1. TECHNICAL SPECIFICATION OF SS TUBES

1.1 SCOPE OF WORK

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

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

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

1.2 CODES & STANDARDS

Items	Applicable Codes and Standards
Tubes	ASTM A269, ANSI B31.3

1.3 PRECEDENCE

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

Job Specification

International Standards/ Codes Applicable

1.4 DEVIATION

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

1.5 SAFETY

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

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

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

1.6 SPECIFICATION

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

i. Tube material shall be stainless steel as per ASTM A269 (Grade TP 316).

ii. Tubing material shall have minimum molybdenum content 2.5%, carbon content of max. 0.030%.

iii. Tube shall be bright annealed.

iv. Tube shall be seamless.

v. Tube hardness shall be less than Rb 80. Tubes shall be NACE MR 0175 certified for hardness. Hardness test shall be carried out on each tube.

vi. Each tube shall be hydrotested as per requirement of ASTM A 450 clause 22.3, at a hydrotest pressure of 350 kg/cm2(g). However, it shall be ensured that the test pressure does not result in stresses exceeding the yield strength at test pressure.

vii. All S.S. tubes shall be online 100% eddy current Tested as per ASTM A450.

viii. Tolerance on outer diameter shall be ± 0.005".

ix. Tube shall be of 5 to 6 meter in length.

x. Minimum thickness shall be as per following table.

Tube OD	Minimum Wall Thickness	Maximum Allowable Working Pressure psig
1"	0.120"	4700
¾"	0.095"	4700
½"	0.083"	4700
3/8"	0.065"	4800
¼"	0.035"	4800

xi. Following documents/ certificates to be submitted.

- Chemical composition for heat
- Chemical composition for products
- Tensile test
- Hardness test
- Flaring test
- Leak test
- Visual inspection and dimensional check

xii. Tubing should be clearly marked with the specifications given in the inspection Certificate with heat code, lot code, outer diameter and wall thickness with inspection certificate number.

xiii. Tubes should be supplied with both ends plugged.

1.7 DOCUMENTATION

i. All document shall be furnished in English language only.

ii. At the time of bidding, bidder shall submit following documents.

a) Reference list of previous supply for similar item, giving following details.

- Name of the customer.
- Specification of the item i.e., size and pressure & temperature rating.
- Service
- Quantity
- Year of supply
- Copy of ISO:9000 certification for supplier/ manufacturer.
- Manufacturer Quality Control Plan.

b) Clause wise deviations to the specification.

c) Following test certificates shall be furnished along with shipment.

- Test certificate of visual, chemical, mechanical testing (incl. tensile, hardness, flaring and leak test).
- Manufacturers standard shop inspection & test report for all items.
- The test report for specified tests.

d) Third party inspection report as applicable to meet the requirements of specified codes & standards as applicable.

1.8 PACKING & SHIPMENT

i. All the items shall be suitably wrapped and packaged to with stand rough handling during ocean shipment and inland journey. Tubes should be supplied with both ends plugged.

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

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

1.9 GUARANTEE

i. Manufacturer shall guarantee that the design, materials, manufacturing and testing of tubes conform to the requirement of this specification. Manufacturer shall replace all tubes free of costs which fail during field pressure testing or do not perform satisfactorily due to inadequate engineering, substandard material and poor workmanship.

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

2. TECHNICAL SPECIFICATION FOR SS FERRULE FITTINGS

2.1 SCOPE OF WORK

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

2.2 CODES & STANDARDS

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

Items	: Applicable Codes and Standards
Bar Stock	: ASME SA-479-316 or DIN 4401 or BS:970-316-S31
Forging	: ASME SA-182-316 or DIN 4401 or BS:970-316-S31
Thread	: NPT ANSI B 1.20.1

2.3 PRECEDENCE

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

Job Specification.

International Standards/ Codes Applicable

2.4 DEVIATION

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

2.5 SPECIFICATION

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

Materials

- Fittings shall be manufactured from the following materials: -

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

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

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

and moisture without rusting.

Design & Manufacture

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

  i) The front ferrule shall effect a long, smooth repeatable seal by contact with body and a grip hold on the tube surface.

  ii) The front ferrule shall always remain in a sprung condition to compensate for thermal stresses and to accomplish repeated make and break.

