handle	:black
Metering and regulating stations		
1.	Ball valves	:Off white / Blue
2.	Bypass valves	:white enamel (epoxy)
3.	ESD valves / Off take	:Red
4.	Gate vale / Plug valves	:Blue / Grey
5.	Relief valves	:Red / Green
6.	3 way Valve	:Red / blue
7.	Valve actuators	:Red
8.	Valve wheels	:Black
9.	Pipes (A/G)	:Grey
10.	Meter run(including regulator)	:Grey
11.	Vessels(scrubber/heater)	:Aluminium
12	Insulating Joint.	:Yellow
13	K.O.Drum / Filter	:Grey
14	Pig Launcher / Receiver / flange	: Off White
15	Fencing	: Aluminium

Table 2
Normal Industrial Environment (Above Ground)

Sl. No.	Description	Temp. Range	Surface Preparation	Primer	Finish Coat	Total DFT	Remarks
1.0	External surface of equipment's and piping.						
1.1	- do -	-10º C to 20ºC	SSPC-SP-3	One coat P-2 50 microns/ coat (min.)	One coat F-4 65 Microns/Coat (Min.) Two coats F- 3, 30 Microns/coat (min.)	175	Primer and Finish coat can applied at Ambient temp.

1.2	- do -	21ºC to 60ºC	SSPC-SP-6	Two coats P-1, 25 Microns/ coat (Min.)	Two coats of F-1, 20 Microns/Co at (min.)	90	-
1.3	- do -	61ºC to 80ºC	SSPC-SP-6	Two coats P-3, 50 microns / coat (Min.)	Two coats of F-13, 25 Microns/Co at (min.)	150	-
1.4	- do -	81ºC to 250ºC	SSPC-SP-6	Covered in Finish coat	Three coats of F-11, 20 Microns/Co at (min.)	60	Paint application at ambient temp. curing at elevated temp. during start-up.
1.5	- do -	251ºC to 400ºC	SSPC-SP-10	Covered in Finish coat	Three coats of F-12, 20 Microns/Co at (min.)	60	- do -

Table 3
Corrosive Industrial Environment (Above Ground)

Sl. No.	Description	Temp. Range	Surface preparation	Primer	Finish Coat	Total DFT	Remarks
1.0	External surface of un-insulated and other equipment						
1.1	- do -	- 10ºC to 20ºC	SSPC-SP-3	Two coat P-2, 50 microns/ coat(Min.)	Two coat F-3 30 microns / coat(min.)	160	Primer and paint application at ambient temp.
1.2	- do -	21ºC to 80ºC	SSPC-SP-10	Two coats P-5, 35 microns / coat(min.)	Two coats F-6, 100 microns/ coat (min.)	270	Paint application at ambient temp.
1.3	- do -	81ºC to 400ºC	SSPC-SP-3	Covered in finish coat	Three coats F-12, 20 microns /coat (min.)	60	Paint application at ambient temp. and curing at 250°C for 4 hours,

Table 4
Coastal and Marine Environment (Above Ground)

Sl. No.	Description	Temp. Range	Surface preparation	Primer	Finish Coat	Total DFT	Remarks
1.0	External surface of equipment's and piping.						
1.1	- do -	-10ºC to 60ºC	SSPC-SP-3	Two coats P-2, 50 microns/ coat (min.)	Two coats F-3, 30 Microns/coat (min.)	160	Primer and Finish coat application at Ambient temp.
1.2	- do -	61ºC to 80ºC	SSPC-SP-10	Two coats P-5, 35 Microns/ coat (Min.)	Two coats of F-6, 100 Microns/Coat (min.)	270	-do-
1.3	- do -	81ºC to 400ºC	SSPC-SP-10	One coat F-9, 85 microns / coat (Min.)	-	85	Paint application at Ambient temp. Primer is acting as primer cum finish coat.
1.4	- do -	i) Upto 80ºC	SSPC-SP-10	One coat F-9, 65 microns / coat (Min.)	One coat of F-2, 30 Microns/Coat (min.)	95	Paint application at ambient temp.
		ii) 81ºC to 400ºC	SSPC-SP-10	-do-		85	Paint application at ambient temp. Primer is acting as primer cum finish coat.

1.8.4 Precautions to be taken

Neither (the environment of the site, nor the marking labels of devices) may be covered with paint and they must be kept free of paint splashes. To this end it is advisable to use removable masking tape.

Paint splashes, leaks. etc. on any adjacent installations such as measuring apparatus, valves, pipes, sources of light, insulation, heat insulators, walls, concrete, etc. must immediately be wiped up and the damage repaired before the paint is dry.

Otherwise, the Employer / Owner's Engineer will be obliged to have the cleaning carried out at the expense of the Contractor. The paint recipient will only be opened at the time of use (unless otherwise specified by the manufacturer).

The product will be mixed in the recipient with the aid of suitable tools and thus homogenized.

1.8.5 Method of application

Normally, three methods of application will be used on the construction site for the paint products - i.e., with a brush, with a roller or with a spray gun.

- The brush method makes it possible to obtain good penetration of the paint over irregularities in the metal.
- Only (this method will be used for application of the base coats, for retouching and for protrusions, welded areas, riveted joints or bolted joints:
- The roller method may be used on large flat surfaces for (the intermediate and topcoats.
- The spray gun method must be used in accordance with the instructions of the manufacturer and carried out by qualified personnel.
- The final / finish coat shall be applied with airless spray gun to achieve smooth and glossy finish.

The Contractor must guarantee that all safety measures have been taken for such work. The spray gun method may only be used on site for places that are difficult to reach with the brush. In this case, a request must be made to the Employer / Owner's Engineer for a deviation.

All paint work will be carried out with good brushes or rollers that are suitable for the type of paint being used and for (the form of the material to be painted and fitted with short handles. The maximum length of the brush and roller handles will be 50 cm; longer handles may only be used for places that are absolutely inaccessible. The maximum width of a brush will be 13 cm.

1.8.6 Application of the coating

Application of the paint shall be carried out in accordance with best practice in order to obtain a homogeneous and continuous layer. The Employer / Owner's Engineer demands that painting of a layer will only be started after acceptance by them of the surface preparation or of the previous layer of paint.

The layers of paint must have a uniform thickness. They must be spread in such a way that all concave parts are dried out and that the surface is completely covered and has a glossy appearance without leaving brush marks and without exhibiting bubbles, foam, wrinkles, drips, craters, skins or gums that arise from weathered paint.

Each layer must have the colour stipulated in the tables of the present specifications, which clearly differs from the previous layer, taking account of the colour of the top layer. All of which for the purpose of being able to identify the number of coats and their order of sequence. If the colour of the coats is not mentioned in the tables the colour difference in consecutive coats must, if possible, be at least 100 RAL. The colour of the top layer is given in the table.

The coating power should be such that the underlying layer is not visible. Only 1 layer per day may be applied, unless otherwise specified by the Employer / Owner's Engineer.

The drying times prescribed by the paint manufacturer must be strictly observed in relation to the environmental conditions before proceeding with the application of the next layer.
The dry coating thickness indicated in the description of the paint systems, are minimum thickness. In this connection, the Contractor is obliged to contact the paint manufacturer and conform to his guidelines. The Contractor must respect the thickness specified by the supplier.

1.8.7 Transporting treated items

In the case of works being carried out in a workshop, the metal structures will be surrounded by ventilated contraction film that prevents damage during transportation. This film may only be applied after complete polymerisation of the paint.

1.9 GROUND-LEVEL TRANSITION POINT

1.9.1 Polyester protection system

The Contractor will provide system 02 over the entire length of the pipes above ground and below ground and up to a height of 30 cm and a depth of 40 cm. perpendicular to the ground level mark. In each case, he must ensure that the jointing below the asphalt is in good condition and assures' faultless adhesion. He will apply the following products over the entire surface area, prepared in accordance with Sa 3:

1) The primer of system 01A

2) Reinforced polyester ± 20 cm above the ground level marker and ± 5 cm on the asphalt cleaned beforehand. (application of reinforced polyester is carried out in accordance with the work method prescribed by the manufacturer). Moreover, in the case of PE, in contrast to asphalt, he will apply a polyken primer to PE immediately before applying the reinforced polyester.

3) He will then apply the other coats of system 0la to the surface section and thus cover the reinforced polyester with about 5 cm.

4) For new constructions, the polyken primer will be applied to PE and then subsequently processed as described under point 2.

1.10 QUALITY CONTROLS AND GUARANTEE

1.10.1 The Contractor is responsible for checking the weather conditions to ascertain whether the paint work can be carried out within the technical specifications.

The Contractor should have the required calibrated monitoring apparatus for this purpose on site (with calibration certificates). The personnel who will have to use this apparatus should have the training for this purpose.

The Employer / Owner’s Engineer may maintain supervision during the works and inspect the works with random checks. A daily report shall be drawn up in relation to the department that maintains supervision of these works.

The supplementary inspection and the supervision by the Employer / Owner’s Engineer do not diminish in any way the liability of the Contractor. The proper execution of the work and the materials used may be checked at any time.

1.10.2 Reference Surfaces

At the start of the works, the Employer / Owner's Engineer will indicate a few surfaces that the Contractor will prepare and cover in accordance with the recognized method of operation under the inspection and to the satisfaction of all parties; the Employer / Owner's Engineer or his representative, the approved supervisory body, the contractor and possibly the paint manufacturer. These reference surfaces will serve as a point of comparison for the good adhesion of the paint on the installations as a whole. The parties will together work out a system for the identification of these surfaces in order to be able to monitor the condition of the coatings over time. If the paintwork on a section of the installations is in a worse condition than the reference surfaces, the Contractor may be obliged to treat these parts again.

1.10.3 The Employer / Owner's Engineer will use the following standard as a base of assessment of quality

- The Swedish standards ISO 8501-1 1988 SS 05.5900 concerning the degree of cleanliness of the areas de-rusted by blasting, by machine or by hand.
- The wet film thickness of the paint will be measured in accordance with ISO 2808 or ASTM D1212
- The dry layer thickness of the film will be measured electronically, will complete statistical information, in accordance with ISO 2808 or ASTM D 1186
- The thickness of each layer will be measured in accordance with ISO 2808, ASTM 4138 or DIN 50986
- Adhesion tests will be carried out in accordance with ISO 2409, ASTM 3359 or DIN 53151
- Traction tests will be carried out in conformity with ISO 4624 or ASTM D 4541
- The rugosity will be measured electronically in accordance with DIN 4768;
- The non-porosity will be measured with a test tension depending on the type of coating, the layer thickness and after consultation with the Paint manufacturer;
- Any defects in the paint film may be inspected visually by means of a magnifying glass or microscope. If necessary a photographic report may be drawn up in accordance with ASTM Standard D 4121-82.

The final judgment of Employer / Owner's Engineer is irrevocable and binding for the Contractor. In the event of non-conformity of the works with the criteria of these

specifications, all costs arising from the inspection by Employer / Owner's Engineer shall be borne by the Contractor.

1.10.4 Guarantee

a) General Principles

The Contractor declares that he is aware of:

- The maximum operating temperature of the surfaces to be covered;
- The maximum permitted degree of humidity of the bearing surface;
- The properties of the environment to which the surfaces to be covered are subject.

b) Summary of the Guarantee

The contractor fully guarantees the following without reservation:

- The observance of all stipulations of the specifications for paint work regarding, among other things ;
- The preparation of the surfaces;
- The thickness of each layer
- The total thickness of the covering.
- The uniformity of the materials used;
- The repair of all defects before delivery of the works.

The Contractor will carry out the requested repair work as promptly as possible.

OIL & GAS DEVELOPMENT COMPANY LTD

SPECIFICATION FOR
PIPING MATERIAL

DOCUMENT NO. : 2895-SP-005

Consultant:

PETROCHEMICAL ENGINEERING CONSULTANTS

1	08-04-18	Issued for review	MT	AJ	AJ
Rev.	**Date**	**Description**	**Prepared By**	**Checked By**	**Approved By**

OIL & GAS DEVELOPMENT COMPANY LIMITED

PIPING SPECIFICATION

A1 (Plant Piping)

SPEC. NO. : 2895-SP-005	DATE : 3/4/2018	Revision : A	Prep. By. : WS

SERVICE	RATING	CORROSION ALLOWANCE	DESIGN CODE
PROCESS GAS	ASME CLASS 150	3 mm	ASME B31.3

PIPES

SIZE	DESIGNATION	DESCRIPTION
3" & 4"	Sch. 40	ASTM A106 Gr. B / API 5L Gr. B (SMLS) B.E. AS PER ASME B36.10
1" & 2"	Sch. 80	ASTM A106 Gr. B / API 5L Gr. B (SMLS) B.E. AS PER ASME B36.10
1/2" & 3/4"	Sch. 80	ASTM A106 Gr. B / API 5L Gr. B (SMLS) P.E. AS PER ASME B36.10

FITTINGS

SIZE	DESCRIPTION
2" to 8"	BW, A-234 Gr. WPB AS PER ASME B16.9
≤ 1 1/2"	SW, A-105 AS PER ASME B16.11 , 3000#

FLANGES

SIZE	CLASS	DESCRIPTION
2" to 8"	150#	WN, RF, ASME B16.5, ASTM A-105
≤ 1 1/2"	150#	SW, RF, ASME B16.5, ASTM A-105 (Note-3)

BOLTS & GASKETS

Stud Bolts	ASTM A-193 B7M, Cadmium Plated
Nuts	ASTM A-194 2HM, Cadmium Plated
Gaskets	3mm Thick Compressed Graphite Filled,Spiral Wound 304 S.S.Central Ring Per ASME B 16.20

VALVES

	SIZE	DESCRIPTION		SIZE	DESCRIPTION		SIZE	DESCRIPTION
GATE	-	-	BALL	≤ 1 1/2"	VB-100	OTHERS		
	-	-		2" to 4"	VB-101			
	-	-						
CHECK	-	-	GLOBE	-	-	OTHERS		
	-	-		-	-			
	-	-		-	-			

PRESSURE - TEMPERATURE RATING-ASME B16.5, MATERIAL GROUP 1.1

TEMPERATURE ºF	−20 to 100	200	300	400	500	600		
MAX. PRESSURE Psig	284.2	260	230	200	170	140		

DESIGN CONDITIONS	256.7 psig @ 212 °F	HYDROSTATIC TEST PRESSURE	384 psig

BRANCH CONNECTIONS

BRANCH SIZE (INCH) \ RUN SIZE (INCH)	32	30	28	26	24	22	20	18	16	14	12	10	8	6	4	3	2	1½	1	¾	½
½					S	S	S	S	S	S	S	S	S	S	S	S	Ts	Ts	Ts	Ts	Ts
¾					S	S	S	S	S	S	S	S	S	S	S	S	Ts	Ts	Ts	Ts	
1					S	S	S	S	S	S	S	S	S	S	S	S	Ts	Ts	Ts		
1½					S	S	S	S	S	S	S	S	S	S	S	S	Ts	Ts			
2					W	W	W	W	W	W	W	W	W	W	RT	RT	ET				
3					W	W	W	W	W	W	W	W	W	RT	RT	ET					
4					W	W	W	W	W	W	W	W	RT	RT	ET						
6					W	W	W	W	W	W	RT	RT	RT	ET							
8					W	W	W	W	RT	RT	RT	RT	ET								
10					W	W	RT	RT	RT	RT	RT	ET									
12					W	RT	RT	RT	RT	RT	ET										
14					RT	RT	RT	RT	RT	ET											
16					RT	RT	RT	RT	ET												
18					RT	RT	RT	ET													
20					RT	RT	ET														
22					RT	ET															
24					ET																

NOTES:

1. Reduced fitting thickness shall match heavier pipe wall thickness, taper to match thinner pipe wall.
2. Instrument connections shall be screwed beyond the first block valve of process piping.
3. Bore to match pipe I.D. for Welding Neck flanges.
4. DELETED
5. Under ground piping should be coated with Zinc-Rich or Zinc Silicate primer, & apply 3 Layer Polyethylene Coted.

