OIL & GAS DEVELOPMENT COMPANY LIMITED
PROCUREMENT DEPARTMENT, ISLAMABAD
FOREIGN SECTION B

(To be completed, filled in, signed and stamped by the principal)

ANNEXURE 'A'

Material PRESSURE CONTROL VALVE

Tender Enquiry No PROC-FB/CB/PROD-4937/2021

Due Date

Evaluation Criteria FULL

SCHEDULE OF REQUIREMENT

Sr No	Description	Unit	Quantity	Unit Price (FOB)	Total Price (FOB)	Unit Price C & F BY SEA	Total Price C & F BY SEA	Deviated From Tender Spec. If Any
1	ACTUATED PRESSURE CONTROL VALVE (PCV) GLOBE TYPE 14" 600 CLASS RF. DETAIL GIVEN IN INSTRUMENT SPECIFICATION SHEET, T&Cs, CODES & STANDARDS ATTACHED AT ANNEXURE-W,ANNEXURE-X & ANNEXURE-Y RESPECTIVELY.	Number	1					

Note: (1) TENDER DOCUMENTS AVAILABLE ON OGDCL'S WEBSITE UNDER TENDER TAB "Master Set of Foreign Tender Document (Press-Single Stage Two Envelop) – Updated". (2) BID BOND AMOUNTING TO USD 1,600/- OR EQUIVALENT PAK RUPEES (3) DELIVERY PERIOD IS FIVE (05) MONTHS ON CFR BY SEA KARACHI BASIS AFTER ESTABLISHMENT OF LETTER OF CREDIT. (4) EVALUATION CRITERIA: FULL CONSIGNMENT WISE ON CFR BY SEA KARACHI-PAKISTAN BASIS

Annexture-W	INSTRUMENT SPECIFICATION SHEET (ISS) Pressure Control Valve Globe Type

General					
1	Service			Gas Delivery Pressure	
2	Location			Gas Delivery Station (Custody transfer point)	
3	Quantity			One (01)	
4	Supply experience of same type of material			10 years	
5	Electrical Area Classification			Class 1, Zone 2, Group II A	
6	Electrical Certification			SAA 'Exd'	
Process Service Condition					
7	Fluid	State		HC Gas	Gas
8	Pressure Units			PSIG	
9	Pressure Inlet:	Outlet:		570-800	450-550
10	Inlet Pressure: Maximum	Shutoff dp:		900	1000
11	Gas Flow Rate: Maximum	Units:		312	MMSCFD
12	Gas Flow Rate: Minimum	Normal:		88	250
13	Temperature: Maximum	Units:		120	°F
14	Temperature: Minimum	Normal:		50	77
15	Valve Pressure Ratio: Xt	Pipe Factor Fp:		1.75	0.96
16	Viscosity (Mixture): cP			0.016	
17	Gas Compressibility Factor:			0.896	
18	Isentrophic Exponent K:	MW:		1.21	30.3
19	Calculated Cv Maximum Flow:			OEM to provide	
20	Calculated Cv Minimum Flow:	Normal Flow:		OEM to provide	
Construction- Valve Body					
21	Body Type			Globe Type	
22	End Connection:	Rating:		Flange	600# RF at 120°F
23	Body Size:	Port Size		14"	14"
24	Guiding:	No. of Ports:		Cage	One (01)
25	Trim Form:			=%	
26	Maximum Possible Cv:	Actual Cv:		OEM to calculate	
27	Flow Action to Open/Close			CLOSE	
28	Lubrication & Isolation Valve:	Bonnet Type:		Yes	STD
29	Body Material:	Packing Material:		Carbon Steel A216 WCB	PTFE Teflon/Chevron
30	Trim Material- Seat:	Plug:		316L(Steel)	316L(Steel)
31	Trim Material-Shaft:	Guiding:		316L(Steel)	316L(Steel)
32	Shutoff Class:			V	
33	SPL Allowed:	Calculated:		90 dBA	As per Vendor recommendations
34	Flange to Flange distance			96 cm	
Construction- Valve Actuator					
35	Actuator Type:	Fail Open/Closed:		DIAPHR	CLOSED
35	Hand Wheel	Location		Yes	OEM to provide
Construction-Valve Positioner					
36	Type:	Input Signal:		E/P or SMART type	4-20mA
37	Filter Regulator & Gauge:	Air Supply:		Yes	30-50 Psi
38	Connections: Pneumatic:			1/4" NPT	
39	Enclosure Type:	IP Rating:		WP	IP65 (minimum)
40	Termination:			Terminals	

General Notes:

1. The Vendor shall provide all instruments with a stainless steel tag stamped with the "Instrument Tag No." in 5mm high Characters permanently attached to the instrument with either stainless steel wire or screws.
2. All Permanent instrument fixings shall be stainless steel.
3. The Vendor shall provide a valve conforming to the material requirements for sour gas service in accordance with NACE standard MR-01-75.
4. The vendor shall follow all T&Cs attached at Annexure-X
5. The vendor shall provide proposed Control Valve design specification as per General (Reference) codes & standards attached at Annexure-Y
6. The vendor shall provide all accessories required for proposed Control Valve in conjunction with the requirement specified in the attached Annexure-Y
7. The Vendor shall prove that the new proposed PCV is true replacement of existing PCV installed at OGDCL facilities. (Specification & Reference Drawing of installed PCV is attached at Annexure-Z).
8. The vendor shall provide OEM Certificate, Material Testing Certificate (MTC), Bench mark / testing Certificate, Calibration Certificates etc.
9. The vendor shall confirm the material shipment in standard OEM packing.

Annexure-X

Terms & Conditions

i. Bidder shall provide OEM Authority letter for supply/distribution.

ii. Bidder shall provide Authority letter from Principal and LC beneficiary.

iii. Bidder/Manufacturer shall be responsible for the provision of all the Technical data, OEM provided detailed Instrument Specification Sheet (ISS), Product brochures and other documents related to the quoted Control Valve.

iv. Bidder/Manufacturer shall be responsible for full compliance of Tender document, Instrument Specification sheet and all related annexures.

v. Bidder/Manufacturer shall be responsible to provide OEM certificates / OEM sureties to prove that the new proposed PCV shall fully comply the design, specification given at Annexure-W with sureties that the proposed PCV is true replacement of existing PCV installed at OGDCL facilities. (Specification & Drawing of installed PCV is attached at **Annexure-Z** for reference).

vi. Materials for the valve shall be suitable for NACE MR-0175 requirements.

vii. Bidder/Manufacturer shall be responsible to provide certificates / OEM sureties to prove the Compliance of required codes and standards for designing, engineering, testing etc. (Attached at **Annexure-Y**)

viii. Successful Bidder/Manufacturer shall be responsible to provide performance testing and Calibration Certificates of Control Valve at the time of delivery.

ix. Bidder/Manufacturer shall be responsible to deliver the material as per PO within **5 Months** after establishment of LC.

x. Bidder/Manufacturer shall have at least 10 years' experience (must have supply record to International E&P companies) in the supply / manufacturing of same type of material. (Client details, description of material, contract value, year of supply shall be provided for evidence.)

xi. Bidder/Manufacturer shall be responsible for provision of OEM standard Warrantees / Guarantees of all equipment.

xii. Bidder/Manufacturer shall provide Item-wise price list of recommended spare parts for two (2) years operation as an optional item. (Cost of spares shall not be included in financial Evaluation).