- Rear Ferrule

  i) The rear ferrule shall collect the tubing surface, improving the performance of the tubing in systems of high impulse or vibration.

  ii) The rear ferrule shall have a machine recess on the inside diameter and shall have complete surface hardening so as to substantially reduce the required pull up torque. Both the requirements i.e. complete surface hardness and machined recess shall be met for all rear ferrules.

- Nuts shall have silver plated threads to act as a lubricating agent to avoid galling and to reduce tightening torque.

Inspection and Testing

- The manufacturer shall submit typical type test reports for the following test carrier out on random samples of two ferrule fittings: -

  i) Hydraulic burst pressure test.

  ii) Helium leak test under 0.0002 PSIA negative pressure, leaks into assembly greater than 4.0 x 10-9 atm-cc/sec being unacceptable.

  iii) Gas pressure test for 25 remarks at 5000 Psig. No leakage should be detectable even after 25 remarks.

  iv) Impulse & vibration testing by "rotary beam method" for 5,00,000 impulse cycles and 20 million vibration cycles with no detectable leakage at full working pressure throughout till the end of the test.

Test Reports and Certificates

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

2.6 MARKING, PACKING & SHIPMENT

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

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

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

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

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

2.7 DOCUMENTATION

All document shall be furnished in English language only.

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

i. Reference list of previous supply for similar item, giving following details:

   a) Name of the customer.

   b) Specification of the item i.e., size and pressure & temperature rating.

   c) Service

   d) Quantity

   e) Year of supply

ii. Test procedure and typical certificates to be submitted as per clause 5.3 and 5.4 of this specification.

iii. Manufacturer Quality Control Plan and sampling plan.

iv. Copy of ISO:9000 certification for supplier/ manufacturer.

Following test certificates shall be furnished along with shipment.

i. Test certificate of chemical, mechanical testing.

ii. Manufacturers standard shop inspection & test report.

iii. The procedure and certificates to be submitted

2.8 GUARANTEE

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

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

3. TECHNICAL SPECIFICATION FOR SS BALL VALVES

3.1 SCOPE OF WORK

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

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

3.2 CODES & STANDARDS

Items	Applicable Codes and Standards
Valves	MSS-SP-99

3.3 PRECEDENCE

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

Job Specification.

International Standards/ Codes Applicable.

3.4 DEVIATION

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

3.5 MATERIALS

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

3.6 DESIGN & MANUFACTURE

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

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

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

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

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

Ball shall be blow out proof and trunnion mounted.

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

3.7 INSPECTION AND TESTING

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

i. Hydrostatic seat leak test shall be carried out with de-ionised water. There shall be no detectable set leakage at 1.1 times the rated pressure of the valve.

ii. Gas pressure test for seat and shell shall be carried out with nitrogen at 1000 psig. There shall be no detectable external leakage. Maximum allowable seat leakage shall be 0.1 atm-cc/min.

3.8 OTHER REQUIREMENTS

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

Spares and Accessories

i. If required, manufacturer shall furnish a list of recommended spares and accessories for valves required during start up and commissioning.

ii. If required, manufacturer shall furnish a list of recommended spares and accessories required for two years of manual operation and maintenance of valves.

iii. Manufacturer shall quote for spares and accessories as per the material requisition.

3.9 TEST REPORTS & CERTIFICATES

The manufacturer shall supply material compliance certificates.

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

3.10 MARKING, PACKING & SHIPMENT

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

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

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

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

3.11 DOCUMENTATION

All document shall be furnished in English language only.

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

i. Reference list of previous supply for similar item, giving following details:
   - Name of the customer.
   - Specification of the item i.e., size and pressure & temperature rating.
   - Service
   - Quantity
   - Year of supply

ii. Test procedure and typical certificates

iii. Copy of ISO:9000 certification for supplier/ manufacturer.

iv. Manufacturer Quality Control Plan and sampling plan.

v. Technical descriptive catalogue of manufacturer.

vi. General arrangement/ assembly drawing of valve showing all features.

vii. Sectional drawing showing major parts with reference number and material specification.

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

i. Test certificate of chemical, mechanical testing.

ii. Manufacturers standard shop inspection test.

iii. Manufacturers standard shop inspection and test reports.

iv. The procedure and certificates to be submitted as per the requirements of clause 4.8 of this specification.

v. Manual for installation, erection, maintenance and operating instructions including a list of recommended spares for valves.

