

# CNG & CITY GAS DISTRIBUTION PROJECT IN HYDERABAD PHASE II

Project No.: P.002062  
Document No.: P.002062 G09 5003



Hyderabad – INDIA  
**BHAGYANAGAR GAS LIMITED (BGL)**



**BHAGYANAGAR GAS LTD.**

**CNG & CGD PROJECT IN HYDERABAD PHASE – II**

INTRODUCTION

3	11.10.11	Issued for Procurement	AR	DNS	NC
2	28.09.11	Client's comments incorporated	AR	DNS	NC
1	02.08.11	Client's comments incorporated	AR	DNS	NC
0	31.05.11	First Issue	AR	DNS	NC
Rev.	Date	Subject of revision	Author	Checked	Approved

**1. INTRODUCTION**

Bhagyanagar Gas Limited (BGL), a joint venture of Hindustan Petroleum Corporation Limited (HPCL) and GAIL (India) Limited is executing Projects for CNG and City Gas Distribution in different cities of Andhra Pradesh.

Bhagyanagar Gas Limited (BGL) (hereinafter referred as Owner), is supplying Piped Natural Gas (PNG) to Domestic, Commercial and Industrial consumers and Compressed Natural Gas (CNG) to automobiles in Hyderabad city of Andhra Pradesh through its CGD and CNG networks. BGL intends to extend its CGD and CNG network in Hyderabad to supply Natural gas to Domestic, Commercial consumers through MDPE network and to existing/ new CNG stations through Steel pipeline network by setting up new facilities.

Tractebel Engineering pvt ltd is now inviting tenders for procurement of Cast Steel Ball Valves for this project.

The present document covers the technical specifications for the enquiry.

**2. TECHNICAL SPECIFICATIONS**

The technical specifications for this present tender enquiry are as listed in Material Requisition (Ref. No. P.002062/L/91/0314).

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**BHAGYANAGAR GAS LTD.**

**CNG & CGD PROJECT IN HYDERABAD PHASE – II**

**MATERIAL REQUISITION**

3	11.10.11	Issued for Procurement	AR	DNS	NC
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Project : CNG & CITY GAS DISTRIBUTION PROJECT IN HYDERABAD PHASE -II

Subject : CAST STEEL BALL VALVES

**DESCRIPTION OF GOODS AND/OR SERVICES**

Item	Quantity/ Unit	Description	Identification Number
		<p><b>For type and quantity of Cast Steel Ball Valves, refer Table # 1</b></p> <p><b>For list of Mandatory Spares of Cast Steel Ball valve, refer Table #2</b></p>	

**MATERIAL REQUISITION**

**P.002062**  
**L/91**  
**0314**

**TABLE # 1**

Sl.No.	ITEMS	DESCRIPTION	MATERIAL / SPEC.	FOR SERVICE/ DESIGN PRESS. / DESIGN TEMP.	PRESS. RATING	SIZE, inch	ENDS/ ASME	TYPE	DIM. / STD.	TOTAL QTY.
1	MANUALLY OPERATED BALL VALVES	FOR A/G SERVICE WITH NORMAL STEM AS PER DATA SHEET	BODY-ASTM A 216 Gr. WCB or Higher BALL-ASTM A 182 Gr.F6/F 304 or ASTM A 351 CF8, STEM - AISI 410/ AISI 304 or F 304 + ENP Coating	Refer data Sheet 3C1A	300#	4"	B W Ends (With extended pups)/ ANSI B 16.25	FULLY WELDED/BOLTED( 2 PIECE ) BODY CONSTRUCTION, FULL BORE, TRUNION MOUNTED AND DOUBLE BLOCK & BLEED	API 6D, TEPL Specs	10
2	MANUALLY OPERATED BALL VALVES	FOR A/G SERVICE WITH NORMAL STEM AS PER DATA SHEET	BODY-ASTM A 216 Gr. WCB or Higher BALL-ASTM A 182 Gr.F6/F 304 or ASTM A 351 CF8, STEM - AISI 410/ AISI 304 or F 304 + ENP Coating	Refer data Sheet 3C1A	300#	6"	B W Ends (With extended pups)/ ANSI B 16.25	FULLY WELDED/BOLTED( 2 PIECE ) BODY CONSTRUCTION, FULL BORE, TRUNION MOUNTED AND DOUBLE BLOCK & BLEED	API 6D, TEPL Specs	10
3	MANUALLY OPERATED BALL VALVES	FOR U/G SERVICE WITH EXTENDED STEM	BODY-ASTM A 216 Gr. WCB or Higher BALL-ASTM A 182 Gr.F6/F 304 or ASTM A 351 CF8, STEM - AISI 410/ AISI 304 or F 304 + ENP Coating	Refer data Sheet 3C1U	300#	12"	B W Ends (With extended pups)/ ANSI B 16.25	FULLY WELDED/BOLTED( 2 PIECE ) BODY CONSTRUCTION, FULL BORE, TRUNION MOUNTED AND DOUBLE BLOCK & BLEED	API 6D, TEPL Specs	31

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**MATERIAL REQUISITION**

**P.002062**  
**L/91**  
**0314**

Sl.No.	ITEMS	DESCRIPTION	MATERIAL / SPEC.	FOR SERVICE/ DESIGN PRESS. / DESIGN TEMP.	PRESS. RATING	SIZE, inch	ENDS/ ASME	TYPE	DIM. / STD.	TOTAL QTY.
4	MANUALLY OPERATED BALL VALVES	FOR U/G SERVICE WITH EXTENDED STEM	BODY-ASTM A 216 Gr. WCB or Higher BALL-ASTM A 182 Gr.F6/F 304 or ASTM A 351 CF8, STEM - AISI 410/ AISI 304 or F 304 + ENP Coating	Refer data Sheet 3CIU	300#	16"	B W Ends (With extended pups)/ ANSI B 16.25	FULLY WELDED/BOLTED 2 PIECE BODY CONSTRUCTION, FULL BORE, TRUNION MOUNTED AND DOUBLE BLOCK & BLEED	API 6D, TEPL Specs	11

Notes: 1. Also ref. Clause No. 3.1 of IFB, Commercial Vol. I of II for detailed scope of work.

Legend: U/G – Under Ground Service, A/G- Above Ground Service  
BW – Butt Welded (with pups – for length ref. data sheets)

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**TABLE # 2**

**LIST OF MANDATORY SPARES FOR BALL VALVES:**

Item SL.NO. Of Table 1	ITEMS	MAT. SPEC.	Kit (Refer Note 1)	Sealant Gun Including Sealant
1	4" Fully Welded / Bolted (2 Piece) Body Construction, Full Bore, Trunion Mounted, Double Block & Bleed, 300#, Butt Welded end, Manually (Gear) Operated Ball Valves for Above Ground Services with Normal stem size.	MFTRS. STD.	10	-
2	6" Fully Welded / Bolted (2 Piece) Body Construction, Full Bore, Trunion Mounted, Double Block & Bleed, 300#, Butt Welded end, Manually (Gear) Operated Ball Valves for Above Ground Services with Normal stem size.	MFTRS. STD.	10	-
3	12" Fully Welded / Bolted (2 Piece) Body Construction, Full Bore, Trunion Mounted, Double Block & Bleed, 300#, Butt Welded end, Manually (Gear) Operated Ball Valves for Under Ground Services with Extended stem size.	MFTRS. STD.	31	-
4	16" Fully Welded / Bolted (2 Piece) Body Construction, Full Bore, Trunion Mounted, Double Block & Bleed, 300#, Butt Welded end, Manually (Gear) Operated Ball Valves for Under Ground Services with Extended stem size.	MFTRS. STD.	11	1

**Note 1: Each kit consists of 3 main stem seal. These spares are mandatory to be supplied. Bidder to include the price of above in his quote.**

**REMARKS / COMMENTS****1. GENERAL NOTES****VENDOR's compliance**

Vendor shall submit his bid in full compliance with the requirements of this MR and attachments.

Vendor must include the following statement in his bid:

*We certify that our bid is fully complying with your enquiry dated....., and referenced.....*

Compliance with this material requisition in any instance shall not relieve the Vendor of his responsibility to meet the specified performance.

**2. COMPLIANCE WITH SPECIFICATION**

The Vendor shall be completely responsible for the design, materials, fabrication, testing, inspection, preparation for shipment and transport of the above equipment strictly in accordance with the Material Requisition and all attachments thereto.

All Ball Valves shall be provided with EN 10204-3.2 certificates.

**3. VENDOR'S SCOPE**

Vendor scope of work includes the equipment with all internals and accessories shown on the data sheets, specifications and all unmentioned parts necessary for a satisfactory operation and testing except those which are indicated to be out of the Vendor's supply.

**4. INSPECTION**

Vendor shall appoint anyone of the following TPIA for inspection purpose after approval by consultant / purchaser:

- a) Lloyd Register of Industrial Services
- b) Technische Ulierwachungs Verein (TUV)
- c) Det Norske Veritas (DNV)
- d) AIB-Vincotte
- e) SGS
- f) American Bureau Services (ABS)
- g) Velosi Certification Services

Apart from inspection by TPIA, inspection shall also be performed by BGL delegate, as set out and specified in the codes and particular documents forming this MR.

**5. APPLICABLE DOCUMENTS**

General prescriptions, requirements and information are listed in annex C of this Material Requisition.

**6. VENDOR'S DOCUMENTS**

Vendor shall supply the documentation as listed under point D of this Material Requisition.

All documents shall be supplied in English language.

Vendor shall strictly follow the document numbering procedure in their document as illustrated below:

**Document No. :**

<b>Project No.</b>	<b>Item</b>	<b>Document Index No.</b>	<b>Serial No.</b>	<b>Revision No.</b>
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Where,

**Project No.** is P.002062;

**Item** is B VALVE;

**Document Index No.** will be of three characters as indicated under point D of this MR;

**Serial No.** shall be 4 digit no. ranging from 0001 to 9999

**Revision No.** is Revision of the document starting with R0, R1 .....

Example: For QA/QC program, the document no. will be

<b>P.002062</b>	<b>BVALVE</b>	<b>QAP</b>	<b>0001</b>	<b>R0</b>
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**C. LIST OF ATTACHMENTS**

<p>The table herebelow lists the documents which are integral part of this Material Requisition. The applicable revision index of each document is mentioned in the column below the current Material Requisition revision index. When the Material Requisition revision index is "A" or "1", all listed documents are attached. For other Material Requisition revision index, only modified or new documents are attached.</p>	Material Requisition revision						
	0	1	2	3			
Documents	Revision of documents						
VBA-3C1A 4" & 6" Manual ball valves – Above ground service	0	1	2	3			
VBA-3C1U 12" & 16" Manual ball valves – Under ground service	0	1	2	3			
Particular Technical Specification – Pipeline Valves P.002062/L/21/0315	0	1	2	3			
General Technical Specification – Pipeline Valves 70000/740/GTS/402	7						
Particular Technical Specification – Piping Classes P.002062/L/21/0316	0	1					
Piping Specifications – Piping classes 3C1 & 3C1U	0	1					
Quality Assurance Plan P.002062/Q/93/0317	0	1	2	3			
Painting System & Colour Code for Final Layer P.002062/L/98/0318	0	1					

**D. DOCUMENTS & DATA REQUIREMENTS**

The table hereunder specifies the quantities and the nature of the documents to be submitted by the CONTRACTOR to the ENGINEER.

The documents required at the inquiry stage and to be included in the bid are listed under column A.

The documents required after award of the AGREEMENT and subject to the written approval of the ENGINEER are listed under column B.

The final and certified documents are listed under column C.

Any document, even when preliminary, shall be binding and therefore duly identified and signed by the CONTRACTOR. It shall bear the ENGINEER's Project reference, the Material Requisition number and the identification number.

THE DOCUMENTS ARE FULLY PART OF THE SUPPLY WHICH SHALL BE COMPLETE ONLY IF AND WHEN THE DOCUMENTS COMPLYING FULLY WITH THE MATERIAL REQUISITION REQUIREMENTS ARE RECEIVED BY THE ENGINEER.

Item	Documents and Data	Document Index No.	A	B		C	
			Number of copies	Number of copies	Required date	Number of copies	Required date
1	Completed data sheet	CDS	3	3	2 weeks	6	2 weeks before despatch with final techn. file
2	Drawing/data submittal list/schedule	DLS	3	3	2 weeks + monthly	6	2 weeks
3	Fabrication, test and delivery schedule (per item)	FTD	3	3	2 weeks + monthly	6	2 weeks
4	Progress report	PRT	-	3	2 weeks + monthly	6	2 weeks
5	Catalogues / References	CRS	3	-	-	3	With final techn. file
6	Outline drawing + material specification + unit weight (per valve and actuator)	OMS	3	3	2 Weeks	6	With final techn. file
7	Packing/shipping list with weights and dimensions	PLD	-	3	2 weeks before shipping/As per SCC	6	2 weeks before despatch with final techn. File/ As per SCC
8	Detail drawing + material specification + unit weight + calculations + Welding details for the pups. (per valve and actuator)	DMU	-	3	2 weeks	6	2 weeks before despatch with final techn. file

Item	Documents and Data	Document Index No.	A	B		C	
			Number of copies	Number of copies	Required date	Number of copies	Required date
9	Code compliance certificate	CCC	-	3	2 weeks	6	2 weeks before despatch with final techn. file
10	Bill of materials (on drawings)	BOM	-	3	2 weeks	6	2 weeks before despatch with final techn. file
11	Recommended spare parts list (for Mandatory Spares-apart from as mentioned in table # 2 of Material requisition)	RSE	3	-	-	-	-
12	Recommended spare parts list (for 2 years operation)	RSO	3	-	-	-	-
13	Welding procedure specification and records WPS/PQR	WPS	-	3	2 weeks	6	2 weeks before despatch with final techn. file
14	QA/QC program	QAP	3	3	2 weeks	6	2 weeks before despatch with final techn. file
15	Inspection and test procedures	ITP	3	3	2 weeks	6	2 weeks before despatch with final techn. file
16	List of fabrication and control operations (LOFC)	LOF	-	3	2 weeks	6	2 weeks before despatch with final techn. file
17	Test reports	TRS	-	3	1 week after test	6	2 weeks before despatch with final techn. file.

Item	Documents and Data	Document Index No.	A		B		C	
			Number of copies	Number of copies	Required date	Number of copies	Required date	
18	NDE reports	NDR	-	3	1 week after test	6	2 weeks before despatch with final techn. file	
19	Heat treatment reports	HTT	-	3	1 week after test	6	2 weeks before despatch with final techn. file	
20	Hydrotest and air test report	HTR	-	3	1 week after test	6	2 weeks before despatch with final techn. file	
21	Maintenance and operating manuals	MOM	-	3	2 weeks before shipping	6	2 weeks before despatch with final techn. file	
22	Installation instructions Site inspection procedure	ITS	-	3	2 weeks before shipping	6	2 weeks before despatch with final techn. file	
23	Material certificate 3.2	MCT	-	3	1 week after test	6	2 weeks before despatch with final techn. file	
24	Painting system description	PSD	3	3	2 weeks	6	2 weeks before despatch with final techn. file	
25	List of subcontractors with their scope, if any.	LSS	3	3	2 weeks			
26	Instrument data sheets if applicable	IDS	3	3	2 weeks	6	2 weeks before despatch with final techn. file	

Item	Documents and Data	Document Index No.	A	B		C	
			Number of copies	Number of copies	Required date	Number of copies	Required date
27	Wiring diagrams if applicable	WDG	3	3	2 weeks	6	2 weeks before despatch with final techn. file
28	CENELEC certificates for electrical instruments in hazardous locations if applicable	CCE	-	3	2 weeks	6	2 weeks before despatch with final techn. file
29	Final technical file, preliminary copy for approval (In Soft & Hard copy)	FTP	-	3	2 weeks before shipping	-	-
30	Final technical file (In Soft & Hard copy)	FTF	-	-	-	6	With material despatch.

**NOTES**

- 1) Documents listed in column A is required to be submitted during bid time (1 original+ 3 copies). Durations in column B (Required date) are weeks after LOA date or as indicated in Table. Durations in column C (Required date) are weeks after document approval or as indicated in Table. Due date of each document may be proposed.
- 2) Latest submittal time for:
  - Test procedure : 2 weeks before test
  - Test report : 2 weeks after test
- 3) Final technical file shall be supplied in hard copy as indicated, and in electronic format (.pdf Acrobat files) on Six (6) CD-ROMs.

