ONGC MRPL	खरीद के लिए तकनीकी विनिर्देश TECHNICAL SPECIFICATION FOR PROCUREMENT OF VALVES-3700004920

NOTES	DELIVER THE ITEM TO	DELIVERY DATE
1.This page is record of all requisition revisions. Normally each time the requisition is changed only new revised page is issued. 2.The nature of is briefly noted under details but these are not a part of the requisition. The revised pages become part of the original requisition and shall be complied within their entirety.	MANGALORE REFINERY AND PETROCHEMICALS LIMIT REFINERY COMPLEX, MANGALORE	Items indented shall be delivered at site within 16 weeks from the date of Order.

REV	DATE	PREPARED BY	CHECKED BY	APPROVED BY	DETAILS
0	12/23/2024	KRM		AK	Issued for Enquiry

DESCRIPTION:

This requisition covers supply of complete materials, inspection, testing, packing and forwarding of VALVES as given under as per the specifications, standards and applicable codes indicated / enclosed with this specification.

Sl NO.	ITEM CODE	DESCRIPTION	QUANTITY	SPECIAL REQUIREMENT	FUGITIVE EMISSION	DATASHEET
1	1300024911	VALVE GATE SW A350LF2/HFHF304, 3/4"800#	150	Extended bonnet	YES	51003
2	1300024853	VALVE GATE SW FG A182F304/304, 3/4"800#	5		YES	51045
3	1300032480	VLV GATE A182/304/STE 51046, 1"800# CRYO	5	CRYOGENIC-Extended bonnet	YES	51046
4	1300032482	VLV GATE A182/304/STE 51046,3/4"800#CRYO	5	CRYOGENIC-Extended bonnet	YES	51046
5	1300032329	VLV CHECK SW A350LF2-CL1/STEL,3/4"800#LT	10		NO	53003

DESCRIPTION:

This requisition covers supply of complete materials, inspection, testing, packing and forwarding of "VALVES" as given under as per the specifications,data sheets, standards and applicable codes indicated / enclosed with this specification.

Abbreviation:
LT- Low temperature
HF- Hardfacing
FG- Forged
STEL- Stellited
VLV----> VALVE
SW--> SOCKET WELD

Please refer Technical specification along with Valve Data-Sheet for more information.

NOTES:

1 All materials above to be supplied shall strictly conform to the "Technical specifications & Data sheet" attached with enquiry.

2 Inspection Requirements:

2.1 CRYOGENIC VALVE:Inspection for items falling under Cryogenic servic shall be inspected as per relevant codes and standard mentioned in SPC-000005 Rev-7 and valve datasheet.

3 For document submission requirement refer Document Submission Schedule attached herewith.

4 Deviation: Any deviation to specifications,terms and condtions,etc to be specified in deviation format only.

5 Bidder shall undertake complete design, documentation, procurement, manufacturing and supply of the items.

6 Any correspondence for techno/commercial clarification ,confirmations and correspondence shall be on bidder letter head

7 In case of any anomaly bidder to bring the same to the notice of MRPL before bid submission.

8 In case any discrepancies between specific standards/specification/codes etc most stringent requirement shall govern.

9 Fugitive emission type testing for raising stem valve shall be done as per DOC No- B038-000-16-43-SP-0002

LIST OF ATTACHMENTS:

Sl No	Originator	Document No	Sheets	Rev No	Description
1	MRPL	STANDARD SPECIFICATION FOR VALVES-SPC000005	23	7	Technical Notes for the Valves
2	MRPL	-	1	-	PQC Compliance Format
3	MRPL	-	1	-	Deviation Sheet
4	MRPL	-	1	-	Technical offer submission checklist
5	MRPL	51003 ,51045 ,51046 ,53003	4	-	Data Sheets for Valves
6	EIL	FUGITIVE EMISSION REQUIREMENTS FOR VALVES-B038-000-16-43-SP-0002	2	0	Technical Notes for the Valves

DOCUMENT REQUIREMENT:

The material should be delivered along with the following documents.

1 Original Third party inspection release note -For Non-IBR Items

2 Documents as per Table below

3 QAP & Drawings shall be provided with in 7 days from the order placement

Serial Number	Document	Stage1 With offer during bid submission	Stage2 After Order Placement		Stage3 As Final Documents with Item Delivery
1	Duly Filled No Deviation Sheet	✓			
2	GA Drawing with BoM and Test Details (Within 15 Days of PO placement)		✓(1)		✓
3	Declaration of bidder not Black listed by any Govt. Body/PSU in letterhead.	✓			
4	Duly Filled Technical offer submission checklist.	✓			
5	Document required as per PQC-BEC sheet.	✓			
6	Quality Assurance Plan		✓(1)		✓
7	Material Test Certificates				✓
8	Packing List				✓
9	PMI report for SS and Alloy Steel Parts(if applicable)				✓
10	Installation & Maintenance Manual				✓
11	Inspection Reports				✓
12	Original Inspection release note (Third party agency)				✓

Notes:

1 For Approval-Note: Approval from MRPL does not absolve the vendor from the responsibility of adhering to proper engineering standards,codes, specifications &workmanship.
2 BoM-Bill of Materials
3 Original /Photocopy of material test certificateduly vetted by TPI agency are accepted
4 In case of non submission of this item Deviation sheet shall be referred and if NO deviation is mentioned it will be understood that bidderhas accepted all clauses in TOTO

END OF DOCUMENT

STANDARD SPECIFICATION
FOR
VALVES

वाल्व के लिए मानक विनिर्देशन

SPC-000005

7	30/11/2023	ANU	AK	THM	PS
REV.	ISSUE DATE	PREPARED BY	CHECKED BY	RECOMMENDED BY	APPROVED BY

CONTENTS

1 GENERAL

1.1 Vendor shall supply valves in accordance with the valve specification sheets along with auxiliaries, if any, such as gear operator, bypasses, drains, locking arrangements etc. wherever specified in the specification sheets, subject notes and other enclosures to the material requisition.

1.2 Vendor shall quote in strict accordance with the valve data / specification sheets, subject technical notes and all other enclosures to the requisition. Deviations to the spec / data sheets, subject technical notes and other enclosures of the requisition, if any, shall be explicitly stated in Deviation Sheet attached with the enquiry.