LEGENDS:

ET = Equal Tee, Butt Welding
RT = Reducing Tee, Butt Welding
Ts = Reducing Tee, Socket Welding
W = Weldolet
S = Sockolet 3000#

OIL & GAS DEVELOPMENT COMPANY LIMITED

PIPING SPECIFICATION

C1 (Plant Piping)

SPEC. NO. : 2895-SP-005	DATE : 3/4/2018	Revision : A	Prep. By. : WS

SERVICE	RATING	CORROSION ALLOWANCE	DESIGN CODE
PROCESS GAS	ASME CLASS 600#	3 mm	ASME B31.3

PIPES

SIZE	DESIGNATION	DESCRIPTION
26"	W/T 25.40mm	ASTM A106 Gr. B / API 5L Gr. B (SMLS) P.E.AS PER ASME B36.10
16"	Sch. 60	ASTM A106 Gr. B / API 5L Gr. B (SMLS) P.E.AS PER ASME B36.10
2-1/2" to 4"	Sch. 80	ASTM A106 Gr. B / API 5L Gr. B (SMLS) B.E.AS PER ASME B36.10
3/4" to 2"	Sch. 160	ASTM A106 Gr. B / API 5L Gr. B (SMLS) B.E.AS PER ASME B36.10
1/2"	Sch. 80	ASTM A106 Gr. B / API 5L Gr. B (SMLS) P.E.AS PER ASME B36.10

FITTINGS

SIZE	DESCRIPTION
2" to 26"	BW, A-234 Gr. WPB AS PER ASME B16.9
≤ 1 1/2"	SW, A-105 AS PER ASME B16.11, 3000#

FLANGES

SIZE	CLASS	DESCRIPTION
26"	600#	WN, RF, ASME B16.47, ASTM A-105
2" to 16"	600#	WN, RF, ASME B16.5, ASTM A-105
≤ 1 1/2"	600#	SW, RF, ASME B16.5, ASTM A-105 (Note-3)

BOLTS & GASKETS

Stud Bolts	ASTM A-193 B7M, Cadmium Plated
Nuts	ASTM A-194 2HM, Cadmium Plated
Gaskets	CL 600, RF,3mm Thick Compressed Graphite Filled,Spiral Wound 304 S.S Central Ring Per ASME B 16.20

VALVES

	SIZE	DESCRIPTION		SIZE	DESCRIPTION		SIZE	DESCRIPTION
GATE	-	-	BALL	≤ 1 1/2"	VB-100	OTHERS		
	-	-		16"	VB-102			
	-	-		26"	VB-103			
CHECK	-	-	GLOBE	-	-	OTHERS		
	-	-		-	-			
	-	-		-	-			

PRESSURE - TEMPERATURE RATING-ASME B16.5, MATERIAL GROUP 1.1

TEMPERATURE ºF	−20 to 100	200	300	400	500	600		
MAX. PRESSURE Psig	1480	1350	1315	1270	1200	1035		

DESIGN CONDITIONS	1300 psig @ 212 °F	HYDROSTATIC TEST PRESSURE	1950 psig

BRANCH CONNECTIONS

BRANCH SIZE (INCH) \ RUN SIZE (INCH)	32	30	28	26	24	22	20	18	16	14	12	10	8	6	4	3	2	1½	1	¾	½
½					S	S	S	S	S	S	S	S	S	S	S	S	S	RT	RT	RT	ET
¾					S	S	S	S	S	S	S	S	S	S	S	S	S	RT	RT	ET	
1					S	S	S	S	S	S	S	S	S	S	S	S	S	RT	ET		
1½					S	S	S	S	S	S	S	S	S	S	S	S	RT	ET			
2					W	W	W	W	W	W	W	W	W	W	RT	RT	ET				
3					W	W	W	W	W	W	W	W	W	RT	RT	ET					
4					W	W	W	W	W	W	W	RT	RT	RT	ET						
6					W	W	W	W	RT	RT	RT	RT	RT	ET							
8					W	W	RT	RT	RT	RT	RT	RT	ET								
10					RT	RT	RT	RT	RT	RT	RT	ET									
12					RT	RT	RT	RT	RT	RT	ET										
14					RT	RT	RT	RT	RT	ET											
16					RT	RT	RT	RT	ET												
18					RT	RT	RT	ET													
20					RT	RT	ET														
22					RT	ET															
24					ET																

LEGENDS:

ET	=	Equal Tee
RT	=	Reducing Tee
W	=	Weldolet
S	=	Sockolet 3000#

NOTES:

1. Reduced fitting thickness shall match heavier pipe wall thickness, taper to match thinner pipe wall.
2. Instrument connections shall be screwed beyond the first block valve of process piping.
3. Bore to match pipe I.D. for Welding Neck flanges.
4. DELETED
5. Ball valve body seat shall be selected with respect to service / with PTFE seat is allowed from-50 Deg F use metal seats beyond this temperature range.
6. Under ground piping should be coated with Zinc-Rich or Zinc Silicate primer, & apply 3 Layer Polyethylene Coted.

OIL & GAS DEVELOPMENT COMPANY LIMITED

VALVE SPECIFICATION
FOR BALL VALVES

DOC. NO. : 2895-SP-005	DATE : - 03-04-2018	REV. : A	PREP. BY SHAH

VALVE	SIZE	PRESSURE CLASSIFICATION	ENDS	STYLE	OPERATOR	DESIGN & TEST	MATERIAL		
							BODY	STEM/BALL	SEAL
VB-100	≤ 1 1/2"	800 #	SW AS PER ASME B16.11	BOLTED BODY, REPLACEABLE BALL & SEATS, FULL PORT, FLOATING BALL	LEVER	API STD. 598	A-105	A 351-CF8M	FILLED TEFLON / PTFE
VB-101	2" - 4"	150#	RF (ASME B16.5)	BOLTED BODY, REPLACEABLE BALL & SEATS, REDUCED PORT, FLOATING BALL	LEVER	API STD. 598 / API 6D, FIRESAFE, ANTISTATIC	ASTM A216 WCB	A 351-CF8M	PTFE
VB-102	2" - 4"	600#	RF (ASME B16.5)	BOLTED BODY, REPLACEABLE BALL & SEATS, REDUCED PORT, TRUNION MOUNTED	GEAR	API STD. 598 / API 6D, FIRESAFE, ANTISTATIC	ASTM A216 WCB	A 351-CF8M	PTFE
VB-103	26"	600#	RF (ASME B16.5)	BOLTED BODY, REPLACEABLE BALL & SEATS, REDUCED PORT, TRUNION MOUNTED	GEAR	API STD. 598 / API 6D, FIRESAFE, ANTISTATIC	ASTM A216 WCB	A 351-CF8M	PTFE

OIL & GAS DEVELOPMENT COMPANY
PAKISTAN

DATASHEETS

Consultant:

PETROCHEMICAL ENGINEERING CONSULTANTS

ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FEC PRCP (QADIRPUR GAS FIELD)

DATA SHEET FOR FEED GAS FILTER COALESCER

CLIENT | **DOCUMENT NO.** **2895-DS-001** | CONSULTANT

Project	Root Cause Analysis for Water Carryover at FEC (PRCP)		Service	Feed Gas to Compressor		
Client	OGDCL		Tag Number	FC-101		
Location	Qadirpur		Project Number	2895		
Revision	1		Sheet#	1 OF 4		

Design Data

Vessel Volume	m^3	VTS
Bottom tan line elevation	m	VTS
Shell Thickness	mm	VTS
Head Thickness	mm	VTS
Orientation		Verical
Vessel Diameter	mm	VTS
Length Tan-Tan	m	VTS
Design Pressure	psig	1100
Operating Pressure	psig	240
Design Temperature	°F	38 / 180
Operating Temperature	°F	110
Max Liquids Capacity	kg/h	VTS
Support	legs/skirt	VTS
Filter Elements:		
Number		VTS
Diameter	mm	VTS
Length	mm	VTS
Clean Pressure Drop:		
Allowed	psi	3
Calculated	psi	VTS
Dirty Pressure Drop:		
Allowed	psi	5
Calculated	psi	VTS

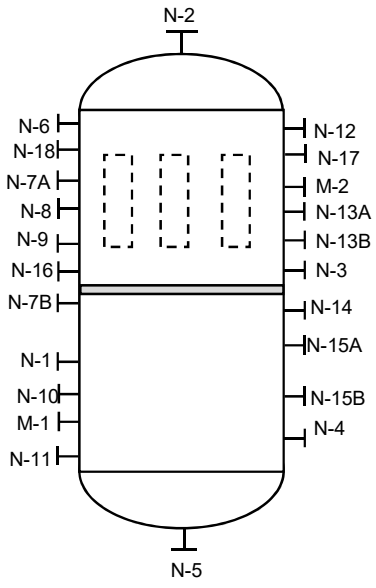
INTERNALS

Element	Yes
Type	VTS
Demister	Yes
Type	VTS
Thickness	VTS
Material	VTS
Tray	NA
Type	-
No. of /Spacing	-
Inlet Device	Yes
Type	VTS
Vortex Breaker	NA

Nozzle Schedule

Mark No.	Size (in)		No.	Rating & Facing	Service
N1	26	VTS	1	600# RF	Inlet
N2	26	VTS	1	600# RF	Outlet
N3	2	VTS	1	600# RF	Filter section liquid out;et
N4	2	VTS	1	600# RF	Separation section liquid outlet
N5	2		1	600# RF	Drain
N6	2		1	600# RF	Filter section Pressure Transmitter
N7A/B	2		1	600# RF	Diffrential Pressure Transmitter
N8	2		1	600# RF	Filter section level switch high high
N9	2		1	600# RF	Filter section level switch low low
N10	2		1	600# RF	Separation section level switch high high
N11	2		1	600# RF	Separation section level switch low low
N12	2	VTS	1	600# RF	Pressure relief valve
N13A/B	2		1	600# RF	Filter section level bridle
N14	2		1	600# RF	Separation section pressure transmitter
N15A/B	2		1	600# RF	Separation section level bridle
N16	2		1	600# RF	Spare
N17	2		1	600# RF	Spare
M1	24		1	600# RF	Manhole
M2	24		1	600# RF	Manhole
N18	2		1	600# RF	Vent

Vessel Schematic



CLIENT	ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FEC PRCP (QADIRPUR GAS FIELD) DATA SHEET FOR FEED GAS FILTER COALESCER	CONSULTANT
	DOCUMENT NO. 2895-DS-001	

Project	Root Cause Analysis for Water Carryover at FEC (PRCP)	Service	Feed Gas to Compressor	
Client	OGDCL	Tag Number	FC-101	
Location	Qadirpur	Project Number	2895	
Revision	1	Sheet#	2 OF 4	

Note:

The vendor is to size all internals and guarantee the following:

1. 99.99% removal of liquid droplets 0.3 microns, and greater.
2. 100% removal of liquid droplets 3 microns, and greater.
3. 99.5% removal of solid particles with diameter > 5μm.
4. Separator pressure loss less than 5 psi (dirty).

Process Data

		Design Case		
Inlet Pressure	psig	70 ~ 250		
Temperature	°F	Min 100	Max 125	
Water Content	lb/MMSCFD	70		
Vapour				
Flow	kg/h	343790	(Includes 10 % margin)	Note 5
Mol. Weight		19.72		
Viscosity	cP	0.0127		
Z-Factor		0.9668		
Density	kg/m^3	14.03		
Liquid				
Flow	kg/h	VTS		
Density	kg/m^3	VTS		
Viscosity	cP	VTS		
Surface Tension	dyne/cm	VTS		

Gas Composition Dry Basis

C1	Mol% 79.653
C2	Mol% 0.87
C3	Mol% 0.23
iC4	Mol% 0.07
nC4	Mol% 0.07
iC5	Mol% 0.03
nC5	Mol% 0.02
nC6	Mol% 0.13
N2	Mol% 12.369
CO2	Mol% 6.549
H2S	Mol% 0.008

CLIENT	ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FEC PRCP (QADIRPUR GAS FIELD)	CONSULTANT
	DATA SHEET FOR FEED GAS FILTER COALESCER	
	DOCUMENT NO. 2895-DS-001	

Project	Root Cause Analysis for Water Carryover at FEC (PRCP)		Service	Feed Gas to Compressor
Client	OGDCL		Tag Number	FC-101
Location	Qadirpur		Project Number	###
Revision	1		Sheet#	3 OF 4

DESIGN CONDITIONS

Design Code	**ASME VIII, DIV 1**	Stress Relief (PWHT)	**Yes**
Test Pressure	**AS PER CODE**	Radiography	**RT-1**
Corrosion Allowance	**3.2** mm	Joint Efficiency	**1**
Type of Heads	**2:1 Elliptical**	Fireproofing	**No**
Code Stamp	**Yes / U- Stamp**	Painting	**Yes**
Wind Load	**120 mph (ANSI / ASCE 7-98)**	Lifting Lugs/Trunnions	**Yes**
Earthquake Factor	**UBC Zone-4**	Earthing Lugs	**Yes**

MATERIAL SPECIFICATION

Shell	**CS~ASME SA516-70-N**	Head studbolts	**A193 Gr B8 Class 2**
Head	**CS~ASME SA516-70-N**	Head nuts	**A194 Grade 8, S1**
Cladding / lining of shell	**NA**	Bolts internal	**SS 316L**
Cladding / lining of head	**NA**	Nuts internal	**SS 316L**
Jacket shell	**NA**	Saddles	**-**
Jacket head	**NA**	Support Legs	**A516 Gr 70**
Main / body flanges	**CS~ ASME SA105**	Skirt, base plate etc	**A516 Gr 70 / A283 Gr C**
Nozzle Neck Pipe	**CS~ASME SA106-B Seamless**	External rings and cleats etc.	**A516 Gr 70 / A283 Gr C**
Nozzle Neck Forged	**CS~ ASME SA105**	Internal rings and cleats etc.	**A240 Type 316L**
Nozzle flanges	**CS~ ASME SA105**	Baffles	**-**
Nozzle Flange Gaskets	**316 SS SPW/ Graphite/ I.R.316/ O.R.316 (NOTE-6)**	Internal parts : Removable	**SS 316L**
		Fixed	**SS 316L**
Vessel Support	**CS~ASME SA516-70-N**	Internal pipe	**SS 316L**
Manholes	**CS~ ASME SA105**	Internal pipe fittings	**SS 316L**
Manholes flanges	**CS~ ASME SA105**	Lifting lugs	**A516 Gr 70**
Reinforcing pads / backing plates	**CS~ASME SA516-70-N**	Manhole davit	**A516 Gr 70**
		Nameplate bracket	**A516 Gr 70**
		Filter Elements	**VTS**

FABRICATION AND INSPECTION REQUIREMENTS

Specifications :	Design	**2895-SP-001**	Category / Class	**-**
			Pressure test	**As per Code / Specifications**
	Fabrication	**2895-SP-001**	Stress relieve	**As per Code / Specifications**
			Special heat treatment	**As per Code / Specifications**
	Painting	**2895-SP-001/004**	Impact testing	**As per Code / Specifications**
Design verification		**Required**	Radiography	**As per Code / Specifications**
Fabrication inspection		**Required**	Ultrasonic	**As per Code / Specifications**
Third party inspection		**Required**	Magnetic particle	**As per Code / Specifications**
Material certification	Pressure	**BS EN 10204 - 3.1B**	Dye penetrant	**As per Code / Specifications**
	Non Pressure	**BS EN 10204 - 2.2**	Visual inspection	**As per Code / Specifications**
			Dimensional control	**As per Code / Specifications**

WEIGHTS

Erection (shipping) weight	**VTS**	kg	Weight of contents	**VTS**	kg
Total weight, operating	**VTS**	kg	Total Volume	**VTS**	m^3
Total weight, full of water	**VTS**	kg	Normal liquid volume	**VTS**	m^3
Weight of internals	**VTS**	kg			

CLIENT	ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FEC PRCP (QADIRPUR GAS FIELD)	CONSULTANT
	DATA SHEET FOR FEED GAS FILTER COALESCER	
	DOCUMENT NO. 2895-DS-001	

1	Project	Root Cause Analysis for Water Carryover at FEC (PRCP)	Service	Feed Gas to Compressor
2	Client	OGDCL	Tag Number	FC-101
3	Location	Qadirpur	Project Number	2895
4	Revision	1	Sheet#	4 OF 4

1 "VTS" Indicates vendor to specify, advise or confirm.

2 Single skid mounted modular package is required.

3 Vendor to design unit with separation section (lower) and a filter cartridge section (upper).

4 Vendor to ensure that vapour disengagement zone is sufficient to prevent re-entrainment of liquid.

5 Vendor to specify filter cleaning / filter change cycle duration.

6 Unit shall meet specifications at turndown vapour flow of 97925 kg/h (100 MMSCFD).

7 CL 600, RF, to ASME B16.21, Spiral Wound, Graphite Filled, 316 inner and outer ring, 4.5mm thick.

8 Pipe and fittings shall be seamless.

9 Vendor to perform sizing calculations as per provided data and specify vessel dimension and nozzle sizes

10 Vendor to submit sizing calculations and data sheet for Purchaser review and approval

11 Vendor to size Pressure Saftey Valve at fire case based on wetted surface area of vessel.

12 Vendor to provide vessel piping along with supports terminated at skid edge.

13 Vendor shall provide construction drawings and all operating and testing manuals (in English version)

14 Feed inlet (gas/liquid) distributor device to be designed and supplied by vendor

15 All manholes shall be provided with davit arm, vendor shall specify the suitable locations for manholes.

16 Vessel shall be provided with access ladder and platform where necessary.

17 Ladder and platform should be of suitable carbon steel material.

18 The vendor shall guarantee gas handling capacity and liquid removal efficiency as stated in datasheet.

19 Vendor to size inlet/outlet nozzles as per standard and specify momentum (ρv2) at each nozzle.

20 For interskid piping and supports elevation terminated at skid edge refer dwg# 2895-PL-001 (Sheet 2 OF 3).

21 Vendor to provide instruments as per P&ID# 2895-PB-2101.

22 Vendor to submit P&ID along with datasheets of all associated instruments, control valves and PSV.

23 Vendor to provide filter coalescer along with all instruments, LCVs, PSV, double block and bleed valves at inlet and gas outlet and interskid piping with supports mounted at single skid.