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# **DATA SHEETS**



CNG & CITY GAS DISTRIBUTION PROJECT IN HYDERABAD PHASE-II	MANUAL BALL VALVES ABOVE GROUND SERVICE SIZE 4" & 6" DATA SHEET	DATA SHEET N°
		VBA-3C1A
		Page 2 of 2

**III. TEST**

- HYDROSTATIC SHELL TEST
  - Test pressure : 1.5 x Design Pressure
  - Test medium : Water
- HYDROSTATIC SEAT TEST
  - Test pressure : 1.1 x Design Pressure
  - Test medium : Water
- AIR SEAT TEST
  - Test pressure : 6 bar
  - Test medium : Air
- FUNCTIONAL TEST : : 3 Opening / Closing
  - Test pressure : ATM & Maximum differential pressure
- LEAK TEST : Yes
- DOUBLE BLOCK & BLEED TEST : Yes
- TORQUE TEST : Yes
- ANTISTATIC TEST : Yes
- FIRE TEST : Yes
- VISUAL AND DIMENSIONAL EXAMINATION TEST: Yes

**NOTE :** UNLESS OTHERWISE STATED, ALL TESTS WILL BE WITNESSED BY THE PURCHASER

**IV. QUALITY CONTROL**

(See quality control table for CS valves)

- MATERIAL CERTIFICATES : EN 10204 - 3.2
- ALL TESTING CERTIFICATES : TEST, FIRE SAFE, PAINTING, ANTISTATIC

DATE	REV	PREPARED BY	CHK	APP	REMARK	<b>TRACTEBEL Engineering</b> <b>GDF SUEZ</b>
02.08.2011	0	AR	DNS	NC	FIRST ISSUE	
05.09.2011	1	AR	DNS	NC	Client's comments incorporated	
28.09.2011	2	AR	DNS	NC	Client's comments incorporated	
11.10.2011	3	AR	DNS	NC	Issued for Procurement	



**III. TEST**

- HYDROSTATIC SHELL TEST
  - Test pressure : 1.5 x Design Pressure
  - Test medium : Water
- HYDROSTATIC SEAT TEST
  - Test pressure : 1.1 x Design Pressure
  - Test medium : Water
- AIR SEAT TEST
  - Test pressure : 6 bar
  - Test medium : Air
- FUNCTIONAL TEST : 3 Opening / Closing
  - Test pressure : ATM & Maximum differential pressure
- LEAK TEST : Yes
- DOUBLE BLOCK & BLEED TEST : Yes
- TORQUE TEST : Yes
- ANTISTATIC TEST : Yes
- FIRE TEST : Yes
- VISUAL AND DIMENSIONAL EXAMINATION TEST: Yes

**NOTE :** UNLESS OTHERWISE STATED IN QAP , ALL TESTS WILL BE WITNESSED BY THE PURCHASER

**IV. QUALITY CONTROL :**

(See Quality Assurance Plan for CS valves)

- MATERIAL CERTIFICATES : EN 10204 - 3.2
- ALL TESTING CERTIFICATES : TEST, FIRE SAFE, PAINTING, ANTISTATIC..

DATE	REV	PREPARED BY	CHK	APP	REMARK
31.05.2011	0	AR	DNS	NC	FIRST ISSUE
02.08.2011	1	AR	DNS	NC	Client's comments incorporated
28.09.2011	2	AR	DNS	NC	Client's comments incorporated
11.10.2011	3	AR	DNS	NC	Issued for Procurement

**TRACTEBEL Engineering**  
GDF SUEZ

**BHAGYANAGAR GAS LTD.**

**CNG & CGD PROJECT IN HYDERABAD PHASE - II**

**PIPELINE TRANSPORTATION SYSTEMS - PIPELINE VALVES**

3	11.10.2011	Issued for Procurement	AR	DNS	NC
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**200021**

**TABLE OF CONTENTS**

INTRODUCTION	1
AMMENDMENT TO GTS 70000/740/402	1
1. SCOPE	1
2. DEFINITIONS	1
3. PRELIMINARY STATEMENT	2
6. DESIGN AND CONSTRUCTION	2
6.2 DESIGN	2
6.2.2 WELDING ENDS	2
6.2.4 DESIGN FEATURES	2
7. METERIALS	4
7.2 PRESSURE RETAINING PARTS	5
7.3 BONNET, COVER AND BODY BOLTING	5
7.6 SOUR GAS SERVICE	5
8. FABRICATION AND TEST	5
8.1 WELDING FABRICATION	5
11. PAINTING AND COATING	5

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**INTRODUCTION**

The present specification has to be read in conjunction with General Technical Specification 70000/740/GTS/402 rev. 7 (The GTS) which it amends and/or complements.

**AMMENDMENT TO GTS 70000/740/402****1. SCOPE**

Add:

The present Particular Technical Specification relates to the manufacture of "Pipeline Ball Valves" (for above and underground) for the CNG & City Gas Distribution Project in Hyderabad Phase -II.

**2. DEFINITIONS**

Add:

**Purchaser** shall mean Bhagyanagar Gas Ltd (BGL)

**GTS** means <<General Technical Specification 70000/740/GTS/402 Rev. 7 >> and all documents it refers to.

**PTS** means the present <<Particular Technical specification P.002062/L/21/0315>> and all its appendices, if any.

**Manufacturer** means the Manufacturer of the valves as well as its sub-contractor(s).

**Control Authority** Owner/Engineer or their Authorised Inspection Agency

**Inspection Agency or Third Party Inspection Agency(TPIA)** means the Inspection Agency to be appointed by the Manufacturer.

**Engineer/ Owner's representative** the entity of the purchaser or the company nominated by the purchaser to design the natural gas transport or distribution system and to specify the equipment.

**3. PRELIMINARY STATEMENT**

Add:

- In case of conflict between the requirements in technical documents, the most severe requirements shall apply.
- A valid copy of API 6D monogram/certificate shall be submitted with the offer.

Modify:

- For any control, test or examination required under the supervision of the Authorised Control authority (LOFC Intervention points included), the latter shall be informed in writing FIVE (5) working days in advance by the Manufacturer (Fifteen working days in case of supply of foreign origin) about place and time with a copy to the Purchaser/Engineer. Wages and travel expenditure of the Authorised Control Authority are at the Purchaser's expenses.

- As the manufacturing is to be carried out under LOFC concept, the Manufacturer shall send for approval a List of Operation in Manufacturing and Control (see annex 1) to the Authorised Control Authority and Purchaser/Engineer, TEN (10) working days before manufacturing. This list shall be in conformity with the annex 1 to this document. Before starting any manufacturing, the Manufacturer shall be in possession of this approved document, filled in with all intervention points.

**6. DESIGN AND CONSTRUCTION**

**6.2 DESIGN**

**6.2.2 Welding ends**

Add:

The valve manufacturer shall supply all butt weld valves with a welded pups/Transition piece at both ends which shall be considered as an integral part of the valve & hence such as strength test, hydrostatic test & leak test should be done with pup-piece/transition piece weld on valve.

The chemical composition of the steel of the Pup/Transition piece meets the following requirements.

Maximum limit of chemical elements which may be used in material under this Particular Technical Specification.

	%maximum
C	0.230
Mn	1.60
Si	0.50
P	0.030
S	0.025
Nb	0.080
V	0.120
Mo	0.250
Ni	0.0150

Alternate alloy elements may be used but they shall be discussed with the user prior to delivery of the material. This table is not intended to represent the composition of any heat of steel, but merely to record the maximum permissible amounts of one element. The combination of elements of any heat must conform to the carbon equivalent, computed like following:

$$C.E. = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$$

And shall not exceed 0.43

For each heat the manufacturer shall analyse the following elements:

C, Mn, Si, P, S, Nb, V, Cr, Mo, Ni and Cu.

The intentional addition of elements other than those specified is not permitted unless agreed upon by the purchaser.

In any case, for an intentional additions, the following limitations shall be respected:

Cr ≤ 0.15%	Mo ≤ 0.05%	Cu ≤ 0.20%
Ni ≤ 0.30%	Co ≤ 0.01%	Al ≤ 0.07%

The content of N total (Ni) may be up to 0.0150% and must be guaranteed by the manufacturer. If the manufacturer cannot give any guaranty of N content, he shall analyse this element.

The total content for Nb + V will be limited to 0.150%.

In grades X42 through X60 for each reduction of 0.01% below the maximum Carbon content, an increase of 0.05% Manganese above the specified maximum is permissible, up to a maximum of 1.70%.

The choice and use of alloying elements made from high strength low alloy steels to give the tensile properties of API 5L X 52 (in table hereafter), is of the responsibility of the manufacturer.

Symbol	Yield Strength (min.)		Tensile Strength (min.)		Elongation in 2 in Gauge length.  Min. percent
	Ksi	Mpa	Ksi	Mpa	
<b>X 52</b>	52.2	360	66.7	460	As per Table 7 of API 5L 44 <sup>th</sup> edition.

The ratio of effective yield strength to effective tensile strength of the steel shall not exceed 0.85.

If the butt-welding end of the valve has a thickness and/or a steel grade not equal to the connecting pipe, butt-welding ends shall be in accordance with any of the suggestive figures and its connecting clauses given in Appendix I of ASME B 31.8 or an appropriate combination selected by the valve manufacturers to ensure that availability of uniform pig passage without sacrificing pressure-temperature design requirement.

Material, diameter and thickness of line pipe where the valve is required to be welded. Table below indicate the size, thickness, material of the line pipe for various sizes of Ball valves:

Sr. No as per MR	Size of Ball valve	Material of construction of Pipe	Thickness
1	4" A/G	API5L X52 - 10 Nos	6.4 mm
2	6" A/G	API 5L X52 - 10 Nos	6.4 mm
3	12" U/G	API 5L X52- 31 Nos	7.1 mm
4	16" U/G	API 5L X52 – 11 Nos	8.74 mm

The Valve Manufacturers shall submit all necessary details regarding welding of BW end of valve with Line pipe along with calculation for provided thickness for approval of Owner/Owner's representative.

**6.2.4 Design features**

Double piston effect: when the pressure is applied to one side, let us say upstream side, and when upstream ball seat is leaking, transfer pressure shall have a positive shut-off effect on the downstream seat (acting, for instance, on the back face of this seat) and thus reinforcing the global tightness of the valve. (*Not applicable*)

6.2.5 Vent, sealant etc. shall be adequately supported on the stem and body using clamps.

**7. MATERIALS****7.2 PRESSURE RETAINING PARTS**

Modify clause no. 7.2.1 as below:

Bodies including end flanges and welding ends (other than for field welding), bonnet and covers of valves, Ball/Obturator shall be made in material conforming to API 6D spec. (or another material specification accepted by the Purchaser/Engineer) and be furnished with certificates EN 10204-3.2 stating the quality, the mechanical properties (yield strength, tensile strength, percent elongation, impact test value at the temperature specified under per Section 8.4.2) the chemical analysis, the manufacturing process and the marking (e.g. the heat number) of the steel. These certificates shall be added to the CMTR.

**7.3 BONNET, COVER AND BODY BOLTING**

Modify first paragraph as below:

Bonnet flange cover and body bolting shall conform to ASTM A320 Gr L7 or L7M or ASTM A193 grade B7 or B7M. Nuts shall be conforming to ASTM A194 Gr 7 or 7M or 2H. For NPS greater than 4", they must be supplied with certificates EN 10204-3.2 and for NPS 4" and smaller with certificates EN 10204.3.1. These certificates shall be added to CMTR.

**7.6 SOUR GAS SERVICE**

Not Applicable

**8. FABRICATION AND TEST****8.1 WELDING FABRICATION**

Replace third point by:

The joints shall be furnished in accordance with the requirements of Section VIII of ASME Boiler and Pressure Vessel Code - Division 1. and Section IX.

Add:

Vendor shall provide detail instruction for carrying out welding; pre heating etc and testing of weld joints between pipe and valves at site. Vendor shall depute engineer for welding instruction at site .

**11. PAINTING AND COATING**

Refer Painting System & Colour Code for Final Layer (P.002062/L/98/0318)

Following coating specification shall be followed:

The surface of the valve will be shot-blasted SA 2 1/2 (Swedish standard SIS 055900). Before painting, the valve shall be cleaned from grease and dirt. The painting shall consist of a primer coating (30 - 40 µm) and a finish coating (30 - 40 µm).

The nature of the products shall be specified in the offer and shall guarantee a corrosion protection for a storage period in a shop for at least one year.

Painting in accordance with Purchaser/Engineer's specifications.

Painting and coating procedures shall be submitted for approval before manufacturing to the Control Authority and to the purchaser/engineer.

<b>TRACTEBEL Engineering</b> <b>GDF SUEZ</b>	<b>GENERAL  TECHNICAL  SPECIFICATION</b>	<b>70000  740  GTS/402</b>
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**PIPELINE VALVES**

7	14/09/09	Logo Changed	AA	PK	NC
6	22/09/08	Logo Changed	AA	PK	NC
5	27/01/04	Updated + Logo Changed	MRY	MRT	DKB
4	30/10/02	Updated	MRY	LEP	LEP
3	01/07/02	Updated	MRY	LEP	LEP
2	07/11/01	Updated	AES	LEP	LEP
1	22/06/00	First issue	AES	LEP	LEP
<b>Rev.</b>	<b>Date</b>	<b>Subject of revision</b>	<b>Author</b>	<b>Checked</b>	<b>Approved</b>

**200028**

**TABLE OF CONTENTS**

<b>1. <u>SCOPE</u></b> .....	<b>1</b>
<b>2. <u>DEFINITIONS</u></b> .....	<b>1</b>
<b>3. <u>PRELIMINARY STATEMENT</u></b> .....	<b>1</b>
<b>4. <u>GENERAL</u></b> .....	<b>3</b>
<b>5. <u>CODES, NORMS AND STANDARDS</u></b> .....	<b>3</b>
<b>6. <u>DESIGN AND CONSTRUCTION</u></b> .....	<b>5</b>
6.1. <u>RATINGS</u> .....	<b>5</b>
6.2. <u>DESIGN</u> .....	<b>6</b>
6.3. <u>OPERATION</u> .....	<b>10</b>
<b>7. <u>MATERIALS</u></b> .....	<b>11</b>
7.1. <u>STEEL USED</u> .....	<b>11</b>
7.2. <u>PRESSURE RETAINING PARTS</u> .....	<b>11</b>
7.3. <u>BONNET, COVER AND BODY BOLTING</u> .....	<b>13</b>
7.4. <u>NON-METALLIC PARTS</u> .....	<b>13</b>
7.5. <u>OTHER PARTS</u> .....	<b>13</b>
7.6. <u>SOUR GAS SERVICE</u> .....	<b>13</b>
<b>8. <u>FABRICATION AND TEST</u></b> .....	<b>13</b>
8.1. <u>WELDING FABRICATION</u> .....	<b>13</b>
8.2. <u>WELDING PROCEDURES</u> .....	<b>14</b>
8.3. <u>HEAT TREATMENT</u> .....	<b>15</b>
8.4. <u>MECHANICAL TESTS ON THE PARTS USED FOR WELDING CONNECTION          WITH THE LINE PIPES</u> .....	<b>15</b>
8.5. <u>NON DESTRUCTIVE EXAMINATION (NDE)</u> .....	<b>16</b>
8.6. <u>PRESSURE TESTING</u> .....	<b>18</b>

<b>TRACTEBEL Engineering</b> <b>GDF SVEZ</b>	GENERAL TECHNICAL SPECIFICATION	<b>70000</b> <b>740</b> <b>GTS/402</b>
---	---------------------------------------	--

8.7. OPERATIONAL TORQUE TEST .....21

8.8. FIRE TEST .....21

8.9. ANTI-STATIC DEVICE TESTING .....21

8.10. VISUAL AND DIMENSIONAL EXAMINATION.....21

**9. MARKING .....21**

**10. INSPECTION.....22**

10.1. INFORMATION.....22

10.2. DOCUMENTS.....22

10.3. CERTIFIED MATERIAL TEST REPORT .....23

10.4. QRN23

10.5. REPAIR .....23

10.6. REJECTION .....23

**11. PAINTING AND COATING .....23**

- TABLE I : CHEMICAL COMPOSITION FOR WELDING END OF VALVES
- TABLE II : TENSILE REQUIREMENTS OF THE WELDING END OF VALVES
- ANNEX I : LOFC (LIST OF OPERATIONS OF FABRICATIONS AND CONTROLS)

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<b>TRACTEBEL Engineering</b> 	<b>GENERAL  TECHNICAL  SPECIFICATION</b>	<b>70000  740  GTS/402</b>
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1. **SCOPE**

This General Technical Specification covers the supply of pipeline valves used in high pressure natural gas transport and distribution systems. It describes the general requirements, controls, tests, QA/QC, examination and final acceptance criteria which needs to be fulfilled.