1.3 All codes and standards for manufacture, testing, inspection etc. shall be of "latest Editions" as on issue date of Tender.

1.4 In case of any conflict amongst documents attached with the MR, the most stringent shall govern and MRPL decision shall be final in this regard.

2 DOCUMENTATION

2.1 Vendor shall submit the Techno-Commercial offer with following as minimum:

2.1.1 Detailed dimensioned & Cross section Drawing with parts / material lists, weight etc.

2.1.2 Drawings for valves with accessories like gear operator, hydraulic / pneumatic operator, motor, extension bonnet, extended stems with stands, bypass etc. giving major salient dimensions.

2.1.3 Vendor shall submit **API Monogram certificate** for the applicable valve type.

2.1.4 Deviations, if any, are to be clearly stated in Deviation Sheet attached with the enquiry, with reference to the original requirement with explanation. In Case of No deviation, the vendor shall submit the deviation format writing No Deviation.

2.1.5 On failure to submit documents as specified above, the offer may be rejected.

2.2 Vendor shall submit following documents as minimum after firm Order placement (Within 15 Days).

2.2.1 Documents for approval as mention in clauses 2.1.1 & 2.1.2.

2.2.2 Test report shall be submitted for all mandatory tests as per the applicable codes. Test reports shall also be furnished for any supplementary tests as specified in test plan.

2.2.3 Material test certificates (physical properties, chemical composition, heat treatment report, etc.) of the pressure containing parts shall be furnished for the valves supplied. Material test certificates for the other parts shall also be furnished for verification during inspection.

2.2.4 Valve Catalogues/Drawings/QAP/IBR FORM-III C/TPI Release Note etc. Shall be submitted in hard copy (1 set) and soft copies (Via Email) along with delivery for MRPL record for all categories/types of valves.

3 DESIGN AND CONSTRUCTION

3.1 Valve shall be designed, manufactured, tested, inspected and marked as per the manufacturing standards, design codes and standards indicated in the respective valve specification sheets. Any conflict between the requisition, enclosures, specification sheets and referred standards/codes shall be brought to the notice of the purchaser for clarifications and resolution, while quoting the bid. The purchaser's decision shall be final and binding to the vendor. The drawings submitted for review shall not include any deviations except as communicated in writing in Deviation permits. The Drawings shall be reviewed only for design and construction features.

3.2 For heavy valves provision shall be available for lifting by way of lugs, eye bolts and other such standard devices.

3.3 All flanged valves shall have flanges integral (unless otherwise stated) with the valve body. Welded-on flanges are not acceptable. Flange finish shall be serrated finish, 125AARH etc. The interpretation for range of face finish shall be as follows-

- Stock Finish: 1000 µ in AARH max
- Serrated Finish / Smooth Finish / 125 AARH: Serrations with 125 to 250 µ in AARH
- Extra Smooth Finish / 63 AARH: 32 TO 63 µ in AARH

3.4 For all butt welds end valves with bevel end as per ASME B16.25. Valve ends shall match thickness of the connecting pipe. Sloping of inside contour of valves shall be done wherever necessary to achieve this. The contour of bevel shall be as per Table-1:

Table-1

MATERIAL	WALL THICKNESS	WELD CONTOUR
Carbon Steel (Except Low Temp. Carbon Steel)	Upto 22MM	Figure 2 Type A
	>22 MM	Figure 3 Type A
Alloy Steel, Stainless Steel & Low Temp. Carbon Steel	Upto 10 mm	Figure 4
	> 10 mm & Upto 25 mm	Figure 5 Type A
	> 25 mm	Figure 6 Type A

3.5 For flanged valves with ring joint flanges, the hardness shall be as per Table-2:

Table-2

Flange Material	Min Hardness of Groove (BHN)
Carbon Steel	140
1% to 5 % Cr	150
Type 304,316,321,347	160
Type 304L,316L	140

3.6 All check valves of size 3" and above (except 900#, 1500# and 2500#) shall have a drain boss at location G (Refer Fig.No.1 of ANSI B 16.34). A tapped drain hole with plug shall be provided as per ANSI B 16.34.Threads shall be as per ASME B1.20.1 (Taper) NPT.

3.7 If an overlay weld-deposit is used for the body seat ring, seating surface, the seat ring base material shall be at-least equal to the corrosion resistance of the material of the shell.

3.8 By-pass requirement for gate valves shall be as per Table-3, unless otherwise indicated in data sheet:

Table-3

ANSI 150 Class	On sizes 26" and above
ANSI 300 Class	On sizes 16" and above
ANSI 600 Class	On sizes 6" and above
ANSI 900 Class	On sizes 4" and above
ANSI 1500 Class	On sizes 4" and above
ANSI 2500 Class	On sizes 3" and above

3.9 The bypass piping arrangement shall be such that clearance between main valve body and bypass assembly shall be the minimum possible for installation reasons. By-pass valve shall be of "Globe Valve". By pass connection ends shall be socket welded upto 600# and butt welded for 900# and above rating. The sizes shall be as under:

- On main valve ≤ 4inch :1/2 inch or more
- On main valve > 4inch But <10inch :3/4 inch or more
- On main valve ≥ 10inch :1 inch or more.

3.10 By-pass piping shall be of same metallurgy as main valve. The by-pass piping, fittings and valve tag numbers as specified in Specification. In case details of by-pass arrangement for any Valve tag number are missing, Vendor shall bring the same to notice of MRPL and provide by-pass arrangement as per details specified. Preferably CS/AS valve bypass pipe shall have thickness of Sch 160. Socket weld fitting for upto 300# valve shall have 3000# rating but for higher rating valves it should be 9000#.

3.11 Valve body / bonnet shall be forged / cast as specified. Forging are acceptable in place of casting but not vice-versa.

3.12 Unless otherwise specified in the data sheets, Gate valves of 3" and above shall be supplied with Full bore port size only.

3.13 Valves specified as LO (Lock open) and LC (Lock closed) shall be supplied with suitable arrangement for locking in open as well as in closed position. Lock is included in vendor's scope of supply.

3.14 Stem shall be forged or machined from forged / rolled bar. No casting is permitted. However, integral stem of cast material is acceptable for Plug valves.