24 For package instruments refer specification 2895-SP-003.

CONSULTANT: PETROCHEMICAL ENGINEERING CONSULTANTS	ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FEC PRCP (QADIRPUR GAS FIELD)	DOCUMENT NO.	
		2895-DS-002	
		REVISION	DATE
	PROCESS DATASHEET	01	4/12/2018
CLIENT: OIL & GAS DEVELOPMENT COMPANY LTD.	LCV-101	BY	APPRVD
		MT	AJ
	-	SHEET	1 OF 1

GENERAL	1	Tag Number			LCV-101				
	2	Service / Location			FC-101 (Filter Section)				
	3	Line Size			VTS				
	4	Area Classification			Class-I, Div-2, Gr. B,C, & D				
	5	Ambient Temperature			35-120 °F				
	6	Allowable Sound Pressure Level			85 dBA @ 1 m from the Valve				
	7	Tightness Requirements			ANSI IV (Standard)				
	8	Available air supply press.	Min.	Max.	30	psi-g	150	psi-g	
	9	Power Failure Position			Close				
	10	Design Pressure Temeperature			1100	psig	180	°F	
	11	P&ID Drawing Number			2895-PB-2101				
PIPE LINE	12	Line Size and Schedule	Inlet	Outlet	VTS		VTS		
	13	Pipe Material			CS				
	14	Pipe Insulation			None				
PROCESS CONDITION	15	Process Fluid			Liquid HC+Water				
	16	Upstream Condition			Liquid				
	17	Differential Pressure for Actuator Sizing			VTS				
	18	Shutoff Pressure			1100				
	19				Units	Minimum	Normal	Maximum	
	20	Flow			BPD	VTS	VTS	VTS	
	21	Inlet Pressure			psig	70	240	300	
	22	Pressure Drop			psi	50	220	280	
	23	Inlet Temperature			°F	100	100	100	
	24	Density			-	VTS	VTS	VTS	
	25	Inlet Compressibility Factor			-	-	-	-	
	26	Inlet Viscosity			cP	VTS	VTS	0.5546	
	27	Inlet Specific Heats Ratio			-	-	-	-	
	28	Inlet Vapour Pressure			psia	VTS	VTS	VTS	
	29	Critical Pressure			psia	VTS	VTS	VTS	
CALCULATED RESULTS	30	Flow Co-efficient Cv			-	**VTS**	**VTS**	**VTS**	
	31	Travel			%	-	-		
	32	Sound Pressure Level			dBA	-	-		

BODY AND TRIM	33	MFR	Model	-	-	POSITIONER/CONTROLLER	58	MFR	Model	VTS	VTS
	34	Body Type		Globe			59	Signal : Inlet	Outlet	4-20 mA; HART	3-15 psig
	35	Body Size	Trim Size	**VTS**	**VTS**		60	Increase Signal Valve		VTS	
	36	Rated Cv	Characteristic	**VTS**	**EQ% or Linear**		61	Cam Characteristic		VTS	
	37	End Connection & Rating		RF 600#			62	Bypass	Gauges	-	Yes
	38	Body Material		ASTM A216 WCB			63	Smart E/P Type		I/P converter	
	39	Bonnet Type	Material	Standard	ASTM A216 WCB		64	Certification / IP Rating		Eex'd' / IP65	
	40	Flow Direction		VTS		SOLENOID VALVE	65	MFR	Model	-	-
	41	Flow Action to		Open			66	Type		-	
	42	Lubricator	Isolat. Valve	No	No		67	When Energizes		-	
	43	Guiding	No. of Ports	Top	1		68	Certification / IP Rating / Voltage		-	
	44	Trim Type		VTS		SWITCHES	69	MFR	Model		
	45	Rate Travel		VTS			70	Type	Quantity	-	-
	46	Plug/Ball/Disk Material		SS			71	Contacts / Rating			
	47	Seat Material		SS			72	Switching Position			
	48	Cage	Stem Mater.	SS	SS		73	Certification / IP Rating			
	49	Gasket Material		316SS Sp. Wound		AIR SET	74	MFR	Model		
	50	NACE MR01-75		NA			75	Set Pressure			
ACTUATOR	51	MFR	Model	-	-		76	Filter	Gauges	Yes	Yes
	52	Type		Diaphragm			77				
	53	Size	Area	VTS	VTS	TESTS	78	HydroPressure		ASME/IEC/BS6755 Pt. 1	
	54	Air Failure Valve		Close			79	Leakage		ANSI B16. 104	
	55	Handwheel Location		-			80				
	56	Bench Range		VTS		PURCHASE	81	Manufacturer		Fisher/Flowserve/Masoneilan	
	57	Stroke Time Sec's					82	Model			
							83	Purchase Order Number			
							84	Price	Item Number		
							85	Serial Number			

NOTES :

1	" VTS " means Vendor to specify
2	Filter coalescer vendor to specify liquid flow rate for control valve sizing.
3	Filter coalescer vendor to specify fluid properties of coalesced liquid
4	Vendor to perform sizing calculation for Cv and select trim size accordingly
5	Control valve to be supplied with stainless steel wire and tag with stamping of tag no. (LCV-101) in 5mm lettering
6	Positioner shall be provided with local indication of input, output and supply gas/air
7	Vendor to check selection/sizing and materials of valve and actuator and to submit one complete copy sizing/calculation data sheets to Purchaser
8	Vendor to select material suitable to the process fluid condition as mentioned above
9	Vendor to check all process conditions and select valve trim according to fluid nature

CONSULTANT	ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FEC PRCP (QADIRPUR GAS FIELD)	DOCUMENT NO.	
PETROCHEMICAL ENGINEERING CONSULTANTS		2895-DS-003	
		REVISION	DATE
	PROCESS DATASHEET	01	4/12/2018
CLIENT	LCV-102	BY	APPRVD
OIL & GAS DEVELOPMENT COMPANY LTD.		MT	AJ
	-	SHEET	1 OF 1

GENERAL	1	Tag Number			LCV-102				
	2	Service / Location			FC-101 (Separation Section)				
	3	Line Size			VTS				
	4	Area Classification			Class-I, Div-2, Gr. B,C, & D				
	5	Ambient Temperature			35-120 °F				
	6	Allowable Sound Pressure Level			85 dBA @ 1 m from the Valve				
	7	Tightness Requirements			ANSI IV (Standard)				
	8	Available air supply press.	Min.	Max.	30	psi-g	150	psi-g	
	9	Power Failure Position			Close				
	10	Design Pressure Temeperature			1100	psig	180	°F	
	11	P&ID Drawing Number			2895-PB-2101				
PIPE LINE	12	Line Size and Schedule	Inlet	Outlet	VTS		VTS		
	13	Pipe Material			CS				
	14	Pipe Insulation			None				
PROCESS CONDITION	15	Process Fluid			Liquid HC+Water				
	16	Upstream Condition			Liquid				
	17	Differential Pressure for Actuator Sizing			VTS				
	18	Shutoff Pressure			1100				
	19				Units	Minimum	Normal	Maximum	
	20	Flow			BPD	VTS	VTS	VTS	
	21	Inlet Pressure			psig	70	240	300	
	22	Pressure Drop			psi	50	220	280	
	23	Inlet Temperature			°F	100	100	100	
	24	Density			-	VTS	VTS	VTS	
	25	Inlet Compressibility Factor			-	-	-	-	
	26	Inlet Viscosity			cP	VTS	VTS	0.5546	
	27	Inlet Specific Heats Ratio			-	-	-	-	
	28	Inlet Vapour Pressure			psia	VTS	VTS	VTS	
	29	Critical Pressure			psia	VTS	VTS	VTS	
CALCULATED RESULTS	30	Flow Co-efficient Cv			-	**VTS**	**VTS**	**VTS**	
	31	Travel			%	-	-		
	32	Sound Pressure Level			dBA	-	-		
BODY AND TRIM	33	MFR	Model	-	-				
	34	Body Type		Globe					
	35	Body Size	Trim Size	**VTS**	**VTS**				
	36	Rated Cv	Characteristic	**VTS**	**EQ% or Linear**				
	37	End Connection & Rating		RF 600#					
	38	Body Material		ASTM A216 WCB					
	39	Bonnet Type	Material	Standard	ASTM A216 WCB				
	40	Flow Direction		VTS					
	41	Flow Action to		Open					
	42	Lubricator	Isolat. Valve	No	No				
	43	Guiding	No. of Ports	Top	1				
	44	Trim Type		VTS					
	45	Rate Travel		VTS					
	46	Plug/Ball/Disk Material		SS					
	47	Seat Material		SS					
	48	Cage	Stem Mater.	SS	SS				
	49	Gasket Material		316SS Sp. Wound					
	50	NACE MR01-75		NA					
ACTUATOR	51	MFR	Model	-	-				
	52	Type		Diaphragm					
	53	Size	Area	VTS	VTS				
	54	Air Failure Valve		Close					
	55	Handwheel Location		-					
	56	Bench Range		VTS					
	57	Stroke Time Sec's							

POSITIONER/CONTROLLER	58	MFR	Model	VTS	VTS
	59	Signal : Inlet	Outlet	4-20 mA; HART	3-15 psig
	60	Increase Signal Valve		VTS	
	61	Cam Characteristic		VTS	
	62	Bypass	Gauges	-	Yes
	63	Smart E/P Type		I/P converter	
	64	Certification / IP Rating		Eex'd' / IP65	
SOLENOID VALVE	65	MFR	Model	-	-
	66	Type		-	
	67	When Energizes		-	
	68	Certification / IP Rating / Voltage		-	
SWITCHES	69	MFR	Model		
	70	Type	Quantity	-	-
	71	Contacts / Rating			
	72	Switching Position			
	73	Certification / IP Rating			
AIR SET	74	MFR	Model		
	75	Set Pressure			
	76	Filter	Gauges	Yes	Yes
	77				
TESTS	78	HydroPressure		ASME/IEC/BS6755 Pt. 1	
	79	Leakage		ANSI B16. 104	
	80				
PURCHASE	81	Manufacturer		Fisher/Flowserve/Masoneilan	
	82	Model			
	83	Purchase Order Number			
	84	Price	Item Number		
	85	Serial Number			

NOTES :

1	" VTS " means Vendor to specify
2	Filter coalescer vendor to specify liquid flow rate for control valve sizing.
3	Filter coalescer vendor to specify fluid properties of coalesced liquid
4	Vendor to perform sizing calculation for Cv and select trim size accordingly
5	Control valve to be supplied with stainless steel wire and tag with stamping of tag no. (LCV-102) in 5mm lettering
6	Positioner shall be provided with local indication of input, output and supply gas/air
7	Vendor to check selection/sizing and materials of valve and actuator and to submit one complete copy sizing/calculation data sheets to Purchaser
8	Vendor to select material suitable to the process fluid condition as mentioned above
9	Vendor to check all process conditions and select valve trim according to fluid nature

CONSULTANT	ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FEC PRCP (QADIRPUR GAS FIELD)	DOCUMENT NO.	
PETROCHEMICAL ENGINEERING CONSULTANTS		2895-DS-004	
		REVISION	DATE
	PROCESS DATASHEET	01	4/12/2018
CLIENT	XV-101	BY	APPRVD
OIL & GAS DEVELOPMENT COMPANY LTD.		MT	AJ
	-	SHEET	1 OF 1

GENERAL	1	Tag Number			XV-001				
	2	Service / Location			FC-101 (Filter Section)				
	3	Line Size			VTS				
	4	Area Classification			Class-I, Div-2, Gr. B,C, & D				
	5	Ambient Temperature	Min.	Max.	35	°F	120	°F	
	6	Allowable Sound Pressure Level		dBA	85 @ 1 m from the Valve				
	7	Tightness Requirements			ANSI IV (Standard)				
	8	Available air supply press.	Min.	Max.	30	psi-g	150	psi-g	
	9	Power Failure Position			Close				
	10	P&ID Drawing Number			2895-PB-2101				
PIPE LINE	11	Line Size and Schedule	Inlet	Outlet	VTS		VTS		
	12	Pipe Material			CS				
	13	Pipe Insulation			None				
PROCESS CONDITION	14	Process Fluid			Liquid HC+Water				
	15	Upstream Condition			Liquid				
	16	Differential Pressure for Actuator Sizing			VTS		psi		
	17					Minimum	Normal	Maximum	
	18	Flow			kg/hr	VTS	VTS	VTS	
	19	Inlet Pressure			psig	70	240	300	
	20	Pressure Drop			psi	VTS	VTS	VTS	
	21	Inlet Temperature			°F	100	100	100	
	22	Inlet Density / Specific Gravity / Molecular Mass			kg/m3	VTS	VTS	VTS	
	23	Inlet Compressibility Factor			-	-	-	-	
	24	Inlet Viscosity			cSt	VTS	VTS	VTS	
	25	Inlet Specific Heats Ratio			-	-	-	-	
	26	Inlet Vapour Pressure			psia	-	-	-	
	27	Water Content			Usg/m	-	-	-	
CALCULATED RESULTS	28	Flow Co-efficient Cv			-	VTS			
	29	Travel			%	VTS			
	30	Sound Pressure Level			dBA	VTS			

BODY AND TRIM	31	MFR	Model	-	-	POSITIONER	56	MFR	Model	-	-			
	32	Body Type		Ball			57	Signal : Inlet	Outlet	N/A				
	33	Body Size	Trim Size	VTS	VTS		58	Increase Signal Valve						
	34	Rated Cv	Characteristi	VTS	Linear		59	Cam Characteristic						
	35	End Connection & Rating		RF 600#			60	Bypass	Gauges					
	36	Body Material		A216 Gr. WCB			61	Smart E/P Type						
	37	Bonnet Type	Material	Standard	A216 Gr. B		62	Certification / IP Rating						
	38	Flow Direction		VTS		SOLENOID VALVE	63	MFR	Model	-	-			
	39						64	Type		3/2 Way Auto Reset				
	40	Lubricator	Isolat. Valve	No	No		65	When De-energizes		Closes				
	41	Guiding	No. of Ports	VTS	VTS		66	Certification / IP Rating / Voltage		Eex'd' / IP65 / 24 VDC				
	42	Trim Type		VTS		SWITCHES	67	MFR	Model	-	-			
	43	Rate Travel		VTS			68	Type		Proximity				
	44	Plug/Ball/Disk Material		SS			69	Tag Open		ZSH-101				
	45	Seat Material		SS			70	Tag Close		ZSL-101				
	46	Cage	Stem Mater.	VTS	VTS		71	Certification / IP Rating / Voltage		Eex'd' / IP65 / 24 VDC				
	47	Gasket Material		316SS Sp. Wound		AIR SET	72	MFR	Model	-	-			
	48	NACE MR01-75		NA			73	Set Pressure		VTS				
ACTUATOR	49	MFR	Model	-	-		74	Filter	Gauges	Required	Required			
	50	Type		Piston Type			75							
	51	Size	Area	VTS	VTS	TESTS	76	HydroPressure		ASME/IEC/BS6755 Pt. 1				
	52	Air Failure Valve		Close			77	Leakage		ANSI B16. 104				
	53	Handwheel Location		Not Required			78							
	54	Bench Range		VTS		PURCHASE	79	Manufacturer		Fisher/Flowserve/Masoneilan				
	55	Stroke Time Sec's		VTS			80	Model						
							81	Purchase Order Number						
							82	Price	Item Number					
							83	Serial Number						

NOTES :

1	Bolting Material SS304.
2	Control valve to be supplied with stainless steel wire and tag with stamping of tag no. (XV-101) in 5mm lettering.

CONSULTANT	ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FEC PRCP (QADIRPUR GAS FIELD)	DOCUMENT NO.	
PETROCHEMICAL ENGINEERING CONSULTANTS		2895-DS-005	
		REVISION	DATE
	PROCESS DATASHEET	01	4/12/2018
CLIENT	XV-102	BY	APPRVD
OIL & GAS DEVELOPMENT COMPANY LTD.		MT	AJ
	-	SHEET	1 OF 1

GENERAL	1	Tag Number			XV-002				
	2	Service / Location			FC-101 (SeparationSection)				
	3	Line Size			VTS				
	4	Area Classification			Class-I, Div-2, Gr. B,C, & D				
	5	Ambient Temperature	Min.	Max.	35	°F	120	°F	
	6	Allowable Sound Pressure Level		dBA	85 @ 1 m from the Valve				
	7	Tightness Requirements			ANSI IV (Standard)				
	8	Available air supply press.	Min.	Max.	30	psi-g	150	psi-g	
	9	Power Failure Position			Close				
	10	P&ID Drawing Number			2895-PB-2101				
PIPE LINE	11	Line Size and Schedule	Inlet	Outlet	VTS		VTS		
	12	Pipe Material			CS				
	13	Pipe Insulation			None				
PROCESS CONDITION	14	Process Fluid			Liquid HC+Water				
	15	Upstream Condition			Liquid				
	16	Differential Pressure for Actuator Sizing			VTS		psi		
	17					Minimum	Normal	Maximum	
	18	Flow			kg/hr	VTS	VTS	VTS	
	19	Inlet Pressure			psig	70	240	300	
	20	Pressure Drop			psi	VTS	VTS	VTS	
	21	Inlet Temperature			°F	100	100	100	
	22	Inlet Density / Specific Gravity / Molecular Mass			kg/m3	VTS	VTS	VTS	
	23	Inlet Compressibility Factor			-	-	-	-	
	24	Inlet Viscosity			cSt	VTS	VTS	VTS	
	25	Inlet Specific Heats Ratio			-	-	-	-	
	26	Inlet Vapour Pressure			psia	-	-	-	
	27	Water Content			Usg/m	-	-	-	
CALCULATED RESULTS	28	Flow Co-efficient Cv			-	VTS			
	29	Travel			%	VTS			
	30	Sound Pressure Level			dBA	VTS			

BODY AND TRIM	31	MFR	Model	-	-	POSITIONER	56	MFR	Model	-	-			
	32	Body Type		Ball			57	Signal : Inlet	Outlet	N/A				
	33	Body Size	Trim Size	VTS	VTS		58	Increase Signal Valve						
	34	Rated Cv	Characteristi	VTS	Linear		59	Cam Characteristic						
	35	End Connection & Rating		RF 600#			60	Bypass	Gauges					
	36	Body Material		A216 Gr. WCB			61	Smart E/P Type						
	37	Bonnet Type	Material	Standard	A216 Gr. B		62	Certification / IP Rating						
	38	Flow Direction		VTS		SOLENOID VALVE	63	MFR	Model	-	-			
	39						64	Type		3/2 Way Auto Reset				
	40	Lubricator	Isolat. Valve	No	No		65	When De-energizes		Closes				
	41	Guiding	No. of Ports	VTS	VTS		66	Certification / IP Rating / Voltage		Eex'd' / IP65 / 24 VDC				
	42	Trim Type		VTS		SWITCHES	67	MFR	Model	-	-			
	43	Rate Travel		VTS			68	Type		Proximity				
	44	Plug/Ball/Disk Material		SS			69	Tag Open		ZSH-102				
	45	Seat Material		SS			70	Tag Close		ZSL-102				
	46	Cage	Stem Mater.	VTS	VTS		71	Certification / IP Rating / Voltage		Eex'd' / IP65 / 24 VDC				
	47	Gasket Material		316SS Sp. Wound		AIR SET	72	MFR	Model	-	-			
	48	NACE MR01-75		NA			73	Set Pressure		VTS				
ACTUATOR	49	MFR	Model	-	-		74	Filter	Gauges	Required	Required			
	50	Type		Piston Type			75							
	51	Size	Area	VTS	VTS	TESTS	76	HydroPressure		ASME/IEC/BS6755 Pt. 1				
	52	Air Failure Valve		Close			77	Leakage		ANSI B16. 104				
	53	Handwheel Location		Not Required			78							
	54	Bench Range		VTS		PURCHASE	79	Manufacturer		Fisher/Flowserve/Masoneilan				
	55	Stroke Time Sec's		VTS			80	Model						
							81	Purchase Order Number						
							82	Price	Item Number					
							83	Serial Number						

NOTES :

1	Bolting Material SS304.
2	Control valve to be supplied with stainless steel wire and tag with stamping of tag no. (XV-101) in 5mm lettering.