This specification is general and is updated / amended by the Particular Technical Specification dedicated to the project.

2. **DEFINITIONS**

**Engineer** : The Entity of the Purchaser or the Company nominated by the Purchaser to design the natural gas transport or distribution system and to specify the equipment.

**Purchaser** : The Company which makes the purchase order.

**Control Authority or CA** : The Organisation put in place/requested by the Purchaser/Engineer to proceed to Quality Controls and Certification.

**Manufacturer** : Manufacturer who receive the purchase order

3. **PRELIMINARY STATEMENT**

The name of Control Organisation shall be mentioned in the purchase order.

Eventual interpretations and deviations to this specification by the Manufacturer shall be requested by writing in his offer with detailed justification and approved by the Purchaser/Engineer and the Control Authority before the eventual order to the Manufacturer. The latter is responsible and shall indemnify the Purchaser/Engineer for any damage resulting from the non-respect of this obligation.

The specifications of the steel used, the material Manufacturer and all potential subcontractors (such as forging plant, heat treatment, weld fabrication, ...) will be described in the offer. After order, no change will be accepted except for justified "force majeure". In that case, the asked changes shall be supported by a technical file submitted to the Purchaser/Engineer for approval.

The Manufacturer shall provide a technical description of the manufacturing method that might influence the quality of the material.

When the order is placed, the Manufacturer shall promptly inform the Purchaser/Engineer about his subcontractor's names, addresses, phone numbers as well as sub-order numbers, extent and delivery terms. On this basis, the Manufacturer shall send a general planning including at least the raw material supply, the manufacturing stages (machining, welding, part assembly, ...), testing, painting and packing/dispatching. This planning shall be updated by the Manufacturer at least every month unless otherwise provided in the purchase order. A Dispatcher/Inspector

<b>TRACTEBEL Engineering</b> <b>GDF SVEZ</b>	<b>GENERAL  TECHNICAL  SPECIFICATION</b>	<b>70000  740  GTS/402</b>
---	--	------------------------------------

delegated by the Purchaser is entitled to follow, examine and verify the planning's relevance and effectiveness.

The Purchaser keeps the right to audit the Manufacturers and subcontractor's manufacturing process and control methods. All costs form such an audit shall be borne by the Manufacturer except the wages and travel expenditures of the auditor(s) supported by the Purchaser.

The manufacturing processes and the laboratories, in which welding tests, destructive and non destructive tests are carried out, shall be approved by the Control Authority.

The Purchaser/Engineer and the Control Authority shall have, at any time, free access to all parts of the Manufacturer's facilities and to those of all his subcontractors involved in the order manufacturing. All reasonable means shall be placed at the inspector(s)'s disposal to enable him to check that the product is being manufactured in accordance with this specification. All tests and inspections required in this specification shall be carried out, prior to shipment, in the Manufacturer's plant (or subcontractor's plant) and at the Manufacturer's expenses, unless otherwise provided in the order. The Purchaser/Engineer and the Control Authority shall try not to interfere unnecessarily with other Manufacturer's works when running these tests and inspection.

A valid copy of the ISO 9001 certificate shall be included in the offer.

For any control, test or examination required under the supervision of the Control Authority (LOFC intervention points included), the latter shall be informed in writing FIFTEEN (15) working days in advance by the Manufacturer about place and time with a copy to the Purchaser/Engineer.

If manufacturing is to be carried out under LOFC concept, the Manufacturer shall send for approval a List of Operation in Manufacturing and Control to the Control Authority and Purchaser/Engineer, TEN (10) working days before manufacturing. This list shall be in conformity with the annex 1 to this document. Before starting any manufacturing, the Manufacturer shall be in possession of this approved document, filled in with all intervention points.

Material, even released by the Control Authority and in which injurious defects are found after delivery, shall be rejected. The Manufacturer shall be notified and the material replaced : all costs involved, including wages and travel expenditure of the Control Authority's representative, Purchaser and Engineer shall be borne by the Manufacturer.

An approval of documents can never be considered as an acceptance of deviations on relaxations to requirements. A deviation is only possible after specific request to the purchaser.

**4. GENERAL**

- Valves are intended to be used in aboveground or underground, with cathodic protection services.

All particular conditions for each valve are described in attached data sheet and valve list.

All valves shall conform to API 6D spec. Whenever this specification and API 6D spec. conflict, this specification shall prevail.

Unless otherwise specified, pipeline valves covered by this specification are suitable for use in gas transmission and distribution systems, and in accordance with ASME B31.8.

**5. CODES, NORMS AND STANDARDS**

Latest edition of following standards are applicable.

- **ASME STANDARDS**

ASME B16.5	Pipe flanges and flanged fittings
ASME B16.34	Valves- flanged and butt welding end
ASME B31.8	Gas transmission and distribution piping systems

- **ASTM STANDARDS**

ASTM A 53	Pipe, steel, black and hot-dipped zinc coated welded and seamless
ASTM A 105/A 105 M	Forgings, carbon steel, for piping components
ASTM A 106	Seamless carbon steel pipe for high temperature service
ASTM A 193/A 193 M	Alloy steel and stainless steel bolting materials for high temperature service
ASTM A 194/A 194 M	Carbon and alloy steel nuts for bolts for high temperature service
ASTM A 234/A 234 M	Piping, fittings of wrought carbon steel and alloy steel for moderate and elevated temperatures
ASTM A 320/A 320 M	Alloy steel bolting materials for low temperature service

<b>TRACTEBEL Engineering</b> <b>GDF SUEZ</b>	<b>GENERAL TECHNICAL SPECIFICATION</b>	<b>70000 740 GTS/402</b>
---	--	----------------------------------

ASTM A 333	Seamless & Steel Pipes for low temperature service
ASTM A 350/A 350 M	Forgings, carbon and low alloy steel, requiring notch toughness testing for piping components
ASTM A 370	Mechanical testing of steel products
ASTM A 381	Metal-arc-welded steel pipe for use with high-pressure transmission systems
ASTM A 420/A 420 M	Piping fittings of wrought carbon steel and alloy steel for low temperature service
ASTM A 694/A 694 M	Forgings, carbon and alloy steel, for pipe flanges, fittings, valves, and parts for high-pressure transmission service
ASTM A 707/A 707 M	Flanges, forged, carbon and alloy steel for low temperature service
• API STANDARDS	
API 5L	Specification for line pipe
API 6D	Specification for pipeline valves, end closures, connectors and swivels
API 6FA	Fire test for valves
API 605	Large diameter carbon steel flanges
• MSS STANDARDS	
MSS SP 6	Standard Finishes for Contact Faces of Pipe Flanges & Connecting – End Flanges of Valves and Fittings
MSS SP 25	Standard marking system for valves, fittings, flanges and unions
MSS SP 44	Steel pipeline flanges
MSS SP 54	Quality Standard for Steel Castings for Valves, Flanges and Fittings and Other Piping Components Radiographic Examination Method
MSS SP 55	Quality standard for steel castings for valves, flanges and fittings and other piping components (visual method)

<b>TRACTEBEL Engineering</b> 	<b>GENERAL  TECHNICAL  SPECIFICATION</b>	<b>70000  740  GTS/402</b>
---	--	------------------------------------

MSS SP 72                      Ball valves with flanged or butt welding ends for general service

MSS SP 75                      Specification for high test wrought butt welding fittings

- ASME STANDARDS

ASME                              Boiler and Pressure Vessel code

- EN STANDARDS

EN 10204                        Metallic products : types of inspection documents

EN 10045/1                      Metallic products : Charpy impact test – test methods (V and U notches)

- ISO STANDARDS

ISO 148                            Acier – Essai de résilience Charpy (entaille V)

ISO 9001 :                        Quality management standard

- BRITISH STANDARDS

BS 5146                            Inspection and test of valves

BS 5351                            Steel ball valves for the petroleum, petrochemical and allied industries

- NACE STANDARDS

MR0175                            Sulphide Stress Cracking Resistant Metallic Materials for Oilfield Equipment.

## 6. **DESIGN AND CONSTRUCTION**

### 6.1. **RATINGS**

- 1) The pressure temperature ratings of flanged and butt welding end valves shall be in accordance with ASME B16.34.
- 2) The temperature and pressure ranges of valves shall be in accordance with the indicated values on the appropriated piping specification and valve data sheet.
- 3) Wall thickness for parts used for the welding connection with the line pipes shall meet the following requirements :

<b>TRACTEBEL Engineering</b> <b>GDF SUEZ</b>	<b>GENERAL  TECHNICAL  SPECIFICATION</b>	<b>70000  740  GTS/402</b>
---	--	------------------------------------

- The maximum allowable stress in the material of the butt weld connection for butt welding end valves shall be equal to fifty per cent of the minimum yield strength guaranteed by the specification of the steel used.
  - The minimum wall thickness for butt welding connection must be greater than or equal to the largest value of either the calculated minimum thickness of butt welding connection or the nominal thickness of the pipe as indicated on data sheet.
  - If the butt welding connection has a yield strength lower than the yield strength of the pipe to which it is intended to be welded, the wall thickness in each zone of the butt welding connection is at least equal to the specified pipe wall thickness times the ratio of the minimum yield strength guaranteed by the specification of the steel of the pipe and the minimum yield strength guaranteed by the specification of the steel of the butt welding connection.
  - The specified pipe wall thickness and grade (with reference to the equivalent grade in API 5L spec. or ASTM spec.) with which the valve is intended to be used is specified in the data sheet/piping class.
- 4) The Manufacturer shall submit for approval to the Control Authority and to the Purchaser/Engineer the dimensional drawings, the calculation of the parts used for the welding connection to the pipeline and the material part list for all the types of valves. All these documents must be identified with the individual valve number according to attached valve list and shall be attached to the CMTR.
- 5) The design shall take into consideration performance requirements prescribed in the next paragraph.

All valves under this specification shall be designed to withstand a field hydrostatic test pressure with non corrosive water, after installation, during 24 hours when the gate, plug, ball or piston is partially or fully open at a pressure of 1.5 times the 38°C pressure rating gauged by ASME B16.34

During this test the closure element shall not be moved.

## 6.2. DESIGN

### 6.2.1. Face-to-face and end-to-end dimensions

Face-to-face and end-to-end dimensions for ball valves shall be in accordance with API spec. 6D.

Valves may be made to special dimension by agreement between the Manufacturer and the Purchaser.

6.2.2. Welding ends

The connecting pipe outside diameter, wall thickness, specified minimum yield strength and material grade are mentioned in the relevant piping specification and valve data sheet.

Butt-welding ends shall be in accordance with figure 1 for wall thickness up to 20.0 mm; for thicker walls, refer to figure 2. The inside diameter at the welding end shall be equal to that of the pipe on which the valve shall be welded. If a welding end of a valve has a thickness not equal to the pipe with which it is intended to be used, the welding end preparation at the joint has to be in conformity with fig. 3.

The tolerance of the inside diameter at the bevel end shall be following :

NPS	Tolerance of inside diameter at bevel end (1) (mm)	
2" - 10"	+ 1.6	-0.4
12" - 48"	+ 2.4	-0.8

(1) Tolerance refers to variation from specified ID calculation by (OD spec. - 2t spec).

OD = outside diameter

t = wall thickness

The out-of roundness at a welding end, defined as the difference between the maximum and the minimum inside diameter at the welding pipe end shall not exceed 1% of the specified inside diameter.

The length of the butt end shall be sufficient to allow welding and heat treatment without damage of the internal parts of the valve. If Purchaser/Engineer accepts design which do not meet this requirement, than Manufacturer shall inform the Purchaser/Engineer about the precautions which needs to be fulfilled in order to guarantee that during welding of the butt welding ends no damage shall occur to the seat. These precautions shall be highlighted by the Manufacturer in the erection and installation instruction book.

6.2.3. End flanges

End flanges shall be furnished in the same class as the valve body with raised face or ring-joint face, as specified by the valve data sheet. Dimensions and tolerances (including drilling templates, flange facing, spot facing and back facing) shall conform to :

- ASME B16.5 standard for NPS 24" and smaller
- MSS SP-44 for NPS 26" to 60"
- MSS SP-6 for flange facing.

<b>TRACTEBEL Engineering</b> <b>GDF SUEZ</b>	<b>GENERAL  TECHNICAL  SPECIFICATION</b>	<b>70000  740  GTS/402</b>
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#### 6.2.4. Design features

All ball valves shall be full bore - to allow pigging - unless stipulated otherwise on the valve data sheet.

All trunnion mounted ball valves shall be fitted with following devices :

- Double block and bleed : design of a valve with two seating surfaces between which the cavity can be vented through a bleed connection and thus confirm the tightness of the valve, at least in closed position, when pressure is applied to any side or both sides of the valve.
- Double piston effect : when the pressure is applied to one side, let us say "upstream" side, and when upstream ball seat is leaking, transfer pressure shall have a positive shut-off effect on the downstream seat (acting, for instance, on the back face of this seat) and thus reinforcing the global tightness of the valve.
- Anti-static design : all ball valves shall be fitted with anti-static device conforming to BS 5351.
- Stem retention (anti blow-out) : In conformity with BS 5351 valve shall be designed with an anti blow-out stem so that the stem cannot be fully ejected by pressure inside the valve with the stem packing, gland retainer bolting removed.
- Secondary seat and stem sealing : all ball valves NPS 6" shall be fitted with a secondary stem sealing and all ball valves greater or equal to NPS 8" shall be fitted with a secondary seat and stem sealing. This system permits an injection of sealant and shall be fitted with an integral check valve. The number and the location of sealing points shall be on the Manufacturer's responsibility.

Purchaser is allowed to request the check of this system design and its operation, specially for modified or new valve model.

- A drain connection shall be located at the lowest part of the body cavity.

#### 6.2.5. Auxiliary connections

The Manufacturer shall complete the valve data sheet with the size and allowable pressure for the following auxiliary piping connections.

##### a) Aboveground valves

- The drain shall be plugged.
- The vent/bleed connection for valves NPS 6" and above shall be equipped with one block valve plus one needle valve, each with anti blow-out stem. The block valve shall be of ball type. The needle valve shall have screwed connections, shall be preferably of angular pattern and shall be fitted with a special plug at the outlet : this plug shall be designed to relieve slowly the pressure without being ejected.

<b>TRACTEBEL Engineering</b> 	<b>GENERAL TECHNICAL SPECIFICATION</b>	<b>70000 740 GTS/402</b>
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- For valve size < NPS 6", the vent/bleed connection shall be equipped with this anti blow-out, depressurising plug only.
- Each secondary stem - and each secondary seat sealing device, when required (see § 6.2.4.), shall be fitted with a check valve integrated in the body plus a sealant fitting with built-in, spring loaded ball check valve, as mentioned in the valve data sheet.

b) Underground valves

- Vent/bleed connection shall be plugged and this functionality is by passed through the drain.
- Drain shall be fitted with a normally open block valve (ball type with anti blow-out stem) at the drain tap, piped to the upper part of the extension and ended by one ball valve plus one needle valve, each with anti blow-out stem.
- The needle valve shall have screwed connections, shall be preferably of angular pattern and shall be fixed with an anti blow-out, depressurising plug, at the outlet.
- Each stem and seat sealing connection, when required (see § 6.2.4) shall have a check valve integrated in the main valve body, a block valve (ball type with anti blow-out stem) closed to the body tap, shall be piped up to the upper part of the extension and equipped with a block valve (same type) plus a sealant fitting with built-in, spring loaded check valve, as mentioned in the valve data sheet.
- Valves and tubing shall be carefully fastened to the valve body and/or extension.

Valve bodies shall have tapped holes with a minimum effective threaded engagement at least equal to the nominal thread diameter. If body wall thickness is too thin, then unthreaded side of OEP/OET (One End Plain/One End Threaded) piece of pipe of a material compatible with the body, shall be welded to the valve body with full penetration or via a boss. Anyway, weld on threads is prohibited.

Material of auxiliary connections (pipe, tube, fittings, valve, ...) shall be, at the least of the same material quality as the main valve and can be in stainless steel series AISI 300.

6.2.6. Stem extension for underground valve

When a stem extension is required (see valve data sheet), the configuration and the length H shall be in accordance with this valve data sheet.

