

IGS-M-PL-002-3(0)

Aug. 2017

Approved

مصوب



شرکت ملی گاز ایران

مدیریت پژوهش و فناوری

امور تدوین استانداردها

# IGS

مشخصات فنی خرید

شیرهای توپی جوشی و فلنجی اندازه ۲ تا ۵۶ اینچ

کلاس ۱۵۰، ۳۰۰ و ۶۰۰

Flanged / Welded End Ball Valves Size 2" to 24" Class Rating  
150,300 and 600



تاریخ ۱۳۹۶/۶/۲۴  
شماره گ. ادب. ۰/۲۱۶ - ۱۸۰۲۱



شرکت ملی گاز ایران



دفتر مدیر عامل

## ابلاغ مصوبه هیأت مدیره

مدیر محترم پژوهش و فناوری

باسلام،

به استحضار می‌رساند در جلسه ۱۷۴۵ مورخ ۱۳۹۶/۶/۵ هیأت مدیره، نامه شماره گ. ۷۱۳۱۰/۰۰۰/۹ مورخ ۹۶/۶/۱ مدیر پژوهش و فناوری در مورد تصویب نهایی استانداردها به شرح زیر مطرح و مورد تصویب قرار گرفت:

۱. مشخصات فنی شیرهای توپی ۲ الی ۵۶ اینچ کلاس‌های ۱۵۰، ۲۰۰ و ۳۰۰

IGS-M-PL-002-3(0)

۲. دستورالعمل بازرسی سامانه‌های حفاظت کاتدی (ابزار و دستگاه‌های اندازه‌گیری)

IGS-I-TP-001(0)

۳. دستورالعمل بازرسی سامانه‌های حفاظت کاتدی (روش اجرایی)

IGS-I-TP-002(0)

۴. دستورالعمل کنترل نشت در تاسیسات خطوط انتقال و شبکه‌های تغذیه و توزیع گاز طبیعی

IGS-O-SF-04(1)

این تصمیم به منزله مصوبه مجمع عمومی شرکت‌های تابعه محسوب و برای کلیه شرکت‌های تابعه لازم الاجرا می‌باشد.

الهام ملکی

دبیر هیأت مدیره

رونوشت: مدیرعامل محترم شرکت ملی گاز ایران و رئیس هیأت مدیره

: اعضای محترم هیأت مدیره

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: رئیس کل محترم امور حسابداری داخلی

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## 1. SCOPE

### 1.1. General

#### (Sub.)

This standard covers the minimum requirements for flanged/welded end carbon steel ball valves with NPS 2 through NPS 56, ASME classes 150, 300 and 600, service temperature range from -29 °C to +60 °C, meeting the requirements of ASME B 31.8 suitable for non-sour natural gas transmission and distribution system.

Design, manufacturing, materials, dimensions, tolerances, inspection, testing and marking shall be according to API 6D, 24th edition: 2014 except as supplemented or amended by this specification.

**Note:** This specification supersedes IGS-M-PL-10-1 (2): 2010 "Ball Valves Class Rating 150" , IGS-M-PL-10-2(2) ): 2010 "Ball Valves Class Rating 300" and IGS-M-PL-10-3 (2): 2010 "Ball Valves Class Rating 600".

#### 1.1. 1. Guidance for use of this specification:

##### (Add)

The amendments/ supplements to API Spec. 6D. 24th edition: 2014 given in this specification are directly equivalent sections or clauses in API 6D. All other paragraphs which are not amended by this supplementary shall remain valid as written. The following annotations, as specified hereunder, have been used at the beginning of each paragraph to indicate the type of change made to that paragraph of API 6D.

**Sub.** (Substitution) "The paragraph in API Spec. 6D shall be deleted and replaced by the new paragraph in this supplementary "

**Del.** (Deletion) "The paragraph in API Spec. 6D shall be deleted without any replacement"

**Add.** (Addition) "The new paragraph with the new number shall be added to the relevant section of API Spec. 6D"

**Mod.** (Modification) "Part of the clause or paragraph in API Spec. 6D shall be modified and/or the new description and/or statement shall be added to that clause or paragraph as given in this supplementary.