3.12 GUARANTEE

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

inadequate engineering, substandard material and workmanship.

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

4. PIPING MATERIAL SPECIFICATION FOR DCS

4.1 GENERAL NOTES

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

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

4.2 DEFINITIONS

Shall	:	This verbal form indicates requirements strictly to be followed in order to confirm to the standards and from which no deviation is permitted.
Should	:	This verbal form indicates that among several possibilities one is particularly suitable without mentioning or excluding others or that a certain course of action is preferred but not necessarily required.
May	:	This verbal form indicates a course of action permissible within the limits of this standard.
Can	:	This verbal form is used for statements of possibility & capability, whether material, physical or casual.

4.3 CODES AND STANDARDS

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

ASME B 16.5	:	Steel Pipe Flanges and Flanged Fittings
ASME B 16.9	:	Factory made Wrought Steel Butt welding Fittings
ASME B 16.10	:	Face to Face/End to End dimension of valves.
ASME B 16. 11	:	Forged steel fittings, including socket weld and threaded type
ASME B 16.20	:	Metallic Gaskets for Pipe Flanges
ASME B 16.21	:	Non-Metallic Flat Gasket for Pipe Flanges
ASME B 16.25	:	Butt welding ends
ASME B 16.34	:	Valves- Flanged, Threaded and welding ends
ASME B 16.47	:	Large Diameter Steel Flanges (26" throu 60")

ASME B 31.3	:	Process Piping
ASME B 31.4	:	Pipeline Transportation system for Liquid hydrocarbons & other Liquids
ASME B 31.8	:	Gas Transmissions and Distribution Piping System
ASME B 36.10	:	Welded and Seamless Wrought Steel Pipe
ASME B 46.1	:	Surface Texture
API 5L	:	Line Pipe
API 6D	:	Pipeline Valves
API 590	:	Steel Line Blank
API 600	:	Steel Gate Valves Flanges and Butt-welding Ends
API 602	:	Steel Gate, Globe, and Check Valves for Sizes NPS 4 (DN 100) and Smaller for the Petroleum and Natural Gas Industries
MSS SP 44	:	Steel Pipe line Flanges
MSS SP 75	:	Specification for High Test Wrought Butt Welding Fittings
MSS SP 97	:	Integrally Reinforced Forged Branch Outlet Fitting - Socket Welding, Threaded and Butt welding Ends
ASTM A 105	:	Forging, Carbon Steel for Piping Components
ASTM A 193	:	Alloy Steel and Stainless-Steel bolting Materials for High temp Service
ASTM A 194	:	Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service
ASTM A 320	:	Standard Specification for Alloy Steel and Stainless-Steel Bolting Materials
ASTM A 216	:	Steel Casting, Carbon, Suitable for Fusion Welding, for High Temperature Service.
ASTM A 234	:	Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperature
ASTM A 285	:	Pressure vessel plates, Carbon steel, low and intermediate

		Tensile strength.
ASTM A 694		Forging, Carbon and Alloy Steel, for Pipe Flanges, Fitting, Valves and Parts for High Pressure Transmission Service.
ASTM A 333	:	Low temperature service seamless pipe.
ASTM A 350	:	Forged Carbon and Low Alloy Steel requiring Notch Toughness Testing for Piping Components
ASTM A 420	:	Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low Temperature Service.
ASTM A 860	:	Standard Specification for Wrought High Strength Low Alloy Steel Butt Welding Fittings
ASTM A 350	:	Forged Carbon and Low Alloy Steel requiring Notch Toughness Testing for Piping Components
ASTM A 420	:	Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low Temperature Service.
ASTM A 860	:	Standard Specification for Wrought High Strength Low Alloy Steel Butt Welding Fittings