In this case and except otherwise specified in the purchase order, valves shall be fitted with drain and sealant extensions well fixed to the stem extension and clearly indicated in the as built design. The stem extension shall be fully watertight, but shall be provided with a means to prevent overpressure built up in the mechanism resulting from stem or bonnet seal leakage.

Valves, equipped with stem extension and/or actuator, shall be delivered completely equipped and mounted (in one piece).

<b>TRACTEBEL Engineering</b> 	<b>GENERAL  TECHNICAL  SPECIFICATION</b>	<b>70000  740  GTS/402</b>
---	--	------------------------------------

Underground actuated valves shall be provided with one identification plate on the valve body and one on the upper part of the extension.

6.2.7. Miscellaneous

Lifting lugs are required on all valves NPS 6" and larger. The lifting lugs shall be stamped with the safe working load. Number of lugs shall be sufficient for safe handling on site. Valve support : All valves greater than NPS 24" shall be equipped with supports to permit the installation of the valve in horizontal position directly on the floor. These supports shall be directly welded or fitted on the body of the valve.

6.2.8. Design review

The Manufacturer shall submit for approval to the Engineer/Purchaser and Control Authority the calculation for all bonnet, cover and body bolting for pressure retaining parts conforming to ASME B16.34.

6.3. OPERATION

6.3.1. Valve shall be operated by a hand-wheel, wrench, manual key or actuator.

Manual override devices shall be provided on all valves. Hand-wheels of electric actuators, shall be normally disengaged and shall automatically disengage when the actuator is operated.

6.3.2. The length of the wrench or diameter of the hand-wheel for direct or gear operated valves shall (after opening and closing a new valve at last three times) be such that a force not exceeding 350 N shall be required to operate the ball from either the open or closed position under the maximum differential pressure recommended by the Manufacturer.

For valves without stem extension equipped with a hand-wheel in vertical position, the maximum radius of the hand-wheel is equal to the distance between the centre line of the pipe and the centre of the hand-wheel minus 120 mm. In this case no extruding lugs on hand-wheel are permitted, and provision for by-pass valve shall be kept.

6.3.3. Hand-wheel shall be marked to indicate the direction of closing.

6.3.4. Hand-wheels and wrenches shall be fitted in such a way that whilst held securely they can be removed and replaced where necessary.

6.3.5. All ball valves shall be provided with a mark on the stem to show the position of the ball in order to enable a good regulation of the actuator without seeing the ball. Exception can be made for valves with gear boxes for underground service.

<b>TRACTEBEL Engineering</b> 	<b>GENERAL TECHNICAL SPECIFICATION</b>	<b>70000 740 GTS/402</b>
---	--	----------------------------------

6.3.6. Ball manual direct operated valves shall be fitted out with fully open and fully closed stops. These stops shall be well fixed to the body of the valve in order to withstand many extreme opening and closing actions. These stops shall be easily removable. Ball gear operated valves shall be fitted out with fully open and fully closed stops shall be adjusted and fixed on the gear box.

6.3.7. The Manufacturer shall advise the maximum operating torque or force which can be sustained without causing permanent damage anywhere in the drive train from the actuator to the obturator. The Manufacturer shall also provide the torque graph : torque value in function of opening angle of the ball and pressure.

Deflection in the extended drive train must be limited so that the closing position contact reflects exactly the real position of the obturator.

6.3.8. Maximum rated differential pressure (MRDP)

The MRDP is the maximum difference between the valve upstream and downstream pressure at which the obturator (closure member) may be operated (opening). The Manufacturer shall specify this value and shall mark it on the valve name plate.

For the specification of different types of actuator refer to the concerned GTS/740/403.

## 7. **MATERIALS**

### 7.1. **STEEL USED**

The steel used in the valve Manufacturing shall be selected by the Manufacturer and filled in data sheet form

This list shall be submitted for approval to the purchaser/Engineer at the time of the offer. This list shall be added to the CMTR.

### 7.2. **PRESSURE RETAINING PARTS**

For pressure retaining parts the following requirements must be fulfilled

7.2.1. Bodies, including end flanges and welding ends (other than for field welding), bonnet and covers of valves shall be made in material conforming to API 6D spec. (or another material specification accepted by the Purchaser/Engineer) and be furnished with certificates EN 10204-3.1. B stating the quality, the mechanical properties (yield strength, tensile strength, percent elongation, impact test value at the temperature specified under per Section 8.4.2), the chemical analysis, the manufacturing process and the marking (e.g. the heat number) of the steel. These certificates shall be added to the CMTR.

For the valves with butt welding end, for the part on which the line pipe shall be welded, see paragraph 7.2.4. and 8.4.

<b>TRACTEBEL Engineering</b> 	<b>GENERAL TECHNICAL SPECIFICATION</b>	<b>70000 740 GTS/402</b>
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7.2.2. Notch toughness properties

The impact test temperature conditions and temperature are defined under Section 8.4.2.

7.2.3. The carbon content of parts involved in welding operation (except for those parts which shall be used for the welding connection with the line pipes) shall be restricted as follows :

- maximum percentage of carbon : 0.230

- $C + \frac{Mn}{6} \leq 0.41$

7.2.4. For parts used for the welding connection with the line pipes the following supplementary requirements must be fulfilled :

- The chemical composition of the steel meets the requirements of table 1. The choice and use of alloying elements made from high strength low alloy steels to give the tensile properties prescribed in table 2 shall be made by the Manufacturer and included and reported to identify the type of steel.
- For each heat, the Manufacturer shall analyse the following elements : C, Mn, Si, P, S, Nb, V, Cr, Mo, Ni and Cu.
- The carbon equivalent shall be computed by the following equation :

$$C.E. = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$$

and shall not exceed 0.45.

- The steel used shall be fully killed, fine grain practice.
- The steel used shall be suitable for field welding to pipes, flanges or fittings manufactured under ASTM A53, A105, A106, A234, A333, A350, A381, A420, A694, A707 or API 5L, 605 or MSS SP-44, SP-72, SP-75, EN10208-2.
- The steel used has tensile properties conforming to requirements prescribed in table 2 and capable of meeting the valve design.
- The ratio of yield strength to tensile strength shall not exceed 0.85.
- Mechanical tests as prescribed in section 8.4. shall be performed after final heat treatment.

<b>TRACTEBEL Engineering</b> <b>GDF SUEZ</b>	<b>GENERAL  TECHNICAL  SPECIFICATION</b>	<b>70000  740  GTS/402</b>
---	--	------------------------------------

7.3. **BONNET, COVER AND BODY BOLTING**

Bonnet flange cover, and body bolting shall be conform to ASTM A320 Gr L7 or L7M or ASTM A193 grade B7 or B7M. Nuts shall be conform to ASTM A194 Gr 7 or 7M or 2H. For NPS greater than 4", they must be supplied with certificates EN 10204-3.1.C. and for NPS 4" and smaller with certificates EN 10204.3.1.B. These certificates shall be added to CMTR.

Bolt design shall be done to withstand safety all stresses occurring under operating conditions, calculations shall be submitted for approval.

Materials shall be compatible in order to avoid galvanic corrosion and shall not be susceptible to hydrogen embrittlement or stress corrosion cracking. Manufacturer must take into account that the materials shall be eventually cathodic protected.

7.4. **NON-METALLIC PARTS**

Non-metallic parts and elements, which usually include such items as packing, injectable material and lubricants, shall be suitable for the service and must be defined in the offer.

7.5. **OTHER PARTS**

Metal parts, which usually include such items as yokes, yoke nuts, stems, glands, gland bushing, gates, balls, plugs, discs, pistons, hand-wheel, gearing and motor drive attachments, shall be of material suitable for the service and must be defined in the offer.

7.6. **SOUR GAS SERVICE**

When sour gas service or NACE is specified, all process wetted, pressure containing parts and bolting shall meet the requirements of NACE MR0175.

**8. FABRICATION AND TEST**

Prior to manufacturing a meeting shall be organised between Manufacturer, Purchasing agent, Engineer and Control Authority.

8.1. **WELDING FABRICATION**

- 1) Welds and repair welds shall be performed according to written procedures. The welding procedure must be submitted for approval to the Control Authority before any fabrication and/or repair.
- 2) Only welders and welder operators who are qualified shall be used in production.
- 3) The joints shall be furnished in accordance with the requirements of Section VIII of ASME Boiler and Pressure Vessel Code - Division 1.

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- 4) The machine welding shall be done by an electric process, preferably by submerged arc.
- 5) Repair by welding is prohibited on forged material.

8.2. WELDING PROCEDURES

- 8.2.1. All welds, repair welds and repair by welding shall be performed according to written procedures. These welding procedures shall be qualified according to the requirements of the ASME Boiler and Pressure Vessel Code, Section IX.

The welding procedure tests are required on material which is on the high side of the chemistry specification.

The Manufacturer shall maintain a weld record of the procedure and performance test results.

For the tensile test, the rupture of the specimen must take place in the unaffected parent material.

The welding procedure qualification must include an impact test set in the weld and in the HAZ with requirements of paragraph 8.4.2. and a macrographic examination described in paragraph 8.2.2. These tests shall be performed after eventual final heat treatment. If weld thickness is higher than 25 mm, even covered by the PQR, additional impact test shall be performed on the test specimens taken in weld thickness layers.

- 8.2.2. Macrographic examination : the etched surface of the macro test specimen viewed macroscopically must display the image of a well performed welded joint with sufficient penetration, free from linear defects and important inclusions. In case of doubt, the etched surface must be examined microscopically and additional macroscopic examinations of other areas may be required.

The macrographic examination will include hardness measurements in the weld and the HAZ. The hardness will not exceed the values measured on the parent metal by more than 80 points for the welds and 100 point for HAZ, with an absolute maximum of 350HV10.

The acceptance of inclusions can be decided upon with the NDE of the welded plates (see paragraph 8.5.).

- 8.2.3. Additional requirements for "Sour Gas". Qualified welding procedure shall guarantee a good geometry without stress concentration and shall be realised according to NACE MR 0175 (max. 1% Ni in welding consumables).

On the macro, series of hardness tests shall be performed in the base metal, weld and Heat affected zone; results shall be maximum 248HV10.

<b>TRACTEBEL Engineering</b> 	<b>GENERAL  TECHNICAL  SPECIFICATION</b>	<b>70000  740  GTS/402</b>
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8.3. HEAT TREATMENT

8.3.1. After hot working and before re-heating for normalising heat treatment, forging or casting shall be allowed to cool substantially below the transformation range. All forging or casting shall be heat treated by normalising. Normalising shall be carried out in such a way that the base material acquires a fine grained perlitic structure.

8.3.2. Heat treatment of welds : the rules of ASME VIII Div. 1 are applicable. If a required treatment is not feasible (seat damage, etc, ...), special agreement must be obtained from Purchaser/Engineer and Control Authority ACA, after the Manufacturer has proved good quality of welds.

8.3.3. The Manufacturer shall include in the CMTR data of this heat treatment.

8.4. MECHANICAL TESTS ON THE PARTS USED FOR WELDING CONNECTION WITH THE LINE PIPES

The following mechanical tests shall be performed on these parts after final heat treatment under the supervision of the Control Authority's delegate and the certificates shall be added to the CMTR.

Test specimens may only be cut after a marking transfer by the Control Authority.

8.4.1. Tensile testing

Requirements :

The material shall be in conformity with table 2. The ratio of yield strength to tensile strength shall not exceed 0.85.

Test specimen :

The test specimen represents any part of the same shape, the same heat of steel and the same heat treatment lot.

Number of test : one

Test location and orientation :

The test specimen shall be orientated transversally to direction of lamination and if this orientation is not feasible, it shall be orientated longitudinally. For castings only one orientation is applicable.

Test method :

Testing shall be performed in accordance with ASTM A370 standard rectangular plate type 1 1/2" wide (fig. 4 - A370) or standard round (fig. 5 or fig. 6 - A370).

<b>TRACTEBEL Engineering</b> 	<b>GENERAL TECHNICAL SPECIFICATION</b>	<b>70000 740 GTS/402</b>
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Yield strength shall be determined either by the 0.2 % offset or the 0.5 % extension under load (EUL) method. If another material are accepted by the Purchaser, the test method will be as specified in the material specification.

#### 8.4.2. Impact test

Requirements :

The standard impact test temperature is -20°C, except if otherwise stated in the "Material Requisition" or particular Technical Specification. The average value of a set of 3 test specimens shall be equal to 35 J/cm<sup>2</sup>. The minimum value per test specimen shall be equal to 35 J/cm<sup>2</sup> but this value may drop to 28 J/cm<sup>2</sup> for only one test specimen per series.

- Test specimen :

The test specimen represents any part of the same shape, the same heat of steel and the same heat treatment lot.

- Number of tests :

2 test sets (3 test specimens constitute one test set). For castings only 1 test set.

- Test location and orientation :

1 set shall be orientated longitudinally and another one transversally. For castings only one orientation is applicable.

- Test method :

The notched bar impact test shall be performed in accordance with ISO 148 or A370-Charpy V - Notch.

If the wall thickness of these parts or the coupon does not enable machining of full size specimens, the largest possible size must be used but not less than (10 x 5) mm. The axis of the notch shall be orientated through the wall thickness of these parts. If the weld thickness is > 25 mm, several specimen sets shall be taken in the weld thickness with min one (1) set per 12.5 mm of thickness, the specimen sets shall be selected in agreement with the Purchaser/Engineer and Authorised Control Authority.

#### 8.5. NON DESTRUCTIVE EXAMINATION (NDE)

The following NDE will be performed after the final heat treatment and before coating.

##### 8.5.1. List of NDE

- All butt welds shall be examined by a radiographic examination. If the thickness exceeds 15 mm or if the radiographic examination is not feasible than welds are only examined by ultrasonic examination to the largest extent possible.

<b>TRACTEBEL Engineering</b> 	<b>GENERAL TECHNICAL SPECIFICATION</b>	<b>70000 740 GTS/402</b>
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The radiographic examination shall be executed in accordance with ASME Boiler and Pressure Vessel Code, section V, art. 2 - using fine grain film and lead screens.

- Butt welding ends on cast bodies shall be examined before fabrication welding end, by radiography in accordance to MSS-SP-54 and over a width of 70 mm.
- 25 mm of base material at each side of each weld and each weld shall be 100 % ultrasonically examined.

The ultrasonic examination shall be executed in accordance with ASME Boiler and Pressure Vessel Code, section 5, art. 5.

- Body for all valves NPS 6" and greater shall be tested by magnetic particle examination in conformity with ASME Boiler and Pressure Vessel Code, section V, art. 7.
  - All valves shall be visually examined.
  - All valves shall be dimensionally examined.
  - For butt welding end valves after machining, the finished bevel end pipe used for field welding shall be submitted to the following tests :
    - ◆ Magnetic (ASME V Art. 7) or liquid penetrant (ASME V Art. 6).
    - ◆ Ultrasonic inspection (ASME V Art. 5) or radiographic examination (ASME V Art. 2) on 25 mm of base material.
    - ◆ Visual and dimensional examination.
  - If any repair by welding is performed, the concerned parts shall be completely re-examined.

#### 8.5.2. Additional NDE requirement for "SOUR Gas"

A series of hardness test on surfaces in contact with the fluid shall be performed to NACE MR 0175. Results shall be 22 HRC or 248 HV 10 max.

#### 8.5.3. Acceptance criteria of the different NDE

- Radiographic examination :
  - ASME Boiler and Pressure Vessel Code, section VIII, division 1, UW 51 for forged steel
  - ASME Boiler and Pressure Vessel Code, section VIII, division 1, appendix 7 for casted steel. The control will done on width of 70mm with.
  - On the first 40mm A1,B1,C1 acceptable, D, E, F and G are rejected.

<b>TRACTEBEL Engineering</b> 	<b>GENERAL TECHNICAL SPECIFICATION</b>	<b>70000 740 GTS/402</b>
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Between 40mm and 70mm, A2, B3, C3 acceptables; D, E, F, G are rejected.

- Ultrasonic inspection of weldings and HAZ:  
ASME Boiler and Pressure Vessel Code, section VIII, division 1, Appendix 12.
- Magnetic particle inspection of the body:  
ASME Boiler and Pressure Vessel Code, section VIII, division 1, Appendix 6.  
For casted pieces refer to Appendix 7.
- Visual examination  
MSS-SP-55.
- Magnetic particle or liquid penetrant of the finished bevel:  
The following defects are unacceptable :
  - Defects extending into the bevel provided the lamination is parallel to the surface and has a transverse dimension exceeding 6.35 mm.
  - All defects not parallel to the surface extending into the bevel.