Annexure-X

xiii. The Bidder / Packager/Vendor shall Comply para 10 of attached General Codes and standards (Annexure-Y) to provide all facilities for Performance Test/ Specific Test.

xiv. The Bidder / Packager/Vendor shall quote firm price (not formula based).

xv. Bidders Proposals shall clearly state all deviations/exceptions/exclusions from technical specifications as per Tender document in deviation list. Any deviation/exception/exclusion found elsewhere (stated other than deviation list) shall not be considered and noncompliance in this regard may lead to rejection of bid.

xvi. Bidder/Manufacturer shall clearly mention the deviation (if any) from material or other standards specified. Separate list of proposed standards with full justifications shall then be attached to the Bid indicating the appropriate standards proposed by the OEM on their letterhead.

- (END) –

PRESSURE CONTROL VALVE

General Codes and Standards

ANNEXURE - Y

Table of Contents

1 Scope

This document prescribes the minimum mandatory requirements governing the design, specification, sizing, selection of control valve and regulators.

2 Conflicts and Deviations

2.1 Any conflicts between given standard in this document and other applicable industry standards, codes, and forms shall be resolved in writing by the Company.

2.2 Direct all requests to deviate from this standard in writing to OGDCL.

3 References

The selection of material and equipment, and the design, construction, maintenance, and repair of equipment and facilities covered by this standard shall comply with the latest edition of the references listed below:

3.1 Industry Codes and Standards

American Society of Mechanical Engineers

ASME B1.20.1	Pipe Threads, General Purpose (Inch) ASME B16.5 Pipe Flanges and Flanged Fittings
ASME B16.20	Metallic Gaskets for Pipe Flanges Ring-Joint, Spiral Wound and Jacketed
ASME B46.1	Surface Texture (Surface Roughness, Waviness and Lay)
ASME VIII D1	Rules for Construction of Pressure Vessels

American Society for Testing and Materials

ASTM A105	Standard Specification for Carbon Steel Forgings for Piping Applications
ASTM A193	Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High- Temperature or High Pressure Service and other Special Purpose Applications
ASTM A194	Standard Specification for Carbon and Alloy-Steel Nuts for Bolts for High-Pressure or High- Temperature Service, or Both
ASTM A216	Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High Temperature Service
ASTM A217/A217M	Standard Specification for Steel Castings, Martensitic

	Stainless and Alloy, for Pressure- Containing Parts, Suitable for High- Temperature Service
ASTM A320	Standard Specification for Alloy-Steel Bolting Materials for Low-Temperature Service
ASTM A351	Standard Specification for Castings, Austenitic, for Pressure-Containing Parts
ASTM A352	Standard Specification for Steel Castings, Ferritic and Martensitic for Pressure-Containing Parts, Suitable for Low-Temperature Service
ASTM A743	Specification for Castings, Iron Chromium, Iron Chromium Nickel, and Nickel Base Corrosion Resistant for General Application

Fluid Control Institute

ANSI/FCI 70-2	Control Valve Seat Leakage

The Instrumentation, Systems and Automation Society Commentary Note:
IEC standards equivalent to the ISA standards referenced herein are also acceptable.

ANSI/ISA 51.1	Process Instrumentation Terminology ANSI/ISA 75.01.01 Flow Equations for Sizing Control Valves ANSI/ISA 75.05.01 Control Valve Terminology
ANSI/ISA 75.11.01	Inherent Flow Characteristic and Range ability of Control Valves
ANSI/ISA RP75.23	Considerations for Evaluating Control Valve Cavitation
ANSI/ISA TR75.25.02	Control Valve Response Measurement from Step Inputs
ANSI/ISA 75.19.01	Hydrostatic Testing of Control Valves

International Electro Technical Commission

IEC 60534-2-5	Industrial Process Control Valves, Part 2-5: "Flow Capacity – Sizing Equations for Fluid Flow through Multistage Control Valves with Inter-Stage Recovery"
IEC 60534-8-3	Industrial Process Control Valves, Part 8-3: Noise Considerations: Control Valves Aerodynamic Noise Prediction Method
IEC 60534-8-4	Industrial Process Control Valves, Part 8-4: Noise Considerations: Prediction of Noise Generated by Hydrodynamic Flow

International Organization for Standardization

NACE MR0175/ ISO 15156	Petroleum and Natural Gas Industries, Materials for Use in H_2S-Containing Environments in Oil and Gas Production

National Fire Protection Association

NFPA 70	National Electrical Code

3.2 Terminology

The terminology and nomenclature used in ANSI/ISA 51.1 and ANSI/ISA 75.05.01 apply to this standard.

4 Design

Control valves shall not be used as emergency shutdown valves (ESDVs), or as emergency isolation valves (EIVs). Control valves may be used as Emergency Vapor Depressurizing valves and may also be used in process interlock systems. Detail of general specification and operating parameters are given at Instrument Specification Sheet (ISS) at Annexure-W. Vendor to use all data / specification for designing of new Globe Type Pressure Control Valve.

4.1 General

4.1.1 Minimum Rating

a) The flange rating for control valve bodies shall be considered as per Control Valve data sheet placed at **Annexure-W**

b) The body rating shall never be lower than the flange rating.

4.1.2 End Connections

a) Raised-face (RF) flanges shall be used for lines rated up to and including Class 600 and up to a design temperature of 425°C.

Separable flanges, flanges with tag welds, or flanges with partial penetration welding are not acceptable.

b) Flangeless sliding stem control valves shall not be used. Flangeless rotary control valves may only be applied when a flanged body is not available for the selected type of control valve.

c) Threaded control valves shall not be used.

4.1.3 Face-to-Face Dimensions

Face-to-face dimensions of control valves shall conform to one of the standards listed in Section 3

4.1.4 Gasket Contact Surface Finish

The gasket contact surface of raised-face flanged valves, Class 600 ratings shall be smooth machine-finished between 3.2 to 6.4 micrometers Ra conform to ASME B46.1. For hydrogen or hydrogen effluent service, the gasket contact surface finish shall not exceed 3.2 micrometers Ra.

4.1.5 Materials

The appropriate ANSI/ASTM specifications to which the valve bodies and bonnets need to be manufactured as per Instrument Specification Sheet (ISS) at **Annexure-W.**

The maximum system pressure and temperature and all materials used in the valve shall be compatible with the specified process conditions.

Note: Bronze, aluminum, plastic, cast iron and ductile iron bodies are not acceptable.