4.4 ABBREVIATIONS

Flange Facing

RTJ - Ring Type Joint

FF - Flat Face

RF - Raised Face

Fittings

PE - Plain End

BE - Bevel End

BW - Butt Weld

PBE - Plain Both End

POE - Plain One End

TBE - Threaded Both End

TOE - Threaded One Ended

LR - Long Radius

SR - Short Radius

Connections

BW - Butt-Weld

FLGD - Flanged

SCRD - Screwed

SO - Slip-on

SW - Socket Weld

THRD - Threaded

WN - Weld Neck

Wall Thickness

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

STD - Standard Weight Wall Thickness

XS - Extra Strong Wall Thickness

XXS - Double Extra Strong Wall Thickness

Valve Description

BC - Bolted Cap

BB - Bolted Bonnet

ES - Extension Stem

FB - Full Bore

MO - Motor Operated

GO - Gear Operated

NRS - Non-Rising Stem (with inside screw)

OS&Y - Outside Screw and Yoke

RB - Reducer Bore

RS - Rising Stem

SC - Screwed Cap

UB - Union Bonnet

UC - Union Cap

WB - Welded Bonnet

Pipes Description

BE - Beveled End

CS - Carbon Steel

ERW - Electric Resistance Welded

EFW - Electric Fusion Welded

FS - Forged Steel

HFI - High Frequency Induction

KCS - Killed Carbon Steel

KFS - Killed Forged Steel

OH - Open Hearth

SAW - Submerged Arc Welded

SMLS - Seamless

PIPING CLASSES DESCRIPTION

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

First Digit

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

A = ASME Class 150

B = ASME Class 300

D = ASME Class 600

E = ASME Class 900

Second Digit

Numerical, denoting the material

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

Third Digit

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

Notes

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

TENDER SPECIFICATION FOR SUPPLY OF DCS

PIPING SPECIFICAITONS	IRM ENERGY LTD					RATING 150#		
A1A	TEMPERATURE RANGE (-10 to 65) °C					CODE ANSI B31.8		
TEMPERATURE-PRESSURE RATING	TEMP. (°C)	-29.00	38.00	93.00	149.00	204.00	260.00	BASIC MATERIAL C.S
	PRESSURE (Barg)	19.63	19.63	17.91	15.85	13.78	11.71	CORROSION ALW-
Service: Non corrosive / flammable / Nonflammable/ non-lethal Process & Hydro carbons, Natural Gas, Ammonia, Steam and Condensate (non-IBR), Instrument Air, Plant Air, Nitrogen, Carbon dioxide, Water, Closed Blow Down.								

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

TENDER SPECIFICATION FOR SUPPLY OF DCS

ITEMS	SHORT CODE	SIZE (inch)	DESCRIPTION	RATING/SCHEDULE/ MIN THICKNESS	DIMENSION STANDARD	MATERIAL	REMARKS
		2" and above	BW	M	ASME B16.9	ASTM A 350 GR LF2	
NIPPLES	NA	0.5" to 1.5"	PBE SEAMLESS	M	ASME B36.10	ASTM A 350 GR LF2	
FULL COUPLINGS	FC	0.5" to 1.5"	SW	3000#	ASME B16-11	ASTM A 350 GR LF2	
HALF COUPLINGS	HC	0.5" to 1.5"	SW	3000#	ASME B16-11	ASTM A 350 GR LF2	
WN FLANGES	FW	0.5" to 1.5"	RF 125 AARH	150#	ASME B16-5	ASTM A 350 GR LF2 Cl-1	SWRF
		2" and above	RF 125 AARH	150#	ASME B16-5	ASTM A 350 GR LF2 Cl-1/ ASTM A 105	WNRF
BLIND FLANGES	FB	0.5" to 1.5"	RF 125 AARH	150#	ASME B16-5	ASTM A 350 GR LF2 Cl-1	SWRF
		2" and above	RF 125 AARH	150#	ASME B16-5	ASTM A 350 GR LF2 Cl-1/ ASTM A 105	WNRF
FLANGES	FF	0.5" to 1.5"	RF 125 AARH	150#	ASME B16-48	ASTM A 350 GR LF2 Cl-1	SWRF
		2" and above	RF 125 AARH	150#	ASME B16-5	ASTM A 350 GR LF2 Cl-1/ ASTM A 105	WNRF
SPCR & BLND	FSB	2" and above	RF 125 AARH	150#	ASME B16-48	ASTM A 350 GR LF2 Cl-1/ ASTM A 105	
STUDS & BOLTS	B	0.5" and above	Hot Dip Galvanized		ASME B18.2	Bolts: ASTM A320 Gr L7, B 18.2, Nuts: ASTM A194 Gr 4,B 18.2 ASTM A153 (Hot Dip Galvanized)	
GASKETS SPIRAL WOUND	G	0.5" and above	Spiral wound with CNAF filler	150#	ASME B16.20 ASME B16.5	SS316 spiral wound with CNAF filler + SS316 & OUTER RING AS PER ASME B16.20	
BALL VALVES	BLV	0.5" to 1.5"	SW ASME B16.11	800#	BS 5351	Body: ASTM A105/A350 LF2, Ball: SS316/ASTM A351 CF8M+80 micron ENP	Full bore, fire safe, lever operated, floating type ball valve
		2" to 3"	BW ASME B16-25/ FLGD RF ASME B 16.5	150#	API 6D	BODY: ASTM A216 Gr. WCB, BALL: SS316	Full bore, fire safe, lever operated, floating type