All the NDE (except radiographic examination) shall be performed under the supervision of the control authority's delegate and the certificates shall be added to the CMTR.

## 8.6. PRESSURE TESTING

### 8.6.1. General requirements

- Each valve shall be tested by the Manufacturer under the supervision of the Control Authority after final completion of all welding and all heat treatment operations.
- Hydrostatic and air seat test shall be performed after an acceptable shell test.
- Fluid for shell and hydrostatic seat tests shall be liquid as water (which may contain a corrosion inhibitor), kerosene, or other fluid with a viscosity not greater than that of water. Temperature of the test fluid shall not exceed 50°C.
- Valves shall be substantially relieved of air when tested with liquid.
- Valves shall be shell tested prior to painting.
- Valve test fixture loads applied to valve ends shall be limited to those required to effectively seal the valve ends.
- Pressure testing certificates shall be included in the CMTR.

<b>TRACTEBEL Engineering</b> <b>GDF SUEZ</b>	<b>GENERAL  TECHNICAL  SPECIFICATION</b>	<b>70000  740  GTS/402</b>
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- Drain, the sealant and the bleed valve shall be included in all pressure tests.
- If any supplementary welding, repair by welding or treatment are performed, valve shall be completely re-tested.

8.6.2. Shell test

- Each valve shall be given a shell test at the gauge pressure not less than 1.5 times the 38°C rating gauged by ASME B16.34, rounded off to the next higher 1 bar increment.
- Shell test shall be conducted with the valve in a partially open position and with the valve ends closed.
- *Drain lines and valves*  
Shall be either included in the hydrostatic shell test, or tested separately.
- Duration of the shell test  
NPS up to 18" shall not be less than 15 minutes.  
NPS 20" and larger shall not be less than 30 minutes.
- Visual leakage or harmful inelastic deformation are not accepted.

8.6.3. Hydrostatic seat test

- Each valve shall be given a hydrostatic seat test at the gauge pressure not less than 1.1 times the 38°C rating gauged by ASME B16.34, rounded off to the next higher 1 bar increment.
- Seat closure testing shall be performed with seat surfaces free of sealant, grease or other foreign material that aids in sealing except as provided hereafter :
  - When necessary to prevent damage during valve actuation, a light oil of viscosity not greater than that of kerosene may be applied to sealing surface.
  - When valve primary design is based on the presence of a sealant material (lubricated plug valve), the sealant material may be in place.
- For valve of the double seating type such as gate, plug and ball valve, the test pressure shall be applied successively to each end of the closed valve and leakage to opposite end checked. Provision shall be taken before, for de energising the self relieving pressure system.
  - For soft seated valves there shall be no visible leakage - for metal seated valves the leakage rate shall not exceed 0.006 ml per minute and per mm of nominal pipe size (ND).

<b>TRACTEBEL Engineering</b> 	<b>GENERAL TECHNICAL SPECIFICATION</b>	<b>70000 740 GTS/402</b>
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- For double block and bleed valve the following tests shall be performed :
  - Close valve, open body vent, apply seat test pressure to both ends of the valve.
  - Close valve, open body vent, apply seat test pressure to one end of the valve, release pressure and repeat test for the other end of the valve.
- For double piston effect valve the following test shall be performed :
  - Release pressure, close valve, open body vent, apply seat test pressure through the body vent.
- For other valve type, the test pressure shall be applied across the closure member in the direction producing the most adverse seating conditions. For example, a globe valve shall be tested with pressure under the disc. A check valve, globe valve or other valve type designed, sold and marked as a one-way valve, requires a closure test only in the appropriate direction.
- The duration of the hydrostatic seat test shall not be less than 5 minutes for each end.
- Visual leakage or harmful inelastic deformation are not accepted.

#### 8.6.4. External leak testing

Under the supervision of the Control Authority's delegate, the Manufacturer shall check the external leak tightness of body, stem and all external taps. This shall be done with soap suds at an inner pressure of 6 bar. For underground valves, this test shall include piping, fittings and valves of the auxiliary lines for drain, vent/bleed and sealant connections.

#### 8.6.5. Air seat test

- Each valve shall be given an air seat test at 6 bar.
- This test shall be performed in the same manner as hydrostatic seat test.
- The duration of this test shall not be less than 5 minutes for each end.
- No signs of leakage are accepted.

#### 8.6.6. Procedure

Procedure of all pressure tests shall be included in the offer.

#### 8.6.7. After tests

After test, any auxiliary connections shall not be removed, and auxiliary piping shall be cleaned and dried, especially the sealant piping.

<b>TRACTEBEL Engineering</b> 	<b>GENERAL TECHNICAL SPECIFICATION</b>	<b>70000 740 GTS/402</b>
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8.7. OPERATIONAL TORQUE TEST

For valves operated with an actuator the Manufacturer shall perform an operational torque test at full rated differential pressure and at ambient temperature. The procedure must be included in the offer. The certificates shall be included in the CMTR.

8.8. FIRE TEST

The Manufacturer shall supply valves qualified by fire testing as specified in API 6FA and this certificate shall be added to the CMTR.

8.9. ANTI-STATIC DEVICE TESTING

If requested in the purchase order, all ball valves shall be submitted of to an anti-static electricity testing in accordance with BS 5146 and this certificate shall be added to the CMTR.

8.10. VISUAL AND DIMENSIONAL EXAMINATION

All valves shall be visually and dimensionally examined, according to API 1104 and MSS-SP-55.

9. MARKING

9.1.1. All valves supplied under this specification shall be clearly identified on the body, on the identification plate and on the valve flange edge.

9.1.2. Body markings

The following markings shall be cast, stamped, forged or engraved on the body of the valve :

c) Manufacturer's name or trademark.

Individual tag number according to attached valves list.

The monogram of the Control Authority. This marking shall only be applied after complete approval of the CMTR.

Flow direction on unidirectional valve.

9.1.3. Permanently attached identification plate markings

On minimum the following markings shall be shown on permanently attached identification plates :

<b>TRACTEBEL Engineering</b> 	<b>GENERAL TECHNICAL SPECIFICATION</b>	<b>70000 740 GTS/402</b>
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- a) Manufacturer's name or trademark.
- b) Individual valve fabrication number (serial number).
- c) Individual tag number.
- d) The maximum operating pressure;
- e) The min and maximum operating temperatures
- f) Body material designation (conforming MSS SP-25).
- g) Rating designation (conforming ASME B16.34).
- h) Valve trim identification (conforming MSS SP-25).
- i) Nominal valve size.
- j) Monogram of the Control Authority.

**10. INSPECTION**

**10.1. INFORMATION**

The Manufacturer shall inform the Control Authority min. five (5) working days in advance of any intervention required by this specification and shall send a copy of it to the Purchaser/Engineer (by fax).

**10.2. DOCUMENTS**

Before starting any fabrication, the Manufacturer shall submit for approval to the Control Authority and the Purchaser/Engineer the following documents :

- Detailed fabrication drawing and calculations.
- Fabrication and control procedure.
- Qualified welding procedures;
- Welders performances qualifications;
- NDT procedures;
- List of Operations in Fabrication and Control (LOFC) in accordance with annex 1.

Each company dealing in the order by fabrication and/or control shall implement a LOFC for all operations and interventions performed in its organisation. They shall also be responsible for the implementation of the same by their subcontractors.

<b>TRACTEBEL Engineering</b> <b>GDF SUEZ</b>	<b>GENERAL  TECHNICAL  SPECIFICATION</b>	<b>70000  740  GTS/402</b>
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10.3. CERTIFIED MATERIAL TEST REPORT

A Certified Material Test Report (CMTR) shall be furnished listing as built drawings and calculations, the LOFC (see paragraph 10.2.), the base material certificate, the chemical check analysis of the welding ends. The certificate of the heat treatment, the mechanical test, the non-destructive examination, the pressure testing, the operational torque test, the quality release note (see paragraph 10.4.) and any special test required by the purchase order. The valve individual number (see paragraph 9.1.2.) must be indicated in the CMTR to permit the correct traceability of each valve. The Manufacturer shall furnish one copy of the CMTR to the Control Authority's delegate and one original and one copy to the Purchaser/Engineer.

10.4. QRN

After final approval of valves and the acceptance of the CMTR, the control authority's delegate shall furnish to the Purchaser/Engineer and to the Manufacturer a Quality Release Note (QRN). The Manufacturer shall deliver one copy of the QRN with the valves and one copy shall be included in the CMTR (see paragraph 10.3.).

10.5. REPAIR

Defects in material may only be repaired provided written acceptance by the contracting parties and the Control Authority has first been obtained.

This written acceptance must be given case per case. Defective material, that cannot be satisfactory repaired or repaired without written approval shall be definitively rejected.

10.6. REJECTION

Each valve in which injurious defects are found after delivery shall be rejected. The Manufacturer shall be notified. In this case, the valve shall be replaced immediately. All the costs involved, including wages and travel expenses of the Control Authority's delegate shall be borne by the Manufacturer.

11. PAINTING AND COATING

The surface of the valve will be shot-blasted SA 2 1/2 (Swedish standard SIS 055900). Before painting, the valve shall be cleaned from grease and dirt. The painting shall consist of a primer coating (30 - 40 µm) and a finish coating (30 - 40 µm).

The nature of the products shall be specified in the offer and shall guarantee a corrosion protection for a storage period in a shop for at least one year.

Painting in accordance with Purchaser/Engineer's specifications.

Painting and coating procedures shall be submitted for approval before manufacturing to the authorized Control authority and to the purchaser / engineer.

<b>TRACTEBEL Engineering</b> <i>GDF SUEZ</i>	<b>GENERAL TECHNICAL SPECIFICATION</b>	<b>70000 740 GTS/402</b>
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For underground valves the Manufacturer shall propose an adequate protection at the time of offer. This adequate protection shall be in accordance with the Purchaser/Engineer's specification.

**TABLE 1**

**CHEMICAL COMPOSITION FOR WELDING END OF VALVES**

Maximum limit of chemical elements which may be used in material under this standard.

	% Maximum
C	0.230
Mn	1.60
Si	0.50
P	0.030
S	0.025
Nb	0.080
V	0.120
Mo	0.250
N <sub>t</sub>	0.0150

Alternate alloy elements may be used but they shall be discussed with the user prior to delivery of the material. This table is not intended to represent the composition of any heat of steel, but merely to record the maximum permissible amounts of one element. The combination of elements of any heat must conform to the carbon equivalent, subsection 3.2.4.3.

For each heat the Manufacturer shall analyse the following elements :

C, Mn, Si, P, S, Nb, V, Cr, Mo, Ni and Cu.

The intentional addition of elements other than those specified is not permitted unless agreed upon by the Purchaser.

In any case, for unintentional additions, the following limitations shall be respected :

Cr ≤ 0.15 %    Mo ≤ 0.05 %    Cu ≤ 0.20 %

<b>TRACTEBEL Engineering</b> <i>GDF SUEZ</i>	GENERAL TECHNICAL SPECIFICATION	<b>70000</b> <b>740</b> <b>GTS/402</b>
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Ni ≤ 0.30 %   Co ≤ 0.01 %   Al ≤ 0.07 %

The content of N total (N<sub>t</sub>) may be up to 0.0150 % and Must be guaranteed by the Manufacturer. If the Manufacturer cannot give any guaranty of N content, he shall analyse this element.

The total content for Nb + V will be limited to 0.150 %.

In grades X42 through X60 for each reduction of 0.01 % below the maximum carbon content, an increase of 0.05 % manganese above the specified maximum is permissible, up to a maximum of 1.70 %.

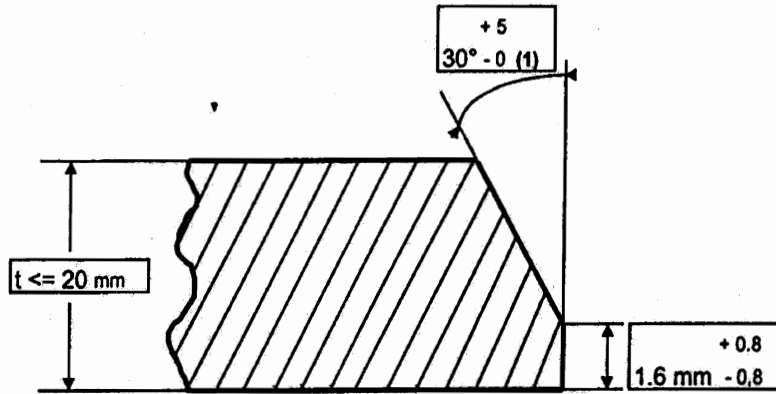
**TABLE 2**

**TENSILE REQUIREMENTS OF THE WELDING END OF VALVES**

CLASS SYMBOL	FIELD STRENGTH (min)		TENSILE STRENGTH (min)		ELONGATION in 2" min. %
	KSI	MPa	KSI	MPa	
B	35	241	60	413	25
X42	42	289	60	413	25
X46	46	317	63	434	25
X52	52	358	66	455	25
X60	60	413	75	517	20

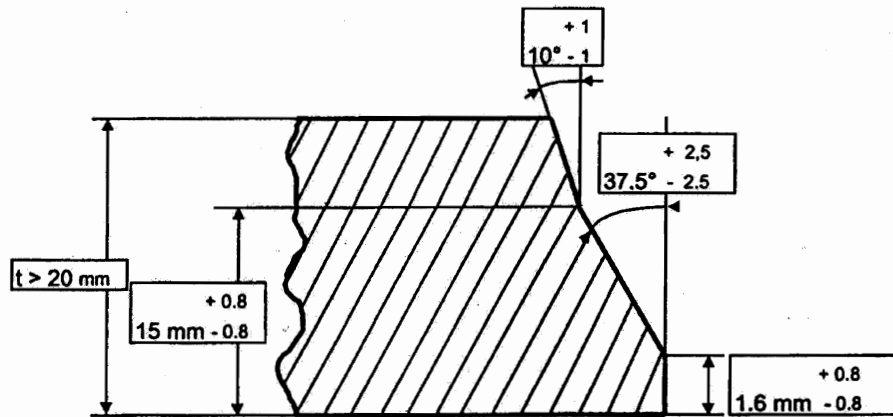
The ratio of effective yield strength to effective tensile strength of the steel shall not exceed 0.85.

**Figure 1**



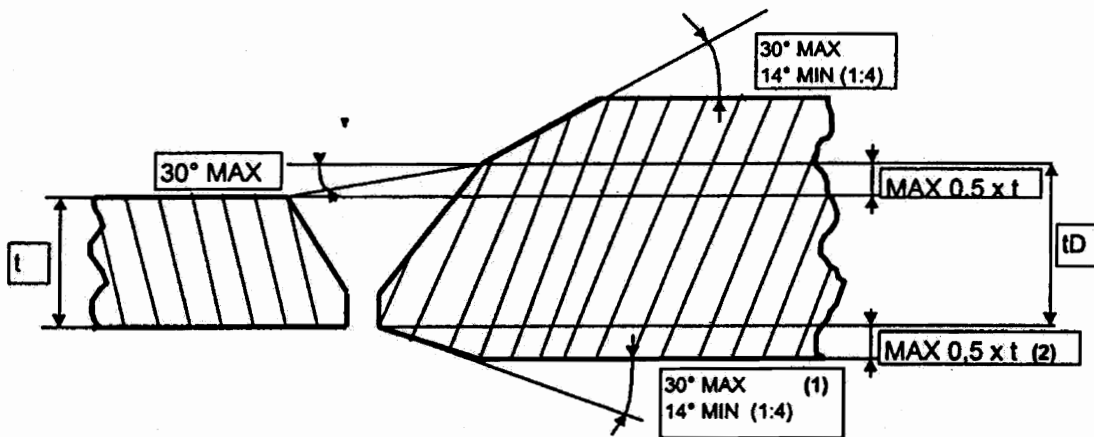
(1): welding end, size 24" and smaller may be furnished with 37.5° ± 2.5 bevel at manufacturer option.

**Figure 2**



**Figure 3**

**ACCEPTABLE DESIGN FOR UNEQUAL WALL THICKNESS AT WELDING END OF VALVE**



Notes

- (1) No minimum when materials joined have equal yield strength.
- (2) Dimension to be limited to a minimum.

