



CORPORATE STANDARD

AA 085 14 03

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TECHNICAL DELIVERY CONDITIONS FOR VALVES

1.0 SCOPE

- 1.1** This Standard stipulates the Technical Delivery Conditions for Industrial Valves to DIN/ANSI/IS/BS Standards, covering the requirements of constructional features, Accessories, Inspection, Tests, Test Certificates, Documentation, Preservation, Packing and Marking.
- 1.2** This Standard supplements the individual BHEL Valve Standards and forms a part of the Purchasing Conditions.
- 1.3** In addition to the general requirements stipulated in this Standard, any special requirements specified on the Enquiry /Purchase Order/Quality plan shall also be complied with.
- 1.4** The suppliers shall strictly comply with this standard in all respects. No deviations shall be allowed, unless written permission of BHEL is obtained before finalization of the Order.

2.0 CONSTRUCTIONAL FEATURES

Provision of the constructional features given in Table-1 shall be ensured for different types of Valves.

3.0 ACCESSORIES

The accessories mentioned in Table - 2 shall be provided for different types of Valves.

4.0 INSPECTION

4.1 INSPECTION AGENCY

Inspection agency for different categories of valves shall be as follows:

4.1.1 ATTESTED VALVES

For carbon and alloy steel attested valves coming under the purview of IBR (Indian Boiler Regulations), the inspection agency shall be as follows

- a) Indigenous Valves: Authorized Inspector of CIB (Chief Inspector of Boilers).

In addition, BHEL representative shall witness the Inspection/Testing at supplier's works (other than BHEL, Tiruchy) for the following categories of valves,

- i) All Valves of Class 600 and above
- ii) All Valves of size 350 NB and above of all pressure ratings.
- iii) All Motor / Gear operated valves,
- iv) All valves with BW ends.
- v) All valves wit any special features like sealed gland, regulating disc etc.

Revisions:

Cl. 19.07 of MOM of WG - VALVES

APPROVED :
INTERPLANT STANDARDIZATION COMMITTEE
WG - VALVES

Rev. No. 02

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b) Imported Valves: M/s Lloyds/TUV or any other inspection agency approved by IBR.

4.1.2 NON-ATTESTED (CERTIFIED) VALVES

- a) For Cast Iron, Gun Metal and other general purpose Valves (other than Stainless Steel Valves), not coming under the preview of IBR, the supplier's Inspection. Department shall undertake testing/inspection in presence of BHEL representative. However, witnessing of testing/inspection by BHEL representative may be waived off for Cast Iron and gun metal Valves on case to case basis.
- b) In case of all Stainless Steel Valves, the inspection agency shall be M/s Lloyds/BHEL Inspectors, unless otherwise specified in the Enquiry / Purchase Order.

4.2 SCOPE OF INSPECTION

The scope of inspection shall be as follows:

- (a) All tests listed in Cl.5
- (b) Any other tests specified in the Enquiry / Purchase Order / Quality Plan
- (c) Stamping of all accepted Valves and issue of Inspection reports and certificates.

5.0 TEST & TEST CERTIFICATES

The tests specified in Table-3 shall be conducted and 5 copies of the relevant test certificates shall be furnished to BHEL along with each consignment. The following abbreviations are used in the table. AI - Authorized Inspector; CS - Carbon Steel; AS - Alloy Steel; SS - Stainless Steel.

6 . 0 GUARANTEE CERTIFICATE

2 copies of the guarantee certificate shall be submitted before dispatch of valves. All the valves shall be guaranteed for trouble free operation for a period of 12 months from the date of commissioning or 24 months from the date of dispatch. The valves found defective due to design deficiency, Manufacturing defects etc., during the guarantee period shall be replaced by the supplier at no extra charge to BHEL.

7.0 DOCUMENTS

7.1 ALONG WITH THE OFFER

4 copies each of the following documents shall be submitted along with the quotation.

- i) Drawing/leaflet/catalogue for the offered item indicating complete cross sectional arrangement, standards governing the valves and valve rating, indicating direction of flow by an arrow marked on the body, binding dimensions, bill of materials with material specification details, hydraulic/air test pressure for body/seat/ back seat, overall height, dismantling clearances, weight and special features, if any, as specified in the main specification of the valves.