3.15 Stelliting / hard facing by deposition shall be minimum 1.6 mm thick each. Renewable seat rings shall be seal welded.

3.16 Material of construction of yoke shall be minimum equivalent to body/bonnet material.

3.17 For all austenitic stainless steel valves Inter Granular Corrosion (IGC) test shall be conducted as per the following:

3.17.1 ASTM A262 Practice 'B' with acceptance criteria of 60 mils/year (max.) for all materials -forged, rolled, wrought and casting.

Or

ASTM A262 Practice `E' with acceptance criteria of 'No cracks as observed from 20X magnification' for all materials other than castings. 'Microscopic structure to be observed from 250X magnification' in addition.

3.17.2 When specifically asked for in purchase requisition for high temperature applications of some austenitic stainless steel grades(TP309,310,316,316H,317,321,347)ASTM A262 Practise 'C' with acceptance criteria of 15 mils/yr max ,shall be conducted in addition to Practise 'B'.

3.17.3 For the IGC test as described in Clauses 3.14.1 & 3.14.2, Two sets of samples shall be drawn from each solution annealing lot. One set shall correspond to the highest Carbon content and the other to the highest pressure rating. When testing is conducted as per practice `E', photograph of the microscopic structure shall be submitted for record.

3.18 All types of 321 or 347 stainless steel valves shall be in a stabilised heat treated condition. Stabilising heat treatment shall be carried out subsequent to the normal solution annealing. Soaking temperature and holding time for stabilising heat treatment shall be 900°C and 4 hours respectively.

3.19 All Stainless Steel Castings shall be solution heat treated.

3.20 Only normalized and tempered material shall be used in the following specifications:

Castings: A217 Gr.WC1, A217 Gr.WC4, A217 Gr.WC5, A217 Gr.WC6, A217 Gr.WC9, A217 Gr.C5, A217 Gr.C12

Forgings: A182 Gr.F11 C1.2, A182 Gr.F12 C1.2

3.21 The MOVs are to be installed in an open area and the actuators shall be suitable for all weather conditions. The testing of complete assemblies of MOVs along with the actuators shall be done by the supplier at his works.

3.22 Bolted design shall not be offered for valve above class 600#. Bonnet Type-B shall be used for valve class 900# and above.

3.23 For vaccum service valves, one valve per size shall be helium vacuum tested as per ASME-V, Subsection-A, Article 10 (hood method) Appendix-IX to check suitability for vacuum service. Vendor shall certify suitability of valves for 10mm of HgA vacuum service at intended temperature.

4 BALL / PLUG / BUTTERFLY VALVES:

4.1 As a prequalification, Fire Safe Test as per API 607 / API 6FA / BS EN ISO 10497 shall be carried on soft seated ball, plug, butterfly valves and also on lubricated plug valves. The test shall be witnessed and certified by third party inspection agency. The vendor has to submit Type Test Certificate for the particular design/model of the valve offered, if fire safe design is required as per the Valve Material Specification sheet or elsewhere mentioned in the tender documents.

4.2 Each valve shall be supplied with a lever except for gear operated / motor operated valves.

4.3 Butterfly valves shall be suitable for both 'on-off' as well as 'Throttling service' under maximum differential pressure for the rating.

4.4 Soft-seated ball, plug and butterfly valves shall be supplied with antistatic devices.

4.5 Soft-seated BW / SW end ball valves shall have a 100MM long seamless pipe nipple (compatible to body material) welded to each end of the valve. Nipples are to be welded prior to assembling Teflon seats / seals. Schedule of pipe nipple shall be indicated in the valve specification sheet.

4.6 Face to face dimensions of all ball valves shall be same as those of gate valves of the corresponding ANSI Class (except 10 inch onward in class 150 where dimensions shall be as per API 6D long patterns).

4.7 The ball of the ball valve shall not protrude out outside the end flanges of valve.

4.8 Ball valves shall be Floating ball type / Trunnion mounted type as per Table-4:

Table-4

Rating	Size Range	Type
150#	8 inch and below	Floating ball
	10 inch and above	Trunnion Mounted
300#	4 inch and below	Floating ball
	6 inch and above	Trunnion Mounted
600# and above	1.5 inch and below	Floating ball
	2 inch and above	Trunnion Mounted

4.9 Unless otherwise specified in the data sheets, bore of all reduced bore Ball valves shall be limited to one size lower than the nominal bore.

4.10 Triple offset butterfly valve shall be supplied in accordance with API-609, Category-B. Valves shall be of high performance type, Bubble Tight shut-off and with Bi-directional operational functionality as per maximum differential pressure for the rating. If any deviation, shall be mentioned in the deviation sheet with reasoning.

5 OPERATION

5.1 Generally the valves are hand wheel or lever operated. Gear operation shall be provided as per Table-5, or unless specified otherwise in the individual valve data sheet:

Table-5

Valve Type	Class	Gear operation required for sizes
Gate Valve, Globe Valve & Diaphragm Valve	150 Class	12" and larger
	300 Class	12" and larger
	600 Class	10" and larger
	900 Class	6" and larger
	1500 Class	3" and larger
	2500 Class	3" and larger
Ball Valve / Plug Valve (Other than pressure balance plug valves*)	150 Class	6" and larger
	300 Class	6" and larger
	600 Class	4" and larger
	900 Class	3" and larger
	1500 Class	3" and larger
Butterfly Valve	150 & 300 Class	6" and larger

*For pressure balance plug valves manufacturer's recommendation shall be acceptable after mutual agreement.

5.2 Gear operation shall be provided with position indicators for open / close positions and with limit stops. (Limit stops are not applicable for gate and globe valves).

5.3 Where gear operation is not called for as per spec but vendor recommends a gear operator, he shall highlight such case(s) and quote separate prices for the valve and gear operator.

5.4 Gear operator shall be so designed to operate effectively with the differential pressure across the closed valve equal to the cold non-shock pressure rating.

5.5 Ball, plug and Butterfly valves even with wrench or lever operators shall have Open position indicators with limit stops.

5.6 Hand wheel diameter shall not exceed 700 mm and lever length shall not exceed 500 mm and effort to operate shall not exceed 35 kg at hand wheel periphery. However failing to meet the above requirements vendor shall offer gear operated valve and mentioned in the spec.