## 2. Normative References

### (Add.)

Throughout this standard specification the standards and codes which mentioned in API 6D: 2014 and the following standard are referred to. The applicability of changes in

standards and codes that occur after the date of this standard that referred shall be mutually agreed upon by the purchaser and supplier and / or manufacturer

**API 6 D: 2014** , " Specification for pipeline and piping valves".

**ASME B36.10: 2004** "Welded and Seamless Wrought Steel pipe"

**ASME B16.20:2012** "Metallic Gaskets for Pipe Flanges"

**ASTM A 105:2014**, "Standard specification for carbon steel forgings for pipeline applications".

**ASTM A 106:2011** "Standard specification for Seamless carbon steel pipe for High-Temperature service.

**ASTM A 193: 2016** , " Standard specification for alloy steel and stainless steel bolting materials for high temperature service".

**ASTM A194:2015** , "Standard specification for carbon and alloy steel nuts for bolts for high pressure of high temp. Service or both".

**ASTM A216:2016** , " Standard specification for carbon steel casting, suitable for fusion welding, for high temperature service".

**ASTM B650:95(2013)**, "Standard specification for electrodeposited engineering chromium coatings on ferrous substrates".

**ASTM B733:2015** Standard specification for autocatalytic (electro less) Nickel-Phosphorus coatings on metal

**EN 10204: 2004**, "metallic products-Type of inspection documents"

**ISO 5211:2001**, " Part-turn Actuator Attachments"

**ISO 9001:2015** , " Quality management system-Requirements".

**ISO TS 29001:2010** "Petroleum, Petrochemical and Natural Gas Industries-Sector Specific Requirements-Requirements for Product and Service Supply Organization".

**ISO 10497:2010** "Testing of valves-Fire type –testing requirements"

**ISO 10474: 2013**"Steel and Steel Products-Inspection Documents"

**MSS SP-6:2012** , " Standard Finishes for Contact Face of Pipe, Flanges and Connecting-End Flanges of Valves and Fittings".

**SSPC-paint 22:1982**" Epoxy polyamide paint

MIL-C-83286 B " Urethane, Aliphatic Isocyanate Coating

**IGS-M-PL-007(0): 1990,**" Gas over Oil Actuator "

**IGS-M-PL-009(0):2005,**" Hand wheel Operated Gear Box for Ball, Plug and Butterfly Valve".

### 3. Terms, Definitions, Acronyms, Abbrevitions, Symbols,and Units.

#### 3.1. Terms and Definitions

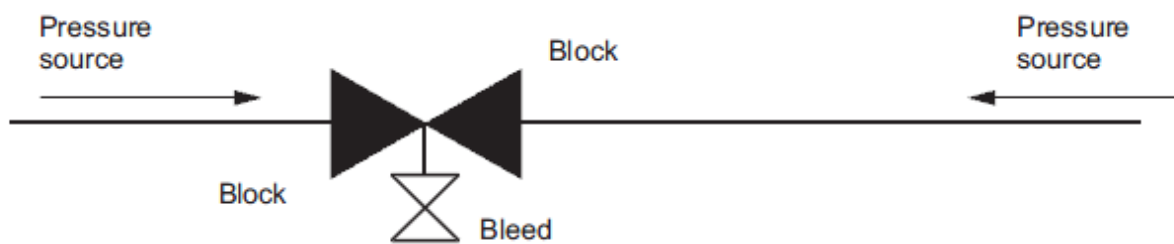
##### (Sub.)

For the purposes of this standard specification the definitions mentioned in API 6D and the following definitions apply:

#### 3.1.10 Double block and bleed valve ( DBB)

##### (Sub.)

Single valve with two seating surface that, in the fully closed and fully opened position, provides a seal against pressure from both ends to valve cavity of the valve which allows for venting gas and draining of liquid from the body cavity.



**Double Block and Bleed-Type B**

#### 3.1.18 Maximum pressure differential (MPD)

##### (Mod.)

Maximum differential between the upstream and downstream pressure across the obturatore base on valve's ASME class rating.

#### Anti-Seize Thread Lubricant

##### (Add.)

A highly refined lubricant use during assembly to prevent galling, corrosion and seizing/gripping of threads due to weathering or chemicals.

