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TECHNICAL NOTES FOR VALVES

1.0 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 etc. wherever specified in the specification sheets, subject notes and other enclosures to the material requisition (MR).

1.2 Vendor shall quote in strict accordance with the valve data / specification sheets, subject technical notes and all other enclosures to the MR. Deviations to the specification / data sheets, subject technical notes and other enclosures of the MR, if any, shall be asked as explained in clause 2.0.

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

2.0 DOCUMENTATION

2.1 Vendor shall submit the following with the offer:

2.1.1 Manufacturer's complete descriptive and illustrative catalogue / literature.

2.1.2 Detailed dimensioned cross section drawing with parts/material lists, weight etc. for the ball valves, plug valves, globe valves, check valves, diaphragm valves and valves to manufacturer's standard.

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

2.1.4 One copy of the valve specification sheets signed as "Accepted" by the manufacturer with all deviations marked clearly.

2.1.5 If the valve is regretted or has no deviation, the manufacturer shall write clearly on valve specification sheets as "Regret" or "No Deviation".

2.1.6 For subject notes, if there is any deviation, the same shall be listed clause wise. Even clauses which are acceptable shall be categorically confirmed as "Accepted".

2.1.7 On failure to submit documents as specified in clauses 2.1.1 to 2.1 .6 above, the offer is likely to be rejected.

2.2 The following documents shall be submitted after placement of the order:

2.2.1 Vendor shall submit for approval drawings mentioned in clauses 2.1.2 & 2.1.3 before start of manufacturing. No other drawing shall be submitted for approval.

2.2.2 Test report shall he supplied for all mandatory tests as per the applicable code. Test reports shall also be furnished for any supplementary tests as specified in clauses 3.13, 3.14 & 3.15.

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

3.0 DESIGN AND CONSTRUCTION

3.1 Valve shall be designed, manufactured, tested, inspected and marked as per the manufacturing standards; design codes and standards (latest editions) indicated in the respective valve specification sheets. Any conflict between the requisition, enclosures, specification sheets and referred standard codes shall be brought to the notice of the purchaser for clarifications. But generally, specification sheets and enclosures of the requisition including subject notes shall govern. After issue of the Purchase Requisition (PR) no deviation to specification/standards shall be permitted through vendor drawing approval. Approval of drawings shall be valid only for design / constructional features.

3.2 All flanged valves shall have flanges integral (except forged valves) with the valve body. Flange face finish shall be normally specified in the valve specification sheet as serrated finish, 125 AARH etc. The interpretation for range of face finish shall be as follows:

Stock finish	:	1000 u in AARH max
Serrated finish / smooth finish / 125 AARH	:	serrations with 125 to 250 u m in AARH
Extra Smooth Finish / 63 AARH	:	32 to 63 u in AARH

3.3 All weld end valves with bevel end as per ASME B16.25. The contour of bevel shall be as follows:

Material	**Wall Thickness**	**Weld Contour**
Carbon Steel (Except low Temp. Carbon Steel	Upto 22 mm	Figure 2 Type A
	> 22 mm	Figure 3 Type A
Alloy Steel. Stainless Steel & Low temp. Carbon Steel	Upto 10 mm	Figure 4
	> 10mm & Upto 25 mm	Figure 5 Type A
	> 25 mm	Figure 6 Type A

3.4 Following requirements for check valves shall be met over and above the valve spec sheet requirements:

3.4.1 Unless specified otherwise in the data sheet all check valves 3" & above (except in 900#, 1500# & 2500# rating) shall have a drain boss at location "G" (Refer Fig. No. 1 of ASME B16.34). A tapped drain hole with plug shall be provided as per ASME B16.34. Threads shall be as per ASME B1.20.I (Taper) NPT.

3.4.2 Wherever check valve disc assembly is supported from the cover of the check valves the following shall be ascertained.

i) Positive location / positioning of cover must be provided to ensure correct alignment of the valve disc.
ii) Hinge pin design must permit accurate alignment of the disc and valve seat.

3.4.3 Lifting lugs are required for all Valves with weight 50 kg and above.

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

3.6 Following valve bypass requirements shall be met

3.6.1 The by-pass piping arrangement shall be such that clearance between main valve body and by-pass assembly shall be the minimum possible for layout reasons.