6 INSPECTION AND TESTING

6.1 Every valve, its components and auxiliaries, must be subjected to all the mandatory tests and checks called in the respective codes, data sheets, QAP, etc. as approved by the purchaser.

6.2 Though the extent of inspection shall be as under, exact extent with Hold points shall be decided by MRPL or Suggested TPI agencies.

6.3 Strip check is required for 1% of total ordered quantity of valves (min 1 no.) for Stainless Steel, Alloy Steel or valves meant for special service (like Sulphuric acid service) or as mentioned in the individual data sheet.

However, strip check is not required for CS/Brass/Bronze material valves with 13% Cr/ Brass/ Bronze trims.

6.4 Samples for strip check shall be selected at random and shall generally be the highest size in the lot.

6.5 In case of motor operated or actuator operated valves, functional / operational checks as per the requirements of the specifications shall be made on each valve.

6.6 Vendor shall supply flame proof / PESO, India approved electrical actuators along with the valves where ever specified. Actuator shall meet API-6DX requirements.

7 RADIOGRAPHY OF CAST VALVES

7.1 Valves under critical, very highly critical, lethal and toxic services shall be radiographed as specified in respective data sheets. When specifically not mentioned in individual data sheets, valve castings shall undergo radiographic examination as specified in Table-6 hereunder (irrespective of material of construction):

Table-6

Rating	Size Range	Radiography
150#	24inch and below	Note*
150#	26inch and above	100%
300#	16inch and below	Note*
300#	18inch and above	100%
600# and above	All sizes	100%

*Note: For sizes 24" & below in 150# and 16" & below in 300#, Radiography shall be performed on minimum 10% of the quantity or as specifically mentioned in individual valve material spec sheet/data sheet shall govern.

7.2 Radiography specified as random 10% or 20% etc. in the respective valve data sheet for cast steel valves, implies 10% or 20% etc. of number of valves ordered against each item code with a **minimum of one valve** against each item code.

7.3 Radiography procedure, areas of casting to be radiographed shall be as per ASME B16.34 and acceptance criteria shall be as per ASME B 16.34 Appendix-1. However for areas of casting to be radiographed for types of valve not covered in ASME B 16.34, vendor shall enclose details of areas to be radiographed in line with ASME B 16.34.

7.4 Radiography wherever specified in the data sheets or as per clause of this specification or anywhere in the enquiry documents shall be done by X-ray / γ-ray to get the required sensitivity.

8 IBR CERTIFICATION

8.1 For valve described as IBR, valves shall be in accordance with the latest IBR (Indian Boiler Regulation) including the requirements specified in the specification.

8.2 SW / BW end carbon steel valves under IBR, the chemical composition shall conform to the following:

- Carbon (Max.) : 0.25%
- Others (S.P.Mn) :As per IBR regulations

8.3 Valves coming under the purview of "IBR"(Indian Boiler Regulations) shall each be individually accompanied by IBR certificate original in Form III-C duly approved by IBR authority / local authority empowered by the Central Boiler Board of India. Photocopy of original certificate duly attested by the local boiler inspector where the supplier is located is the minimum requirement for acceptance.

8.4 All "IBR" valves shall be painted RED in body-bonnet / body-cover joint.

9 MARKING

9.1 Valve makings, symbols, abbreviations etc. shall be in accordance with MSS-SP-25 or the standard referred in specification sheet as applicable. Vendor's name, Valve rating, material designation, nominal size, direction of flow (if any) etc. shall be integral on the body. rating, material designation, nominal size, direction of flow (if any) etc. shall be integral on the body.

9.2 Each valve shall have a corrosion resistant tag giving size, valve serial number, and valve specification sheet number securely attached on the valve body.

9.3 Paint or ink for marking shall not contain any harmful metal or metal salts such as Zinc, lead or copper which causes corrosive attack on heating.

9.4 Carbon steel valves shall be painted with two coats of Red Oxide Zinc Chromate primer.

9.5 All alloy steel high temperature valves shall be painted with heat resistant silicone paint suitable for intended temperature.

9.6 All 3-1/2% Ni Steel / LTCS valves shall be painted with paint suitable for low temp.

10 DISPATCH

10.1 Valves shall be dry, clean and free from moisture, dirt and loose foreign materials of any kind.

10.2 Valves shall be protected from rust, corrosion and any mechanical damage during transportation, shipment and storage.

10.3 Rust preventive on machined surfaces to be welded shall be easily removable with a petroleum solvent or not harmful to welding.

10.4 End of valves shall be protected with the following materials:

- Flange face : Wood, metal or plastic cover
- Bevelled end : Wood, metal or plastic cover
- SW and Screwed end : Plastic cap

10.5 End protectors to be used on flange faces shall be attached by at least three bolts or wiring through bolt holes and shall not be smaller than the outside diameter of the flange. However plastic caps for SW and screwed end valves shall be press fit type.

10.6 End protectors to be used on bevelled end shall be securely and tightly attached.

10.7 For special service valves additional requirement of dispatch shall be prescribed in data sheet.

10.8 All certification / records required as per the standard shall be supplied along with the material itself. Non-compliance of this may lead to material rejection after receipt.

SPECIAL REQUIREMENT AS PER SERVICE CONDITIONS

11 CRYO

11.1 All valves of Low Temperature Carbon Steel (LTCS) and all grades of austenitic SS (CRYO) material are categorised as cryogenic valves. All these valves shall have extended bonnet as per BS 6364 except check valves. Valves shall be suitable for installation in any position (on vertical, horizontal or skewed pipe line).

11.2 Test temperature, unless specifically called for otherwise in the individual Requisition, shall be -45 degree C for LTCS and -196 degree C for all grades of austenitic stainless steel.

11.3 Bonnet and Gland extension joints shall be of butt welded construction.

11.4 Bonnet extension wherever specified in the valve sheet to BS: 6364 shall be for Non Cold Box Application unless otherwise specified in the requisition. Even if not called for in valve sheet, valves indicated as "LT" or "CRYO" shall be supplied with bonnet extension.

11.5 As a prequalification, austenitic stainless steel Cryo valves shall be subjected to cryogenic test as per BS 6364 and test shall be witnessed and certified by third party inspection agency. The vendor has to submit Test Certificate for prototype valves along with the offer. Prototype test carried on a particular size of the same rating and design.