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- ii) Quality plan adopted by the supplier during manufacture and inspection / testing of valves.
- iii) List of recommended spares for 3 years trouble free operation of valves.
- iv) Any deviations to this standard / individual specification proposed by the supplier.
- v) Actuator technical data sheet, wiring diagram, limit Switch development diagram.
- vi) Regulation characteristics for Regulating globe valve.

The offer submitted without the above mentioned documents shall be considered as incomplete and therefore the offer shall be ignored for the purpose of technical/commercial evaluation.

7.2 AFTER PLACEMENT OF ORDER

7.2.1 Immediately after placement of order as per purchase order the following documents shall be furnished,

- i) Certified contract drawings for approval. After approval of the same RTF shall be furnished
- ii) Standard Quality plan duly countersigned by the supplier.
- iii) Operation and maintenance instructions.
- iv) Lubricant recommendation covering the following details:
 - a) Item to be lubricated.
 - b) Method of lubrication.
 - c) Type of lubricant and source of supply.
 - d) Frequency of lubrication.
- v) Storage instructions.

8.0 CLEANING

Particular care shall be taken to ensure that all foundry sand and loose material is properly removed by fettling/shot blasting.

9.0 PAINTING

Valves shall be painted externally after the hydraulic testing has been carried out. Just before the painting, valve bodies and other items shall be thoroughly cleaned. The valves shall be first painted with red oxide primer followed by 2 coats of spray painting with enamel paint. The colour of the paint shall be Blue for Carbon Steel Valves and Aluminum heat resisting for alloy steel valves. In case of forged steel valves up to 2" phosphating may be done instead of painting. For alloy steel forged valves a yellow band may be painted on the body after phosphating.

**10.0 MARKING ON VALVES****10.1 BODY**

The body of the valve shall have the following markings:

- a) Nominal size.
- b) Pressure rating.
- c) Material grade of body.
- d) Supplier's Trade Mark.
- e) Arrow showing direction of flow (for globe and check valves).
- f) Inspector's identification mark.

10.2 NAME PLATE

10.2.1 The nameplate shall be fitted below the hand wheel nut for globe/gate valve and on the body/cover for Non-return valves covering the following details.

- a) Manufacturer's name.
- b) Nominal size,
- c) Pressure rating.
- d) Material grades of body, bonnet and trim.
- e) Manufacturer's identification/serial No.,
- f) Year of manufacture.
- g) BHEL material code number/Tag No. From Purchase Order.

10.2.2 ACTUATOR

A name plate covering the following details shall be fitted to the actuator.

- a) Make.
- b) Model No.
- c) Output shaft r.p.m.
- d) K.W. rating

10.3 HAND WHEEL

Hand wheel shall have the working "open" and "shut" - duly cast alongwith the arrow to show direction of closing the valve.

11.0 PRESERVATION

Suitable temporary rust preventive with minimum life of one year shall be applied inside the valve body in order to prevent corrosion.

12.0 END PROTECTION**12.1 FLANGED VALVES**

A circular blanking plate made of thin steel sheet, with diameter 6mm less than the bolt holes inner PCD, shall be firmly fixed to the flange faces by the application of adhesive, after ensuring that the flange faces have been thoroughly degreased. A thin coat of adhesive shall be applied to the flange face and the blanking plate and then allowed to dry for 15 to 20 minutes. The coated face of the blanking plate should then be joined to the face of the flange taking care that the plate is concentric with the flange. Firm pressure shall be applied to ensure intimate contact between the plate and flange.

A wooden blank should then be bolted to the flange using a minimum of four bolts.



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12.2 SCREWED, SOCKET & BUTT WELDED VALVES

Valve ends shall be protected from external damage and sealed against the ingress of dirt by means of plastic/ Steel end covers firmly secured.

12.3 Any improved method of end protection can however be considered and the suppliers shall furnish complete details at offer stage.

13.0 PACKING

13.1 All the valves shall be packed suitably in closed wooden cases in order to avoid damage during transit and storage at BHEL. Suitable supports shall be provided inside the cases in order to avoid internal movement. In case of imported consignments the packing shall be seaworthy.

13.2 Each valve after end protection should be wrapped in polythene sheet before packing in the cases.

13.3 Valves of sizes upto Nb 50mm (2") could be packed in one packing case taking care that they do not strike with each other. Enough packing material shall be kept inside the case to avoid damage.

13.4 Valves of size above 50mm (2") shall be packed separately in each case. In case, the handwheel, extension spindle or any other accessory of a valve is removed at the time of packing, the same must be kept in the same case and not separately.