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TENDER SPECIFICATION FOR SUPPLY OF DCS

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

TENDER SPECIFICATION FOR SUPPLY OF DCS

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

NOTE: M= THICKNESS TO MATCH PIPE WALL THICKNESS
LOCATION CLASS 4
SAFTY FACTOR 0.4

LEGEND
H - HALF COUPLING-HC
T - TEE
S - SOCKOLET-SW
W - WELDOLET - BW
R - PIPE TO PIPE REINFORCED
P - PIPE TO PIPE
eg S/H FOR SERVICES UNDER ASME B31.8/ OTHER SERVICES

BRANCH TABLE

BRANCH SIZE

HEADER SIZE	1/2"	3/4"	1"	1 1/2"	2"	3"	4"	6"	8"	10"	12"	14"	16"		
1/2"	T														
3/4"	T	T													
1"	T	T	T												
1 1/2"	T	T	T	T											
2"	S/H	T	T	T	T										
3"	S/H	S/H	S/H	S/H	T/P	T									
4"	S/H	S/H	S/H	S/H	T/P	T/P	T								
6"	S/H	S/H	S/H	S/H	W/R	T/P	T/P	T							
8"	S/H	S/H	S/H	S/H	W/R	W/R	T/P	T/P	T						
10"	S/H	S/H	S/H	S/H	W/R	W/R	T/P	T/P	T/P	T/P					
12"	S/H	S/H	S/H	S/H	W/R	W/R	W/R	T/P	T/P	T/P	T				
14"	S/H	S/H	S/H	S/H	W/R	W/R	W/R	T/P	T/P	T/P	T/P	T			
16"	S/H	S/H	S/H	S/H	W/R	W/R	W/R	T/P	T/P	T/P	T/P	T/P	T		

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TENDER SPECIFICATION FOR SUPPLY OF DCS

PIPING SPECIFICAITONS	IRM ENERGY LTD						RATING 300#	
B1A	TEMPERATURE RANGE (-10 to 65) °C						CODE ANSI B31.8	
TEMPERATURE-PRESSURE RATING	TEMP. (°C)	-29.00	38.00	93.00	149.00	204.00	260.00	BASIC MATERIAL C.S
	PRESSURE (Barg)	50.94	50.94	46.50	45.13	43.75	41.34	CORROSION ALW 1.5 MM
Service: Non corrosive / flammable / Non flammable/ non lethal Process & Hydro carbons, Natural Gas, Ammonia, Steam and Condensate (non-IBR), Instrument Air, Plant Air, Nitrogen, Carbon dioxide, Water, Closed Blow Down.								