Downstream temperature conditions shall be calculated on the basis of specified on the Instrument Specification Sheet (ISS) at **Annexure-W.** Control valves in gas pressure letdown services where the downstream temperature conditions may be reduced to below 0°C due to the Joule-Thompson effect. Body and trim materials shall meet the lowest temperature requirements.

NACE MR0175/ISO 15156, "Petroleum and Natural Gas Industries Materials for Use in H_2S-Containing Environments in Oil and Gas Production" shall be applied for all materials in sour fluid services.

Trim materials (Seat & Plug) 316 L Steel shall be used as minimum. Material selected must to withstand corrosion, erosion and wear. Trim material combinations shall not be susceptible to galling. AISI 300- and 400- series.

Hard faced trims, or solid Stellate or Colmonoy type trims or as per Vendor recommendations shall be used in erosive, cavitating and flashing type services, including steam, wet gas and water applications with pressure drop conditions exceeding 350 kPa (51 psi), other applications with pressure drop conditions exceeding 4000 kPa (580 psi) and as per manufacturer's recommendation. Such hard or hardened trims shall have a hardness of at least 38 HRC (hardness Rockwell C).

Monel, nickel, titanium and Hastelloy trim materials shall be considered in very

corrosive type services to ensure acceptable service life.

Valve actuator springs shall be minimum carbon steel or as per Vendor recommended material which complies to NACE with standard factory applied corrosion resistant coating or be hot oil dipped

Packing Systems

4.1.6 General

Control valve packing systems shall enable plant operations to effectively maintain minimum leakage and travel performance within the inaccuracy limits specified in paragraph 7.1.
All proposed packing systems and bellows seals shall be field proven for a minimum of 3 years and references of other users shall be made available upon request.
Note: Packing systems shall not require lubrication.

4.1.7 Gaskets

Body gaskets shall be fully retained 316 SST, or other appropriate alloy, spiral wound, with PTFE or graphite compound fillers.

4.1.8 Bonnet

Bolts, studs and nuts shall meet the applicable ASTM A193, ASTM A194 or ASTM A320 specifications.

Threaded connections shall be NPT and comply with ASME B1.20.1.

4.1.9 Seat Leakage

Seat leakage classification shall be in accordance with ANSI/FCI 70-2. The leakage class shall be determined by the service and valve-type used.

Tight-Shut-Off (TSO) control valves shall be identified on the Process & Instrument Diagrams (P&ID's) as "TSO". TSO control valves shall be class V or better. Vendor/ Supplier shall provide TSO class and maximum differential pressure under shut-off conditions shall be specified on the vendor ISS.

In order to minimize product loss or to maximize energy conservation and to minimize seat erosion Leakage Class V, or better, metal-to-metal TSO shall be applied for:

- Compressor anti-surge and spill-back services and for gas to flare pressure letdown services.

- vapor, wet gas, steam and water services with shut-off pressure drop exceeding 2500 kPa (363 psi)

Soft-seated shut-off trim designs shall not be applied in services with design temperature conditions over 230°C nor in flashing liquid or other erosive type services.

If pipe provisions allow, TSO control valves shall be tested at site for acceptable leakage with water containing a corrosion inhibitor. Class V shutoff shall be tested at the shutoff pressure conditions specified on the ISS.

4.1.10 Hydrostatic Testing

New control valves are hydro-tested at the factory and there is no need to hydro-test them in the field.

For control valves in existing facilities, hydrostatic testing of the valve body shall be done without trim parts per ANSI/ISA 75.19.01.

4.1.11 Sliding Stem Type Control Valves

Bottom flanges on globe type control valves shall not be used unless they are justified and approved by the proponent.

Split type bodies shall not be used unless they are justified and approved by the proponent.

Three-way diverting or mixing type control valve bodies shall not be used and these requirements shall be accomplished by using two standard control valves.

5 Specification

5.1 Process Data Specification

5.1.1 Process Data Operating Window

For each control valve, the process data for the following three flow conditions shall be specified as a minimum:

- Normal Flow Rate
- Maximum Flow Rate
- Minimum Flow Rate

5.1.2 Process Data for Flashing and Two-Phase Flow

For flashing services, the downstream vapor phase shall be specified on the ISS in percentage (%) weight together with the average MW.

For two-phase flow services the upstream and downstream vapor phase shall be specified on the ISS in percentage (%) weight together with the average MW.

All Fluids

- ☐ wellhead flow line applications
- ☐ oxygen services
- ☐ compressor anti-surge control valves
- ☐ erosive fluid applications including fluids with black powder
- ☐ de-superheater (steam conditioning) applications
- ☐ temperature cycling applications
- ☐ all applications considered special, difficult, or severe by the proponent

5.1.3 Dry Gas and Superheated Steam

- control valve body outlet velocities greater than 0.4 Mach
- all services with a pressure ratio greater than 15 (P1/P2 > 15, pressures expressed in absolute pressure units)

5.1.4 Wet Vapor and Saturated Steam

- control valve body outlet velocities in greater than 0.3 Mach
- all services with a pressure ratio greater than 10 (P1/P2 > 10; pressures expressed in absolute pressure units)

5.1.5 Gas or Vapor with Entrained Particulates (including the black powder)

- control valve body outlet velocities greater than 0.2 Mach (for black powder greater than 0.15 Mach)
- all services with a pressure ratio in greater than 3 (P1/P2 > 3; pressures expressed in absolute pressure units)

5.1.6 Liquids

- flashing services with downstream vapor content exceeding 10% weight
- cavitating services, where more than a two stage let-down trim is required to meet the noise limits without application of path-treatment

- two-phase flow services with downstream vapor content exceeding 10% weight
- water injection services
- boiler feed water services
- entrained solid or particulate services

5.2 Control Valve Acceptance

Prior to placing the order, the Bidder shall submit a technical proposal for required Pressure control valve for acceptance to OGDCL. The technical proposal shall include a completed Vendor ISS, vendor capacity, C.V and noise calculation, complete technical specification of the proposed control valve covering all material selections and trim performance data.

6 Engineering

6.1 Sizing

Vendor to provide Control valve sizing shall be based on ANSI/ISA 75.01.01 and IEC 60534-2-5. Manufacturer may deviate from the standard formulas provided that the reason and the formulas used are detailed in the technical quotation.

The manufacturer shall be provided with all data necessary to select and size the control valve and actuator assembly and to accurately evaluate the minimum trim performance requirements.

All factors used in sizing per ANSI/ISA 75.01.01 shall be presented on ISS. These include Reynolds Number Factor F_R, piping geometry factor F_P, calculated F_{LP} and/or X_{TP} factors and manufacturer's correction factors.

Vendor to provide Control valve noise calculations shall be in accordance with the IEC 60534-8-3 and IEC 60534-8-4. Capacity and noise level calculations for all operating conditions shall be specified on ISS. The calculation basis and results shall be shown for manual or computer calculations. The calculated Cv capacities for the minimum, normal and maximum flow conditions and the highest calculated noise level shall also be specified on the ISS.