CONSULTANT	ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FEC PRCP (QADIRPUR GAS FIELD)	DOCUMENT NO.	
PETROCHEMICAL ENGINEERING CONSULTANTS		2895-DS-006	
		REVISION	DATE
	PROCESS DATASHEET	01	4/12/2018
CLIENT		BY	APPRVD
OIL & GAS DEVELOPMENT COMPANY LTD.	PSV-101	MT	AJ
		SHEET	1 OF 1
	-		

S.No.			PSV-101			
1	SERVICE		GAS			
2	LINE NO. / VESSEL NO.		FC-101			
3	FULL NOZZLE / SEMI NOZZLE		FULL			
4	SAFETY OR RELIEF		SAFETY - RELIEF			
5	CONV. / BELLOWS / PILOT OP.		CONVENTIONAL			
6	BONNET TYPE		CLOSED			
7	SIZE: INLET	OUTLET	VTS	VTS		
8	FLANGE RATING		600 X 150			
9	TYPE OF FACING		RF x RF			
10	BODY AND BONNET		S 31803			
11	SEAT AND DISC		UNS S31803			
12	RESILIENT SEAT SEAL		VITON - V 2595			
13	GUIDE AND RINGS		UNS S31803			
14	SPRING		INCONEL X-750			
15	BELLOWS		N/A			
16	NOZZLE		UNS S31803			
17	CAP: SCREWED OR BOLTED		SCREWED			
18	LEVER: PLAIN OR PACKED		NO			
19	TEST GAG		NO			
20	TEST CONNECTION		YES-CARBON STEEL			
21	MANUAL BLOWDOWN		YES-CARBON STEEL			
22	BACK FLOW PREVENTER		NO			
23	CODE		ASME SEC VIII / API RP-520-521			
23	LEAKAGE CODE		ANSI / API 527			
20	SIZING BASIS		FIRE CASE			
25	PILOT SUPPLY FILTER		N/A			
26	PRESSURE HOOKUP		DIRECT			
27	FLUID		VAPOURS			
28	FLUID STATE		VAPOURS			
29	REQUIRED CAPACITY		VTS			
30	MOL. WEIGHT GAS	DENSITY LIQUID	VTS	47.15 kg/m^3		
31	OPER. PRESS.	SET PRES.	240	100 Psig		
32	OPER. TEMP.	MAX TEMP.	100 ^{O}F	120 ^{O}F		
33	BACK PRESSURE: CONSTANT		-			
34	VARIABLE		-			
35	TOTAL		ATM. - 50 psig			
36	% ALLOWABLE OVERPRESSURE		21%			
37	OVERPRESSURE FACTOR		N/A			
38	COMPRESSIBILITY FACTOR		VTS			
39	LATENT HEAT OF VAPORIZ.		VTS			
40	RATIO OF SPECIFIC HEATS		VTS			
41	BAROMETRIC PRESSURE		14.7			
42	DISCHARGE COEF kd		VTS			
43	CHANGE OF STATE COEF. C		VTS			
44	P&ID NO.		2895-PB-2101			
45	CALC. AREA SQ. IN.		VTS			
46	SELECTED AREA SQ. IN.		VTS			
47	ORIFICE DESIGNATION		VTS			
48	MANUFACTURER		Dresser/Tyco/Lesser/Farris/Crosby			
49	MODEL NUMBER		-			

NOTES:

1. VENDOR TO CONFIRM THE SUITABILITY OF THIS MODEL FOR THE REQUIRED SERVICE.

CONSULTANT	ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FEC PRCP (QADIRPUR GAS FIELD)	DOCUMENT NO.	
PETROCHEMICAL ENGINEERING CONSULTANTS		2895-DS-007	
		REVISION	DATE
	PROCESS DATASHEET	01	4/12/2018
CLIENT		BY	APPRVD
OIL & GAS DEVELOPMENT COMPANY LTD.	RO-101	MT	AJ
		SHEET	1 OF 1

FLUID DATA	1	Tag Number			RO-101		
	2	Service			Natural Gas		
	3	Line Size			2-inch		
	4	Fluid State			Gas		
	5	Max. Flow		MMSCFD	VTS		
	6	Normal Flow		MMSCFD	VTS		
	7	Min Flow		MMSCFD	VTS		
	8	Op. Pressure		PSIG	240		
	9	Temperature		^{o}F	100		
	10	Molecular Weight			19.72		
	11	Comp. Factor Z			0.9668		
	12	CP/CV			1.351		
	13	Op. Viscosity Up Stream		cP	0.0127		
	14	Base Press (psia)	Base Temp	^{o}F	14.7	60	
	15	Design Pressure		PSIG	1100		
METER	16	Type of meter			Not required		
	17	Diff. Pressure			Not required		
	18	Static Press. Range			Not required		
	19	Calibration Units			Not required		
ORIFICE PLATE	20	Beta = d/D			VTS		
	21	Orifice Bore Diameter			VTS		
	22	Line I.D			VTS		
	23	Flange Rating			600#		
	24	Vent or Drain Hole			Not required		
	25	Plate Thickness			Note-2		
	26	Pipe Schedule			VTS		
	27	Concentric/Other			Cocentric		
	28	Sq.Edged / Other			Sq. Edge		
	29	Flange Taps / Other			Not required		
	30	Flange R.F / Other			Not required		
	31	Flange Type W.N/ Other			Not required		
	32	Material			UNS S31803		
	33	Calc. Seller / Other			Seller		
	34	Item no.			-		
	35	Manufacturer			Emerson / Daniel /ABB /Precision Flow Inc.		

NOTES :

1	Thickness calculation to be in accordance with BS 1042 PT 1.5

ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FEC PRCP (QADIRPUR GAS FIELD)

OIL AND GAS DEVELOPMENT COMPANY LIMITED

DOCUMENT TITLE:	DATA SHEET OF LEVEL GAUGE (LG-101)	
DOCUMENT NO.	2895-DS-008	Rev-1

Petrochemical Engineering Consultants

GENERAL	1	Tag Number		LG-101				
	2	Service / Location		PRCP INLET FEED GAS FILTER COALESCER				
	3	Line Size		1"				
	4	Area Classification		ZONE 2 Group IIA Temperature T3				
	5	P & ID Drawing Number		2895-PB-2101				
	6							
PROCESS CONDITIONS	7	Fluid		CONDENASATE + WATER				
	8	Oper. Temp.	Max. Temp.	100	°F	180	°F	
	9	Oper. Pressure	Max. Press.	240	psi-g	1100	psi-g	
	10	Oper. Specific Gravity		VTS				
	11							
	12							
GAUGE	13	Type		Reflex				
	14	Vessel height		VTS		mm		
	15	Sections Required		VTS				
	16	Connection Size	Rating	1	in	300#		
	17	Connection Arrangement		Top and Bottom				
	18	Body Material		A312 TP316L S.S				
	19	Center to Center distance		VTS				
	20	Gasket Material		Asbestos Free Graphite				
	21	Float Material		N/R				
	22	Sheet		No				
	23	Illuminator	Power Supply	No				
	24	Frost Extension	Length	N/A				
	25	Calibration Range	Min / Max	N/A				
	26	Bolting Materials		A193 B8 / A194 Gr8				
	27	All Wetted Part Materials to NACE		-				
	28	Radiography or Dye-Penetrant of all Welds		None				
OPTIONS	29	Drain Connection		1/2" NPT BALL Valve				
	30	Vent Connection		1/2" NPT BALL Valve				
	31	Connection on Bridle		-				
PURCHASE	32	Manufacturer		Cesare Bonetti S.p.a / Equivalent				
	33	Model						
	34	Purchase Order Number						
	35	Price	Item Number					
	36	Serial Number						

NOTES :

1. GAUGE TO BE MOUNTED AS PER SITE REQUIREMENT.
2. LEVEL GAUGE TO BE SUPPLIED WITH STAINLESS STEEL WIRE AND TAG WITH STAMPING OF TAG NO. (LG-101) IN 5MM LETTERING.

Date	Rev	Description	PREP.	CKD	APPR	PM
12/4/2018	1	ISSUED FOR REVIEW	ZUA	SAG	AJ	

ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FEC PRCP (QADIRPUR GAS FIELD)

OIL AND GAS DEVELOPMENT COMPANY LIMITED

DOCUMENT TITLE:	DATA SHEET OF LEVEL GAUGE (LG-102)	
DOCUMENT NO.	2895-DS-009	Rev-1

Petrochemical Engineering Consultants

GENERAL	1	Tag Number			LG-102			
	2	Service / Location			PRCP INLET FEED GAS FILTER COALESCER			
	3	Line Size			1"			
	4	Area Classification			ZONE 2 Group IIA Temperature T3			
	5	P & ID Drawing Number			2895-PB-2101			
	6							
PROCESS CONDITIONS	7	Fluid			CONDENASATE + WATER			
	8	Oper. Temp.	Max. Temp.		100	°F	180	°F
	9	Oper. Pressure	Max. Press.		240	psi-g	1100	psi-g
	10	Oper. Specific Gravity			1.019			
	11							
	12							
GAUGE	13	Type			Reflex			
	14	Vessel height			VTS	mm		
	15	Sections Required			VTS			
	16	Connection Size	Rating		1	in	300#	
	17	Connection Arrangement			Top and Bottom			
	18	Body Material			A312 TP316L S.S			
	19	Center to Center distance			VTS			
	20	Gasket Material			Asbestos Free Graphite			
	21	Float Material			N/R			
	22	Sheet			No			
	23	Illuminator	Power Supply		No			
	24	Frost Extension	Length		N/A			
	25	Calibration Range	Min	Max	N/A			
	26	Bolting Materials			A193 B8 / A194 Gr8			
	27	All Wetted Part Materials to NACE			-			
	28	Radiography or Dye-Penetrant of all Welds			None			
OPTIONS	29	Drain Connection			1/2" NPT BALL Valve			
	30	Vent Connection			1/2" NPT BALL Valve			
	31	Connection on Bridle			-			
PURCHASE	32	Manufacturer			Cesare Bonetti S.p.a / Equivalent			
	33	Model						
	34	Purchase Order Number						
	35	Price	Item Number					
	36	Serial Number						

NOTES :

1. GAUGE TO BE MOUNTED AS PER SITE REQUIREMENT.
2. LEVEL GAUGE TO BE SUPPLIED WITH STAINLESS STEEL WIRE AND TAG WITH STAMPING OF TAG NO. (LG-101) IN 5MM LETTERING.

Date	Rev	Description	PREP.	CKD	APPR	PM
12/4/2018	1	ISSUED FOR REVIEW	ZUA	SAG	AJ	

ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FEC PRCP (QADIRPUR GAS FIELD)

OIL AND GAS DEVELOPMENT COMPANY LIMITED

DOCUMENT TITLE:	DATA SHEET OF LEVEL SWITCH HIGH HIGH (LSHH-101)	
DOCUMENT NO.	2895-DS-010	Rev-1

Petrochemical Engineering Consultants

GENERAL	1	Tag Number		LSHH-101				
	2	Service		PRCP INLET FEED GAS FILTER COALESCER				
	3	Area Classification		Zone 2,Gas Group IIA,Temperature Class T4				
	4	P & ID Drawing Number		2895-PB-2101				
	5							
PROCESS CONDITIONS	7	Upper Liquid		CONDENASATE + WATER				
	8	Lower Liquid		CONDENASATE + WATER				
	9	Specific Gravity Upper	Specific Gravity Lower	VTS		VTS		
	10	Oper. Temperature	Max. Temperature	100	°F	180	°F	
	11	Oper. Pressure	Max. Pressure	240	psi-g	1100	psi-g	
	12							
BODY/CAGE	13							
	14	Body/Cage Material		316SS				
	15	Rating		150#				
	16	Connection Size		2"				
	17	Type		RF				
	18	Connection Size		N/A				
	19	Type		N/A				
	20	Case Mounting		N/A				
	21	Rotatable Head		VTA				
	22	Orientation		Up/Down				
	23	Cooling Extension		N/A				
	25	Connection from bottom		VTS				
FLOAT	26	Select Standard Span		N/A				
	27	Insertion Depth		N/A				
	28	Displacer Extention		None				
	29	Float Material		304SS				
	30	Spring Material	Tube Material	N/A		N/A		
SWITCH	31	Output		On/Off				
	32	Control Modes		N/A				
	33	Differential		Fixed				
	34	Output Action on Switch Activation		Alarm on DCS				
	35	Mounting		Integral				
	36	Electrical Enclosure Class		IP 65 or better				
	37	Electric Power or Air Supply		None-Passive Switch				
	38	Configuration and Calibration		N/A				
	39	Electrical Entries		Bottom				
OPTIONS	40	Airset	Supply Guage	NA		N/A		
	41	Guage Glass Connection		NA				
	42	Guage Glass Model No.		NA				
	43	Contacts:No	Form	SPDT				
	44	Contact Rating		0.5A @ 125VDC Max				
	45	Action of Contacts		NA				
PURCHASE	46	Manufacturer		Fisher (Emerson) / Murphy / Equivalent				
	47	Model						
	48	Purchase Order Number						
	49	Price	Item Number					
	50	Serial Number						

NOTES :

1	Level Switch to be mounted as per site requirements

Date	Rev	Description	PREP.	CKD	APPR	PM
12/4/2018	1	ISSUED FOR REVIEW	ZUA	SAG	AJ	

OIL AND GAS DEVELOPMENT COMPANY LIMITED

ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FEC PRCP (QADIRPUR GAS FIELD)

DOCUMENT TITLE:	DATA SHEET OF LEVEL SWITCH HIGH HIGH (LSHH-102)	
DOCUMENT NO.	2895-DS-011	Rev-1

Petrochemical Engineering Consultants

GENERAL	1	Tag Number		LSHH-102				
	2	Service		PRCP INLET FEED GAS FILTER COALESCER				
	3	Area Classification		Zone 2,Gas Group IIA,Temperature Class T4				
	4	P & ID Drawing Number		2895-PB-2101				
	5							
PROCESS CONDITIONS	7	Upper Liquid		CONDENASATE + WATER				
	8	Lower Liquid		CONDENASATE + WATER				
	9	Specific Gravity Upper	Specific Gravity Lower	VTS		VTS		
	10	Oper. Temperature	Max. Temperature	100	°F	180	°F	
	11	Oper. Pressure	Max. Pressure	240	psi-g	1100	psi-g	
	12							
BODY/CAGE	13							
	14	Body/Cage Material		316SS				
	15	Rating		150#				
	16	Connection Size		2"				
	17	Type		RF				
	18	Connection Size		N/A				
	19	Type		N/A				
	20	Case Mounting		N/A				
	21	Rotatable Head		VTA				
	22	Orientation		Up/Down				
	23	Cooling Extension		N/A				
	25	Connection from bottom		VTS				
FLOAT	26	Select Standard Span		N/A				
	27	Insertion Depth		N/A				
	28	Displacer Extention		None				
	29	Float Material		304SS				
	30	Spring Material	Tube Material	N/A		N/A		
SWITCH	31	Output		On/Off				
	32	Control Modes		N/A				
	33	Differential		Fixed				
	34	Output Action on Switch Activation		Alarm on DCS				
	35	Mounting		Integral				
	36	Electrical Enclosure Class		IP 65 or better				
	37	Electric Power or Air Supply		None-Passive Switch				
	38	Configuration and Calibration		N/A				
	39	Electrical Entries		Bottom				
OPTIONS	40	Airset	Supply Guage	NA		N/A		
	41	Guage Glass Connection		NA				
	42	Guage Glass Model No.		NA				
	43	Contacts:No	Form	SPDT				
	44	Contact Rating		0.5A @ 125VDC Max				
	45	Action of Contacts		NA				
PURCHASE	46	Manufacturer		Fisher (Emerson) / Murphy / Equivalent				
	47	Model						
	48	Purchase Order Number						
	49	Price	Item Number					
	50	Serial Number						

NOTES :

1	Level Switch to be mounted as per site requirements

Date	Rev	Description	PREP.	CKD	APPR	PM
12/4/2018	1	ISSUED FOR REVIEW	ZUA	SAG	AJ	

ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FEC PRCP (QADIRPUR GAS FIELD)