#### Approval Agency

Authorized certifying body which approved by technical inspection division.

Subsidiaries of National Iranian Gas Company in order to identify these companies should refer to the URL (<http://inspect.nigc.ir>) for list of qualified companies in this field of use

### Carbon equivalent

(Add.)

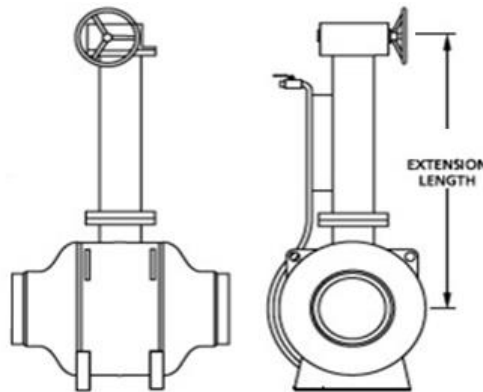
The carbon equivalent ( CE) calculated in accordance with the Equation below:

$$(CE_{IIW} = C + \frac{Mn}{6} + \frac{(Cr + Mo + V)}{5} + \frac{(Ni + Cu)}{15})$$

### Extension Length

(Add.)

The distance from belowground valve centerline to hand wheel centerline/ operating level.

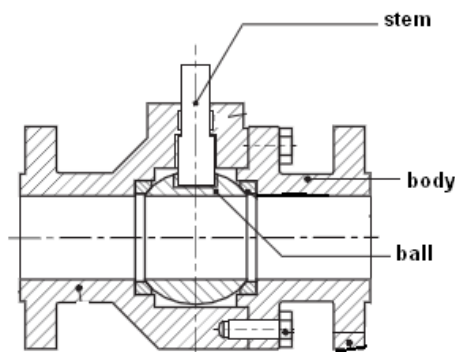


### Stem Extension Details (informative)

#### Floating ball

(Add.)

Valve in which, the ball floats inside the body towards the seat rings and it is not fixed to the valve bottom. Under process pressure ball is pressed into the seat ring. By that, the valve is tight downstream.

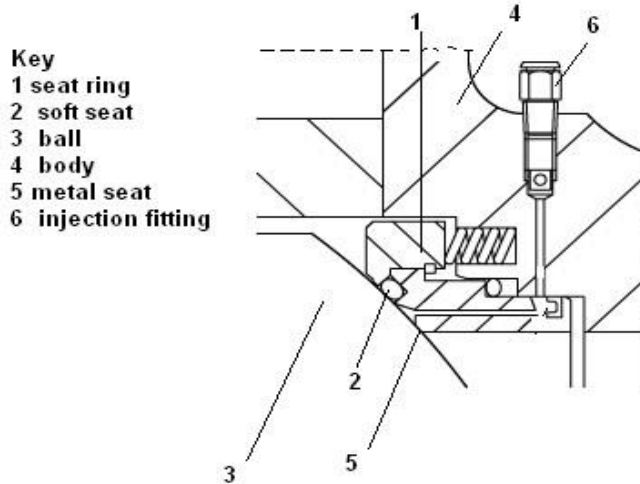


### Floating ball valve (informative)

**PMSS sealing system**

**(Add.)**

In primary metal, secondary soft seats (PMSS) sealing is achieved by the simultaneous contact of primary metal seat ring and secondary soft insert with the ball.

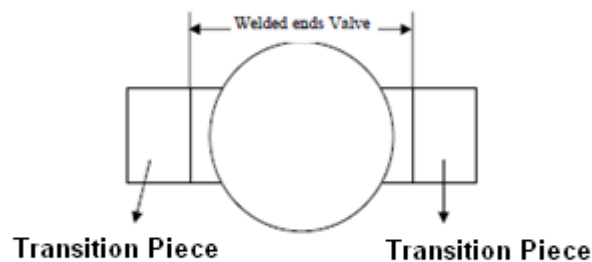


**PMSS sealing system (informative)**

**Transition piece**

**(Add.)**

A piece of pipe welded to end of valve allow for transition between the valve body and the adjacent pipe to which the valve is intended to be connected. These pieces will be ordered with the necessary extra length by purchaser. The thickness and material grade of the pieces and welding process shall be met the criteria of ASME B31.8 (material, grade, thickness, etc.).