6.2 Selection

6.2.1 Body Size

The control valve body size shall be 14" Globe Type with body material carbon steel A216 WCB with Chevron packing material.

6.2.2 Minimum Cv Capacity (Cv Required)

The selected control valve trim capacity (Cv selected) shall meet the following:

a) An equal percentage trim shall operate below 93% travel at maximum flow condition. If no maximum flow condition is specified on the ISS, then the trim shall operate below 85% travel at normal flow condition.

b) A linear trim and quick opening trim shall operate below 90% travel at maximum flow condition. If no maximum flow condition is specified on the ISS, then the trim shall operate below 75% travel at normal flow condition. Anti-surge control valves shall operate below 55% travel at maximum flow condition.

c) A modified parabolic trim shall operate below 90% travel at maximum flow condition. If no maximum flow condition is specified on the ISS, then the trim shall operate below 80% travel at normal flow condition.

6.2.3 Minimum Rangeability

The installed rangeability of each control valve shall meet all flow conditions specified on the ISS. The specified minimum flow condition shall operate above 10% travel for globe, angle and axial flow type control valves, 5 degrees for ball and segmented ball type control valves and10 degrees for butterfly, rotary plug/disk and crammed type control valves.

When the minimum required rangeability cannot be met with one control valve, two or more parallel runs of control valves with split range control shall be provided.

6.2.4 Flow Characteristics

Manufacturer's control valve characteristics shall conform to ANSI/ISA 75.11.01.

The control valve flow characteristics shall be selected based on the following:

a) linear flow characteristic

- ☐ when the ratio of differential pressure across the control valve at minimum flow over the differential pressure across the control valve at maximum flow is equal to or less than 1.5
- ☐ when the differential pressure conditions across the control valve under all specified flow conditions are more than $\frac{2}{3}$ of the differential pressure across the control valve in the closed condition
- ☐ when two control valves are used in pairs as a 3-way valve

☐ for compressor recycle (spill-back) applications

☐ for compressor anti-surge control valves

☐ for centrifugal pump minimum flow bypass applications

b) equal percentage flow characteristic

☐ for all other modulating control applications, except for those under a), c) and d)

c) modified parabolic flow characteristic

☐ may only be substituted for equal percentage trim applications, provided that the smaller inherent range ability is acceptable for the subject application

d) quick opening flow characteristic

☐ on/off control applications

Permissible deviations between actual and manufacturer-stated inherent flow characteristics shall not exceed the limits specified in ANSI/ISA 75.11.01.

If necessary, the contractor shall modify the installed control valve flow characteristic in the positioner to obtain constant controller gain over the required flow range. The installed flow characteristic shall provide stable process control for all specified operating conditions without the need to change controller tuning parameters.

6.2.5 Minimum Flow Capacity

Permanently welded mechanical limit stops may be used for minimum flow requirements. When limit stops are used on a control valve, the signal from the control system shall be limited to the same travel values.

6.2.6 Critical Downstream Pressure Conditions

The downstream pressure conditions of the control valve shall be accurately calculated and specified on the ISS for each flow condition. To determine the worst-case service conditions, considerations shall be given to the different downstream pressures that can exist under various operating conditions.

6.3 Cavitation, Choked Flow and Flashing

ANSI/ISA 75.01.01 and ANSI/ISA RP75.23, together with the manufacturer's valve cavitation index data, shall be used for determining the severity of cavitation, choked flow

or flashing conditions in a control valve.

If cavitation cannot be eliminated completely, (e.g., by providing more downstream pressure through relocating the valve in the piping system) then a special control valve shall be selected with a high liquid pressure recovery coefficient F_L and/or low anti-cavitation index □ that will provide maximum lifetime for the valve and piping system. Noise and piping vibration levels shall not exceed the limits defined in paragraph **6.4.**

Control valves in potentially cavitating service conditions shall be analyzed in detail to ensure that the intensity, or degree, of cavitation of the selected trim is acceptable based on the recommendations of ANSI/ISA RP75.23. This requires the valve manufacturer to provide a recommended sigma ($□_{mr}$) for the specific valve and a scaled and adjusted proposed sigma ($□_p$). These factors shall be stated on sheet of the ISS.

Contingencies on the minimum required control valve cavitation index shall be applied to compensate for inaccuracies in process data and inaccuracies in manufacturer's control valve cavitation index data.

The location and piping installation of a control valve in flashing services shall be designed to limit the outlet velocity in order to minimize erosion in the control valve outlet area and downstream piping section.

6.4 Noise and Vibration

6.4.1 Noise Limits

It is required by Vendor to calculate as per design specification must be in accordance to Sound Pressure Level (SPL) limits or must be the maximum noise level emission measured 1 m (3 ft) downstream of the valve and 1 m (3 ft) away from the valve including noise contributions from the piping system, piping elbows and reducers, is not allowed to exceed:

These maximum noise levels are specified in terms of equivalent continuous A-weighted Sound Pressure Levels (SPL) with a maximum inaccuracy of ±5 dB (A).

Manufacturers shall be required to include inaccuracies of their quoted noise levels and shall be requested to guarantee that the noise emission from the proposed control valve in the specific piping system. Contingencies need to be included in the design to ensure that the actual noise levels will be not be exceeded.

Control valve noise shall be treated at the source through the provision of low-noise multipath trim designs. To ensure that excessive noise and piping vibration problems will not occur, a contingency in trim performance shall be provided in high energy dissipating type services (example highly cavitating services, high pressure letdown services...etc.). When the noise limit cannot be met by source treatment alone, application of diffusers, baffle plates and silencers may be considered, Acoustic or thermal insulation shall not be

used for control valves in continuous or intermittent services.

6.4.2 Vibration Limits

The maximum vibration levels of the control valve, manifold and piping system shall be less than 12.5 mm/sec Root Mean Square (0.5 inch/sec RMS) under all specified operating conditions. Proper control valve selection shall ensure that the required energy can be dissipated without exceeding the maximum vibration levels in the piping system. The control valve manifold piping layout and piping support design shall facilitate maximum reduction of control valve induced vibration.

6.4.3 Noise and Vibration Test

A control valve noise and vibration test shall be conducted for control valve with a calculated noise level.

6.4.4 Outlet Velocity Limits

Body outlet velocity, defined as the fluid velocity at the discharge flange of a control valve, shall be limited to:

- 0.15 Mach for gas containing black powder
- 0.2 Mach for gas, vapor and steam services containing any particulate matter
- 0.3 Mach for wet gas, vapor and saturated steam services
- 0.4 Mach for dry clean gas and superheated steam services
- 0.5 Mach for dry clean gas in infrequent services. Infrequent services include vent or gas-to-flare valves where the downstream pressures fall below 100kPag (14.5 psig).

7 Actuators and Positioners

7.1 General

Actuators, positioners and other accessories shall be procured as part of the control valve purchase order. The control valve manufacturer shall be responsible for packaging and guaranteeing the whole control valve assembly.