OIL AND GAS DEVELOPMENT COMPANY LIMITED

DOCUMENT TITLE:	DATA SHEET OF LEVEL SWITCH LOW LOW (LSLL-101)	
DOCUMENT NO.	2895-DS-012	Rev-1

Petrochemical Engineering Consultants

GENERAL	1	Tag Number		LSLL-101				
	2	Service		PRCP INLET FEED GAS FILTER COALESCER				
	3	Area Classification		Zone 2,Gas Group IIA,Temperature Class T4				
	4	P & ID Drawing Number		2895-PB-2101				
	5							
PROCESS CONDITIONS	7	Upper Liquid		CONDENASATE + WATER				
	8	Lower Liquid		CONDENASATE + WATER				
	9	Specific Gravity Upper	Specific Gravity Lower	VTS		VTS		
	10	Oper. Temperature	Max. Temperature	100	°F	180	°F	
	11	Oper. Pressure	Max. Pressure	240	psi-g	1100	psi-g	
	12							
BODY/CAGE	13							
	14	Body/Cage Material		316SS				
	15	Rating		150#				
	16	Connection Size		2"				
	17	Type		RF				
	18	Connection Size		N/A				
	19	Type		N/A				
	20	Case Mounting		N/A				
	21	Rotatable Head		VTA				
	22	Orientation		Up/Down				
	23	Cooling Extension		N/A				
	25	Connection from bottom		VTS				
FLOAT	26	Select Standard Span		N/A				
	27	Insertion Depth		N/A				
	28	Displacer Extention		None				
	29	Float Material		304SS				
	30	Spring Material	Tube Material	N/A		N/A		
SWITCH	31	Output		On/Off				
	32	Control Modes		N/A				
	33	Differential		Fixed				
	34	Output Action on Switch Activation		Alarm on DCS				
	35	Mounting		Integral				
	36	Electrical Enclosure Class		IP 65 or better				
	37	Electric Power or Air Supply		None-Passive Switch				
	38	Configuration and Calibration		N/A				
	39	Electrical Entries		Bottom				
OPTIONS	40	Airset	Supply Guage	NA		N/A		
	41	Guage Glass Connection		NA				
	42	Guage Glass Model No.		NA				
	43	Contacts:No	Form	SPDT				
	44	Contact Rating		0.5A @ 125VDC Max				
	45	Action of Contacts		NA				
PURCHASE	46	Manufacturer		Fisher (Emerson) / Murphy / Equivalent				
	47	Model						
	48	Purchase Order Number						
	49	Price	Item Number					
	50	Serial Number						

NOTES :

1	Level Switch to be mounted as per site requirements

Date	Rev	Description	PREP.	CKD	APPR	PM
12/4/2018	1	ISSUED FOR REVIEW	ZUA	SAG	AJ	

OIL AND GAS DEVELOPMENT COMPANY LIMITED

ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FEC PRCP (QADIRPUR GAS FIELD)

DOCUMENT TITLE:	DATA SHEET OF LEVEL SWITCH LOW LOW (LSLL-102)	
DOCUMENT NO.	2895-DS-013	Rev-1

Petrochemical Engineering Consultants

GENERAL	1	Tag Number		LSLL-102				
	2	Service		PRCP INLET FEED GAS FILTER COALESCER				
	3	Area Classification		Zone 2,Gas Group IIA,Temperature Class T4				
	4	P & ID Drawing Number		2895-PB-2101				
	5							
PROCESS CONDITIONS	7	Upper Liquid		CONDENASATE + WATER				
	8	Lower Liquid		CONDENASATE + WATER				
	9	Specific Gravity Upper	Specific Gravity Lower	VTS		VTS		
	10	Oper. Temperature	Max. Temperature	100	°F	180	°F	
	11	Oper. Pressure	Max. Pressure	240	psi-g	1100	psi-g	
	12							
BODY/CAGE	13							
	14	Body/Cage Material		316SS				
	15	Rating		150#				
	16	Connection Size		2"				
	17	Type		RF				
	18	Connection Size		N/A				
	19	Type		N/A				
	20	Case Mounting		N/A				
	21	Rotatable Head		VTA				
	22	Orientation		Up/Down				
	23	Cooling Extension		N/A				
	25	Connection from bottom		VTS				
FLOAT	26	Select Standard Span		N/A				
	27	Insertion Depth		N/A				
	28	Displacer Extention		None				
	29	Float Material		304SS				
	30	Spring Material	Tube Material	N/A		N/A		
SWITCH	31	Output		On/Off				
	32	Control Modes		N/A				
	33	Differential		Fixed				
	34	Output Action on Switch Activation		Alarm On DCS				
	35	Mounting		Integral				
	36	Electrical Enclosure Class		IP 65 or better				
	37	Electric Power or Air Supply		None-Passive Switch				
	38	Configuration and Calibration		N/A				
	39	Electrical Entries		Bottom				
OPTIONS	40	Airset	Supply Guage	NA		N/A		
	41	Guage Glass Connection		NA				
	42	Guage Glass Model No.		NA				
	43	Contacts:No	Form	SPDT				
	44	Contact Rating		0.5A @ 125VDC Max				
	45	Action of Contacts		NA				
PURCHASE	46	Manufacturer		Fisher (Emerson) / Murphy / Equivalent				
	47	Model						
	48	Purchase Order Number						
	49	Price	Item Number					
	50	Serial Number						

NOTES :

1	Level Switch to be mounted as per site requirements

Date	Rev	Description	PREP.	CKD	APPR	PM
12/4/2018	1	ISSUED FOR REVIEW	ZUA	SAG	AJ	

ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FEC PRCP (QADIRPUR GAS FIELD)

OIL AND GAS DEVELOPMENT COMPANY LIMITED

DOCUMENT TITLE:	DATA SHEET OF LEVEL TRANSMITTER (LIT-101)	
DOCUMENT NO.	2895-DS-014	Rev-1

Petrochemical Engineering Consultants

GENERAL	1	Tag Number		LIT-101			
	2	Service		PRCP INLET FEED GAS FILTER COALESCER			
	3	Vessel No.		FC-101			
	4	Area Classification		Zone 2,Gas Group IIB,Temperature Class T4			
	5	P & ID Drawing Number		2895-PB-2101			
	6	Certification		Eex 'ia' IIC T3			
PROCESS CONDITIONS	7	Fluid		CONDENSATE + WATER			
	8	Oper. Temperature	Max. Temperatu	100	°F	180	°F
	9	Oper. Pressure	Max. Pressure	240	psi-g	1100	psi-g
	10	Oper. Specific Gravity		VTS			
BODY/GUAGE	13	Type		Displacer Type			
	14	Body/Guage Material		316 St.Stl (ASTM A351 CF8M)			
	15	Rating		300 lb			
	16	Connection Size & Location Upper		2" Side			
	17	Type		RF(125AARH)			
	18	Connection Size & Location Lower		2" Side			
	19	Type		RF(125AARH)			
	20	Case Mounting		Right Hand			
	21	Rotatable Head		Yes			
	22	Orientation		Right Hand Position			
	23	Cooling Extension		NA			
	24	Drain & Vent Connection		1/2"-NPTF (Plugged)			
	25	Connection Center to Center		VTS			
	26	Bolting Material		316 SSt			
DISPLACER	27	Select Standard Span		VTS			
	28	Displacer Extention		Not Required			
		Displacer Material		316 SSt			
		Spring Material	Tube Material	NA		Inconel	
		Gasket Material		VTS			
TRANSMITTER		Output		Smart HART 2-wire,4-20 mA			
		Calibration Range	mm	VTS			
		Output Actuator Level Rise		Increase			
		Mounting		VTS			
		Electrical Enclosure Class		IP 65 or better			
		Power Supply		24V.DC (Remote,Max 600)			
		Configuration and Calibration		Through Hand-Held Communicator			
		Electrical Entries		ISO M20			
OPTIONS		Airset	Supply Guage	NA		NA	
		Guage Glass Connection		NA			
		Guage Glass Model No.		NA			
		Contacts:No	Form	NA			
		Contact Rating		NA			
		Action of Contacts		NA			
	50	Manufacturer		Dresser Flow Control /Equivalent			
	51	Model		VTS			
	52	Purchase Order Number					
	53	Price	Item Number				
	54	Serial Number		VTS			

NOTES :

Date	Rev	Description	PREP.	CKD	APPR	PM
12/4/2018	1	ISSUED FOR REVIEW	ZUA	SAG	AJ	

ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FEC PRCP (QADIRPUR GAS FIELD)

OIL AND GAS DEVELOPMENT COMPANY LIMITED

DOCUMENT TITLE:	DATA SHEET OF LEVEL TRANSMITTER (LIT-102)	
DOCUMENT NO.	2895-DS-015	Rev-1

Petrochemical Engineering Consultants

GENERAL	1	Tag Number		LIT-102			
	2	Service		PRCP INLET FEED GAS FILTER COALESCER			
	3	Vessel No.		FC-101			
	4	Area Classification		Zone 2,Gas Group IIB,Temperature Class T4			
	5	P & ID Drawing Number		2895-PB-2101			
	6	Certification		Eex 'ia' IIC T6			
PROCESS CONDITIONS	7	Fluid		CONDENSATE + WATER			
	8	Oper. Temperature	Max. Temperat	100	°F	180	°F
	9	Oper. Pressure	Max. Pressure	240	psi-g	1100	psi-g
	10	Oper. Specific Gravity		VTS			
BODY/GUAGE	13	Type		DP Type			
	14	Body/Guage Material		316 St.Stl (ASTM A351 CF8M)			
	15	Rating		300 lb			
	16	Connection Size & Location Upper		2" Side			
	17	Type		RF(125AARH)			
	18	Connection Size & Location Lower		2" Side			
	19	Type		RF(125AARH)			
	20	Case Mounting		Right Hand			
	21	Rotatable Head		Yes			
	22	Orientation		Right Hand Position			
	23	Cooling Extension		NA			
	24	Drain & Vent Connection		1/2"-NPTF (Plugged)			
	25	Connection Center to Center		VTS			
	26	Bolting Material		316 SSt			
DISPLACER	27	Select Standard Span		VTS			
	28	Displacer Extention		Not Required			
		Displacer Material		316 SSt			
		Spring Material	Tube Material	NA		Inconel	
		Gasket Material		VTS			
TRANSMITTER		Output		Smart HART 2-wire,4-20 mA			
		Calibration Range	mm	VTS			
		Output Actuator Level Rise		Increase			
		Mounting		VTS			
		Electrical Enclosure Class		IP 65 or better			
		Power Supply		24V.DC (Remote,Max 600)			
		Configuration and Calibration		Through Hand-Held Communicator			
		Electrical Entries		ISO M20			
OPTIONS		Airset	Supply Guage	NA		NA	
		Guage Glass Connection		NA			
		Guage Glass Model No.		NA			
		Contacts:No	Form	NA			
		Contact Rating		NA			
		Action of Contacts		NA			
	50	Manufacturer		Dresser Flow Control /Equivalent			
	51	Model		VTS			
	52	Purchase Order Number					
	53	Price	Item Number				
	54	Serial Number		VTS			

NOTES :

Date	Rev	Description	PREP.	CKD	APPR	PM
12/4/2018	1	ISSUED FOR REVIEW	ZUA	SAG	AJ	

ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FEC PRCP (QADIRPUR GAS FIELD)

OIL AND GAS DEVELOPMENT COMPANY LIMITED

DOCUMENT TITLE:	DATA SHEET OF DIFFERENTIAL PRESSURE TRANSMITTER (PDIT-101)	
DOCUMENT NO.	2895-DS-016	Rev-1

Petrochemical Engineering Consultants

	1	Tag No. PDIT-101	SERVICE: PRCP INLET FEED GAS FILTER COALESCER
GENERAL	2	Function	Record ☐ Indicate ☐ Control ☐ Blind ☐ Trans. ■ Other
	3	Case	MFR STD ■ Nom Size ____ Colour MFR STD ■ Other ____
	4	Mounting	Flush ☐ Surface ☐ 2" Yoke ■ Other ____
	5	Enclosure Class	General Purpose ☐ Weather Proof ■ Explosion Proof(EExd) ■ Class IP-67
			For Use in Intrinsically Safe System. ☐ Other ZONE II,CLASS IIB, T3
	6	Power Supply	110 V 50Hz ☐ Other AC ____ DC 24 Volts
	7	Chart	____ Strip ☐ ____ Roll ☐ ____ Fold ☐ Circular ____ Time Marks ____
			Range ____ Number ____
	8	Chart Drive	Speed ____ Power ____
	9	Scales	Type ____
			Range 1 ____ 2 ____ 3 ____ 4 ____
XMTR.	10	Transmitter Output	4-20 mA ■ 10-50 mA ☐ 21-103 kPa (3-15 psig) ☐ Other Loop powered Hart
			Output Load Capability 600 OHMS @ 24 V DC
		Electrical Entry	2 x M20
CONTROLLER	11	Control Modes	P = Prop (Gain), I = Integral (Auto Reset), D = Derivative (Rate), Sub : s = Slow, f = Fast
			P ☐ PI ☐ PD ☐ PID ☐ If ☐ Df ☐ Is ☐ Ds ☐ Other ____
	12	Action	On Meas. Increase Output : Increases ☐ Decreases ☐
	13	Auto-Man Switch	None ☐ MFR STD ☐ Other ____
	14	Set Point Adj.	Manual ☐ External ☐ Remote ☐ Other ____
	15	Manual Reg.	None ☐ MFR. STD. ☐ Other ____
	16	Output	4-20 mA ☐ 10-50 mA ☐ 21-103 kPa (3-15 psig) ☐ Other ____
ELEMENT	17	Service	Gauge Press. ■ Vacuum ☐ Absolute ☐ Diff. Press. ■
	18	Measuring Device / Principle	Capacitance Cell ■ Other ☐
	19	Element Type	Diaphragm ■ Helix ☐ Bourdon ☐ Bellows ☐ Other ____
	20	Material	316 SS ☐ Ber. Copper ☐ Other HASTELLOY C
	21	Range	Calib. Range ☐ VTS Range Limits ■ VTS
	22	Process Data	Press : Operating 240 PSIG Max. 1100 PSIG Static over pressure Note-3
	23	Process Conn.	1/4 in. NPT ☐ 1/2 In. NPT ■ Other ____
			Location : ☐ Bottom ■ Back ☐ Other ____
		Bore Size	* ■ ☐
		Beta Ratio	*
		Flow Min / Max	5 MMSCFD / 60 MMSCFD ☐ ☐
	24	Alarm Switches	Quantity ____ Form ____ Rating ____
	25	Function	Press. ☐ Deviation ☐ Contacts To ☐ On Inc. Press. ____ ☐
OPTIONS	26	Options	Filt Reg. ____ ☐ Sup. Gauge ☐ Output Gauge ☐ Charts ____
			Diaph. Seal ☐ Type ____ Diaph. ____ Bot. Bowl ____
			Conn. ____ Capillary : Length ____ Mtl. ____
			Other ____ Traditional flange SS-316 5- valve manifold
	27	MFR / Model No.	MOORE OR EQUIVALENT / NOTE 2

NOTES

1 VENDOR TO SPECIFY
2 VENDOR TO ADVISE.
3 VENDOR TO ADVISE IN VIEW OF MAX. PROCESS PRESSURE.
4 ALL WETTED PARTS TO BE HASTELLOY C.
5 2" STANCHION MOUNTING BRACKET REQUIRED.
6 VENDOR SHALL STAMP THE TAG NOS. ON STAINLESS STEEL TAGS AND PERMANANTLY ATTACH THE TAGS TO APPROPRIATE EQUIPMENT.

Date	Rev	Description	PREP.	CKD	APPR	PM
12/4/2018	1	ISSUED FOR REVIEW	ZUA	SAG	AJ	

ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FEC PRCP (QADIRPUR GAS FIELD)

OIL AND GAS DEVELOPMENT COMPANY LIMITED

DOCUMENT TITLE:	DATA SHEET OF PRESSURE TRANSMITTER (PIT-102)	
DOCUMENT NO.	2895-DS-018	Rev-1

Petrochemical Engineering Consultants

1		Tag No. PIT-102	Service: PRCP INLET FEED GAS FILTER COALESCER
GENERAL	2	Quantity	1
		Function	Record ☐ Indicate ■ Control ☐ Blind ☐ Trans. ■ Other
	3	Case	MFR STD ■ Nom Size ____ Colour MFR STD ■ Other ____
	4	Mounting	Flush ☐ Surface ☐ 2" Yoke ■ Other ____
	5	Enclosure Class	General Purpose ☐ Weather Proof ■ Explosion Proof (Eexd) ■ Class IP-67
			For Use in Intrinsically Safe System. ☐ Other ZONE II,CLASS IIB, T3
	6	Power Supply	110 V 50Hz ☐ Other AC ____ DC 24 Volts
	7	Chart	____ Strip ☐ ____ Roll ☐ ____ Fold ☐ Circular ____ Time Marks ____
			Range ____ Number ____
	8	Chart Drive	Speed ____ Power ____
	9	Scales	Type ____
			Range 1 ____ 2 ____ 3 ____ 4 ____
XMTR.	10	Transmitter Output	4-20 mA ■ 10-50 mA ☐ 21-103 kPa (3-15 psig) ☐ Other Loop powered Hart
			Output Load Capability 600 OHMS @ 24 V DC
	11	Electrical Entry	2 x M20 (unused cable entry to be plug with Eexd plug)
CONTROLLER	12	Control Modes	P = Prop (Gain), I = Integral (Auto Reset), D = Derivative (Rate), Sub : s = Slow, f = Fast
			P ☐ PI ☐ PD ☐ PID ☐ If ☐ Df ☐ Is ☐ Ds ☐
			Other ____
	13	Action	On Meas. Increase Output : Increases ☐ Decreases ☐
	14	Auto-Man Switch	None ☐ MFR STD ☐ Other ____
	15	Set Point Adj.	Manual ☐ External ☐ Remote ☐ Other ____
	16	Manual Reg.	None ☐ MFR. STD. ☐ Other ____
	17	Output	4-20 mA ☐ 10-50 mA ☐ 21-103 kPa (3-15 psig) ☐ Other ____
ELEMENT	18	Service	Gauge Press. ■ Vacuum ☐ Absolute ☐ Compound ☐
	19	Measuring Device / Principle	Capacitance Cell ■ Other ☐
	20	Element Type	Diaphragm ■ Helix ☐ Bourdon ☐ Bellows ☐ Other ____
	21	Material	316 SS ☐ Ber. Copper ☐ Other HASTELLOY C
	22	Range	Fixed ☐ Adj. Range ■ Set At Calib. Range
			Caliberated Range VTS
	23	Process Data	Press : Operating 240 PSIG Max. 1100 PSIG Element Range NOTE 3
	24	Process Conn.	1/4 in. NPT ☐ 1/2 In. NPT ■ Other ____
			Location : Bottom ■ Back ☐ Other ____
	25	Alarm Switches	Quantity ____ Form ____ Rating ____
	26	Function	Press. ☐ Deviation ☐ Contacts To ____ On Inc. Press. ____
OPTIONS	27	Options	Filt Reg. ☐ Sup. Gauge ☐ Output Gauge ☐ ____ Charts ____
			Diaph. Seal ☐ Type ____ Diaph. ____ Bot. Bowl ____
			Conn. ____ Capillary : Length ____ Mtl. ____
			Other ____ SS-316 2- valve manifold
	28	MFR / Model No.	Endress + Hauser / Rosemount / Or Equivalent