11.6 Repair welding procedure for austenitic stainless steel valves in Cryo service shall have to be qualified for impact test as per ANSI B31.3. Minimum acceptable impact energy shall be 20J or lateral expansion of 0.38 mm at temp. of -196 Deg. C.

11.7 Wherever Impact Test of SS Studs / Nuts are called for in the data sheet, the impact valve shall be 27J at the intended service temperature specified in the data sheets.

12 SOUR SERVICE

12.1 This section covers the minimum requirements for material, fabrication and testing of material in Wet Hydrogen Sulphide environment.

12.2 Material shall conform to NACE MR-0103(Latest Edition). MTC complying the same shall be reviewed by TPI and submitted together with original documents.

13 HYDROGEN SERVICE

13.1 All valve castings shall be of radiographic quality.

13.2 All cast valve flanges and bodies with flange rating of 900# or greater shall be examined in accordance with paragraphs 7.2 through 7.5 of Appendix VII of ASME Section VIII Division 1, regardless of casting quality factor.

13.3 Body, bonnet, cover joints and stuffing box of all valves shall be of low emission type and shall be Helium leak tested as per ASME Section V, Subsection A, Article 10 (Detector Probe Technique), Appendix IV at a minimum of 25% of the allowable rated cold working pressure. Minimum Test durations (In minutes) shall be as per Table-7:

Table-7

NPS	Upto 300#	600#	800 and 900#	1500#	2500#
Up to 2"	3	6	9	12	12
3" to 6"	6	9	12	15	18
8" to 16"	9	9	12	15	18
18" to 24"	9	12	15	18	21

The valve shall show no leakage. No leakage is defined as a total leakage rate of less than 0.0001 ml/s of helium.

13.4 Only normalized and tempered materials shall be used for the following specifications:

13.4.1 Castings: A217 Gr.WC1, A217 Gr.WC4, A217 Gr.WC5, A217 Gr.WC6, A217 Gr.WC9, A217 Gr.C5, A217 Gr.C12

13.4.2 Forgings: A182 Gr F11 CL2

13.5 CS AND AS VALVES IN HYDROGEN SERVICE

13.5.1 Bend test and Magnetic Particle inspection of the entire surface of body and bonnet casting shall be in accordance with ASTM A217 along with ASTM A703. Supplementary requirement S3 and S4 evaluation of magnetic particle, inspection shall be in accordance with MSS-SP-53 except that no linear discontinuities shall be allowed.

13.5.2 The Brinell hardness of heat treated casting shall not exceed 200 BHN for carbon steel and 225 BHN for alloy steel.

13.5.3 Repair to defective casting shall be outlined in writing to the purchaser before repair starts. Repair method to be approved prior to welding.

13.5.4 Casting shall be preheated to a minimum of 200^{0}C prior to welding and all Chromium-Molybdenum alloys shall be post weld heat treated after welding is complete. Stress relieving is essential for welds.

13.5.5 Carbon steel shall be normalised and alloy steels shall be normalised and tempered.

13.5.6 Dye Penetrant test of welds shall be in accordance with ASTM B165 Procedure B-2. Interpretation as per Appendix-8 of ASME-VIII Div.1.

13.5.7 The tensile stress for AS shall be less than 655 MPa.

13.5.8 Charpy V-notch impact testing is to be done for valve material (average 27 joule for set of 3 [minimum value 20 Joule] at 0^{0}C).

13.5.9 For radiography and acceptance criteria for valve castings shall be the same as those specified for SS Valves in Hydrogen service.

13.6 SS VALVES IN HYDROGEN SERVICE

13.6.1 All stainless steel Casting and test bar shall be solution heat treated and pickled condition.

13.6.2 Critical body and bonnet casing section typically defined by ASME B16.34 shall be radiographed and shall meet ASTM E446 (upto 2" thick) Category A,B and CA Level 2, Category CB, OC and CD Level 3, Category D,B and F Level 0. For wall thickness 2 inch to 4.5 inch comparable plates of ASTM E186 shall be used. ASTM E94 and ASTM E142 shall be used for recommended practice and controlling quality of radiography as guide. The entire surface of all castings shall be dye-penetrant inspected after pickling.

13.6.3 Welds shall be 100% radiographed and evaluated in accordance with paragraph 344.5 of ASME B31.3 with a minimum casting quality factor of 0.95.

13.6.4 Dye Penetrant test of welds shall be as per ASTM-E165 Procedure B-2, Interpretation as per Appendix-8 of ASME-VIII Div. 1.

13.6.5 All weld desposits shall be checked for ferrite content. A FN range between 3 to 10 shall be maintained to avoid sigma phase embrittlement during heat treatment. FN shall be measured using ferritoscope and shall be reported prior to the heat treatment.

13.7 CARBON STEEL VALVES IN "WET H2S" SERVICE

13.7.1 Following are the design requirement for carbon steel "Wet H2S resistant":

13.7.1.1 Carbon steel must be Fully Killed Carbon Steel type.

13.7.1.2 Hardness of the base metal shall be below 233 BHN.

13.7.1.3 Ni content less than 1%.

13.7.1.4 Carbon content shall be 0.20% maximum.

13.7.2 All the specifications given in clause 13.6.1 are applicable and shall be supplemented by following limitations on impurities level:

13.7.2.1 Maximum allowable Phosphorus content 0.030%

13.7.2.2 Maximum allowable Sulphur content 0.025%

13.7.3 Valves internals made from carbon steel shall have hardness limited below 233 HB before PWHT. Other elements not made from carbon steel shall comply with dedicated section of NACE MR0103 if applicable.

13.8 CARBON STEEL VALVES IN "HIC RESISTANT" SERVICE

13.8.1 It shall be noted that stress have no influence on HIC phenomenon, however the material composition and structure do. The most important factor to avoid HIC is 'Purity (cleanliness) and homogeneity' of the steel. The non-metallic inclusion as well as any sites where hydrogen recombination might occur (eg. Elongated MnS inclusions) must be kept at very low content.