The control valve manufacturer shall be responsible for correctly sizing the actuators based on the technical specification(s) and the data specified on OGDCL ISS given at Annexure-W.

Vendor shall provide the bench set (spring range) of actuators must be specified on the Vendor provided ISS's. Actuator sizing shall be based on a minimum available instrument air pressure of 415 kPag (50-60 psig), including worst-case requirements for maximum

force/torque. Maximum air supply system design pressure conditions are generally 862 kPag (125 psig) at 82°C, or less. Actuator systems shall be suitable for non-lubricated air. A regulator/filter (with adequate capacity) shall be used to provide a constant air supply pressure under all operating conditions. A regulator is not required for pneumatic piston type actuators with design pressure conditions in excess of 862 kPag (125 psig).

Actuator force/torque requirements shall be specified for the worst case condition. Type and size of actuator system shall develop minimum 110% of the required seat load to meet the leakage class and the shut-off pressure drop specified on the ISS.

The maximum shut-off differential pressure shall always be calculated and specified on the ISS. For TSO applications, actuator load calculations shall be made and shown on sheet of the ISS.

7.2 Positioners

7.2.1 Digital positioners shall be applied for all new control valves, unless otherwise specified.

7.2.2 A double acting positioner shall be used for double acting type actuators (i.e., it is not acceptable to use a single acting positioner with a reversing relay).

7.3 Pneumatic Diaphragm Actuators

Spring-return pneumatic diaphragm actuators are preferred and shall be used whenever feasible.

7.4 Pneumatic Piston Actuators

Air failure position shall be accomplished without the aid of process pressure conditions. Air failure position shall be testable during inspection at factory level.

When the "air failure open" (AFO) or "air failure close" (AFC) action mode of a piston-operated actuator system cannot be accomplished due to insufficient spring force, then a volume tank with fail-safe trip valves shall be provided (refer to paragraph 8.3 for volume tank requirements). Air failure mode movement of the control valve shall be prompt in the event of air supply failure.

When "air failure lock" (AFL) action mode is required, also referred to as "air failure steady" (AFS), for any critical valve operation, lock-up valves and if so required, a volume tank shall be provided to lock the actuator in the last operating position upon air supply failure for a minimum period of 30 minutes.

7.5 Actuator Systems other than Pneumatic Air Operated

Control valve actuator systems other than pneumatic may be applied if access to instrument air is impractical. Process Gas as Actuating Medium

For applications where instrument air supply cannot practically be made available, sweet, clean, dry process gas may be considered as the actuating medium. Sour gas shall never be used. Process gas operated actuator systems shall never be used at an indoor location or enclosed area.
Electronic, smart or any positioners with potential ignition sources, shall not be used for such applications. Actuator and positioner materials, specifically the elastomer seals, shall be suitable for the particular process gas application. All materials in the actuator and control instrumentation shall be certified for the particular process gas services.

The gas shall be properly conditioned through a fully redundant gas supply system each with a dedicated inlet and outlet block valve (e.g., dual regulators, dual liquid knock-out pots with drain valves, dual filtering systems, over-pressure relief valves, etc.) connected to a ring header to enable on-line maintenance on one system at the time.

The gas supply ring header piping shall be sloping, without pockets, towards the knock-out pots installed at the lowest point. The liquid knock-out system design shall be over designed such to ensure trouble-free operation even during upset conditions of the process.

Sweet gas venting shall be kept to a minimum (i.e., selecting instruments with the lowest venting rates available, minimizing the number of venting instruments, etc.). Sweet gas venting shall be elevated to direct the gas away from the immediate area around the control valve.

All enclosures shall be metallic (i.e., non-metallic actuator systems shall not be used in sweet gas services).

7.6 Actuator Stroke Speed Requirements

For minimum control performance requirements, the minimum stroke speed in modulating modes of process operation shall be:

- 0.75 inch per second for time-critical gas/vapor control applications, including but not limited steam pressure, fuel gas pressure, etc.
- 0.15 inch per second for general control applications.

  For example: The maximum stroke times in control mode, for a valve with a 6"stem travel, are:

  - 8 sec's at a stroke speed of 0.75 inch per second and

- 40 sec's at a stroke speed of 0.15 inch per second

Note: Anti-surge applications are specified in paragraph 6.3.

All applications need to be verified for the actual stroke speed requirements by the contractor. The required stroke time shall be specified on the ISS for each control valve.

Stroke times shall be tested on a 50% control signal step change (i.e., on a 50% step change the resulting change in valve travel needs to be performed within 50% of the required stroke time) without the aid of process pressure conditions. Stroke times shall be tested during manufacturer's inspection and during plant commissioning when piping systems are de-pressurized. Boosters may be applied to meet stroke time requirements, but stroke movements shall remain stable at 20%, 50% and 80% control signal step changes (i.e., overshoot to be less than 120% of the input step change and be dampening as defined in ANSI/ISA 51.1, and ANSI/ISA TR75.25.02).

Fast-stroke time requirements under air failure conditions shall be separately specified on the ISS (e.g., stroke times faster than the manufacturer's standard; piston-type actuators may have prolonged stroke times under air failure conditions). Typical applications requiring fast stroke times on air failure conditions include vent and flare dump valves to prevent safety/relief valves from being lifted. Quick-exhaust valves may be used, provided that they do not interfere with the normal control operation of the actuator system.

7.7 Exception:

Prolonged stroke times shall be applied for control valves in liquid lines, when required to prevent hydraulic surge conditions to exceed the pipeline Maximum Allowable Surge Pressure (MASP). When the stroke time of a control valve affects the pipeline MASP, or the load of a surge relief valve system, then the following note shall be specified on the ISS: "Valve Stroke Time Affects Pipeline MASP or Surge Relief Valve System Load". Typical applications may include pipelines, loading lines, tankage transfer lines, etc.

8 Accessories

8.1 Limit Switches

Limit switches shall be actuated by proximity sensors. Limit switch enclosures shall be hermetically sealed. Switch contact outputs shall be at minimum, Single-Pole, Double-Throw (SPDT). Contact rating shall be at minimum,
0.5 Amp inductive at 125 VDC.

8.2 Solenoid Valves

Requirements for solenoid valves shall be specified on the subject control valve ISS. High

temperature class "H" coil insulation rated for continuous duty shall be used with viton elastomers. Class "F" coil insulation is acceptable for low power (<2 watt) solenoid valves. Solenoid valves shall not be used for in-process service applications.

8.3 Volume Tanks

Volume tanks shall be mechanically designed to withstand a maximum pressure of 862 kPag (125 psig) at 82°C. Volume tanks shall be manufactured in accordance with ASME VIII D1 (stamped UM) or PED requirements. Volume tanks shall have a minimum capacity for two complete stroke operation of the control valve at the minimum available instrument air pressure of 415 kPag (60 psig). The volume tank shall be equipped with all required accessories to ensure that the control valve fails in the safe position.

Commentary Note:

The two strokes consist of the failure mode movement plus one movement in the opposite direction. So, if the control valve is AFC, the volume tank will be sized to move the valve from open to close and then from close to open.