ITEMS	SHORT CODE	SIZE (inch)	DESCRIPTION	RATING/SCHEDULE/ MIN THICKNESS	DIMENSION STANDARD	MATERIAL	REMARKS
PIPES	P	0.5" to 1.5"	PE, SEAMLESS	SCH80	ASME B36.10	ASTM A106 Gr.B/ ASTM A 333 Gr 6	A/G- PRIMARILY SEAMLESS
		2"	BE, SEAMLESS	SCH80	ASME B36.10	ASTM A106 Gr.B /ASTM A 333 Gr 6	
		3"	BE, SEAMLESS	SCH80	ASME B36.10	ASTM A106 Gr.B /ASTM A 333 Gr 6	
		4"	BE, SEAMLESS	Min. thickness 6.4mm	ASME B36.10	ASTM A106 Gr.B	
		6" and above	BE, SEAMLESS	SCH40	ASME B36.10	ASTM A106 Gr.B	
ELBOWS/BENDS 90 LR	E	0.5" to 1.5"	SW	3000#	ASME B16.11	ASTM A105	
		2"- 6"	BW, 1.5D, 3D	M	ASME B16.9	ASTM A234 Gr. WPB	
		8"	BW, 1.5D, 3D	M	ASME B16.9	MSS SP75WPHY42	
		12"	BW, 1.5D, 3D	M	ASME B16.9	MSS SP75WPHY52	
ELBOWS/BENDS 45 LR	E45	0.5" to 1.5"	SW	3000#	ASME B16.11	ASTM A105	
		2"- 6"	BW, 1.5D, 3D	M	ASME B16.9	ASTM A234 Gr. WPB	
		8"	BW, 1.5D, 3D	M	ASME B16.9	MSS SP75WPHY42	
		12"	BW, 1.5D, 3D	M	ASME B16.9	MSS SP75WPHY52	
REDUCERS CONCENTRIC	RC	2"- 6"	BW- ASME B16.25	MxM	ASME B16.9	ASTM A234 Gr. WPB	
		8"	BW- ASME B16.25	MxM	ASME B16.9	MSS SP75WPHY42	
		12"	BW- ASME B16.25	MxM	ASME B16.9	MSS SP75WPHY52	
REDUCERS ECCENTRIC	RE	2"- 6"	BW- ASME B16.25	MxM	ASME B16.9	ASTM A234 Gr. WPB	
		8"	BW- ASME B16.25	MxM	ASME B16.9	MSS SP75WPHY42	
		12"	BW- ASME	MxM	ASME B16.9	MSS	

TENDER SPECIFICATION FOR SUPPLY OF DCS

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

TENDER SPECIFICATION FOR SUPPLY OF DCS

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

TENDER SPECIFICATION FOR SUPPLY OF DCS

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

NOTE: M= THICKNESS TO MATCH PIPE WALL THICKNESS
LOCATION CLASS 4
SAFTY FACTOR 0.4

LEGEND
H - HALF COUPLING-HC
T - TEE
S - SOCKOLET-SW
W - WELDOLET - BW
R - PIPE TO PIPE REINFORCED
eg S/H FOR SERVICES UNDER ASME B31.8/ OTHER SERVICES

BRANCH TABLE

HEADER SIZE	BRANCH SIZE														
	1/2"	3/4"	1"	1 1/2"	2"	3"	4"	6"	8"	10"	12"	14"	16"		
1/2"	T														
3/4"	T	T													
1"	T	T	T												
1 1/2"	T	T	T	T											
2"	S/H	T/H	T/H	T	T										
3"	S/H	S/H	S/H	S/H	T	T									
4"	S/H	S/H	S/H	S/H	T	T	T								
6"	S/H	S/H	S/H	S/H	W/R	T/R	T/R	T							
8"	S/H	S/H	S/H	S/H	W/R	W/R	T/R	T/R	T						
10"	S/H	S/H	S/H	S/H	W/R	W/R	T/R	T/R	T	T					
12"	S/H	S/H	S/H	S/H	W/R	W/R	W/R	T/R	T/R	T/R	T				
14"	S/H	S/H	S/H	S/H	W/R	W/R	W/R	T/R	T/R	T/R	T/R	T			
16"	S/H	S/H	S/H	S/H	W/R	W/R	W/R	T/R	T/R	T/R	T/R	T/R	T		

5. ENCLOSURES

5.1 DATASHEETS

- **Piping Material Specification Carbon Steel – 600#**

		PIPING MATERIAL SPECIFICATION CARBON STEEL-600#												
CLIENT: IRM ENERGY LTD														
CONSULTANT:-														
TEMP.(°C)	-29 TO 38	50	60	65										
PRESSURE (Barg)	102.1	100.2	98.8	98.1										
NOMINAL SIZE		IN	1/2"	3/4"	1"	1.5"	2"	3"	4"	6"	8"	10"	12"	14"
		mm	15	20	25	40	50	80	100	150	200	250	300	350
PIPES	SCHEDULE	SCH-80									SCH-40			
	MATERIAL	ASTM A106 GR.B, SEAMLESS/ ASTM A 333 Gr 6												
	ENDS	PLAIN					BEVELED							
	PIPE TO PIPE JOINT	SOCKET WELD					BUTT WELD							
	DIMENSION STANDARD	ASME B 36.10												
FLANGES	TYPE	S. W . R. F.					W. N. R. F.							
	RATING	600 #					600 #							
	MATERIAL	ASTM A 105					ASTM A 105							
	DIMENSION STANDARD	ASME B 16.5					ASME B 16.5							
BLINDS	TYPE	R.F.												
	RATING	600 #												
	MATERIAL	ASTM A 105												
	DIMENSION STANDARD	ASME B 16.5												
FITTINGS	TYPE	S. W.					BUTT WELD							