When the minimum specified yield strengths of the sections to be joined are unequal :

- the deposited weld metal shall have mechanical properties at least equal to those of the section of the higher strength.
- $tD$  shall be equal to at least  $t$  times the ratio of min. specified yield strength of pipe by those of welding end of valve.
- $tD \geq tx \frac{\text{Min. Yield strength guaranteed by the standard of the steel of the pipe}}{\text{Min. yield strength guaranteed by the standard of the steel of the welding end of the valve}}$

<b>TRACTEBEL Engineering</b> <b>GDF SUEZ</b>	<b>GENERAL TECHNICAL SPECIFICATION</b>	<b>70000 740 GTS/402</b>
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**ANNEX 1**

**LOFC (LIST OF OPERATIONS OF FABRICATIONS AND CONTROLS)**

Each LOFC must contain the following information as a minimum (all clearly marked and separated) :

- k) Company name and references relating to the order.
- l) All technical and other information required in order to define the items covered.

The area of application will be limited to that item or those considered as in fabrication and control.

- m) A numerical sequence of operations with description will be built-up in a logical way of work progress.

- The first operation will be the control of the incoming material(s) and documents.
- The last operation will be the control of the CMTR.

The following operations have to be included (not limited to) :

- Each fabrication step.
  - Each step which calls for own quality control (eventually QA).
  - Each applicable examination as part of this specification.
  - Document controls - stamping and final documentation.
- n) Each operation will be followed by the applicable specification or procedure number (with the latest revision).
  - o) Columns to be provided for possible interventions of :
    - the Manufacturer's fabrication control,
    - the Manufacturer's quality control (eventually QA),
    - Control Authority,
    - the Purchaser/Engineer,

and place of intervention if not by the Manufacturer.

The interventions will be indicated per operation with H or W and/or R.

H = hold point

No further steps may be undertaken before the intervention of the appointed responsible takes place.

<b>TRACTEBEL Engineering</b> <b>GDF SUEZ</b>	<b>GENERAL  TECHNICAL  SPECIFICATION</b>	<b>70000  740  GTS/402</b>
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W = witness point

The appointed responsible has to be notified of the operation in advance, but production will continue whether the intervention took place or not.

R = point for which a control report or a recording has to be made.

The Manufacturer will fill in his own H, W and R points. The Control Authority and the Purchaser/Engineer will do the same in their designated columns, but this will not implicate a relaxation or wearing of the requirements of the Manufacturer's controls.

Each intervention has to be signed and dated by the person acting as controller. Only the original documents will be presented for this purpose.

- p) One column to be provided for report or record numbers (points marked R) and one for the review of these documents by the Control Authority.
- q) Two extra columns may give reference to a non-conformity report if any and to the resolution given to it.

Completion of the LOFC does not automatically give rise to a release of the material or it must be stipulated otherwise in the contract.

\* \* \*

**BHAGYANAGAR GAS LTD.**

**CNG & CGD PROJECT IN HYDERABAD PHASE - II**

**PIPING CLASS**

			<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i>
1	11.10.11	Issued for Procurement	AR	DNS	NC
0	31.05.11	First Issue	AR	DNS	NC
Rev	Date	Subject of revision	Author	Checked	Approved

<b>TRACTEBEL Engineering</b> <b>GDF SUEZ</b>	<b>PARTICULAR  TECHNICAL  SPECIFICATION</b>	<b>P.002062  L/21  0316</b>
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**TABLE OF CONTENTS**

**1. SCOPE.....1**

1.1. CODING OF PIPING CLASSES ..... 1

1.2. WALL THICKNESS.....2

1.3. CORROSION ALLOWANCE.....2

1.4. WALL THICKNESS CALCULATION .....2

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**1. SCOPE**

Piping classes are established taking into account the following criteria:

- The medium to be handled.
- The surrounding.
- The referenced codes.
- The temperature-pressure rating.

**1.1. Coding Of Piping Classes**

Each class is named by a code consisting of four parts:

First part

A figure designating the rating and the code :

- 1 = 150 lbs ANSI
- 3 = 300 lbs ANSI
- 6 = 600 lbs ANSI
- 9 = 900 lbs ANSI

Second part

A letter designating the material:

- A = Alloy steel
- C = Carbon steel
- F = Fiberglass reinforced plastic/epoxy (FRP)
- G = Galvanized
- P = Plastic (PEHD, ...)
- S = Stainless steel
- V = PVC

Third part

A sequential number to differentiate two or more piping classes of the same rating and same material but presenting some differences related to the handled fluid.

Fourth part

A letter designating the underground:

- U = Underground

**1.2. Wall Thickness**

The wall thickness of pipe shall be as follows :

Wall thickness of pipe shall be calculated as specified in the applicable sections of :

- ANSI B 31.8 for classes covering the main process and auxiliary gas lines.
- ANSI B 31.3 for classes covering utilities lines.

**1.3. Corrosion Allowance**

The minimum corrosion allowance used to calculate wall thickness as follows :

- Carbon steel and ferritic alloys in classes calculated following ANSI B 31.8 : 0 mm
- Carbon steel and ferritic alloys in classes calculated following ANSI B 31.3 : 1.6 mm
- Stainless steel : 0 mm
- Plastic and FRP pipes : 0 mm.

**1.4. Wall Thickness Calculation**

a) Pipes for gas application have to comply with ASME/ANSI B 31.8 code. Pipe wall thickness will be calculated as follows :

$$t = \frac{PD}{2xSxFxExT} + c \quad (1)$$

t = nominal wall thickness (mm)

P = design pressure (MPa)

S = minimum yield strength (MPa)

D = nominal outside diameter (mm)

F = design factor = 0.50

E = longitudinal joint factor

= 1.0 for ASTM A 333 (seamless or electric resistance welded)

= 1.0 for API 5LX70F (seamless or EFW or SAW)

T = temperature derating factor = 1.0

C = corrosion allowance (mm)

b) Pipes for utilities lines have a wall thickness complying with ASME/ANSI B 31.3 code :

$$t = \left[ \frac{PD}{2x(SE + PY)} + c \right] x (1+a)$$

t = nominal wall thickness (mm)

S = allowable stress (MPa)

P = design pressure (MPa)

E = longitudinal joint factor

Y = coefficient as per table 304.1.1

C = corrosion allowance (mm)

a = negative fabrication tolerance (%)

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# **PIPING SPECIFICATION**

<b>TRACTEBEL Engineering</b> <i>GDF SUEZ</i>		<b>CNG &amp; CITY GAS DISTRIBUTION PROJECT          IN HYDERABAD PHASE - II</b>				<b>SPECIFICATION NO</b> 3C1	
						<b>SHEET 1 OF 6</b>	
						<b>REV 1</b>	
<b>BASIC PIPING SPECIFICATION DATAS</b>			<b>MAXIMUM DESIGN CONDITIONS</b>				
			<b>TEMPERATURE ° C</b>		<b>PRESSURE bar g</b>		
<b>PRIMARY FLANGE RATING</b>	300#-RF	NG	0 to 45	NG	49.00		
		AG	60	AG	49.00		
<b>BASIC MATERIAL</b>	CARBON STEEL						
<b>CORROSION ALLOWACE</b>	1.6 mm						
<b>X-RAYS</b>	100%						
<b>SIZE RANGE</b>	1/2"-18"						
<b>CODE</b>	ANSI B 31.8						
<b>FLUIDS</b>							
<b>NG : NATURAL GAS</b>							
<b>AG : ACTUATING GAS</b>							
<b>1</b>	<b>Issued for Procurement</b>	11.10.11	AR	DNS	NC		
<b>0</b>	<b>FIRST ISSUE</b>	31.05.11	AR	DNS	NC		
<b>REV</b>	<b>DESCRIPTION</b>	<b>DATE</b>	<b>AUTHOR</b>	<b>CHECKER</b>	<b>APPROVED</b>		

200068

TRACTEBEL Engineering GDF SUEZ			CNG & CITY GAS DISTRIBUTION PROJECT IN HYDERABAD PHASE - II				SPECIFICATION NO 3C1
							SHEET 2 OF 6
							REV 1
ITEM	SHORT CODE	SIZE FROM-THRU	END CONNECTION	RATING AND/OR SCHED.	DIMENSION STANDARD	MATERIAL	REMARKS
PIPES	P	1/2" - 2"	BE-ANSI B16-25	80	ANSI B36-10	ASTM A 106 Gr. B	SEAMLESS
		4"	BE-ANSI B16-25	6.4 mm	API 5L	API 5L Gr. B	ERW
		6"	BE-ANSI B16-25	6.4 mm	API 5L	API 5L Gr. B	ERW
		8"	BE-ANSI B16-25	8.2	API 5L	API 5L Gr. B	ERW
		12"	BE-ANSI B16-25	6.4 mm	API 5L	API 5L X 60	ERW / SMLS / LSAW / HSAW
		16"	BE-ANSI B16-25	7.9mm	API 5L	API 5L X 60	ERW / SMLS / LSAW / HSAW
		18"	BE-ANSI B16-25	8.7mm	API 5L	API 5L X 60	ERW / SMLS / LSAW / HSAW
ELBOWS 90 LR	E	1/2" - 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS ( Excluding 12" )
		12"				API 5L X 60 or	
		16" 18"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A860 WPHY 60	
ELBOWS 45 LR	E45	1/2" - 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS ( Excluding 12" )
		12"				API 5L X 60 or	
		16" 18"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A860 WPHY 60	
ELBOWS 30 LR	E30	1/2" - 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS ( Excluding 12" )
		12"				API 5L X 60 or	
		16" 18"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A860 WPHY 60	
ELBOWS 22.5 LR	E22.5	1/2" - 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS ( Excluding 12" )
		12"				API 5L X 60 or	
		16" 18"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A860 WPHY 60	
ELBOWS 15 LR	E15	1/2" - 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS ( Excluding 12" )
		12"				API 5L X 60 or	
		16" 18"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A860 WPHY 60	
REDUCERS CONCENTRIC	RC	3/4" - 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS ( Excluding 12" )
		12"				API 5L X 60 or	
		16"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A860 WPHY 60	
		18"					
REDUCERS ECCENTRIC	RE	3/4" - 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS ( Excluding 12" )
		12"				API 5L X 60 or	
		16"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A860 WPHY 60	
		18"					
TEES EQUAL	T	1/2" - 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS ( Excluding 12" )
		12"				API 5L X 60 or	
		16"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A860 WPHY 60	
		18"					
TEES RED	TR	3/4" - 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS ( Excluding 12" )
		12"				API 5L X 60 or	
		16"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A860 WPHY 60	
		18"					
WELDOLETS	WEL	3/4"-18"	BW - ANSI B16-25	SEE PIPE	MANUFACTURER	ASTM A 105	SEAMLESS
CAPS	C	1/2" - 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS ( Excluding 12" )
		12"				API 5L X 60 or	
		16" 18"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A860 WPHY 60	
NIPPLES	NBEP	1/2" - 1.1/2"	BOTH ENDS PLAIN	80	ANSI B36-10	ASTM A 106 Gr. B	SEAMLESS-LG=100mm
	NOET	1/2" - 1.1/2"	ONE END THRD-MNPT	80	ANSI B36-10	ASTM A 106 Gr. B	SEAMLESS-LG=100mm
	NBET	1/2" - 1.1/2"	BOTH ENDS THRD-MNPT	80	ANSI B36-10	ASTM A 106 Gr. B	SEAMLESS-LG=100mm
FULL COUPLINGS THRD	CF	1/2" - 1.1/2"	FNPT ANSI B1-20-1	3000#	ANSI B16-11	ASTM A 105	SEAMLESS
CAPS THRD	C2	1/2" - 1.1/2"	FNPT ANSI B1-20-1	3000#	ANSI B16-11	ASTM A 105	SEAMLESS
PLUGS THRD	PL	1/2" - 1.1/2"	MNPT ANSI B1-20-1	3000#	ANSI B16-11	ASTM A 105	SEAMLESS

200069

TRACTEBEL Engineering GDF SUEZ			CNG & CITY GAS DISTRIBUTION PROJECT IN HYDERABAD PHASE - II				SPECIFICATION NO 3C1	
							SHEET 3 OF 6	
							REV 1	
ITEM	SHORT CODE	SIZE FROM-THRU	END CONNECTION	RATING AND/OR SCHED.	DIMENSION STANDARD	MATERIAL	REMARKS	
WN FLANGES	F	1/2"-12"		300# RF	ANSI B16-5	ASTM A 105	(Excluding 12")	
		12"				ASTM A 694 F 60	Always to be weilded on 3C1 pipe	
		16"						
		18"						
ORIFICE FLANGES	FO	1" - 12"		300# RF	ANSI B16-36	ASTM A 105	COMPLETE WITH GASKET	
		12"				ASTM A 694 F 60	BOLTS, NUTS	
		16"					JACK-SCREWS AND PLUGS	
		18"						
BLIND FLANGES	FB	1" - 12"		300# RF	ANSI B16-5	ASTM A 105	(Excluding 12")	
		12"				ASTM A 694 F 60		
		16"						
		18"						
DRIP RINGS	DR	1" - 12"		300# RF	ANSI B16-36	ASTM A 105	3/4" FNPT OUTLET CONNECTION	
		12"				ASTM A 694 F 60		
		16"						
		18"						
SPECTACLE BLINDS	SB	1" - 12"		300# RF	ANSI B16-5	ASTM A 515 GR 70	(Excluding 12")	
		12"				ASTM A 694 F 60		
		16"						
		18"						
RESTRICTION ORIFICES	RO	1" - 12"		300# RF	ANSI B16-5	ASTM A240 GR 304	(Excluding 12")	
		12"				ASTM A 694 F 60		
		16"						
		18"						
MONOLITHIC INSULATING JOINTS	IJ	2"-12"	BW - ANSI B16-25	300#	ANSI B16-5	PIPE PUPS: Same as pipe Material Forged Ring - ASTM A 105	(Excluding 12") REFER DATA SHEET	
		12"	BW - ANSI B16-25	300#	API 5L	PIPE PUPS: API 5L X 60 Forged Ring - ASTM A 694 F60	REFER DATA SHEET	
		16"	BW - ANSI B16-25	300#	API 5L	PIPE PUPS: API 5L X 60 Forged Ring - ASTM A 694 F60	REFER DATA SHEET	
		18"	BW - ANSI B16-25	300#	API 5L	PIPE PUPS: API 5L X 60 Forged Ring - ASTM A 694 F60	REFER DATA SHEET	
STUD BOLTS	B	1/2" - 18"		300# RF	ANSI B18.2.1 ANSI B18.2.2	ASTM A 193 B 7 HEXAGONAL NUTS ASTM A194 GR 2H		
GASKETS SPIRAL WOUND	G	1/2"-18"		300# RF	API 601 MSS SP 44	WINDING ANSI 304 FILLING PURE GRAPHITE CENTERING RING CS	4.5 mm THK	

200070

TRACTEBEL Engineering GDF SUEZ			CNG & CITY GAS DISTRIBUTION PROJECT IN HYDERABAD PHASE - II				SPECIFICATION NO
							3C1
							SHEET 4 OF 6
							REV 1
ITEM	SHORT CODE	SIZE FROM-THRU	END CONNECTION	RATING AND/OR SCHED.	DIMENSION STANDARD	MATERIAL	REMARKS
BALL VALVES	VBA	1/2" - 1 1/2"	FLGD RF:ANSI B16-5	600#	ANSI B16-10	BODY: ASTM A 105 BALL: SS 316	FULL BORE WRENCH OPERATED. FIRE SAFE
		2" - 4"	FLGD RF:ANSI B16-5 or BW :ANSI B16.25	300#	ANSI B16-10	BODY: ASTM A 216 WCB BALL: ASTM A 216 WCB / A 234 WPB / A 395 with ENP ( 75 microns )	FULL BORE / REDUCED BORE AS INDICATED DATA SHEET DOUBLE BLOCK & BLEED WRENCH OPERATED. FIRE SAFE
		6" - 8"	FLGD RF:ANSI B16-5 or BW :ANSI B16.25	300#	ANSI B16-10	BODY: ASTM A 216 WCB BALL: ASIM A 216 WCB / A 234 WPB / A 395 with ENP ( 75 microns )	FULL BORE / REDUCED BORE AS INDICATED DATA SHEET DOUBLE BLOCK & BLEED GEAR OPERATED. FIRE SAFE
		12" - 18"	BW :ANSI B16.25	300#	ANSI B16-10	BODY: ASTM A 105 BALL: ASTM A 105	FULL BORE / REDUCED BORE AS INDICATED DATA SHEET DOUBLE BLOCK & BLEED GAS OVER OIL ACTUATED VALVE FIRE SAFE
GLOBE VALVES	VGL	1/2"-1 1/2"	FLGD RF:ANSI B16-5	600#	ANSI B16-10	BODY: ASTM A 105 TRIM: ASTM A182 F6	HANDWHEEL FIRE SAFE
		2" - 18"	FLGD RF:ANSI B16-5	300#	ANSI B16-10	BODY: ASTM A 216 WCB TRIM: ASTM A 216 WCB	HANDWHEEL FIRE SAFE
SWING CHECK VALVES	VCH	1/2" - 1 1/2"	FLGD RF:ANSI B16-5	600#	ANSI B16-10	BODY: ASTM A 105 TRIM: ASTM A182 F6	HORIZONTAL INSTALLATION VERTICAL INSTALLATION FLOW UPWARDS
		2"-18"	FLGD RF:ANSI B16-5	300#	ANSI B16-10	BODY: ASTM A 216 WCB TRIM: ASTM A 216 WCB	HORIZONTAL INSTALLATION VERTICAL INSTALLATION FLOW UPWARDS