3.6.2 By-pass valve shall be a globe valve. The sizes shall be as under

On main valve <=4"	:	1/2" or more
On main valve > 4" but < 10"	:	3/4" or more
On main valve >= 10"	:	1" or more

3.6.3 Vendor shall supply the by-pass valve duly tested and fitted to the main valve.

3.6.4 Valves with by-pass shall have the direction of flow marked on the main valve. Bypass attachment to the main valve body shall not be screwed. All fillet welds for bypass installation shall be 100% examined by DP/MP test.

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

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

3.9 Stem shall be forged or machined from forged / rolled bar. No casting is permitted. However, integral stem of cast stainless steel ball valve is acceptable.

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

3.11 Valves under "NACE" category shall meet the requirements specified in MR-0I-75 unless otherwise specified.

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

3.13.1 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 250 X magnification" in addition.

3.13.2 When specifically asked for in MR for high temperature application of some grades of austenitic stainless steel (e.g. SS309, 310, 316, 316H etc.) ASTM A262 Practice 7 "C" with acceptance criteria of "15 mils/year (max.)" shall he conducted.

3.13.3 For the IGC test as described in Clauses 3.12.1 & 3.12.2, 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.

3.14 All types of 321 or 347 stainless steel valves shall be in a stabilized heat treated condition.

Stabilizing heat treatment shall be carried out subsequent to the normal solution annealing. Soaking temperature and holding time for stabilizing heat treatment shall be 900°C and 4 hours respectively.

3.15 Spiral wound bonnet gaskets are to be provided with inner/outer ring except when encapsulated gaskets type body-bonnet joints are employed. Outer ring may be avoided in case of non-circular spiral wound gasket used in 150# valve provided the outermost layer of spiral touches the bolts ascertaining the centering.

3.16 Ball / Plug

3.16.1 All ball valves shall be forged type for 1 ½" & below.

3.16.2 As a prequalification, fire safe test as per API 607 / API 6FA / BS 6755 Part II shall be carried out on soft seated ball, and also on lubricated plug valves. The test shall be witnessed and certified by a third party inspection agencies Approved by GSPC Gas. The vendor has to submit test certificate for the particular design of the valve offered.

3.16.3 Each valve shall be supplied with a lever / wrench except the gear operated / motor operated valves.

3.16.4 Soft-seated valves in service lines are not permitted. All trunion-mounted ball valves shall be provided with spring loaded seat rings.

3.16.5 Soft-seated BW / SW end ball valves if allowed in special cases shall have a 100 mm long seamless pipe nipple welded to each end of the valve. Nipples are to be welded if allowed as special cases prior to assembling Teflon seats / seals. Specifications of the nipples shall be as indicated in the MR.

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

3.16.7 Ball valves shall be of floating ball/ trunnion mounted type as per following:

Class	Size	Type
150#	Up to 3"	Floating
	4" and Above	Trunion Mounted
300#	Up to 3"	Floating
	4" and Above	Trunion Mounted
600#	Below 2"	Floating
	2" and Above	Trunion Mounted

3.16.8 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 for valves up to DN 300 (NPS 12) and two size lower than the nominal bore for DN 350 (NPS 14) and above up to DN 600 (NPS 24).

3.17 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. Torque details for MOVs shall be furnished by the bidder/supplier.

4.0 OPERATION

4.1 Generally the valves are hand wheel or lever operated. Gear operation shall be provided as under

Valve Type	Class	Size Requiring Gear Operated
Globe Valve	300, 600 & 900#	6" and Larger
	1500, 2500 #	3" and Larger
Ball Valve	150, 300#	6" and Larger
	600#	4" and Larger
	900#	3" and Larger

4.2 For sizes lower than these ranges, hand wheel / lever / wrench shall be provided. For pressure balance plug valves manufacturer's recommendation shall be acceptable provided the requirements specified in clause 4.6 are met.

4.3 Gear operator shall be as under with position indicators for open /close positions and with limit stops. (Limit stops are not applicable for gate and globe valves).

For Globe Valve	Totally enclosed bevel gear in grease case with grease nipples / Plugs
For Ball Valve	Totally enclosed helical worm or combination of Helical worm and spur gear in grease case with Grease nipples/ Plugs

4.4 Where gear operator is not called for as per Clause 4.1 but vendor recommends a gear operator, he shall highlight such case(s).