13.8.2 When "HIC" is specified, in addition to the recommendations relative to "Wet H2S resistant steels", the following requirements shall also be met:

13.8.2.1 Carbon steel made by vacuum degassing process.

13.8.2.2 Oxygen content less than 0.0025% (target being 0.002%).

13.8.2.3 Calcium treatment, if any, shall be Ca/S ratio greater than 1.2.

13.8.2.4 It is required to pass the NACE standard TM0284 (Evaluation of Pipeline and Pressures Vessels Steels for Resistance to Hydrogen-Induced Cracking) by using the acidified test solution A specified in NACE standard TM0177 (Laboratory Testing of Metals for Resistance to Sulphide Stress Cracking and Stress Corrosion Cracking in H2S environments) with :

13.8.2.5 Crack Length Ratio (CLR) lower than or equal 5 %

13.8.2.6 Mill test reports shall include the values for the crack length ratio (CLR), crack sensitivity ratio (CSR) and crack thickness ratio (CTR) as defined in NACE standard TM0284 and also carbon equivalent (CE).

13.8.3 All the specifications given at clause 13.8.2 are applicable and shall be supplemented by following limitations on impurities level:

13.8.3.1 Maximum allowable Phosphorus content 0.025%

13.8.3.2 Maximum allowable Sulfur content 0.020%

14 FUGITIVE EMISSION DESIGN REQUIREMENT

14.1 Valves, which are specified to meet Fugitive emission requirements in Valve Material Specification/Data sheets shall comply the following:

14.1.1 Type Testing of Rising Stem Valves Equipped with Graphite Packing for Fugitive Emission: **Gate, Globe, Needle valves** etc. shall meet the Fugitive Emission requirements as per API Std. 624 (latest edition).

14.1.2 Type Testing of Quarter-turn valves for Fugitive Emission: **Ball, Plug, Butterfly valves** etc. shall meet the Fugitive Emission requirements as per API Std. 641 (latest edition).

14.1.3 Type Testing of valves for Fugitive Emission as per ISO 15848-Part 1: For valve sizes & ratings, which are not covered in API 624 & API 641, Fugitive Emission requirements shall be met as per ISO-15848-1(latest edition) with "Methane" as test fluid and emission limit shall be restricted to ≤ 100 ppmv.

15 INSPECTION & TEST PLAN (INDICATIVE)

SL. No.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION	
					VENDOR/ SUPPLIER	MRPL/ TPI
1.0	**Procedure**					
1.1	Hydrostatic Test, Heat Treatment, NDT, Helium Leak Test and Other Procedures	Documented Procedures	100%	Procedure Documents	H	W-New R-Existing
1.2	WPS, PQR & WPQ	Welding Parameters & Qualification Record	100%	WPS, PQR & WPQ	H	W-New R-Existing
1.3	Pre-Qualification Tests	Fire safe, Cryogenic & Other Test as applicable	As per PR/ Purchase Specification	Acceptance Report	H	H
2.0	**Material Inspection**					
2.1	Castings & Forgings (Body, Bonnet, Disc, Stem, Body ring)	Chemical, Mechanical, Heat Treatment, NDT, IGC & Other Properties as applicable	100%	Test Certificates /MTC as per EN10204 type 3.2	R	R
2.2	Castings & Forgings (Body, Bonnet, Disc, Stem, ring)	Visual & Dimension	100%	Inspection Report	H	-
2.3	Body and Bonnet Castings	Radiography as per ASTM E-94/ASME SEC-VIII DIV.1 UW-51	As per PR/ purchase specification/ Valve data sheet	Films and report	P	R
2.4	Bars for Trim material	Chemical Analysis	Each Heat	Test Certificates & lab report	P	R
2.5	Gaskets, Gear units, Fasteners, Gland, Packing's, etc.	Physical/ Chemical Properties	100%	Test Certificates & lab report	R	R

SL. No.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION	
					VENDOR/ SUPPLIER	MRPL/ TPI
3.0	**In process Inspection**					
3.1	Welding	Welding parameters as per WPS/ PQR	100%	Inspection Reports	P	-
3.2	Machining of components	Visual / Dimension	100%	Inspection Reports	P	-
4.0	**Final Inspection**					
4.1	Hydrostatic / Pneumatic / Vacuum or Helium Leak test as applicable	Leak Check	As per PR/ purchase specification	Test report	P	RW W-100% for cast valve rating #900 & above.
4.2	Visual / Dimension	Surface & Dimension Check	100%	Test report	P	RW
4.3	Functional Test for Actuator Operated Valves	Satisfactory Performance	100%	Test report	P	RW
4.4	PMI Check	Chemical	As per MRPL Spec.	Inspection Report	P	RW
4.5	Hydrogen service test	Bend test/MPI/Hardness test/Impact test	100%	Test report	P	R RW-Hardness
4.6	Wet H2S service	MTC/Harness test	100%	Test report	P	R RW-Hardness
4.7	HIC resistance test	MTC/Chemistry control procedure	100%	Test report/ TM0284	P	R
4.8	Strip Check (as applicable)	Verify components & Differential hardness if applicable	As per PR/ Purchase specification	Inspection Report	P	RW
4.9	Final Stamping	Stamping of Accepted Valves	Stamping of Valves which are witnessed by TPIA.	Inspection Report	P	H

SL. No.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION	
					VENDOR/ SUPPLIER	MRPL/ TPI
5.0	**Painting**					
5.1	Painting and color coding as applicable	Visual / DFT check		Inspection Report	P	R
6.0	**Documentation & IC**					
6.1	Documentation & Inspection Certificate (IC)	Review of Inspection Reports/ Test Reports & Issue of IC	100%	Supplier TC & IC	H	H
Legend: H- Hold (Do not proceed without approval), P- Perform, RW- Random Witness (As specified or 10% (min.1 no. of each item code), R- Review, W- Witness						

Notes:

1) No repair without prior permission from MRPL

2) Hydrotest of cast valve body and seat shall be permormed and witnessed by vendor for 100% quantity.

3) This document describes the generic test requirements. Any additional test or Inspection scope if specified in Bid documents shall also be applicable.

4) Acceptance norms for all the activities shall be as per PR/PO/Standards/Job spec and Approved document's only.