TENDER SPECIFICATION FOR SUPPLY OF DCS

	SCHEDULE / RATING	3000#	SCH 80	SCH-40
	MATERIAL	ASTM A 105	ASTM A234 Gr. WPB	
	DIMENSION STANDARD	S.W ASME B 16.11	B.W ASME B 16.9	
"O" LET FITTINGS	TYPE	S. W. / NPT(F)	B.W	
	SCHEDULE / RATING	3000#	SCH 80	SCH 40
	MATERIAL	ASTM A105	ASTM A105	
	DIMENSION STANDARD	MSS SP 97	MANUFACTURER STD.	
HEX NIPPLES	TYPE	BOTH END THRD - NPT(M)		
	SCHEDULE / RATING	3000#		
	MATERIAL	ASTM A 105		
	DIMENSION STANDARD	ASME B 16.11		
NIPPLES	TYPE	ONE / BOTH END THRD - NPT(M)		
	SCHEDULE	SCH 80		
	MATERIAL	A 106 GR. B		
	DIMENSION STANDARD	ASME B36.10		
GASKETS	TYPE	SPRIAL WOUND		
	THICKNESS	4.5 MM THK		
	MATERIAL	SPIRAL WOUNDED SS304, PTFE FILLED + CS INNER & OUTER RING OF 3.2 mm THK.		
	DIMENSION STANDARD	ASME B 16.20		
FASTENRS	STUD	FULL THREADED		
	MATERIAL	ASTM A 193 GR. B7		
	DIMENSION STANDARD	ASME B 18.2.1		
	NUT	HEAVY HEXAGONAL NUT		
	MATERIAL	ASTM A 194 GR. 2H		
	DIMENSION STANDARD	ASME B 18.2.2		

NOTES

1. PIPE JOINT: 40 NB & BELOW:3000# SOCKET WELD FITTING
2. PIPE JOINT: 50 NB & ABOVE:BUTT WELDED.
3. INSPECTION & TESTING:
4. A) RADIOGRAPHY OF WELD JOINT : AS PER QAP
   B) HYDROTEST: AS PER QAP
   C) PNEUMATIC TEST : AS PER QAP
5. SERVICE-NATURAL GAS
6. CS- CARBON STEEL
7. CORROSION ALLOWANCE-1.6 MM

TENDER SPECIFICATION FOR SUPPLY OF DCS

BRANCH CONNECTIONS														BWT	BRANCH SIZES	350	14"
	SWT	SOCKET WELD EQUAL / UNEQUAL TEE											BWT	RT		300	12"
	BWT	BUTT WELDED TEE										BWT	RT	RT		250	10"
	S/T	SOCKOLET / THREDOLET									BWT	RT	RT	RT		200	8"
	RT	REDUCING TEE								BWT	RT	RT	RT	RT		150	6"
	WL	WELDOLET							BWT	RT	RT	RT	WL	WL		100	4"
								BWT	RT	RT	WL	WL	WL	WL		80	3"
							BWT	RT	RT	WL	WL	WL	WL	WL		50	2"
						SWT	RT	RT	RT	S/T	S/T	S/T	S/T	S/T		40	1.5"
					SWT	SWT	S/T	S/T	S/T	S/T	S/T	S/T	S/T	S/T		25	1"
				SWT	SWT	SWT	S/T	S/T	S/T	S/T	S/T	S/T	S/T	S/T		20	3/4"
			SWT	SWT	SWT	SWT	S/T	S/T	S/T	S/T	S/T	S/T	S/T	S/T		15	1/2"
			HEADER SIZE														
			1/2"	3/4"	1"	1.5"	2"	3"	4"	6"	8"	10"	12"	14"		IN	
			15	20	25	40	50	80	100	150	200	250	300	350			mm