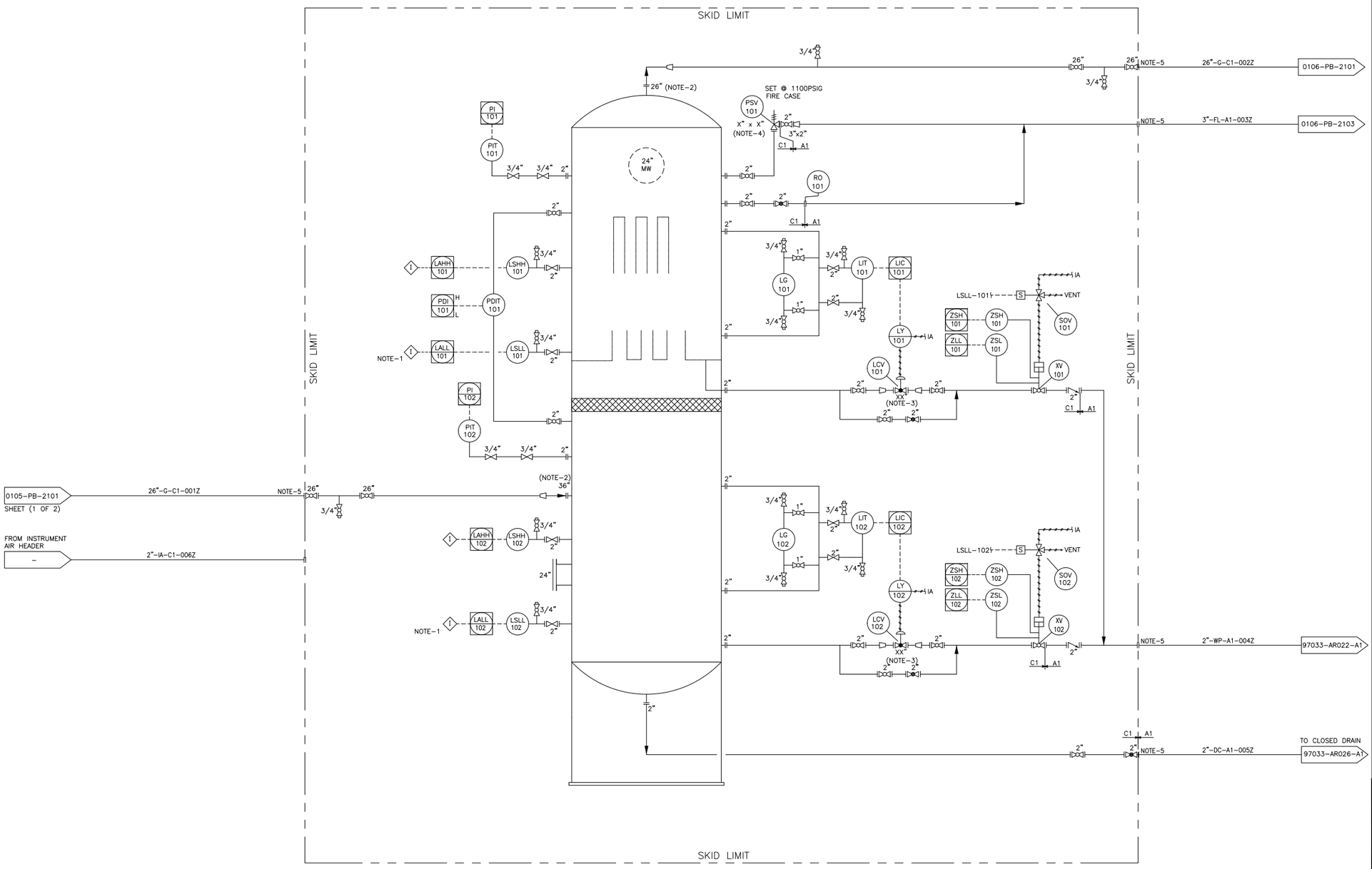
NOTES

1 VENDOR TO SPECIFY
2 VENDOR TO ADVISE
3 VENDOR TO ADVISE IN VIEW OF MAX. PROCESS PRESSURE.
4 ALL WETTED PARTS TO BE HASTELLOY C.
5 2" MOUNTING BRACKET REQUIRED.
6 VENDOR SHALL STAMP THE TAG NOS. ON STAINLESS STEEL TAGS AND PERMANANTLY ATTACH THE TAGS TO APPROPRIATE EQUIPMENT.

Date	Rev	Description	PREP.	CKD	APPR	PM
12/4/2018	1	ISSUED FOR REVIEW	ZUA	SAG	AJ	

FC-101

PRCP INLET FEED GAS FILTER COALESCER
DIMENSIONS: XXXmm T/T x XXXmm I.D.
DESIGN CONDITIONS: 1100psig / 180F
OPERATING CONDITIONS: 240psig / 100F
DESIGN FLOWRATE: 350MMSCFD @ 240psig
100MMSCFD @ 70psig



NOTE:

1. LSLL-101 AND LSLL-102 SHALL BE INTEGRATED WITH PR COMPRESSOR HIGH LIQUID LEVEL SHUTDOWN.
2. VENDOR/MANUFACTURER TO CONFIRM INLET AND GAS OUTLET NOZZLE SIZES.
3. VENDOR/MANUFACTURER TO SIZE LCV-101 AND LCV-102 AS PER LIQUID COALESCING RATE.
4. VENDOR TO SIZE PSV-101 AT FIRE CASE BASED ON WETTED SURFACE AREA.
5. ALL INLET OUTLET CONNECTIONS SHALL BE TERMINATED AT SKID EDGE WITH MATTING FLANGE.

LEGEND:-

PROPOSED WORK

REV.	DATE	DESCRIPTION	DRAWN	CHK'D	APP'VD
0	07-04-18	ISSUED FOR REVIEW	NU	MT	
			CONSULTANT		

PETROCHEMICAL ENGINEERING CONSULTANTS
C-2, BLOCK NO. 17, GULSHAN-E-IQBAL, NEAR NATIONAL STADIUM, KARACHI-75300. PAKISTAN.
TEL. +92 (21) 34827780, 34961088, FAX: +92 21 34961089, E-Mail: contact@pcec.com.pk web site: www.pcec.com.pk

CLIENT: OIL & GAS DEVELOPMENT COMPANY LIMITED

PROJECT: ROOT CAUSE ANALYSIS STUDY FOR WATER CARRY OVER AT FRONT END COMPRESSORS (PRCP) QADIRPUR GAS FIELD

TITLE: PIPING & INSTRUMENTATION DIAGRAM FOR FRONT END COMPRESSORS (PRCP) INLET FILTER COALESCER

DRAWING NO.	SHEET NO.	OF	SCALE	REV.
2895-PB-2101	1	1	N.T.S A3	0

IV- FORM OF CONTRACT

FORM OF CONTRACT FOR

DESIGN, MANUFACTURING, SUPPLY INCLUDING INSTRUMENTATION ALLIED PIPING, MATERIAL ETC, INSTALLATION SUPERVISION, COMPLETE TESTING AND COMMISSIONING OF FILTER COALESCER PACKAGE

THIS Contract is made this _____ day of _____, _____ between Oil & Gas Development Company Limited having its Head Office situated at OGDCL House, Jinnah Avenue, Blue Area, Islamabad (hereinafter referred to as "OGDCL", which expression where the context admits shall include and mean its successors in interest and assigns) of the FIRST PART and _____ having its offices at _____ (hereinafter referred to as "Supplier", which expression wherever the context admits shall include and mean its successors in interest and assigns) of SECOND PART.

WHEREAS OGDCL intends to procure Design, Fabrication, Supply, Installation Supervision, Complete Testing and Commissioning of Filter Coalescer Package for KPD-TAY Development Project.

WHEREAS the Supplier after reviewing and understanding the complete description of required Design, Fabrication, Supply, Installation Supervision, Complete Testing and Commissioning of Filter Coalescer Package for KPD-TAY Development Project has submitted the Bid for Design, Fabrication, Supply, Installation Supervision, Complete Testing and Commissioning of Filter Coalescer Package.

WHEREAS OGDCL has accepted the Supplier's Bid and agreed to purchase the Design, Fabrication, Supply, Installation Supervision, Complete Testing and Commissioning of Filter Coalescer Package for the Project from the Supplier.

NOW THIS CONTRACT WITNESSETH AS FOLLOWS:

1.0 CONTRACT

In this Contract words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract.

The following contract documents including this Contract their Attachments, Annexures, Appendices and Addendums shall be deemed to form and be read and construed as part of this Contract:

- Conditions of Contract and its Attachments — Appendix – I
- Price Schedule — Appendix – II
- Delivery Schedule — Appendix – III
- OGDCL's Tender Document — Appendix – IV
- Supplier's Technical & Commercial Bids — Appendix – V
- Clarifications & communication exchanged with Bidder — Appendix – VI
- The OGDCL's notification of Award — Appendix –VII

Notwithstanding anything contained in the documents:

- To the extent of any conflict between this Contract and the contract documents including Annexures, Appendices and Addendums, the Contract shall prevail.

- To the extent of any conflict between the Conditions of Contract and Technical Specifications given in the Scope & Specifications, the later shall prevail; similarly drawing/data sheets shall have precedence over technical specifications.

The object of the Contract is the performance of all the Works by the Contractor on a fixed price basis so as to result in Provisional Acceptance of the Plant capable of achieving Guaranteed Performance, within the Time for Completion, in strict accordance with all the requirements of the Contract and the Contractor acknowledges, agrees and undertakes that the performance of its obligations under the Contract would result in the achievement of the object of the Contract.

This Contract shall become effective upon the date after formal execution of the Contract by the duly authorized representatives of OGDCL and Contractor provided that all of the following conditions have been fulfilled:

a) The submission and authentication of the Performance Bond by the Contractor to OGDCL as per tender format.

The Contractor and OGDCL agree that this Contract, including all the documents incorporated by reference earlier express all of the covenants and agreements of the parties and that this Contract integrates, combines and supersedes all earlier negotiations and "Understanding" whether written or verbal. It is also understood that no modification or alteration of this Contract shall be valid or binding on either party, unless agreed in writing by both the parties.

IN WITNESS WHEREOF, the parties hereto have caused this Contract to be executed by their duly authorized representatives and their respective corporate seals to be affixed as of the day first above mentioned.

For and on behalf of OIL & GAS DEVELOPMENT COMPANY LIMITED	For and on behalf of
By: Title:	By: Title:
Witness:	Witness:
1. (Name)	1. (Name)
2. (Name)	2. (Name)

V – CONDITIONS OF CONTRACT

TABLE OF CONTENTS

1.0 DEFINITIONS

1.1 **Terms**

a) "OGDCL" means Oil & Gas Development Company Ltd.

b) "Applicable Law" means the law and any other instruments having the force of law in the Islamic Republic of Pakistan, as they may be issued and in force from time to time.

c) "Contract" means the Agreement entered into between OGDCL and the Supplier, as recorded in the Contract Form signed by both parties, including all attachments and appendices thereto and all documents incorporated by reference therein.

d) "Contract Price" means the price payable to the Supplier under the Contract for the full and proper performance of its contractual obligations.

e) "FOB" have the meaning assigned to them in the International Rules for the interpretation of Trade Terms (INCOTERMS 2010).

f) "CFR (C&F)" have the meaning assigned to them in the International Rules for the interpretation of Trade Terms (INCOTERMS 2010).

g) "Foreign Currency" means any currency other than the currency of the Government of Islamic Republic of Pakistan.

h) "Goods or Equipment/Material" means all equipment and materials i.e. Filter Coalescer including their spare parts, which the Supplier is required to supply to OGDCL under the Contract.

i) "Government" means the Government of the Islamic Republic of Pakistan.

j) "Local Currency" means the currency of the Government of the Islamic Republic of Pakistan.

k) "Supplier" means the individual, firm or corporation Design, Fabrication, Supply, Installation Supervision, Complete Testing and Commissioning of Filter Coalescer.

l) "Specifications" means the technical information on the materials, i.e. Filter Coalescer given in Scope of work and Tender Document.

m) "Site" means the place where the material and equipment purchased under the Contract will be installed and is located within the premises of OGDCL's Qadirpur Plant.

n) "Warranty Period" means the period of twelve (12) month from the date of commissioning of Filter Coalesceror or twenty four (24) months from the date of shipment, whichever occurs first.

2.0 APPLICATION

2.1 These Conditions shall apply to the extent that they are not superseded by provisions in other parts of the Contract.

3.0 STANDARDS

3.1 The materials supplied under this Contract shall conform to the Standards mentioned in the Scope and Specifications. In each case where reference is made to any specific National or International

Standards, other recognized and authoritative Standards ensuring equal or higher quality will also be acceptable. In case your offer conforms to Standards other than stipulated in the Scope and Specifications you are required to submit alongwith your bid one copy of the Standards in English Language and evidence that Standard used is a recognized and authoritative Standard, which ensures equal or higher quality. Your bid shall be declared non-responsive and rejected if you do not submit required evidence and a copy of such Standards in English Language with your bid and it is subject to acceptance by OGDCL / Engineering Consultant. In case where metric or foot-pounds-second (F.P.S.) system is specified only those Standards will be considered.

4.0 USE OF CONTRACT DOCUMENTS AND INFORMATION

4.1 The Supplier shall not, without OGDCL's prior written consent, disclose the Contract, or any provision thereof, or any specification, plan, drawing, sample or information furnished by or on behalf of OGDCL in connection therewith, to any person other than a person employed by the Supplier in the performance of the Contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far as may be necessary for purposes of such performance.

4.2 The Supplier shall not, without OGDCL's prior written consent, make use of any document or information enumerated in Clause 4.1 except for purposes of performing the Contract.

4.3 Any documents, other than the Contract itself, enumerated in Clause 4.1 shall remain the property of OGDCL and shall be returned (all copies) to OGDCL on completion of Supplier's performance under the Contract, if so required by OGDCL.

5.0 PATENT RIGHTS

5.1 The Supplier shall indemnify and hold OGDCL harmless against all actions, claims, demands, costs, charges, damages and expenses arising from or incurred by reason of any infringement of patent, trade mark or industrial design rights arising from use of the material or any part thereof.

6.0 INSPECTIONS AND WITNESS TESTING

6.1 The Supplier shall carryout all inspection, examinations and tests and provide certification as per requirements stipulated in the Contract Documents, industry’s practice and instructions of OGDCL/Engineering Consultant

6.2 OGDCL will participate in tests conducted at manufacturers works and pre-shipment inspection of the equipment and material. For test and inspection conducted on the premises of the manufacturer’s works all reasonable facilities and assistance (including access to drawings and production data) shall be furnished to the inspectors at no charge to OGDCL. The participation/presence for acceptance of such test by OGDCL shall not relieve the Supplier from its obligations liabilities under the Contract.

6.3 Should any inspected or tested equipment, material fails to conform to the Specifications, the OGDCL may reject them and the Supplier shall either replace the rejected equipment/material and installation work or make all alterations necessary to meet specification requirements free of cost to OGDCL.

6.4 OGDCL right to inspect and where necessary, reject the equipment, material shall in no way be limited or waived by reason of the equipment, material and installation work having previously been inspected, tested and passed by the OGDCL or its representative.

6.5 Nothing in Clause 6.0 shall in any way release the Supplier from any warranty, obligations or liabilities under this Contract.

7.0 DELIVERY AND DOCUMENTS

7.1 OGDCL shall take delivery of the equipment on CFR Karachi basis (INCOTERMS 2010).

7.2 OGDCL has the option to take delivery of the equipment either on the basis Ex-works or at Site. (Applicable Only for Local Bidders)

7.3 Delivery shall be deemed to have been made when the equipment and material has been shipped or arrived at Karachi Port/at Site (whichever is the case) and all documentation specified in 7.5 have been submitted to OGDCL.

7.4 The timely delivery shall be the essence of the Contract, as OGDCL has to meet its obligations for completion of the Project. Accordingly, the Supplier is required to complete the Design, Fabrication and Supply of Filter Coalescer within eight (08) months on CFR Karachi sea port basis from the date of letter of credit established by OGDCL.

A notice shall be given by OGDCL after preparation of site for commissioning services of the package which shall be done within sixty (60) days after establishment of services letter of credit. The bidder/packager shall provide firm mobilization schedule within ten (10) days of issuance of notice by OGDCL which shall ensure mobilization of bidder/packager experts not later than 15 days.