***** END *****

Client : Engineers India Ltd.	**Dept./Sect. :** 16/43
Project : Std. Specification	
Location : New Delhi	**Tag No: 51003** **Sheet No. 1 of 1**

GATE VALVE SPECIFICATION

MANUF'S OFFER

TAG NO. : **51003** **PIPING CLASS** : A4A, B4A, D4A
RATING : 800 **STANDARD** : API 602/ ISO 15761
SIZE RANGE : 0.5" TO 1.5" **ENDS** : SW 3000 TO B-16.11

STANDARD:
MFGRS CAT/FIG:
RATING: **ENDS:**

DESCRIPTION	CONSTRUCTION	MATERIAL	CONSTRUCTION	MATERIAL
BODY	FORGED	ASTM A 350 GR.LF2 CL.1		
BONNET	BOLTED	ASTM A 350 GR.LF2 CL.1		
STEM	RISING	SS 304/SS316 (NO CASTING)		
WEDGE DISC	SOLID	STELLITED		
BODY SEAT RING	RENEWABLE	STELLITED		
STEM PACKING	RENEWABLE WITH VALVE OPEN ON STREAM	CORROSION INHIBITED DIE FORMED FLEXIBLE GRAPHITE WITH BRAIDED ANTI EXTRUSION RINGS		
HAND WHEEL	NON RISING	MALLEABLE IRON/CAST ST/FAB.ST/DUCT. IRON		
BONNET BOLTS		ASTM A320 GR L7		
BONNET NUTS		ASTM A194 GR 4/GR 7		
BONNET GASKET		SP WND SS316 - GRAFOIL FILLER		
SPECIAL SERVICE CONDITIONS	LT	UPTO -45 DEG. C.		
BACK SEAT & SHOULDER	INTEGRAL			
OTHERS	O.S & Y.			
HYDROSTATIC TEST PRESSURE	BODY : 2975 PSIG.	SEAT : 2175 PSIG		
TEST PRESSURE WITH AIR	80 PSIG			

NOTES

1 THIS VALVE SPEC SHEET SHALL BE READ IN CONJUNCTION WITH TECHNICAL NOTES FOR VALVES.
2 BIDDER SHALL CLEARLY WRITE ALL/ ANY DEVIATION AGAINST EACH PART/ MATERIAL OF VALVE IN THE SPACE PROVIDED FOR. WHEREVER BIDDER AGREES WITH EIL'S SPEC BIDDER SHALL INDICATE "AGREED".
3 NO CUTTING/ OVERWRITING BY BIDDER ON EIL'S SPEC IS ALLOWED.
4 TESTING SHALL BE AS PER BS-6364 ALSO.
5 VALVES SHALL BE PROVIDED WITH EXTENDED BONNET AS PER BS 6364 (NON COLD BOX APPLICATION).
6 VALVES TO COMPLY WITH DESIGN REQUIREMENTS OF BS-6364 ALSO.
7 VALVES AS PER API-602 AND TESTING AS PER API-598 & BS-6364 ARE ALSO ACCEPTABLE.

SIGNATURE & SEAL OF MANUFACTURER

SHEET REV. NO.	2	3	4	5	
DATE	02/01/1995	14/12/2000	28/05/2001	30/06/2009	**51003**

Client : MRPL	**Dept./Sect.** : 16/43
Project : MRPL BSVI PROJECT	
Location : MANGALORE	**Tag No: 51045** **Sheet No. 1 of 1**

GATE VALVE SPECIFICATION

TAG NO. : 51045 **PIPING CLASS :** A1K, A3K, B1K,
RATING : 800 **STANDARD** : API 602/ ISO 15761
SIZE RANGE : 0.5" TO 1.5" **ENDS** : SW 3000 TO B-16.11

MANUF'S OFFER

STANDARD:
MFGRS CAT/FIG:
RATING: **ENDS:**

DESCRIPTION	CONSTRUCTION	MATERIAL	CONSTRUCTION	MATERIAL
BODY	FORGED	ASTM A 182 GR.F304		
BONNET	BOLTED	ASTM A 182 GR.F304		
STEM	RISING	SS 304/ SS 316; (NO CASTING)		
WEDGE DISC	SOLID	STELLITED		
BODY SEAT RING	RENEWABLE	STELLITED		
STEM PACKING	RENEWABLE WITH VALVE OPEN ON STREAM	CORROSION INHIBITED DIE FORMED FLEXIBLE GRAPHITE WITH BRAIDED ANTI EXTRUSION RINGS		
HAND WHEEL	NON RISING	MALLEABLE IRON/CAST ST/FAB.ST/DUCT. IRON		
BONNET BOLTS		ASTM A193 GR B7		
BONNET NUTS		ASTM A194 GR.2H		
BONNET GASKET		SP WND SS316-GRAFOIL FILLER		
SPECIAL SERVICE CONDITIONS		MAX TEMP 454 DEG.C.		
BACK SEAT & SHOULDER	INTEGRAL			
OTHERS	O.S & Y.			
HYDROSTATIC TEST PRESSURE	BODY : 2900 PSIG	SEAT : 2125 PSIG		
TEST PRESSURE WITH AIR	80 PSIG			

NOTES

1 THIS VALVE SPEC SHEET SHALL BE READ IN CONJUNCTION WITH TECHNICAL NOTES FOR VALVES.
2 ONLY IN THE CASE OF CATEGORY - II MRs,BIDDER SHALL CLEARLY WRITE ALL/ ANY DEVIATION AGAINST EACH PART/ MATERIAL OF VALVE IN THE SPACE PROVIDED FOR AND WHEREVER BIDDER AGREES WITH EIL'S SPEC BIDDER SHALL INDICATE "AGREED".
3 NO CUTTING/ OVERWRITING BY BIDDER ON EIL'S SPEC IS ALLOWED.
4 VALVES AS PER API-602 AND TESTING AS PER API-598 ARE ALSO ACCEPTABLE.
5 VALVES SHALL MEET THE FUGITIVE EMISSION REQUIREMENTS SPECIFIED IN DOC. NO. B038-000-16-43-SP-0002.