8.4 Mechanical Limit Stops

When mechanical limit stops are required, they shall be of a permanently welded type. Screwed type, if seal-welding at the locking nuts, is acceptable.

Limit stop arrangements through: hand wheel mechanism, jam-nut arrangement, tack welding arrangement or positioner configuration, are not acceptable.

8.5 Position Indication

8.5.1 Valve Position Indicator

Control valve shall be provided with a valve position indicator. The indicating pointer shall be directly connected to the stem or shaft. The valve position shall be indicated on a reversible scale, with clearly graduated markings at the 0%, 25%, 50%, 75% and 100% valve opening position and open and/or closed indication at the valve travel limits.

8.5.2 Valve Position Transmitter

For safety related applications, a dedicated electronic travel position transmitter, providing a proportional valve stem or shaft position signal, shall be specified for remote valve position indication.

8.6 Marking and Identification

8.6.1 Marking

The direction of flow shall be cast or steel-stamped on the valve body, or alternatively a stainless steel arrow shall be permanently fixed to the body by rivets, for all appropriate valves which have been designed or selected for a specific flow direction.

For butterfly valves and other rotary valves, the vane, disk, cam or ball position shall be indicated by an engraved marking on the shaft end.

8.6.2 Identification

The Vendor shall provide all instruments with a stainless steel tag stamped with the "Instrument Tag No." in 5mm high Characters permanently attached to the instrument with either stainless steel wire or screws. (i.e., adhesive fastening is not acceptable).

9. Installation

9.1 General

Control valves shall be installed in horizontal lines.

Control valves shall be installed such that they can easily be removed for maintenance (i.e., if necessary a piping spool shall be installed to prevent the need to remove major piping).

Control valves and their actuating systems shall be mounted such that all adjustments are accessible (and all indicators/gauges are readable) from grade, permanent platform, walkway or fixed ladder. Portable platforms and portable ladders shall not be used. Sufficient clearances shall be provided for the removal of any part of the control valve or actuator assembly. Access space for lifting equipment shall be provided for valve and actuator assemblies.

Control valve actuating systems and cabling shall not be located in close proximity to high temperature sources. Thermal shielding shall be applied from surfaces exceeding 260°C (500°F) when less clearance than 1000 mm (40 inches) is provided.

A permanent, spool-mounted strainer of adequate strength shall be installed upstream of control valves in dirty and erosive services.

Electrical Systems for Instrumentation." The electrical area classification of the control valve location shall be specified on the ISS. Electrical installation shall comply with NFPA 70, National Electrical Code (NEC).

9.2 Anti-Static Devices

Control valve designs shall be evaluated for the presence of electrically isolated metal parts when used in non-conductive fluid services.

Anti-static devices shall be provided to ensure electric continuity between all isolated parts and the valve body. These shall fulfill the following requirements:

a) Provide a discharge path with an electrical resistance of not greater than 10 ohms.

b) Be of such a design that the valve cannot be assembled, or reassembled, without the device.

10. Inspection and Testing

10.1 General

Before shipment Packager/ Manufacturer shall arrange physical inspection of Control Valve and all its associated parts and accessories. Quality assurance and testing shall be designed to simulate as closely as possible to actual application. The programs shall outline methods, procedure and simulation facilities proposed based on Manufacturer's recommended procedures.

All equipment will be subject to inspection by the OGDCL's appointed representatives and inspectors. The Packager/ Manufacturer shall arrange full facilities to the officials during the time of Open box pre-shipment course of manufacture and shall arrange access to any sub-Packager/ Manufacturers work where necessary.

The Packager/ Manufacturer shall ensure that adequate notice, in writing, is given to the OGDCL and the inspector to enable them to arrange their visits to suit the manufacturing program in accordance with the conditions of the requisition documents.

All test and inspection data shall be legible including the name and signature of the Packager/ Manufacturer and where applicable the inspector.

All defects in materials detected as a result of testing shall be repaired or replaced by the Packager/ Manufacturer at no cost to the OGDCL. If the correcting of any error or defect involves serious alternations requiring replacement of parts, the approval of the OGDCL shall be obtained before proceeding with such corrections. Also if the correction of the error requires witnessing by the Inspector or a change in certificates issued by

the Inspector the correction shall be properly corrected and signed by the Inspector.

If any part of the equipment is damaged after tests have been completed retesting of the affected parts is mandatory. The method of repair shall be in accordance with the Packager/ Manufacturer's standard procedures.

All formal testing will be conducted in accordance with a written test procedure. The Packager/ Manufacturer's standard test procedures shall be forwarded to the OGDCL for review and approval. Each formal acceptance test must be signed by the Packager/ Manufacturer and the OGDCL representatives at the successful completion of the test. The Packager/ Manufacturer shall supply supervision specialist personnel and all necessary materials to support the inspection and testing. This shall include all the certified Test equipment and signal generator to simulate all inputs and outputs.

10.2 Performance Tests / Specific Tests with Certification:

- Performance Tests / Specific Tests shall be conducted at the original point of manufacture facilities. The Performance Tests / Specific Tests shall be conducted in accordance with the Manufacturer's standard test procedures.
- The Packager/ Manufacturer shall be responsible for generating the Performance Tests / Specific Tests procedures.
- The pass/fail criteria shall be 100% correct performance otherwise the faulty item shall be rectified or replaced at the Packager/ Manufacturer's cost.
- These tests shall include the testing and acceptance of complete PCV with all associated proprietary equipment like I/P converter and positioner etc.
- Expanses including airfare, boarding & lodging, Visa processing fees shall be borne by OGDCL.

File No: JV05-011.XLS

Data sheet for ① 14" of PCV

GENERAL INFORMATION:

Tag Number:	PCV-2267		
Service Description:	GAS DELIVERY PRESSURE GAS DELIVERY STN		CASE 2
Location:	PP-0034 DA2N		
Line, Vessel, Equipment No: / Piping Class:	DWG-00-BP-2202		
P &ID No:	J-0005 10026		
R.F.Q. No: / Purchase Order No:	1		
Item No:	ABB KENT-INTROL		
Manufacturer:	ABB KENT-TAYLOR		
Vendor:	SERIES 12-835A		
Model No:	D8249V1P1		
Serial No:	CL 1 ZN 2 GRP IIA		
Electrical Area Classification:	SAA 'Exd'		
Electrical Certification:			

PROCESS SERVICE CONDITIONS:

Fluid:	State:	HC GAS	GAS	HC GAS	GAS		
Pressure Units:		PSIG		PSIG			
Pressure Inlet:	Outlet:	800	450	570	450		
Inlet Pressure: Maximum:	Shutoff dp:	900	1000	900	1000		
Gas Flowrate: Maximum:	Units:	312	MMSCFD		MMSCFD		
Gas Flowrate: Minimum:	Normal:	88	250	88	450		
Liquid Flowrate: Maximum:	Units:	---	---	---	---		
Liquid Flowrate: Minimum:	Normal:	---	---	---	---		
Temperature: Maximum:	Units:	120	°F	120	°F		
Temperature: Minimum:	Normal:	50	77	50	77		
Valve Pressure Ratio: Xt	Pipe Factor Fp:	1.75	0.96	1.26	0.96		
Viscosity (Mixture): cP		0.016		0.015			
Gas Compressibility Factor:		0.896		0.886			
Isentropic Exponent: k:	MW:	1.21	30.3	1.24	30.3		
Liquid Density at Upstream Conditions: lb/ft³		---		---			
Liquid Vapour Pressure:	Critical Pressure:	---	---	---	---		
Liquid Pressure Recovery Factor: ft/lb		---		---			
Reynolds No. (Liquids):		---		---			
Flow Type (Choked/Flashing etc.):		---		---			
Calculated Cv Maximum Flow:		477		1266			
Calculated Cv Minimum Flow:	Normal Flow:	130	382	247	---		

CONSTRUCTION - VALVE BODY:

Manufacturer:		ABB KENT-INTROL			
Body Type:	Model No:	GLOBE	SERIES 12		
End Connection:	Rating:	FLANGE	600# RF		
Body Size:	Port Size:	14"	14"		
Guiding:	No of Ports:	CAGE	ONE		
Trim Form:		=%			
Maximum Possible Cv:	Actual CV:	1940	507		
Maximum Flow for Actual Cv:		---			
Flow Action to Open/Close:		CLOSE			
Lubricator & Isolation Valve:	Bonnet Type:	YES	STD		
Body Material:	Packing Material:	A216 WCB	TECHEV		
Trim Material - Seat:	Plug:	316L(STEL)	316L(STEL)		
Trim Material - Shaft:	Guiding:	316L(STEL)	316L(STEL)		
Shutoff Class:		IV			
SPL Allowed:	Calculated:	90 dBA	88		

CONSTRUCTION - VALVE ACTUATOR:

Manufacturer:		ABB KENT-INTROL			
Model No:		G4-300			
Actuator Type:	Fail Open/Closed:	DIAPHR	CLOSED		
Handwheel:	Location:				

CONSTRUCTION - VALVE POSITIONER:

Manufacturer:		ABB KENT-INTROL			
Type:	Model No:	E/P	P3300		
Positioner Type:	Input Signal:	---	4-20mA		
Filter/Regulator & Gauge:	Air Supply:	YES	30		
Connections: Pneumatic:		¼" NPT			
Enclosure Type:	IP Rating:	WP	IP65		
Entry: Size:	Termination:	20mm	TERMINALS		

GENERAL NOTES:

* = Information to be provided by VENDOR

1. The VENDOR shall provide all instruments with a stainless steel tag plate stamped with the INSTRUMENT TAG No. in 5mm high characters permanently attached to the instrument with either stainless steel wire or screws.
2. All permanent instrument fixings shall be stainless steel.
3. The VENDOR shall provide a valve conforming to the material requirements for sour gas service in accordance with NACE standard MR-01-75.

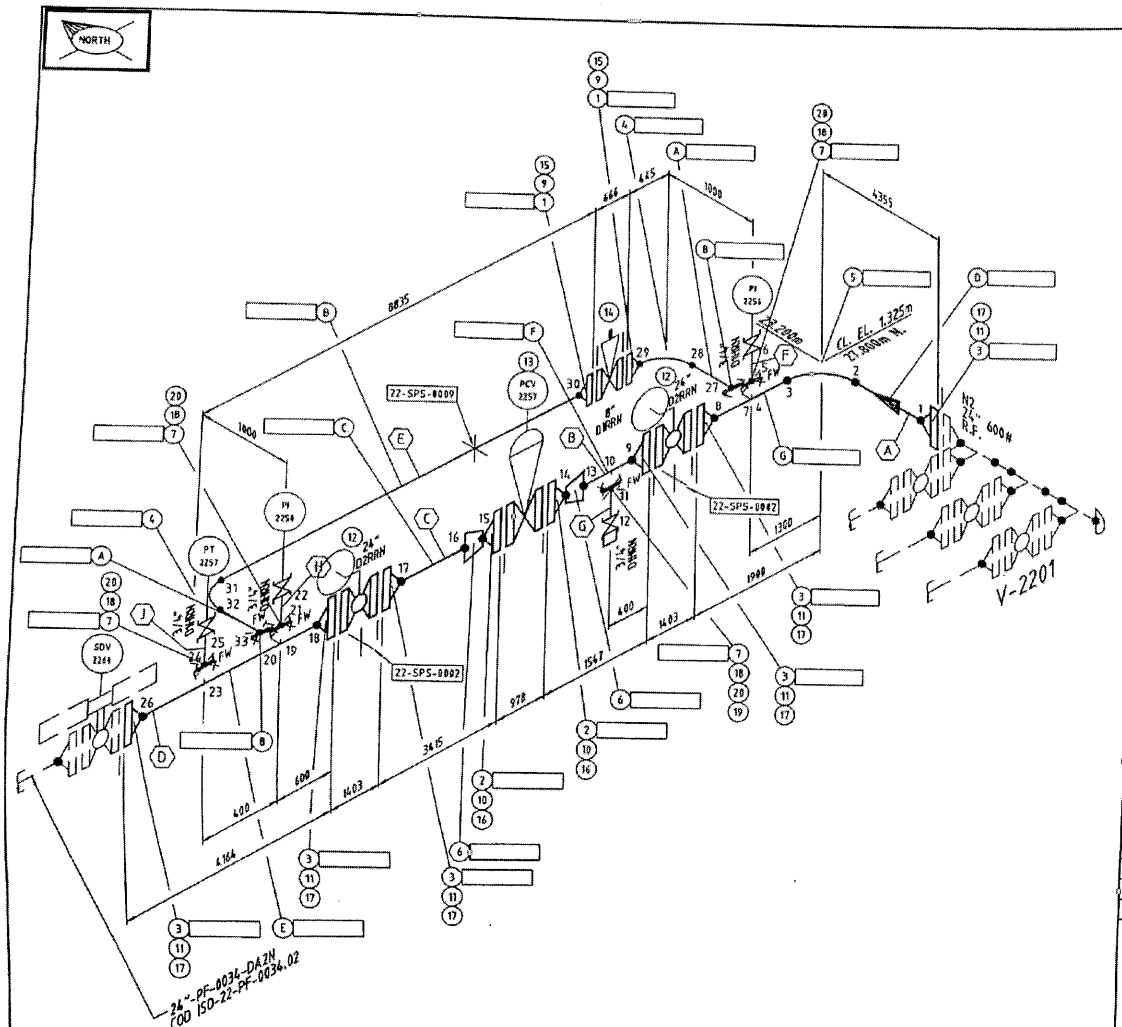
Rev	REVISION DESCRIPTION	DATE	PREPARED	CHECKED	APPROVED
4	ISSUED FOR AS-BUILT	27-May-97	AST	YYU	AST
3	ISSUED FOR PURCHASE	19-Jul-96	AST	YYU	AST
2	ISSUED FOR ORDER	6-May-96	AST	YYU	AST
1	ISSUED FOR PROCESS INFORMATION	22-Mar-96	AST		