13.5 Each packing case must contain 2 copies of the shipping list giving details of all the contents of the case.

14.0 MARKING

The following marking shall be done on each packing case minimum on two sides and also at the top.

- a) Complete address of the consignee and destination as per BHEL Purchase Order.
- b) BHEL Purchase Order Number.
- c) BHEL Valve Standard Number(s).
- d) Number of pieces in each packing case.
- e) Net weight.
- f) Gross weight.
- g) Packing case numbers and total number of packings.
- h) Arrow indicating top of the packing case.



TABLE I – CONSTRUCTIONAL FEATURES

CL NO	FEATURE	VALVE TYPE	PRESSURE CLASS ANSI/DIN					
			CL 150	CL 300	CL 600	CL 900	CL 1500	CL 2500
			NP 10&16	NP 25&40	NP 64&100	NP 160	NP 250	NP 320&400
2.1	SPINDLE	GLOBE GATE	Outside screw & Yoke type with rising Spindle					
2.2	BONNET/COVER	GLOBE GATE CHECK	Bolted to the Body for all sizes			Seal welded for NB50 and below. Pressure sealed for NB65 and above.		
2.3	BORE	GLOBE GATE CHECK	Full bore ANSI rating. For DIN rating			Shall not be less than 80% of the Full Venture Bore area.		
2.4	DISC	GLOBE	Radii used/ Spherical Seating Disc. For NB65 and above, the Disc shall be free to Revolve on the spindle for valves upto C1.900.					
		REGU LATING GLOBE	Taper Plug type Disc/Parabolic type Disc. For NB65 and above the disc shall 1 be free to revolve on the spindle					
		SWING CHECK N.R.V	The Body Seat shall be inclined at such an angle from the vertical, to facilitate positive closing and to prevent valve clatter. The friction between hinge pin and bush shall be as minimum as possibilities so as to ensure that The check valve closes when the return of flow is even at a pressure of 1 ata.					
		PISTON LIFT N.R.V	Shall be provided with guided Disc, which enables the back pressure to be utilized fully for positive disc closing. The fluid collected in the space between disc, body and Cover should act as a damper.					
2.5	WEDGE	GATE	Solid Wedge for upto NB80, Flexible Wedge for NB 100 & above.					
2.6	TRI M	GLOBE GATE N.R.V	Minimum Hardness Values for various trim materials shall be as follows and the seating surface of stainless steel shall have a minimum differential Hardness of 50 BHN					



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TABLE I – CONSTRUCTIONAL FEATURES

CL NO	FEATURE	VALVE TYPE	PRESSURE CLASS ANSI/DIN					
			CL 150	CL 300	CL 600	CL 900	CL 1500	CL 2500
			NP 10&16	NP 25&40	NP 64&100	NP 160	NP 250	NP 320&400
2.6	TRIM (Contd.)		Part Hardness, BHN					
			Stem/Hingepin 200-220					
			Body Seat 250-270					
			Wedge/Disc Seating 300-320					
			Back Seat bush 250-270					
			Thrust Plate (for gate Valves)/ 350-370					
2.7	BACK SEAT	GLOBE GATE	Shall be provided for all sizes. For NB65 and above back seat bush will be Provided.					
2.8	DIRECTION OF FLOW	GLOBE	The direction of Flow shall be preferably from bottom to top and the Arrow showing the direction shall be cast on the body.					
2.9	OPENING/ CLOSING	GLOBE GATE	The valves shall close by rotating the Hand Wheel in clockwise Arrow showing the direction shall be cast on the body.					

TABLE – 2 ACCESSORIES

CL NO	FEATURE	VALVE TYPE	PRESSURE CLASS ANSI/DIN					
			CL 150	CL 300	CL 600	CL 900	CL 1500	CL 2500
			NP 10&16	NP 25&40	NP 64&100	NP 160	NP 250	NP 320&400
3.1	Position Indicator	GLOBE GATE REGULATING GLOBE	Shall be provided for all regulating globe valve and other valves of non-rising spindle type.					
3.2	Impact Hand Wheel	GLOBE	Shall be provided wherever necessary.					
3.3	Ball Bearing	GLOBE GATE	Shall be provided wherever necessary for smooth operation.					
3.4	Gear Operation	GATE	Shall be provided for the following sizes for different pressure classes.					
			NB 350& above	NB 300& above	NB 250& above	NB 200& above	NB 150& above	NB 150 above



TABLE – 2 ACCESSORIES (Contd.)