200071

**REDUCERS CHART**

**SMALL SIZE**

	1/2"	3/4"	1"	1.1/2"	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	28"	30"	32"	36"	
1/2"																					
3/4"	X																				
1"	X	X																			
1.1/2"	X	X	X																		
2"		X	X	X																	
3"				X	X																
4"				X	X	X															
6"						X	X														
8"							X	X													
10"							X	X	X												
12"								X	X	X											
14"								X	X	X	X										
16"									X	X	X	X									
18"										X	X	X	X								
20"																					
24"																					
28"																					
30"																					
32"																					
36"																					
42"																					

**L  
A  
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G  
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Z  
E**

**LEGEND**

X: CONCENTRIC AND ECCENTRIC REDUCERS-BW

**BRANCH CHART**

**BRANCH SIZE**

**H  
E  
A  
D  
E  
R  
  
S  
I  
Z  
E**

	1/2"	3/4"	1"	1.1/2"	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	28"	30"	32"	36"
1/2"	T																			
3/4"	TR	T																		
1"	TR	TR	T																	
1.1/2"	W	TR	TR	T																
2"	W	W	TR	TR	T															
3"	W	W	W	TR	TR	T														
4"	W	W	W	W	TR	TR	T													
6"	W	W	W	W	W	TR	TR	T												
8"	W	W	W	W	W	BW	TR	TR	T											
10"	W	W	W	W	W	BW	BW	TR	TR	T										
12"	W	W	W	W	W	BW	BW	BW	TR	TR	T									
14"	W	W	W	W	W	BW	BW	BW	BW	TR	TR	T								
16"	W	W	W	W	W	BW	BW	BW	BW	TR	TR	T								
18"	W	W	W	W	W	BW	BW	BW	BW	BW	TR	TR	T							
20"																				
24"																				
28"																				
30"																				
32"																				
36"																				


**LEGEND**

T : TEE EQUAL-BW

TR : REDUCING TEE-BW

W : WELDOLET- BW

BW : BRANCH WELD-CHECK IF REINFORCING PLATE IS NECESSARY ACCORDING ANSI B 31.8

<b>TRACTEBEL Engineering</b> 		<b>CNG &amp; CITY GAS DISTRIBUTION PROJECT          IN HYDERABAD PHASE - II</b>			<b>PIPING SPECIFICATION</b> <b>3C1U</b> SHEET 1 OF 6	
<b>BASIC PIPING SPECIFICATION DATAS</b>			<b>MAXIMUM DESIGN CONDITIONS</b>			
			<b>TEMPERATURE ° C</b>		<b>PRESSURE bar g</b>	
<b>PRIMARY FLANGE RATING</b>	300# -RF	NG	- 20 to 65	NG	49.00	
		AG	65	AG	49.00	
<b>BASIC MATERIAL</b>	CARBON STEEL					
<b>CORROSION ALLOWACE</b>	0					
<b>X-RAYS</b>	100%					
<b>SIZE RANGE</b>	1/2"-16"					
<b>CODE</b>	ANSI B 31.8					
<b>FLUIDS</b>						
<b>NG : NATURAL GAS</b>						
<b>AG : ACTUATING GAS</b>						
<b>1</b>	<b>Issued for Procurement</b>	<b>11.10.11</b>	<b>AR</b>	<b>DNS</b>	<b>NC</b>	
<b>0</b>	<b>First Issue</b>	<b>31.05.11</b>	<b>AR</b>	<b>DNS</b>	<b>NC</b>	
<b>REV</b>	<b>DESCRIPTION</b>	<b>DATE</b>	<b>AUTHOR</b>	<b>CHECKER</b>	<b>APPROVED</b>	

200074

**CNG & CITY GAS DISTRIBUTION  
PROJECT IN HYDERABAD PHASE - II**

ITEM	SHORT CODE	SIZE FROM. THRU	END CONNECTION	RATING AND/OR SCHED.	DIMENSION STANDARD	MATERIAL	REMARKS
PIPES	P	1/2" - 1 1/2"	BE-ANSI B16.25	80	ANSI B36.10	ASTM A 106 GR B	SEAMLESS
		2" - 8"	BE-ANSI B16.25	40	ANSI B36.10	ASTM A 106 GR B	SEAMLESS
		10"	BE-ANSI B16.25	6.4 mm Thk	A P 1 5 L	A P 1 5 L X 5 2	ERW
		12"	BE-ANSI B16.25	7.1 mm Thk	A P 1 5 L	A P 1 5 L X 5 2	ERW
		16"	BE-ANSI B16.25	8.74mm Thk	A P 1 5 L	A P 1 5 L X 5 2	ERW
ELBOWS 90 LR	E	1/2" - 8"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	ASTM A 234 WPB A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	SEAMLESS
		10"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
		12"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
		16"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
ELBOWS 45 LR	E45	1/2" - 8"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	ASTM A 234 WPB A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	SEAMLESS
		10"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
		12"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
		16"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
REDUCERS CONCENTRIC	RC	3/4" - 8"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	ASTM A 234 WPB A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	SEAMLESS
		10"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
		12"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
		16"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
REDUCERS ECCENTRIC	RE	3/4" - 8"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	ASTM A 234 WPB A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	SEAMLESS
		10"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
		12"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
		16"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
TEES EQUAL	T	3/4" - 8"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	ASTM A 234 WPB A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	SEAMLESS
		10"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
		12"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
		16"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
TEES RED	TR	3/4" - 8"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	ASTM A 234 WPB A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	SEAMLESS
		10"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
		12"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
		16"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
WELDOLETS	WEL	11/2" - 16"	BW - ANSI B16.25	SEE PIPE	MANUFACTURER STANDARDS	ASTM A 105	
CAPS	C	3/4" - 8"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	ASTM A 234 WPB A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	SEAMLESS
		10"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
		12"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
		16"	BE-ANSI B16.25	SEE PIPE	ANSI B16.9	A P 1 5 L X 5 2 / A 8 6 0 WPHY 5 2	
NIPPLES	NBEP NOET NBET	1/2" - 1 1/2"	BOTH ENDS PLAIN	80	ANSI B36.10	ASTM A106	SEAMLESS.LG=100mm
		1/2" - 1 1/2"	ONE END THRD.MNPT	80	ANSI B36.10	ASTM A106	SEAMLESS.LG=100mm
		1/2" - 1 1/2"	BOTH ENDS THRD.MNPT	80	ANSI B36.10	ASTM A106	SEAMLESS.LG=100mm
FULL COUPLINGS THRD	CF	1/2" - 1 1/2"	FNPT ANSI B1.20.1	3000#	ANSI B16.11	ASTM A 105	
CAPS THRD	C2	1/2" - 1 1/2"	FNPT ANSI B1.20.1	3000#	ANSI B16.11	ASTM A 105	
PLUGS THRD	PL	1/2" - 1 1/2"	MNPT ANSI B1.20.1	3000#	ANSI B16-11	ASTM A 105	

TRACTEBEL Engineering GDF SVEZ		CNG & CITY GAS DISTRIBUTION PROJECT IN HYDERABAD PHASE - II					PIPING SPECIFICATION <b>3C1U</b>
							SHEET 3 OF 6
							REV 1
ITEM	SHORT CODE	SIZE FROM-THRU	END CONNECTION	RATING AND/OR SCHED.	DIMENSION STANDARD	MATERIAL	REMARKS
WN FLANGES	F	1/2"-8" 10" 12"-16"	SEE PIPE	300 # RF	ANSI B16.5	ASTM A105 ASTM A 694 F 52 ASTM A 694 F 52	Always to be welded on 3C1U Pipe.
BLIND FLANGES	FB	1/2"-8" 10" 12"-16"	-	300 # RF	ANSI B16.5	ASTM A105 ASTM A 694 F 52 ASTM A 694 F 52	
STUD BOLTS	B	1/2" - 16"		300 # RF	ANSI B16.5	ASTM A193 HEXAGONAL NUTS ASTM A194 GR 4	
GASKETS SPIRAL WOUND	G	1/2"-16"		300 # RF	ANSI B16.5 API 601/ASME B 16.20	WINDING AISI 304. FILLING PURE GRAPHITE. CENTERING RING CS	4.5 mm THK

200076

TRACTEBEL Engineering GDF SVEZ		CNG & CITY GAS DISTRIBUTION PROJECT IN HYDERABAD PHASE - II					PIPING SPECIFICATION	
							3C1U	
							SHEET 4 OF 6	
				REV 1				
ITEM	SHORT CODE	SIZE FROM-THRU	END CONNECTION	RATING AND/OR SCHED.	DIMENSION STANDARD	MATERIAL	REMARKS	
BALL VALVES	VBA	1/2" - 1 1/2"	FLGD RF:ANSI B16-5	300 # RF	ANSI B16-10	BODY: ASTM A216 Gr. WCB BALL: ASTM A216 Gr. WCB +ENP Coating / SS316	FULL BORE FIRE SAFE WRENCH OPERATED. FLOATING	
		2" - 3"	FLGD RF:ANSI B16-5	300 # RF	ANSI B16-10	BODY: ASTM A216 Gr. WCB BALL: ASTM A216 Gr. WCB +ENP Coating / SS316	FULL BORE - DOUBLE BLOCK AND BLEED FIRE SAFE WRENCH OPERATED. TRUNION MOUNTED	
		4" - 10"	FLGD RF:ANSI B16.5/ BW ANSI B 16.25	300 # RF	ANSI B16-10	BODY: ASTM A216 Gr. WCB BALL: ASTM A216 Gr. WCB +ENP Coating / SS316	DOUBLE BLOCK AND BLEED FIRE SAFE GEAR OPERATED. TRUNION MOUNTED	
		12" - 16"	FLGD RF:ANSI B16-5	300 # RF	ANSI B16-10	BODY: ASTM A216 Gr. WCB BALL: ASTM A216 Gr. WCB +ENP Coating / SS316	DOUBLE BLOCK AND BLEED TRUNION MOUNTED FIRE SAFE GEAR OPERATED.	
GLOBE VALVES	VGL	1/2"-1 1/2"	FLGD RF:ANSI B16-5	300 #	ANSI B16-10	BODY: ASTM A 105 TRIM: ASTM A182 F6	HANDWHEEL FIRE SAFE	
		2" - 16"	FLGD RF:ANSI B16-5	300 #	ANSI B16-10	BODY: ASTM A216 WCB TRIM: ASTM A182 F6	HANDWHEEL FIRE SAFE	
SWING CHECK VALVES	VCH	1/2" - 1 1/2"	FLGD RF:ANSI B16-5	300 #	ANSI B16-10	BODY: ASTM A105 TRIM: ASTM A182 F6	HORIZONTAL INSTALLATION VERTICAL INSTALLATION FLOW UPWARDS	
		2"-16"	FLGD RF:ANSI B16-5	300 #	ANSI B16-10	BODY: ASTM A216 WCB TRIM: ASTM A182 F6	HORIZONTAL INSTALLATION VERTICAL INSTALLATION FLOW UPWARDS	

200077

REDUCERS CHART

SMALL SIZE

	1/2"	3/4"	1"	1.1/2"	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	28"	30"	32"	36"
1/2"																				
3/4"	X																			
1"	X	X																		
1.1/2"	X	X	X																	
2"		X	X	X																
3"				X	X															
4"				X	X	X														
6"						X	X													
8"							X	X												
10"							X	X	X											
12"								X	X	X										
14"								X	X	X	X									
16"									X	X	X	X								
18"																				
20"																				
24"																				
28"																				
30"																				
32"																				
36"																				
42"																				

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LEGEND

X :CONCENTRIC AND ECCENTRIC REDUCERS-BW

**BRANCH CHART**

**BRANCH SIZE**

	1/2"	3/4"	1"	1.1/2"	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	28"	30"	32"	36"	
1/2"	T																				
3/4"	TR	T																			
1"	TR	TR	T																		
1.1/2"	W	TR	TR	T																	
2"	W	W	TR	TR	T																
3"	W	W	W	TR	TR	T															
4"	W	W	W	W	TR	TR	T														
6"	W	W	W	W	W	TR	TR	T													
8"	W	W	W	W	W	BW	TR	TR	T												
10"	W	W	W	W	W	BW	BW	TR	TR	T											
12"	W	W	W	W	W	BW	BW	BW	TR	TR	T										
14"																					
16"																					
18"																					
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24"																					
28"																					
30"																					
32"																					
36"																					

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**LEGEND**

T : TEE EQUAL-BW

TR : REDUCING TEE-BW

W : WELDOLET - BW

BW : BRANCH WELD-CHECK IF REINFORCING PLATE IS NECESSARY ACCORDING ANSI B 31.8

Sl. Nos.	ACTIVITY	70000740/GTS/402		TYPE		Applied standard & Procedure	Acceptance criteria	Document type	Third Party Inspection Agency (By supplier)	Control Authority/ Engineer Inspector	
		chp.	Welded	Flanged							
I	<b>CONTROL BEFORE MANUFACTURING</b> - list of operation in manufacturing and control material part list - dimensional drawings - calculation butt welding ends - calculation of body bolting, Bonnet, Cover (For Pressure Retaining Parts)  <b>Fixation of Operation Methodology</b> - qualified welding procedures/welders performances qualification record - heat treatment procedure - non destructive testing procedures - pressure test procedure - painting procedure	3	x	x		ASME B16.34	specification			Hold (kick-off meeting)	
		6.1	x	x			specification		Hold (kick-off meeting)		
		6.1	x	x			specification		Hold (kick-off meeting)		
		6.1 / 6.2.2.	x	x			specification		Hold (kick-off meeting)		
		6.2.8.	x	x			specification		Hold (kick-off meeting)		
		6.3	x	x			specification, <b>Data Sheet</b>		Hold (kick-off meeting)		
		8.1, 8.2, 10.2	x	x			specification		Hold (kick-off meeting)		
		8.3	x	x			specification		Hold (kick-off meeting)		
		8.5	x	x			specification		Hold (kick-off meeting)		
		8.6.6	x	x			specification		Hold (kick-off meeting)		
		11	x	x			specification		Hold (kick-off meeting)		
1A	<b>CONTROL ON RECEIPT OF MATERIAL</b>  <b>VALVE BODY:</b> Chemical Testing, Carbon Equivalent Mechanical tests (Remark : marking transfer by Control Authority I)  Charpy-test at -20°C, 2 test sets (1 long/1 trans) (Remark : marking transfer by Control Authority I) Radiography Test of Casting Body (100%)  <b>FLANGES:</b> Chemical Testing, Carbon Equivalent Mechanical tests (Remark : marking transfer by Control Authority I)  Charpy-test at -20°C, 2 test sets (1 long/1 trans) (Remark : marking transfer by Control Authority I)  <b>LATERAL CONNECTIONS:</b> Chemical Testing, Carbon Equivalent Mechanical tests (Remark : marking transfer by Control Authority I)  Charpy-test at -20°C, 2 test sets (1 long/1 trans) (Remark : marking transfer by Control Authority I)  <b>EXTENSION PIPE PIECES L&amp;ND</b> Chemical Test, Carbon Equivalent Mechanical tests (Remark : marking transfer by Control Authority I)  Charpy-test at -20°C, 2 test sets (1 long/1 trans) (Remark : marking transfer by Control Authority I)  <b>BALL/OBTURATOR:</b> Chemical Testing, Carbon Equivalent Mechanical tests  <b>SEAT:</b> - Mechanical, Chemical tests, Carbon equivalent  <b>STEM:</b> - Chemical Testing, Carbon equivalent - Mechanical tests	7	x	x		ASME B 16.34	70000740/GTS/402	certif. 3.1		hold point	review point
		7	x	x			70000740/GTS/402	certif. 3.2		hold point	review point
			x	x			35J/cm <sup>2</sup> (A) / 28J/cm <sup>2</sup> (S)	certif. 3.2		hold point	review point
			x	x			ASME B 16.34	certif. 3.2		review point	review point
			x	x			70000740/GTS/402	certif. 3.1		hold point	review point
			x	x			70000740/GTS/402	certif. 3.2		hold point	review point
			x	x			35J/cm <sup>2</sup> (A) / 28J/cm <sup>2</sup> (S)	certif. 3.2		hold point	review point
			x	x			70000740/GTS/402	certif. 3.1		hold point	review point
			x	x			70000740/GTS/402	certif. 3.2		hold point	review point
			x	x			35J/cm <sup>2</sup> (A) / 28J/cm <sup>2</sup> (S)	certif. 3.2		hold point	review point
			x	x			70000740/GTS/402	certif. 3.2		hold point	review point
	x	x		35J/cm <sup>2</sup> (A) / 28J/cm <sup>2</sup> (S)	certif. 3.2		hold point	review point			
	x	x		70000740/GTS/402	certif. 3.1		hold point	review point			
	x	x		70000740/GTS/402	certif. 3.2		hold point	review point			
	x	x		70000740/GTS/402	certif. 3.2		hold point	review point			
	x	x		70000740/GTS/402	certif. 3.1		hold point	review point			
	x	x		70000740/GTS/402	certif. 3.2		hold point	review point			
	x	x		70000740/GTS/402	certif. 3.2		hold point	review point			
	x	x		70000740/GTS/402	certif. 3.1		hold point	review point			
	x	x		70000740/GTS/402	certif. 3.2		hold point	review point			
	x	x		70000740/GTS/402	certif. 3.1		hold point	review point			
	x	x		70000740/GTS/402	certif. 3.2		hold point	review point			
	x	x		70000740/GTS/402	certif. 3.2		hold point	review point			
	x	x		70000740/GTS/402	certif. 3.1		hold point	review point			
	x	x		70000740/GTS/402	certif. 3.2		hold point	review point			