INSTRUMENT DATA SHEET

CONTROL VALVES GLOBE TYPE

Client:	Oil & Gas Development Corp.
Project:	Uch Gas Pipeline
Data Sheet No:	DS-00-JV-0005.011
Job No:	1846 Revision:
Print Date:	27/05/97

Form No: JV-0005.011



LINE MATERIAL SUMMARY
PIPING MATERIAL SPECIFICATION

PRIORITY | FABRICATOR

MARK	QTY	SIZE	SCH/RAT	COMPONENT DESCRIPTION	TAG/LENGTH	STOCK CODE
				SHOP MATERIAL		
1	2	8"	80	FLANGE W.N.600LB R.F. - ASTM A105 (NACE)		CNFW6R080
2	2	14"	80	FLANGE W.N.600LB R.F. - ASTM A105 (NACE)		CNFW6R080
3	6	24"	80	FLANGE W.N.600LB R.F. - ASTM A105 (NACE)		CNFW6R080
4	2	8"	80	ELBOW 90 DEG, L.R. B.W. - ASTM A234 GR.WPB (NACE)		CNBE9080
5	1	24"	80	ELBOW 90 DEG, L.R. B.W. - ASTM A234 GR.WPB (NACE)		CNBE9080
6	2	24"X14"	80x80	REDUCER CONC. B.W. - ASTM A234 GR.WPB (NACE)		CNBRC080080
7	4	24"X3/4"	3000#	SOCKOLET 3600LB - ASTM A105 (NACE)		CNSOL3
8	2	24"X8"	80x80	WELDOLET - ASTM A105 (NACE)		CNBWOL080080
9	2	8"		600LB GASKET 4.6mm THK.- SPIRAL WOUND		FGS6
10	2	14"		600LB GASKET 4.6mm THK.- SPIRAL WOUND		FGS6
11	6	24"		600LB GASKET 4.6mm THK.- SPIRAL WOUND		FGS6
12	2	24"		VALVE BALL 600LB R.F. - REDUCED BORE (NACE)	D2RRN	VD2RRN
13	1	14"		PRESSURE CONTROL VALVE	PCV-2257	JVPS
14	1	8"		VALVE GATE 600LB R.F. (NACE)	D1RRN	VD1RRN
15	2	8"		1 1/8 X 280 STUD BOLTS-12/SET-A193 GR.B7/ASTM A-194 GR 2H - F/KOTE (BLUE)		FBSCB
16	2	14"		1 3/8 X 240 STUD BOLTS-28/SET-A193 GR.B7/ASTM A-194 GR 2H - F/KOTE (BLUE)		FBSCB
17	6	24"		1 7/8 X 340 STUD BOLTS-24/SET-A193 GR.B7/ASTM A-194 GR 2H - F/KOTE (BLUE)		FBSCB
18	4	3/4"	80	PIPE NIPPLE PBE 100mm LG - ASTM A106 GR.B (NACE)		CNNPPP080
19	1	3/4"	-	PLUG HEX HEAD TH'D - ASTM A105 (NACE)		CNTPH
20	4	3/4"		VALVE GATE 800LB SW/TH'D (NACE)	D1HRN	VD1HRN
A	2	8"	80	PIPE SMLS ASTM-A106 GR. B - BEVELLED ENDS (NACE)	288	CNPS1068080
B	1	8"	80	PIPE SMLS ASTM-A106 GR. B - BEVELLED ENDS (NACE)	8398	CNPS1068080
C	1	24"	80	PIPE SMLS ASTM-A106 GR. B - BEVELLED ENDS (NACE)	2527	CNPS1068080
D	1	24"	80	PIPE SMLS ASTM-A106 GR. B - BEVELLED ENDS (NACE)	3231	CNPS1068080
E	1	24"	80	PIPE SMLS ASTM-A106 GR. B - BEVELLED ENDS (NACE)	3744	CNPS1068080
F	1	24"	80	PIPE SMLS ASTM-A106 GR. B - BEVELLED ENDS (NACE)	658	CNPS1068080
G	1	24"	80	PIPE SMLS ASTM-A106 GR. B - BEVELLED ENDS (NACE)	776	CNPS1068080

HOLDS:
1. REMOVED
2. REMOVED
3. REMOVED
4. REMOVED

ORIGINAL

SHOP FABRICATION ◯ | SPOOL IDENTIFICATION | ◯ FIELD FABRICATION

A B C D E F G H J

AREA 22 | PLANT UCH GAS PIPELINE | TITLE/LINE No. 24"-PF-0034-DA2N

Unless otherwise stated all flange bolt holes to be drilled off centre.

FW indicates field weld

FFW indicates field fit weld

indicates fab. shop weld

Numbers shown adjacent to welds are weld numbers for use in Q.C./document identification

All dimensions are in millimetres.

All elevations are in metres.

After shop fabrication all flanges and open ends to be completely covered and sealed.

Each pipe spool to be tagged with the identification reference.

PAINTING SPEC.	SYSTEM A	SPOOL No.	
COLOUR CODE	BS 4800 08 A01	TOTAL S. AREA	m²
INSULATION		WT. PIPE & FITTINGS	Kg
	DESIGN / WORK	WT. INSULATION	Kg
LINE PRESSURE PSIG	1080 / 800	WT. VALVE & SP.	Kg
LINE TEMPERATURE °F	140 / 77	TOTAL WT	Kg
LINE TEST PRESS/MED.	1500 PSIG FRESH WATER	WELDING	
SHOP TEST PRESS/MED.	PSIG	RADIOGRAPHY	10%
TEST PACK		STRESS RELIEVING	YES
PIPE SPEC. DWG	DWG-22-L-0006	THREAD SEALING	
P & ID DWG	DWG-08-BP-2202	PIPING PLAN DWG	DWG-22-L-0006

STRESS RELIEVE
FULLY TRACEABLE
CARBON STEEL
LAST WELD No. 33

REFERENCE DRAWING

No	TITLE

REVISIONS

REV	BY	DATE	DESCRIPTION	CKD	APP
B	J.W.	9/96	ISSUED FOR CONSTRUCTION		
A	J.W.	19.07.96	ISSUED FOR REVIEW		

Drawn J.W. 12.07.96
Traced
Checked 11/9/96
Supervisor 19/9/96
Designed
Project Engineer
App for Construction
Client Approved 20/9/96

CLOUGH

Project UCH GAS PIPELINE
Client OIL & GAS DEVELOPMENT CORPORATION

Title GAS DELIVERY STATION
METERING SKID (V-2201) OUTLET
24"-PF-0034-DA2N

A2

Scale	CAD No.	Job No.	Drawing No.	Rev.
NIL	PF003401	1846	ISO-22-PF-0034.01	0