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

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

4.7 Hand wheel diameter shall not exceed 750mm and lever length shall not exceed 500mm on either side. 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 quote as per clause 4.3.

5.0 INSPECTION AND TESTING

5.1 Every valve shall be subjected to all the mandatory tests and checks called in the respective codes / data sheet by any third party as approved by the purchaser.

5.2 Every valve, its components and auxiliaries must be subjected to all the mandatory tests and checks called for in the respective codes, data sheets etc. by the manufacturer.

5.3 In case of third party inspection, the inspection plan shall be approved by the purchaser.

Forged Valves:

1. Visual and dimensional inspection.
2. Review of material test certificates.
3. Any mandatory or supplementary test.
4. Hydrostatic test on 100% valves selected on random basis.

5. Strip check is required for 1 % of total ordered quantity of valves (min. 1 No.) against each sheet no.

Cast Steel Vales

1. Visual and dimensional inspection.
2. Review of material test certificates.
3. Review of radiographs/radiographic reports or any other NDT tests wherever applicable as per data sheet.
4. Any mandatory or supplementary test.
5. Hydrostatic test 100% for body, 10% other test.
6. Strip check is required for 1% of total ordered quantity of valves (min. 1 No.) against each sheet no. Samples for strip check shall be selected at random and shall generally be in the highest size in the lot.

5.4 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.

5.5 Positive Material Identification (PMI) shall be performed as per the scope and procedures as defined in the 'Specification for Positive Material Identification (PMI) at Vendor's Works'

6.0 RADIOGRAPHY OF CAST VALVES

6.1 Steel casting of valves shall be 100% radio graphed irrespective of rating and size.

6.2 Radiography procedure, areas of casting to be radio graphed shall be as per ASME B16.34 and acceptance criteria shall be as per ASME B16.34 Annexure-B. However for areas of casting to be radio graphed for types of valves not covered in ASME B 16.34, vendor shall enclose details of areas to be radio graphed in line with ASME B16.34.

6.3 For random radiography wherever specified in individual data sheets, the sampling shall be per size of the quantity ordered for each foundry.

6.4 Radiography wherever specified in the data sheets or as per clause 6.1 shall be done by X-ray/gamma- ray to get the required sensitivity with proper safety.

7.0 IBR CERTIFICATION

7.1 For valves described "IBR". valves shall be in accordance with the latest IBR (Indian Boiler Regulation) including the requirements specified in the specification.

7.2 For 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
The above composition is not valid for non-IBR valves.

7.3 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. All "IBR" valves shall be painted red in body-bonnet / body-cover joint.

8.0 MARKING

8.1 Valve markings, 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.

8.2 Each valve shall have a corrosion resistant tag giving size, valve tag / code no., securely attached to the valve body.

8.3 Paint or ink for marking shall not contain any harmful metal or metal salts such as zinc, lead or copper which cause corrosive attack on heating.

8.4 Carbon Steel / Alloy Steel valves shall be painted with one coat of inorganic zinc silicate (minimum DFT 65 to 75 microns). For the valves to be installed underground, when indicated in Valve Data Sheet, the external surfaces of buried portion of the valve shall be painted with three coats of suitable coal tar epoxy resin with a minimum dry film thickness of 300 microns

9.0 DESPATCH

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

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

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

9.4 Each end of valve shall be protected with the following materials

Flange Face	:	Wood or Plastic Cover
Beveled End	:	Wood or Plastic Cover
SW & SCRD	:	End Plastic Cap

9.5 End protectors of wood/plastic to be used on flange faces shall be attached by at least three bolts and shall not be smaller than the outside diameter of the flange. However plastic caps for SW & SCRD, end valves shall be press fit type.

9.6 End protectors to be used on beveled end shall be securely and tightly attached.

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

BYPASS PIPING ARRANGEMENT

NOTES

1. The orientation & location of hand wheel of bevel gear operator & the bypass arrangement shall be strictly as per this sketch.
2. The bypass pipe ends shall be socket/butt welded to the body wall of the main valve.
3. The bypass arrangement shall he properly clamped to & supported by the body of the main valve.
4. Basic design of bypass shall he to MSS-SP-45 & ASME B16.34
5. Material of bypass pipe & 90° elbows shall be same or equivalent to the body material.
6. This sketch is applicable for both BGO & NON-BGO Valves.
7. Vendor shall furnish dimensions L1 to L8.