Sl. No.	ACTIVITY	70000740/GTS/402		Applied standard e/o Procedure	Acceptance criteria	Document type	Third Party Inspection Agency (By supplier)	Control Authority/Engineer/Inspector	
		chap.	TYPE Welded Flanged						
2	<b>STAINLESS:</b> - Chemical Testing, Carbon Equivalent - Mechanical tests (Remark : marking transfer by Control Authority I) <b>VENT/BLEED PLUG:</b> - Chemical test, Mechanical tests <b>DRAIN: OPEN BLOCK VALVE AT DRAIN TAP:</b> - Chemical test, mechanical tests <b>DRAIN: UPPER BALL VALVE &amp; NEEDLE VALVE:</b> - Chemical Test, Mechanical tests <b>STEM &amp; SEAT SEALING CONNECTION:</b> - Chemical Test, Mechanical tests <b>OTHER VALVE PARTS</b> - Mechanical and Chemical tests <b>FABRICATION AND TESTS</b> Welds and repair welds shall be performed according to written qualified procedures Heat treatment fully welded valve and test pieces <b>Mechanical tests</b> (Remark : marking transfer by Control Authority I) Charpy-test at -20°C, 2 test sets (1 long/1 trans) (Remark : marking transfer by Control Authority I) (if feasible) RT on butt welds (if not feasible & t/thk > 15mm) UT on butt welds Butt welding ends on cast bodies shall be examined before fabrication welding end by radiography (Over a width of 70 mm) (not applicable for forged bodies) UT on 25 mm of base mat. (at each side) and each weld (100%) Magnetic Particulate Examination on valve body 10% valves < 6" 100% valves ≥ 6" Visual examination Dimensional examination Finished bevel end pipe used for field welding:	7	x	x	70000740/GTS/402	certif. 3.1	review point	review point	
		7	x	x	70000740/GTS/402	certif. 3.2	hold point	review point	
		7	x	x	70000740/GTS/402	certif. 3.1	review point	review point	
		7	x	x	70000740/GTS/402	certif. 3.1	review point	review point	
		7	x	x	70000740/GTS/402	certif. 3.1	review point	review point	
		7	x	x	70000740/GTS/402	certif. 3.1	review point	review point	
		8.1 - 8.2	x	x	ASME IX + spec.	ASME IX + spec.	Welding Procedure Specification (WPS)	hold point	review & approval point
		8.3	x	x	ASME VIII Div.1	ASME VIII Div.1	review CT/TT curves	review report	review point
		8.4.1	x	x	ASTM A370	70000740/GTS/402	certif. 3.2	hold point	review point
		8.4.2	x	x	ISO 148 or ASTM A370	35J/cmp(A) / 28J/cmp(S)	certif. 3.2	hold point	review point
8.5.1	x	x	ASME SECT V art. 2	ASME SECT VIII div.1, UW 51	(RT-Test report)	witness point	review point		
8.5.1	x	x	ASME SECT V art. 5	ASME SECT VIII div.1, App.12	UT-Test report	witness point	review point		
8.5.1	x	x	ASME SECT V art. 5	MSS-SP-54	(RT-Test report)	witness point	review point		
8.5.1	x	x	ASME SECT V art. 5	ASME SECT VIII, div.1, App.12	US-Test report	witness point	review point		
8.5.1	x	x	ASME SECT V art. 7	ASME SECT VIII App.6	MPE-Test report	witness point	review point		
8.5.1	x	x	Sec. 8 proc.7 Sec. 8 proc.24	MSS-SP-55 DWG **	report	hold point	review point		
8.5.1	x	x			report	witness point	review point		
2A	Magnetic Particulate Examination/ Liquid Penetrant Examination UT inspection on 25 mm of base material RT examination on 25 mm of base material Visual and dimensional examination		x		unacceptable defects : defects not parallel to the surface extending into the bevel + defect extending into the bevel provided the lamination is parallel to the surface and has a transverse dimension exceeding 6.35 mm	MPE/LPP-Test report	witness point	review point	
		8.5.1	x	x	ASME SECT V art. 5	ASME SECT VIII, div.1, App.12	UT-Test report	witness point	review point
		8.5.1	x	x	ASME SECT V art. 2	ASME SECT VIII, div.1, UW 51	RT-Film & report	witness point	review point
		8.5.1	x	x	Sec. 8 proc.7	MSS-SP-55 + DWG**	report	witness point	review point

Sl. Nos.	ACTIVITY	700007400/CTS/482	TYPE		Applied standard & Procedure	Acceptance criteria	Document type	Third Party Inspection Agency (By supplier)	Control Authority/ Engineer Inspector
			clup.	Welded					
<b>FINAL INSPECTION TEST</b>									
	Hydrostatic Shell Test	8.6.2	x	x	API 6D + specification	154 bar, 30 Min(NPS>=18")15 Min (NPS<20")	certif. 3.2	witness point	hold point
	Hydrostatic Seat Test	8.6.3	x	x	API 6D + specification	113 bar, 5 Min.	certif. 3.2	witness point	hold point
3	External leak testing	8.6.4	x	x	specification	6 bar	certif. 3.2	witness point	hold point
	Air seat test	8.6.5	x	x	specification	6.0 bar, 5 Min.	certif. 3.2	hold point	hold point
	Operational torque test	8.7	x	x	to be submitted		report	witness point	hold point
	Fire test	8.8	x	x	API 6FA	API 6FA	report	review report	review report
	Visual examination	8.10	x	x	Sec 8 proc.7	MSS-SP-53	report	hold point	review report
	Dimensional examination	8.10	x	x	Sec 8 proc.24	DWG **	report	witness point	review report
	Marking	9	x	x	section 9 of specification		X	witness point	review report
	Inspector's stamp	9.1.2	x	x	section 9 of specification		X	X	X
	Control of all certificates	10	x	x	section 10 of specification		X	X	X
	Painting And Coating	11	x	x	SI8055900	SA2.5, Cl.11 of Specification	report	witness point	review report

MT-Magnetic particle test  
W-Witness

PT-Liquid penetrant test  
R-Review

TPIA: Third Party Inspection Agency; Control Authority: Owner/Engineer or their Authorised Inspection Agency.

- Note: 1 The above testing and acceptance criteria are minimum requirements, however, equipment supplier shall ensure that the product also comply to the additional requirements as per Technical specifications/Code and data sheets.
- 2 The supplier shall submit their own detailed QAP prepared on the basis of the above for approval of Owner/Owner's representative and TPJA.
- 3 Supplier shall submit Calibration certificates of all Instruments/Equipment to be used for Inspection and Testing to TPJA with relevant procedures and updated standards for TPJA review/Approval.
- 4 TPJA will have Right to Inspect minimum 10% of all manufacturing activities on each day or as specified above.
- 5 TPJA along with Owner/Owner representative shall review/approve all the documents related to QAP/Quality manual/Drawings etc. submitted by supplier.
- 6 Contractor shall in coordination with Supplier/Sub vendor issue detailed Production and Inspection schedule indicating the dates and the locations to facilitate Owner/Owner's representative and TPJA to organise Inspection.
- 7 Certification requirements shall comply with European Standard EN 10204 (latest edition)
- 8 All bought out items will be procured with 3.2 Certificates.
- 9 The bold points in this QAP pertains to mechanical tests and hydro test. These tests on all the components can be clubbed together to be performed during a single visit of TPJA

200082

**BHAGYANAGAR GAS LTD.**

**CNG & CGD PROJECT IN HYDERABAD PHASE - II**

**PAINING SYSTEM & COLOUR CODE FOR FINAL LAYER**

Rev.	Date	Subject of revision	Author	Checked	Approved
1	11.10.11	Issued for Procurement	AR	DNS	NC
0	31.05.11	First Issue	AR	DNS	NC

The colour codes for final layer of Station Pipe Work & Metering Shed shall be as under:

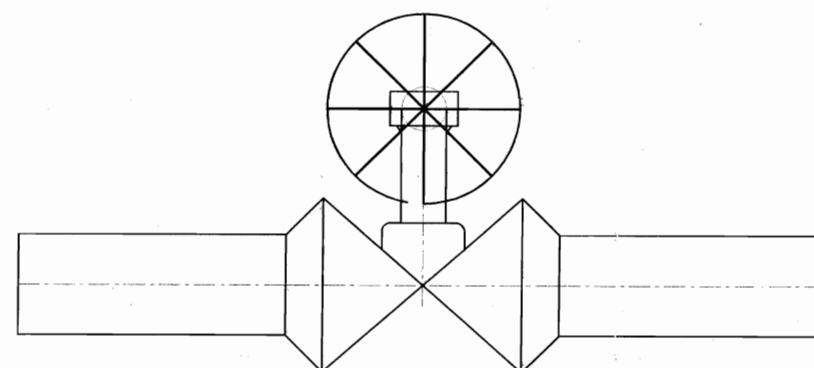
S. No.	DESCRIPTION	FINAL LAYER COLOUR SHADE	RAL CODE
1	Pipe Work	Yellow	RAL 1004
2	Piping Support	Grey	RAL 7043
3	Hand Rail	Grey	RAL 7043
4	Gas O/L Actuator	Blue	RAL 5015
5	Valve Handle/Wheel	Black	RAL 9005
6	All Valves	Grey	RAL 7038
7	IJ	Grey	RAL 7038
8	Filter	Grey	RAL 7038
9	Pig launcher & Receiver	Grey	RAL 7038
10	Bolts & Nuts	Grey	RAL 7038
11	Grating	Hot Galvanized	
12	Metering Station Shed		
12.1	Steel Frame	Beige	RAL 1018
12.2	Roof / Vertical Shed	Grey	RAL 7030
12.3	Control Panel	Grey	RAL 7032

The recommended painting system should be of Category C5 – I Very high (Industrial) as specified in the Standard ISO 12944 Part 1 to 8. The proposed Painting system shall conform to Table A 5 of ISO 12944 – 5 Standard.

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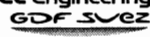
NOTES

1. ALL DIMENSIONS ARE IN MM.
2. THIS IS A INDICATIVE DRAWING DIMENSIONS SHOULD COMPLY TO APPLICABLE CODES AND PESO GUIDELINES.



SIZE OF VALVE	PUP PIECE LENGTH
4"	300 MM
6"	340 MM

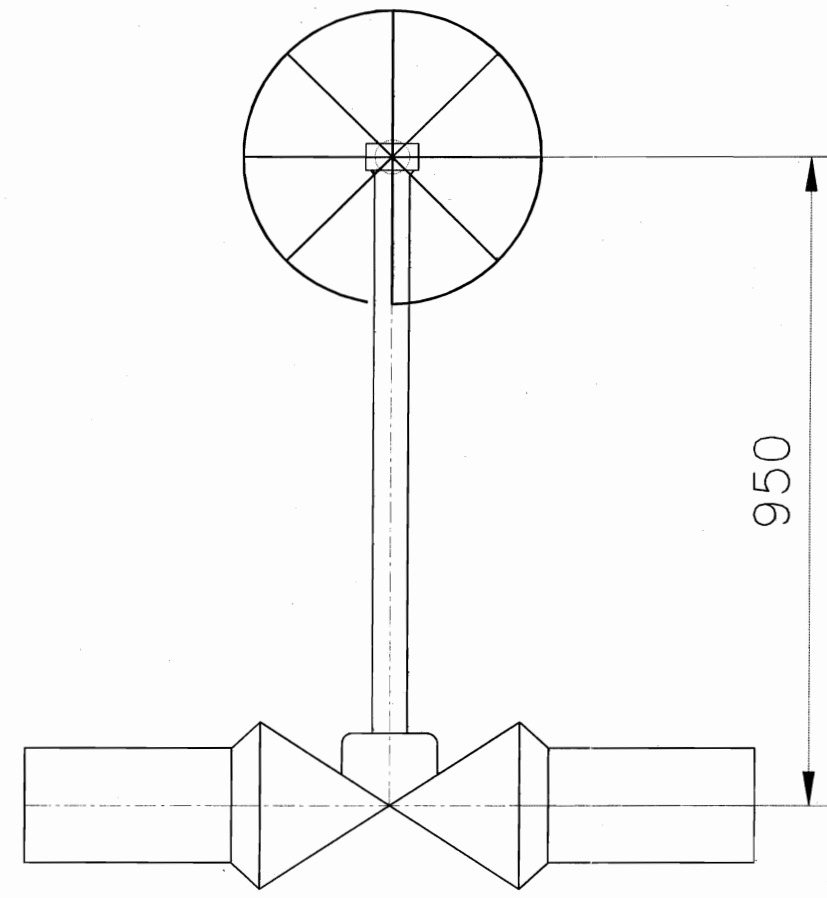
200085

00	04.08.11	A.SINGH	CP	NC	
REV.	DATE	SIGN	SIGN	SIGN	SUBJECT OF REVISION
REVISION	DRAWN	CHECKED	APPROVED		
TITLE					
<b>SCHEMATIC DRAWING FOR A/G 4" AND 6" BALL VALVE</b>					
CLIENT					
 Bhagyanagar Gas Limited 1st Floor Parvatham Showan 2nd Floor, Sushravanagar, Hyderabad, 500 064, AP.					
PROJECT					PROJECT NO.
CNG & City Gas distribution project in Hyderabad Phase-2					P.002062
TRACTEBEL Engineering		SIZE : A1	SCALE : 1:100	SHEET : 1 OF 1	
		DRAWING NUMBER			
		P.002062-L-16-0003			
		REV 0			

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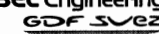


SIZE OF VALVE	PUP PIECE LENGTH
12"	485 MM
16"	610 MM

**NOTES**

1. ALL DIMENSIONS ARE IN MM.
2. THIS IS A INDICATIVE DRAWING DIMENSIONS SHOULD COMPLY TO APPLICABLE CODES AND PESO GUIDELINES.

200086

OC	04.08.11	A.SINGH	CP	NC	
REV.	DATE	SIGN	SIGN	SIGN	
REVISION	DRAWN	CHECKED	APPROVED	SUBJECT OF REVISION	
TITLE					
<b>SCHEMATIC DRAWING FOR U/G 12" AND 16" EXTENDED STEM BALL VALVE</b>					
CLIENT					
 Bhaganagar Gas Limited 1st Floor, Parkin Bhawan APDC, Bala, Saikrishna Nagar, Hyderabad, 500 055, AP.					
PROJECT					PROJECT NO.
CNG & City Gas distribution project in Hyderabad Phase-2					P.002062
TRACTEBEL Engineering		SIZE : A1		SCALE : 1:100	SHEET : 1 OF 1
		DRAWING NUMBER			
		P.002062-L-16-0004			
		REV 0			

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