CL NO	REQUIREMENT	VALVE TYPE	PRESSURE CLASS ANSI/DIN					
			CL150 NP10&16	CL300 NP25&40	CL600 NP64&100	CL900 NP160	CL1 500 NP 250	CL2 2500 NP320&400
3.5	Integral Bypass	GATE	NB 250 & above			NB 200 & above		
			*NOTE: Integral Bypass hall be provided as per MSS:SP-45. The Bypass Pipe shall be seamless, Schedule 80 minimum and of the same material As that of Valve body.					
3.6	EyeBolts	All valves	Suitable eyebolts shall be provided for heavy valves.					

TABLE – 3 TESTS

CL. NO.	TEST	APPLICABLE STANDARD	APPLICABLE COMPONENTS	EXTENT OF TESTING	CERTIFICATES REQUIRED
5.1	Visual Inspection	MSS-SP55 IS:210 IS:318	Steel Castings CI Castings Gunmetal Castings	100 %	Inspection by 'AI' and then attestation of Manufacturer's certificate by 'AI'
		Manufac-turer's Standard	Forgings and other components	100 %	Verification of Manufac-turer's certificate by 'AI'
5.2	Dimensional Check	Relevant BHEL Standards	Overall dimensions and end connections	100%	IBR, Form IIIc Inspection report by 'AI'
5.3	Material Tests:				
5.3.1	Chemical Analysis	Relevant material Standard	Body, bonnet, Yoke	Each heat/melt	Material test certificate attested by 'AI'; Body bonnet & yoke shall have identification
5.3.2	Mechanical Tests	-do-	-do-	-do-	-do-



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TABLE -3 TESTS

CL.NO	TEST APPLICABLE STANDARD	APPLICABLE COMPONENTS	EXTENT OF TESTING	CERTIFICATES REQUIRED
5.3.3	Heat Treatment -do-	Body, Bonnet, Yoke	100%	Inspection Report Test Certificate
5.3.4	Hardness Tests -do-	Trim	100%	
5.4	Non-destructive tests:			
5.4.1	Radio-graphy ASTM:E94&E142	Body& Bonnet Castings	AS:100% CS&SS upto CL 300-10% CL600 to CL 1500 & above -100% 100%	Manufacturer's Certificates with the stamp of 'AI'
	CL90050 %			
		Any butt Welded Joints		-do-
5.4.2	Ultrasonic Test ASTM : 388	Body/Cover Forging	100%	-do-
5.4.3	Magnetic Particle Inspection (MPT) ASTM: E138/E709	Trim	100%	-do-
5.4.4	Liquid Penetrant Inspection Dye Penetrant Inspection (LPI/DPI) ASTM:E165	Seating Surfaces, Spindle Butt Welding ends of valves	100%	-do-
*5.5	Hydraulic Test API:598	a) Body & Seat b) Back Seat	100% 100%	IBR-Forth IIIC-b/AI Authorised inspector's certificate
*5.6	Air Leak Test API:598	Seat	100%	-do-



TABLE – 3 TESTS

CL. NO	TEST	APPLICABLE STANDARD	APPLICABLE COMPONENTS	EXTENT OF TESTING	CERTIFICATES REQUIRED
5.7	Functional test on Assembled valves with actuators / gears (with hand wheel on actuator and with electrical actuator)	--	Motor / Gear operated Valves	100%	Authorised Inspector certificates

***Note: Test pressure shall be as given in individual BHEL standards and no leakage shall be allowed during hydraulic/air test. The test duration shall be as follows:**

Nominal Size 'mm'		Minimum Test Duration in seconds		
		Body	Seat	Back Seat
Test Duration	Upto and including 50	15	15	15
	65 upto and including 150	60	60	15
	200 upto and including 300	120	120	15
	350 and above	300	120	15

TABLE 4 – Duration of Required Test Pressure

Valve Size (NPS)	Minimum Test Duration (Seconds) ^a				
	Shall		Back Seat	Closure	
	Check Valves (API Std 594)	Other Valves	All Valves with Backseat Feature	Check Valves (API Std 594)	Other Valves
=2	60	15	15	60	15
2½ -6	60	60	60	60	60
8-12	60	120	60	60	120
=14	120	300	60	120	120

Note: ^aThe test duration is the period of inspection after the valves is fully prepared and is under full pressure.