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- **Ball Valve Floating Type Flanged End - 150#**

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

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

TENDER SPECIFICATION FOR SUPPLY OF DCS

➢ **BALL VALVE 1" & BELOW FLOATING TYPE**

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

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

➢ **1/2" Stainless-Steel High-Pressure Ball Valve**

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

TENDER SPECIFICATION FOR SUPPLY OF DCS

- **INLINE FILTER**

	GAS FILTER			
GENERAL				
TAG No.	Vendor to Specify			
Service	Filtration			
Make	Vendor to Specify			
Model no	Vendor to Specify			
Type	INLINE			
SERVICE CONDITION				
Fluid State	Natural Gas			Unit
Flow Rate- MIN/OP/MAX	50			SCMH
Inlet/Line Pressure-Min/Op/Max	20	To	250	Barg
Temperature - MIN/OP/MAX	30	To	50	°C
Sp. Gravity/Mol.wt.	0.8			
VALVE & ACTUATOR CONSTRUCTION				
Body Size	1/2”			
End Connection	1/2” OD Double ferrule lock			
Rating	2500#			
Filtration Size	10 micron			
Impulse Connection	NA			
Impulse Size	NA			
Leakage Class	Class VI			
MATERIAL				
Body	SS 304/ SS316			
sealing	Nitrile/ PTFE			
MESH	SS304			

- **Self-Actuated Pressure Control Valve (2500#)**

	SELF ACTUATED DOWNSTREAM PRESSURE CONTROL VALVE			
GENERAL				
TAG No.	Vendor to Specify			
Service	Pressure Regulation			
Make	Vendor to Specify			
Model no	Vendor to Specify			
Type	Direct acting Spring operated			
SERVICE CONDITION				
Fluid State	CNG			Unit
Flow Rate- MIN/OP/MAX	50			SCMH
Inlet Pressure-Min/Op/Max	20	To	250	Bar(g)
Outlet Pressure-Min/Op/Max	15			Bar(g)
Temperature - MIN/OP/MAX	30	To	50	°C
DP Shut off	15			Barg
Sp. Gravity/Mol.wt.	0.8			
Set Pressure	15			Barg
Set Pressure Range	12 to 22			Barg
VALVE SIZING DATA				
Regulation	Downstream			
Calculated Cv	Vendor to specify			
Selected Cv	Vendor to Specify			
Predicted Noise Level dBA-at 1m	< 85 dba			
VALVE & ACTUATOR CONSTRUCTION				
Body Size	Vendor to Specify			

End Connection	Screwed To NPT(F)

Rating	2500#
Impulse Connection	Internal
Impulse Size	NA
Leakage Class	Class VI
MATERIAL	
Body	SS304
Bonnet	SS304
Trim	SS316
Disc	Nylon
Diaphragm	Nitrile

- **Creep Relief Valve (150#)**

	CREEP RELIEF VALVE	
GENERAL		
TAG No.	Vendor to Specify	
Service	Creep Relief	
Make	Vendor to Specify	
Model no	Vendor to Specify	
Type	Vendor to Specify	
SERVICE CONDITION		
Fluid State	CNG	Unit

TENDER SPECIFICATION FOR SUPPLY OF DCS

Line Pressure	4			Barg
Temperature - MIN/OP/MAX	30	To	50	°C
Sp. Gravity/Mol.wt.	0.8			
Set Pressure	5			Barg
Set Pressure Range	2 to 5.5			Barg
VALVE SIZING DATA				
Regulation	Upstream			
VALVE & ACTUATOR CONSTRUCTION				
Body Size	Vendor to Specify			
End Connection	SCREWED TO NPTF			
Rating	150#			
Impulse Connection	NA			
Impulse Size	NA			
Leakage Class	Class VI			
MATERIAL				

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

TENDER SPECIFICATION FOR SUPPLY OF DCS

- **Bourdon Pressure Gauge**

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

Zero Adjustment	MICROMETER POINTER
Inspection And Test	AS PER EN 837
Documentation	CALIBRATION REPORT
OPTIONS	
1. Two Valve Manifold	YES
2. Additional Requirement	NA