7.5 Immediately after shipment, the Supplier shall send to OGDCL by courier, the following copies of shipping documents:

i) Signed Invoices, prepared as per instructions
ii) Bill of Lading/Postal Receipt/Airway Bill
(Applicable for foreign bidder)
i) Full set of clean Truck receipt
(applicable for local bidder)
iii) Certificate of Origin
iv) Packing list indicating
- Contents
- Gross and net weight in Kgs.
- Complete dimensions of each package and volume of each package in cubic meters.

v) Maker's Test Certificate
vi) Third Party Inspection Report.
vii) Declaration Certificate for submission of MDR documents prior to shipment.
viii) Sales tax invoice & Annexure-C (only for local bidders)

7.6 The above documents should be received by Manager (Procurement) at the latest ten (10) days before arrival of the equipment/materials at the Karachi Port and if not so received, the Supplier will be responsible for any expenses resulting from any delay in customs clearance caused thereby and extension of the period of insurance coverage by corresponding period of delay

8.0 INSURANCE

8.1 Insurance from port of shipping/delivery will be covered by openers and declaration shall be made by the beneficiary to Insurance Company i.e. M/s National Insurance Corporation NIC Building, Abbasi Shaheed Road. off Shahrah-e-Faisal Road, Karachi (Pakistan) , Fax : 0092-21-9202734 and Dy. Chief Accountant (Imports),OGDCL, Islamabad, Fax No. 0092-51-9209803-07, immediately after shipment giving full details of shipment as follows;

i) Contract number

ii) Insurance cover note number and date
iii) Quantity
iv) Description of equipment/material and value
v) Name of the vessel
vi) Bill of lading number and date
vii) Port of loading
viii) Date of shipment
ix) Expected date of arrival at Karachi Port

8.2 The equipment/material supplied under the Contract shall be fully insured for transportation from Suppliers works to Site. (Applicable for local bidder)

9.0 TRANSPORTATION

9.1 Where the Supplier is required under the Contract to deliver Filter Coalescer on CFR basis, transport of the Filter Coalescer to Karachi (Pakistan) shall be arranged and paid for by the Supplier, and the cost thereof shall be included in the Contract Price.

9.2 Supplier is required under the Contract to deliver the equipment/material at Site. The transportation and Insurance cost shall be specified in the Contract and shall be arranged and paid for by the Supplier. (Applicable for local bidder)

9.3 The transportation shall be made by the Supplier in accordance with the terms specified by OGDCL in its Scope of Work and Specifications.

9.4 No shipment shall be made without the prior authorization of OGDCL. Any unauthorized shipment will either be returned without prior notice or stored by OGDCL at the Supplier's expense and risk.

The Supplier shall submit to OGDCL Two (02) weeks before shipment:

- A list of packages which by virtue of their nature, size or weight may give rise to difficulties in transport or handling.
- The probable time table of shipment in accordance with the schedule so that deliveries are made in the most convenient order for Site Work.

10.0 SPARE PARTS

The Supplier shall propose in the Bid recommended list of spare parts required during two years of satisfactory operation of the Coalescer Filter. The Supplier should ensure an arrangement where by the spare parts inventory/backup facilities for the Filter Coalescer is maintained for minimum period of two (02) years years. In the event of termination of production of spare parts an advance notification should be given to OGDCL giving sufficient time enabling it to procure the required spare parts and following such termination, furnishing at no cost to OGDCL, the blue prints, drawings and specifications of the spare parts.

11.0 WARRANTY

11.1 The Supplier warrants to OGDCL that the supplied equipment under this Contract shall be brand new, designed, and manufactured/fabricated as per requirements and fit for the intended purpose. The supplied equipment shall have no defect arising from design, materials or workmanship or from any act or omission of the Supplier that may develop under normal use of the supplied equipment under the conditions prevailing at the Qadirpur site.

11.2 The foregoing warranty shall be remain valid for a period of twelve (12) months from the date of commissioning of Filter Coalescer or Twenty Four (24) months from the date of shipment, whichever occurs first.

11.3 If the supplied equipment fail to meet the warranty conditions set forth in Clause 11.1 OGDCL shall promptly notify the Supplier in writing about the defects and claims under the warranty. Upon receipt of such notice the Supplier shall within the time specified by OGDCL repair/ replace the defective material and or portion of works, with no cost or expense to OGDCL. The repaired or replaced material or works shall be warranted by Supplier for twelve (12) months from the date of repair(s) or replacement(s).

If the Supplier having been notified, fails to remedy the defect(s) within the specified time, OGDCL shall proceed to take remedial actions as may be necessary, at the Supplier's risk and cost. All costs thereof shall be charged to the Supplier or recovered from performance bond. The Supplier shall have no objection to the above and hereby acknowledges the rights of OGDCL to recover such sums as a debt due to OGDCL from defaulting Supplier. It is understood that in this case the Supplier shall not be relieved from the provided warranties and contractual obligations.

11.4 The Supplier shall also provide back-up guarantee of respective original manufacturer of equipment.

12.0 PRICE

Price charged by the Supplier for equipment/material delivered under the Contract shall not vary from the prices quoted by the Supplier in his bid.

In consideration of the due performance of the obligations of the Supplier under the Contract, OGDCL shall pay the Supplier an amount of US$_____ or Pak Rupees_____for Design, Fabrication, Supply, Installation Supervision, Complete Testing and Commissioning of Filter Coalescer as per Scope & Specifications.

The above price of the Contract covers the total payment for Supplier's obligations under the Contract.

This price shall be firm lumpsum price and not subject to any escalation or alteration regardless of any circumstances whatsoever even unforeseeable at present. The price shall include duties, taxes and levies payable on equipment, machinery and other items and services being supplied/provided under the Contract in country of origin/ exporting/Importing country and the Supplier will assume full and exclusive liability on this account.

OGDCL shall provide boarding/lodging and transport to supplier's representatives, visiting the Site (Qadirpur) for providing Commissioning and expert specialized services. The boarding/lodging will be provided at Qadirpur Plant. The transport will be provided at site from and to nearest civil airport.

The withholding tax deductions shall be made as per prevailing laws/ regulations.

13.0 PAYMENT

13.1 The payment of the Contract Price shall be made by OGDCL through two separate irrevocable letters of credit (L/C) or account payee cheque i.e. First for Supply of equipment and Second for Services. The Letter of Credits to be established in accordance with the requirements of State Bank of Pakistan, Custom authorities and other government organizations in Pakistan and direct bank transfer. The terms and conditions of L/C is given in **Attachment-I**.

The Bank charges for establishment of L/C, additional confirmation and any subsequent amendments in L/C will be borne as follows:

a) All charges of the Bank for letter of credit opening will be borne by OGDCL.
b) All charges of the Corresponding Bank such as negotiation of documents, adding confirmation to credit etc. will be to the account of beneficiary/Supplier.
c) All Bank charges for any amendment/extension in L/C or revalidation of L/C if required extension will be to the account of Supplier.

The Contract Price shall be paid by OGDCL as per following terms:

A) **Supply of Equipment**

First irrevocable Letter of Credit (L/C) in currency of Contract shall be established in favour of Supplier through a Pakistani bank and with Supplier's correspondent bank for the contract price of supply of Filter Coalescer (including spares and optional items). The payments terms of L/C are as follows:

- SeventyFive (75) percent of Contract Price for Supply of Filter Coalescer shall be paid by OGDCL on shipment of the equipment/package.

  The payment under the L/C shall be effected upon submission of following documents upon each shipment of equipment/package component:

  i) Clean on board ocean vessel Master bills of lading. (applicable for foreign bidder)
  ii) Full set of clean Truck receipt (applicable for local bidder)
  iii) Original detailed invoice showing equipment/package description, quantity unit price and total price strictly in line with the Contract.
  iv) Packing list
  v) Certificate and list of measurements and weight gross/net.
  vi) Mill Inspection/Quality Certificate.
  vii) Insurance declaration.
  viii) Warranty Certificate
  ix) Certificate of origin.
  x) Third party Inspection Report
  xi) Technical Catalogue/Literature etc.

- Ten (10) percent of the Contract Price for Supply of Filter Coalescer shall be released under the L/C upon delivery of Complete Packages at site on submission of Supplier's original invoice duly verified by OGDCL.

- Fifteen (15) percent of the Contract Price for Supply of Filter Coalescer shall be released on issuance Provisional Acceptance Certificate on successful commissioning by OGDCL and submission of Supplier's original invoice verified by OGDCL.

B) **Services**

Second irrevocable Letter of Credit (L/C) in currency of Contract shall be established in favour of Supplier through a Pakistani bank and with Supplier's correspondent bank for the contract price of providing Services. The payments terms of L/C are as follows:

Supervision of Installation, Commissioning, Start-up & Testing
The lumpsum charges for supervision of installation, commissioning, start-up, testing of Filter Coalescer at Qadirpur plant, on issuance of Provisional Acceptance Certificate and submission of Supplier's original invoice verified by OGDCL.

Supplier's request(s) for payment shall be made to OGDCL in writing accompanied by an invoice describing, as appropriate, the equipment delivered and services performed, and by shipping documents, submitted pursuant to relevant clauses and upon fulfillment of other obligations stipulated in the Contract.

14.0 AGENCY COMMISSION

14.1 OGDCL will not pay any commission to any Bidder or his local agent against this tender and/or resulting Contract in local or foreign currency whatsoever.

15.0 AMENDMENTS

15.1 No variation in or modification of the terms of the Contract shall be made except by written amendment signed by the parties.

16.0 ASSIGNMENT

16.1 The Supplier shall not assign, in whole or in part, its obligations to perform under the Contract, except with prior written consent of OGDCL.

17.0 DELAYS IN THE SUPPLIER'S PERFORMANCE

17.1 Delivery of the Filter Coalescer shall be made by the Supplier in accordance with the time schedule specified in the Conditions of Contract.

17.2 An unjustified prolonged delay by the Supplier in the performance of his delivery obligations shall render the Contract liable to any or all of the following sanctions:

- imposition of liquidated damages;
- forfeiture of performance security
- and/or termination of the Contract for default

17.3 If at any time during the performance of the Contract the Supplier should encounter conditions impeding timely delivery of the Filter Coalescer and performance of the Services, the Supplier shall promptly notify the OGDCL in writing of the fact of the delay, its likely duration and its cause(s). As soon as practicable after receipt of the notice from the Supplier, the OGDCL shall evaluate the situation and may at its discretion extend the Supplier's time for performance, in which case the extension shall be ratified by the parties by amendment of the Contract.

18.0 LIQUIDATED DAMAGES FOR DELAY

18.1 If the contractor fails to deliver any or all of the goods within the time period(s) specified in the Contract, the Purchaser shall, without prejudice to other remedies under the contract, deduct from the contract price / Bank Guarantee as liquidated damages, a sum not more than 0.5% of the contract price per week or part thereof for first four weeks, 1.00% per week for next four weeks and 1.5% per week exceeding four weeks up to maximum extent of 10% of the contract value.

18.2 In case the Purchaser is satisfied that the delayed / defective shipment was due to some mistake or circumstances beyond the control of the contractor and the contractor has not intentionally or negligently contributed in the delay, the Purchaser may impose Liquidated Damages for not more than a sum equivalent to 0.5% of the delayed or defective shipment per week or part thereof for first two weeks, 1.00 % per week for next three weeks and 1.5% per week exceeding five weeks but not exceeding 10% of the contract value of the delayed/ defective shipment provided that the contractor takes immediate remedial measures for the-replacement of defective shipment and takes prompt steps to mitigate the delay. The Purchaser may however, impose Liquidated Damages as per (a) above if the delayed or defective shipment has affected the project completion schedule or has resulted in production losses.

18.3 Even after imposition of LDs, if the supplier fails to materialize the delivery (material and or services); the Purchaser reserves the right to cancel Purchase order/contract/LC and to forfeit the Guarantee (if applicable) after intimating the supplier for such cancellation / forfeiture.

19.0 TERMINATION FOR DEFAULT

19.1 OGDCL may, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the Supplier, terminate this Contract in whole or in part provided that:

a) The Supplier fails to deliver equipment within the time periods(s) specified in the Contract, or any extension thereof granted by OGDCL; or

b) The Supplier fails to perform any other obligations(s) under the Contract, and provided that the Supplier in either of the above cases does not remedy his failure within a period of ten days after receipt of the default notice.

19.2 In the event, OGDCL terminates the Contract in whole or in part pursuant to Clause 19.1, OGDCL may procure, upon such terms and in such manner, as he deems appropriate, material similar to those undelivered, and the Supplier shall be liable to any excess cost for such similar material, which may be deducted from his Bank Guarantee.

20.0 FORCE MAJEURE

This Contract is subject to force majeure. Force majeure are contingencies caused by neither of the parties and which are enforceable at the time of concluding this Contract and are uncontrollable and render further performance of contractual obligations impossible or impracticable. This includes acts of God, acts of war, acts of Government, blockades, revolutions, strikes, civil disturbances, riots, floods, power breakdown but is not limited thereto.

Upon the occurrence of such contingency, the party suffering there from, shall immediately but in no case later than seven (7) days from the occurrence of such contingency, give the other party notice in writing of the happening of such event. Such notice shall be accompanied by relevant proof thereof. Neither party shall be deemed to be in default of its contractual obligations if performance thereof is prevented by force majeure and the time limits, if any, laid down for the performance of such

obligation shall accordingly be extended by a period equal to that during which the force majeure contingencies remain in force.

If the force majeure contingencies continuously last for seven (7) days, both parties will discuss necessary arrangements for further implementation of the Contract and either party shall be entitled to terminate this Contract by giving seven (7) days written notice to the other. Such termination shall be without prejudice to the respective rights and obligations for the parties which arise prior to termination. In case of termination of the Contract OGDCL or Supplier shall present a detailed account of their respective claims which shall be settled by negotiations. If no settlement is reached by negotiations, the matter shall be referred to Arbitration.

21.0 TERMINATION FOR INSOLVENCY

21.1 OGDCL may at any time terminate this Contract by giving written notice to the Supplier, without compensation to the Supplier, if the Supplier becomes bankrupt or otherwise insolvent, provided that such termination shall not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the OGDCL

22.0 TERMINATION FOR CONVENIENCE

22.1 OGDCL may, by written notice to the Supplier, terminate the Contract, in whole or in part, at any time at its convenience. The action of termination shall specify that the termination is for the convenience of the OGDCL, the extent to which performance of work under the Contract is terminated, and the date upon which such termination becomes effective.

22.2 The equipment that are complete and ready for shipment within 30 days after receipt of notice of termination by the Supplier, shall be purchased by the OGDCL at the Contract terms and prices. For the remaining equipment the OGDCL may elect:

i) to have any portion completed and delivered at the Contract terms and prices; and/or
ii) to cancel the remainder and pay to the Supplier an agreed amount for partially completed equipment and for materials and parts previously procured by the Supplier.

23.0 RESOLUTION OF DISPUTES

23.1 If any difference or dispute arises out of or in connection with the Contract the OGDCL and the Supplier shall make every effort to resolve amicably by direct informal negotiations.

23.2 If, after thirty (30) days from the commencement of such informal negotiations, the OGDCL and the Supplier have been unable to resolve amicably a Contract dispute, the dispute may be referred to Arbitration of two arbitrators, one arbitrator to be appointed by each party. In case of disagreement between the arbitrators, the matter shall be referred to an Umpire to be appointed by the arbitrators prior to their entering upon the reference. The Umpire shall be a retired judge of High Court or the Supreme Court of Pakistan. The venue of arbitrator shall be Islamabad, Pakistan. Such Arbitrators and Umpire shall together proceed to adjudicate the dispute in accordance with the Pakistan Arbitration Act, 1940, as amended from time to time. The award shall be final and binding on the parties.

23.3 The Contract shall be governed by Pakistani Law and the arbitration language shall be English.

23.4 The Supplier shall not suspend the performance of its responsibilities and obligations under the Contract unless authorized by the OGDCL in writing to do so.

24.0 GOVERNING LANGUAGE

24.1 The Contract shall be written in English language. All the communications and notifications between the OGDCL and the Supplier as well as all documents, drawings, instructions, manuals and any other writings, which are exchanged between the parties shall be written in English language.

25.0 PERFORMANCE BOND/BANK GUARANTEE

25.1 Within ten (10) days of the receipt of notification of intent to award the Contract from OGDCL, the successful Bidder shall furnish a Performance Bond in the Form of Bank Guarantee for an amount of ten (10) percent of the Contract Price in US Dollars (for foreign bidder) or in Pak Rupees (for local bidder). Performance bank guarantee shall be issued by any bank mentioned in annexure-II.

25.2 As a guarantee for the faithful performance of the obligations under the Contract, the Supplier shall establish such Guarantee in favor of OGDCL as per Contract Documents.

25.3 The said Guarantee and the terms of the said security shall be in accordance with format given in **Annexure-XIII**. The procurement of such guarantee and the cost of the security to be so entered into shall be at the expense of the Supplier.

25.4 The proceeds of the Performance Bond/Guarantee shall be payable to OGDCL as compensation for any loss resulting from the Supplier's failure to fulfill its obligations under the Contract (including warranty/performance guarantee).

25.5 The Performance Bond/Guarantee shall be released to the Supplier after twelve (12) months from the date of Commissioning or twenty four (24) months from the date of shipment, which ever occurs first provided that the Supplier has performed and fulfilled warranty/obligations in pursuance of the Conditions of the Contract, to the entire satisfaction of OGDCL. If Supplier is unable to meet its obligations the Performance Bond/Guarantee will be extended or encashed as per OGDCL's discretion.

26.0 NOTICES

26.1 Any notice given by one party to the other pursuant to the Contract shall be given in writing or by fax and confirmed in writing to the address specified in 27.3.