SIGNATURE & SEAL OF MANUFACTURER

SHEET REV. NO.	2	3	4	5	6	
DATE	02/01/1995	14/12/2000	28/05/2001	30/06/2009	18/05/2018	**51045**

Client : MRPL	**Dept./Sect.** : 16/43
Project : MRPL BSVI PROJECT	
Location : MANGALORE	**Tag No: 51046** **Sheet No. 1 of 1**

GATE VALVE SPECIFICATION

TAG NO. : 51046 **PIPING CLASS :** A2K,
RATING : 800 **STANDARD** : API 602/ ISO 15761
SIZE RANGE : 0.5" TO 1.5" **ENDS** : SW 3000 TO B-16.11

MANUF'S OFFER

STANDARD:
MFGRS CAT/FIG:
RATING: **ENDS:**

DESCRIPTION	CONSTRUCTION	MATERIAL	CONSTRUCTION	MATERIAL
BODY	FORGED	ASTM A 182 GR.F304		
BONNET	BOLTED	ASTM A 182 GR.F304		
STEM	RISING	SS 304/ SS 316; (NO CASTING)		
WEDGE DISC	SOLID	STELLITED		
BODY SEAT RING	RENEWABLE	STELLITED		
STEM PACKING	RENEWABLE WITH VALVE OPEN ON STREAM	CORROSION INHIBITED DIE FORMED FLEXIBLE GRAPHITE WITH BRAIDED ANTI EXTRUSION RINGS		
HAND WHEEL	NON RISING	MALLEABLE IRON/CAST ST/FAB.ST/DUCT. IRON		
BONNET BOLTS		ASTM A320 GR B8 CL.2 (IMPACT TESTED)		
BONNET NUTS		ASTM A194 GR.8 (IMPACT TESTED)		
BONNET GASKET		SP WND SS316-GRAFOIL FILLER		
SPECIAL SERVICE CONDITIONS	CRYO	MIN TEMP -196 DEG C.		
BACK SEAT & SHOULDER	INTEGRAL			
OTHERS	O.S & Y. (NOTE 5)			
HYDROSTATIC TEST PRESSURE	BODY : 2900 PSIG	SEAT : 2125 PSIG		
TEST PRESSURE WITH AIR	80 PSIG			

NOTES

1 THIS VALVE SPEC SHEET SHALL BE READ IN CONJUNCTION WITH TECHNICAL NOTES FOR VALVES.
2 ONLY IN THE CASE OF CATEGORY - II MRs,BIDDER SHALL CLEARLY WRITE ALL/ ANY DEVIATION AGAINST EACH PART/ MATERIAL OF VALVE IN THE SPACE PROVIDED FOR AND WHEREVER BIDDER AGREES WITH EIL'S SPEC BIDDER SHALL INDICATE "AGREED".
3 NO CUTTING/ OVERWRITING BY BIDDER ON EIL'S SPEC IS ALLOWED.
4 TESTING SHALL BE AS PER BS 6364 ALSO.
5 VALVE SHALL BE PROVIDED WITH EXTENDED BONNET AS PER BS 6364 (NON COLD BOX APPLICATION).
6 VENDOR SHALL CERTIFY SUITABILITY OF THE VALVE FOR INTENDED SERVICE CONDITIONS.
7 VALVES TO COMPLY WITH DESIGN REQUIREMENTS OF BS-6364 ALSO.
8 VALVES AS PER API-602 AND TESTING AS PER API-598 & BS-6364 ARE ALSO ACCEPTABLE.
9 VALVES SHALL MEET THE FUGITIVE EMISSION REQUIREMENTS SPECIFIED IN DOC. NO. B038-000-16-43-SP-0002.

SIGNATURE & SEAL OF MANUFACTURER

SHEET REV. NO.	2	3	4	5	6	
DATE	02/01/1995	14/12/2000	28/05/2001	30/06/2009	18/05/2018	**51046**

Client : Engineers India Ltd.	**Dept./Sect. :** 16/43	
Project : Std. Specification		
Location : New Delhi	**Tag No: 53003**	**Sheet No. 1 of 1**

CHECK VALVE SPECIFICATION

TAG NO. : **53003** **PIPING CLASS** : A4A, B4A, D4A
RATING : 800 **STANDARD** : BS EN ISO 15761
SIZE RANGE : 0.5" TO 1.5" **ENDS** : SW 3000 TO B-16.11

MANUF'S OFFER
STANDARD:
MFGRS CAT/FIG:
RATING: **ENDS:**

DESCRIPTION	CONSTRUCTION	MATERIAL	CONSTRUCTION	MATERIAL
BODY	FORGED	ASTM A 350 GR.LF2 CL.1		
COVER	BOLTED	ASTM A 350 GR.LF2 CL.1		
DISC/PISTON		STELLITED		
BODY SEAT RING	RENWABLE/NON-RENEWABLE	STELLITED		
DISC HINGE/HINGE PIN				
COVER STUD BOLT		ASTM A320 GR L7		
COVER NUT		ASTM A194 GR 4/GR 7		
COVER GASKET		SP WND SS316-GRAFOIL FILLER		
TYPE	LIFT CHECK TYPE			
OTHERS				
SPECIAL SERVICE CONDITIONS	LT	MIN TEMP -45 DEG.C.		
WASHER,NUT,PIN				
HYDROSTATIC TEST PRESSURE	BODY : 2975 PSIG	SEAT : 2175 PSIG		
TEST PRESSURE WITH AIR				

NOTES

1 THIS VALVE SPEC SHEET SHALL BE READ IN CONJUNCTION WITH TECHNICAL NOTES FOR VALVES.
2 BIDDER SHALL CLEARLY WRITE ALL/ ANY DEVIATION AGAINST EACH PART/ MATERIAL OF VALVE IN THE SPACE PROVIDED FOR. WHEREVER BIDDER AGREES WITH EIL'S SPEC BIDDER SHALL INDICATE "AGREED".
3 NO CUTTING/ OVERWRITING BY BIDDER ON EIL'S SPEC IS ALLOWED.
4 TESTING SHALL BE AS PER BS-6364 ALSO.
5 VALVES TO COMPLY WITH DESIGN REQUIREMENTS OF BS-6364 ALSO.
6 VALVES SHALL BE OF STANDARD BORE DESIGN.
7 VALVES AS PER BS-5352 AND TESTING AS PER BS 6755(PART-I) & BS-6364 IS ALSO ACCEPTABLE .

SIGNATURE & SEAL OF MANUFACTURER