26.2 A notice shall be effective when delivered or on the notice's effective date, whichever is later.

26.3 For the purpose of all notices, the following shall be address of the OGDCL and Supplier:

If to OGDCL (To be filled in at the time of Contract Signature)

_____

_____

If to Supplier (To be filled in at the time of Contract Signature)

_____

_____

28.0 TAXES, DUTIES, FEES AND OTHER LEVIES

28.1 All taxes on the income or payments to the contractor arising, accruing or resulting under the contract, whether present or future, assessed or payable inside or outside Pakistan shall be the exclusive responsibility of the contractor or its sub-contractor(s). Company, in order to discharge its responsibilities as withholding agent shall withhold income tax from the payments to the contractor within the contract value at the rates applicable at the time of payments.

28.2 Sales tax on goods as well as services is applicable in Pakistan under federal/provincial sales tax laws. The contractor being registered with respective federal/provincial revenue authority of Pakistan is entitled to charge applicable sales tax over and above its bid price and will be responsible for the payment of such sales tax to the respective revenue authority as per the prevailing federal/provincial sales tax laws. OGDCL being the withholding agent shall withhold sales tax from the contractor (whether registered or unregistered), as per respective sales tax withholding rules.
Any indirect tax including value added tax, sales tax etc. present or future, applicable outside Pakistan shall be exclusive responsibility of the Contractor.

28.3 The Contractor shall be responsible for income tax and all other taxes levied on the Contractor's and its sub contractor's expatriate personnel, their social security obligations and contributions regardless of whether such contributions are levied on employer or employee or both in Pakistan or outside Pakistan.

28.4 The Contractor shall keep OGDCL informed of the steps taken by it to discharge the tax obligations under the Contract and provide supporting documents whenever required by the OGDCL.

28.5 The Contractor shall indemnify OGDCL against any claim which might occur due to non-compliance by Contractor of any legal obligation regarding taxes, duties, fees, levies, or other charges, including taxes on income and sales tax in Pakistan and any other payments due to the Federal or Provincial Governments, their agencies or any other relevant authority.

28.6 All clearing and brokerage charges incurred shall be to the account of CONTRACTOR.

28.7 CONTRACTOR agrees not to sell, transfer or dispose any of its machinery, equipment, spare parts or material imported under this contract within the country without prior written approval from COMPANY and without payment of taxes (including custom duties etc) due to the Government.

28.8 CONTRACTOR is responsible to settle all COMPANY obligations or guarantees with the customs authorities and to clear COMPANY of all such responsibilities.

28.9 CONTRACTOR is responsible to obtain all customs approvals and other documentations. COMPANY will endeavor to assist CONTRACTOR in obtaining such approvals and documentation.

28.10 The above clauses relating to payment of taxes would prevail notwithstanding a contrary expression reflected in any other clause of the contract.

29.0 ACCEPTANCE CERTIFICATES

29.1 Provisional Acceptance Certificate

The Provisional Acceptance Certificate will be issued by OGDCL in one (01) week time after successful commissioning and testing as per the requirements stipulated in the tender document.

29.2 Final Acceptance Certificate

The final acceptance certificate shall be issued by OGDCL after twelve (12) months from the date of issuance of Provisional Acceptance Certificate.

30.0 CHANGE ORDERS

30.1 OGDCL may at any time, by a written order given to Supplier make changes within the scope of the Contract in any one or more of the following:

i) Drawings, design or specifications.

ii) Addition or deletion in scope of supply.

30.2 If any such change causes an increase or decrease in the cost of, or the time required for Supplier's performance of any part of the Contract, an equitable adjustment (to be mutually agreed) shall be made in the Contract Price or Project Completion Schedule, or both, and the Contract shall accordingly be amended. Any claims by Supplier for adjustment under this Clause must be asserted within 30 days from the date of Change Orders.

31.0 APPLICABLE LAWS

The Contract shall be interpreted in accordance with the law applicable in the Islamic Republic of Pakistan.

Supply Portion

OTHER TERMS AND CONDITIONS OF THE L/C TO BE STRICTLY COMPLIED BY THE BENEFICIARY
(C&F by Sea Karachi)

1. CONSIGNEE:

The goods must be consigned to *the L/C establishing bank* and notify party Oil & Gas Development Company Ltd., Chief Material Officer, Plot No. 21, OGDCL Warehouse, West Wharf Road, Karachi. Telephone No. 021-32311108, 32313119, Fax No. 021-32311040, E-mail: mujahid_ali@ogdcl.com

2. PACKING:

The Packing of the merchandise must conform to the International Standards and the packing list along-with Commercial Invoice must be placed inside the container without fail.

3. MARKING:

3.1 All Packages/boxes must bear the Purchase Order No. as Shipping Marks, Country of Origin and Weight in Kilograms (Gross/Net). The marks must tally with shipping documents like B/L and manifest there should not be any difference.

3.2 In addition to the above mentioned shipping marks, the following procedure of color code marking is to be adopted / made on each side of the package/box/container while dispatching the material: -

"There will be an isosceles triangle with or less than six inches side, triangle side marked in black lines, letters "OGDCL" inscribed inside, the letters to be not less than 1½" tall and will be in black. On big packages/boxes/containers, the sides or triangle and letters will be increased appropriately. Underneath the triangle there will be two color code bars in **"GREEN"** color size six inches in length and 1½" in width. If the above color codes marking is not appropriate/suitable, the sizes and color may be changed".

3.3 Each item of the consignment should also be marked with item # of the Purchase Order.

4. SHIPPING DOCUMENTS.

Shipping documents shall consist of the following:

4.1 Master Bill of Lading on Freight Pre-Paid Basis signed by the carrier or their authorized agent showing clean shipped on board. Freight forwarders, Third party, Short form, blank back and House Bill of Lading is not acceptable.
4.2 Detail invoice showing commodity description, quantity, unit/total price, total No. of packages, etc. containing original signatures.
4.3 Packing List, (Showing total number of packages, gross/net weight & measurement and Box No. in case of more than one boxes such as Box No. 1/10, 2/10 ……10/10 and so on and detailed of equipment in each box.
4.4 Certificate of origin.
4.5 Certificate of compliance of the credit terms as per clause No. 2 in respect of Packing.
4.6 Insurance declaration. A copy of Fax OR E-mail sent to Insurance Company in compliance to the Clause No. 9 of the purchase order.

4.7 A Copy of the Fax OR E-mail sent in compliance to the Clause No. 6.1 of the purchase order.

4.8 Third party Inspection certificate

5. INSTRUCTIONS FOR COMPLETING SHIPPING DOCUMENTS:

5.1 The shipping invoice should be marked on top in capital words.

a) Complete, first and last consignment (if all the contractual material is shipped in one lot.)
b) First partial shipment/second partial shipment (and so on). Final and last shipment as the case may if shipments are effected in parts.

5.2 All Invoices should be signed, and must indicate value of the each items total value and also show 'SHIPPING MARKS' as provided in the contract.

5.3 All containers of cargo must carry copy of invoice. A compliance certificate in this regard shall be provided along with the shipping documents. In case on noncompliance the beneficiary shall pay the penalty imposed by the Custom Authority.

6. SHIPMENT INTIMATION:

6.1 The beneficiary within 24-48 hours of making shipment must sent fax OR E-mail to (1) Chief Material Officer, Plot No. 21, West Wharf, Karachi, Fax No. 0092-21-2311040 , E-mail: mujahid_ali@ogdcl.com (2) Manager (Foreign) Procurement, OGDC House Plot No. 3 (New NO. 3013)F-6/G6, Blue Area, Jinnah Avenue, Islamabad. Fax No. 0092-51-9244210 & 0092-051-9209803-7, E-mail: irshad_muhammad@ogdcl.com (3) Chief Accountant (Imports) on Fax No. 0092-51-9209803-7, E-mail: zahoor_mohyuddin@ogdcl.com'' (4) National Insurance Company Limited, Karachi on FAX No. 0092-21-99202734 or E-mail: ''sanaullah.shaikh@nicl.com.pk" OR gulam.akbar@nicl.com.pk, OR info@nicl.com.pk intimating them the following: -

a) L/C numbers and Contract No.
b) Name of the Ship & Shipping Line.
c) Bill of Lading No. & Date.
d) Total CFR value of the consignment shipped.
e) Port of shipment.
f) No. of boxes/packages/pieces.
g) Net and gross weight.
h) Expected time of arrival (ETA) of ship.

7. SHIPMENT INSTRUCTIONS

a) The contractor/Supplier/Vendor is requested to ensure that Commercial Invoice / Packing List shall be pasted on the inner side of the door of container for FCL Shipments and on Boxes / Crates / Cartons etc. for LCL Shipments. Non-Compliance to this instruction may result in heavy penalty imposed by Custom Authorities which shall be recovered from the Contractor/Supplier/Vendor.

b) Please ensure that in case of CFR contracts the local charges at Karachi Seaport/Airport must be included in the freight cost.

c) The freight forwarders/shipping agents at country of origin must include the corresponding local charges such as delivery order/port handling & container rentals for free time etc. Company shall pay only the wharfage/demurrage charges. They should also ensure that there should be only one local agent of the shipping

company who should handle such matters. In case OGDCL had to pay such charges, it shall be recovered from the contractor.

8. INSTRUCTION REGARDING TRANSMISSION/NEGOTIATION OF SHIPPING DOCUMENTS.

8.1 ORIGINAL NEGOTIABLE DOCUMENTS:

a) The beneficiary immediately upon making shipment(s) should negotiate the original clean shipping documents free from any discrepancy with negotiating bank as indicated in the L/C.

b) If clean documents free from any discrepancy are not negotiated within negotiation period mentioned in the L/C, or if the documents are withheld by the Bank on account of any discrepancy whatsoever the demurrage or financial impact if any incurred due to late negotiation of clean documents will be on beneficiary's account.

c) Original/negotiable documents must contain at least four sets of the shipping documents mentioned under Clause No. 5 above.

d) The original shipping documents should be dispatched through courier service by the negotiating bank at the beneficiary's cost within 24-48 hours after receipt from the beneficiary.

e) The discrepant documents with minor discrepancies will be accepted subject to the consent of Procurement Department to facilitate prompt clearance of the consignment on the condition that demurrage, if any due to the discrepancies reported by L/C opening bank will be on beneficiary account.

8.2 NON-NEGOTIABLE DOCUMENTS:

a) One complete sets of non-negotiable shipping documents must be dispatched OR E-mailed to the Manager Procurement (Foreign) at the following address immediately upon shipment is effected:-

MANGER PROCUREMENT (FOREIGN)
OIL & GAS DEVELOPMENT COMPANY LIMITED
OGDC HOUSE, PLOT NO. 3 (NEW NO. 3013),
F-6/G-6, BLUE AREA, JINNAH AVENUE,
ISLAMABAD, PAKISTAN.
PHONE NO. 0092-51-920022144, 920023593 & FAX NO. 0092-51-9244210, 9209673
E-mail: irshad_muhammad@ogdcl.com

b) One complete sets of non-negotiable shipping documents must be dispatched OR E-mailed to Chief Material Officer at the following address immediately upon shipment is effected:-

CHIEF MATERIAL OFFICER,
OIL & GAS DEVELOPMENT COMPANY LIMITED,
PLOT NO. 21, WEST WHARF ROAD,
KARACHI, PAKISTAN.
PHONE NO. 0092-21-2311108, 2313119-23 & FAX NO. 0092-21-2311040
E-mail: mujahid_ali@ogdcl.com

c) The shipping documents should be couriered through any reliable courier company at shipper's cost so that the same must be received at least 10 days before arrival of the vessel.

9. INSURANCE:

Insurance from port of shipment/delivery will be covered by openers and declaration shall be made by the beneficiary to Insurance Company i.e. M/S National Insurance Company Limited, NICL Building, South Zone, Abbasi Shaheed Road, off Shahra-e-Faisal Road, Karachi (Pakistan). Fax No. 0092-21-99202734 or E-mail: ''sanaullah.shaikh@nicl.com.pk" OR gulam.akbar@nicl.com.pk, OR info@nicl.com.pk and Chief Accountant (Imports)/OGDC LTD., Fax No. 0092-51-9209803-07 or E-mail: zahoor_mohyuddin@ogdcl.com'' immediately after shipment giving full details of shipment e.g. value of shipment description of material, name of vessel, B/L with date, port of shipment, contract and Letter of Credit Numbers.

10. DEMURRAGE DUE TO DELAY IN RECEIPT OF ORIGINAL/NEGOTIABLE DOCUMENT / TRANSSHIPMENT AND SHIPPING LINES AGENTS:

10.1 If clean documents are not negotiated within negotiation period of the L/C or documents are withheld by bank on account of any discrepancy, the demurrage charges, if any incurred due to late negotiation of the clean documents and paid by the OGDCL. will be realized from the beneficiary directly by raining debit advice, or by deducting the amount paid from the L/C value or by encashing Performance Bond (if provided) to the extent of demurrage amount. In case the demurrage amount exceeds the value of Performance Bond the balance amount will be payable by the beneficiary.

10.2 Transshipment is totally prohibited under this L/C. The beneficiary must ensure that no transshipment takes place against this L/C, and demurrage paid by OGDCL. due to transshipment will be on beneficiary's account.

10.3 Any demurrage paid by OGDCL. due to inconsistency in B/L and manifest will be recovered from beneficiary.

11. LIQUIDATED DAMAGES.

a) If the contractor fails to deliver any or all of the goods within the time period(s) specified in the Contract, the Purchaser shall, without prejudice to other remedies under the contract, deduct from the contract price / Bank Guarantee as liquidated damages, a sum not more than 0.5% of the contract price per week or part thereof for first four weeks, 1.00% per week for next four weeks and 1.5% per week exceeding four weeks up to maximum extent of 10 % of the contract value.

b) In case the Purchaser is satisfied that the delayed / defective shipment was due to some mistake or circumstances beyond the control of the contractor and the contractor has not intentionally or negligently contributed in the delay, the Purchaser may impose Liquidated Damages for not more than a sum equivalent to 0.5% of the delayed or defective shipment per week or part thereof for first two weeks, 1.00 % per week for next three weeks and 1.5% per week exceeding five weeks but not exceeding 10% of the contract value of the delayed/ defective shipment provided that the contractor takes immediate remedial measures for the-replacement of defective shipment and takes prompt steps to mitigate the delay. The Purchaser may however, impose Liquidated Damages as per (a) above if the delayed or defective shipment has affected the project completion schedule or has resulted in production losses.

c) Even after imposition of LDs, if the supplier fails to materialize the delivery (material and or services); the Purchaser reserves the right to cancel Purchase order/contract/LC and to forfeit the Guarantee (if applicable) after intimating the supplier for such cancellation / forfeiture.

12. AMENDMENT / EXTENSION OF L/C:

The beneficiary will positively confirm shipment of all ordered goods within L/C validity or make request for extension of shipment and negotiation dates at least 15 to 30 days prior to the expiry of L/C. If shipment is not effected within L/C validity or request for extension is not received 15 to 30 days prior to expiry of L/C validity, no request for grant of extension in shipment and negotiation will be entertained under any circumstances. In case of extension in shipment/negotiation period, the beneficiary will be required to extend the validity of his

performance bond (if provided) accordingly. All charges on this account will be on beneficiary's account.

13. CHARGES FOR L/C ESTABLISHMENT:

13.1 All charges of credit opening bank for credit will be borne by the OGDCL.
13.2 All charges of corresponding bank such as negotiation of documents, adding confirmation to credit etc. will be to the account of beneficiary.
13.3 All charges for amendments/extension in L/C will be to the account of beneficiary.

TERMS AND CONDITIONS & FORMAT OF L/C FOR SERVICES

1. **FORM OF DOCUMENTARY CREDIT**
Irrevocable

2. **DOCUMENTARY CREDIT NUMBER**

3. **DATE OF ISSUE**

4. **DATE AND PLACE OF EXPIRY**

5. **APPLICANT BANK – NAME & ADDRESS**

6. **APPLICANT**

7. **BENEFICIARY – NAME & ADDRESS**

8. **CURRENCY CODE, AMOUNT**

9. **AVAILABLE WITH…BY……NAME & ADD.**

10. **DRAFTS AT……..**

Supervision Services during Erection/Installation Pre-Commissioning, Commissioning Start-up & Performance Testing Charges & Training

The charges providing supervision services during erection/installation for Pre-Commissioning, Commissioning start-up, performance testing and training of **FILTER COALESCER**shall be paid by OGDCL after thirty (30) days of successful commissioning on submission of original invoice (duly verified by OGDCL).

11. **DOCUMENTS REQUIRED**

Supervision Services during Erection/Installation Pre-Commissioning, Commissioning Start-up & Performance Testing Charges
The lumsump charges for providing supervision services during erection/installation for Pre-Commissioning, Commissioning start-up and performance testing of **FILTER COALESCER**shall be paid by OGDCL after thirty (30) days of successful commissioning on submission of original invoice (duly verified by OGDCL).

12. DRAWEE – NAME & ADDRESS

13. **ADDITIONAL CONDITIONS**

1) All documents to show L/C number
2) LC represents 100 percent value that is _____.
3) The amount of negotiation should not exceed the LC value

4) The negotiating bank must endorse the amount of negotiation on the reverse of the original letter of credit.

14. **CHARGES**

The Bank charges for establishment of L/C, additional confirmation and any subsequent amendments in L/C will be borne as follows:

a) All charges for L/C opening inside of Pakistan will be borne by Engineering Consultant.
b) All charges for L/C outside Pakistan and confirmation will be to the beneficiary's account including advising commission, taxes, postage, telex charges and reimbursement commission etc.

15. Deduction of Taxes
All payments will be made subject to deduction of locally applicable taxes.
16. **PERIOD FOR PRESENTATION**

Documents to be presented and negotiated within validity of this Letter of Credit.

17. **CONFIRMATION INSTRUCTIONS**

Reimbursing Bank
_____
1. The amount _____ with the reimbursing Bank if the documents are in Strict Compliance of the L/C Terms.
2. Please send the original set of documents direct to us _____ followed by duplicate set.
3. Please do not negotiate the documents under reserve or against guarantee.