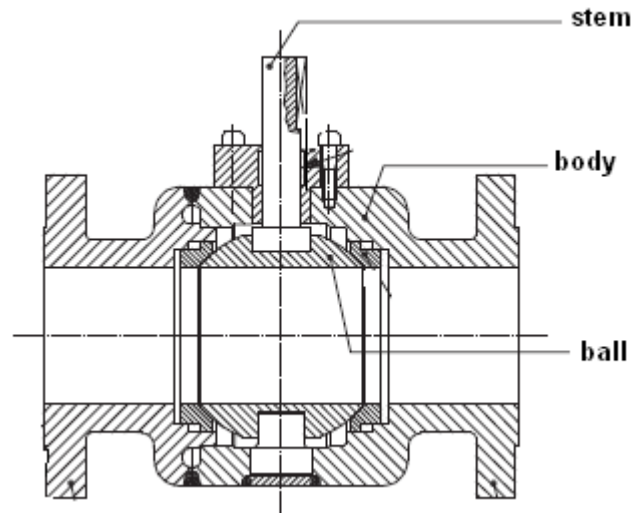


**Transition piece sketch**



### **Trunnion mounted ball (Add.)**

Valve in which the ball is mounted at two pivot points and it is fixed to the valve bottom. The seat rings are not fixed and the process pressure plus spring tension pushes the seat rings against the ball's sealing surface.



**Trunnion mounted ball valve(informative)**

## **4. Valve Types and Configurations**

### **4.1 Valve Types**

#### **4.1.3 Ball valves**

##### **(Sub.)**

Ball Valves shall have a solid spherical obturator with circular opening through that rotates on an axis perpendicular to the direction of flow.

### **4.2 Valve Configurations**

#### **4.2.1 Full-opening Valves**

##### **(Add.)**

Unless otherwise specified in purchase order, all ball valves shall be full bore. The port diameter (bore of ball) and seat dimensions shall meet Table 1 of API 6D. In case of reduced bore, port diameter shall be specified by manufacturer and approved by purchaser.

## **5. Design**

### **5.1 Design Standards and Calculations**

##### **(Sub)**

**5.1.1** Design, calculation and testing shall be in accordance with API 6D and ASME B16.34 base on pressure Class rating. Body thickness shall comply with ASME B16.34 including consideration of pipe loads, operating forces, etc.

**5.1.2** Unless otherwise specified in purchase order, all belowground ball valves shall be of fully welded body construction with welding end design.

Aboveground ball valves shall have one of the following body constructions as per request:

- a) Side entry split body (two/three pieces).
- b) Top entry split body (only class 600, if specified).
- c) Fully welded body.

**5.1.3.** Ball's type shall be "Trunnion mounted", however "floating type" is acceptable for:

- Valves with NPS ≤ 6 pressure class 150.
- Valves with NPS ≤ 4 pressure class 300.

## **5.2. Pressure and Temperature Rating (Sub.)**

Valves covered by this specification shall be furnished in one of the pressure classes: 150,300 or 600, as per request. Pressure-temperature rating for class-rated valves shall be in accordance with ASME B16.34.

All metallic/nonmetallic parts shall meet the applicable valve pressure-temperature rating and service condition.

## **5.4. Face –to-face and End-to-end Dimensions (Add.)**

Unless otherwise specified in purchase order, face-to-face (A) or end-to-end (B) dimensions and tolerances of ball valves shall be in accordance with API 6D. Face-to-face or end-to-end dimensions for ball valves Class 600, with NPS>36 should be as below:

<b>NPS</b>	<b>end-to-end/face to face dimension (mm)</b>
40	2100
42	2200
48	2300
56	2500

**Note:** Specific face-to-face/ end-to-end dimensions may be requested in purchaser order. (For example: face-to-face 72 inches for hot tapping valve 36").

## **5.5. Valve operation (Sub.)**

Unless otherwise specified in purchase order, valve operation method shall be as below Table.

<b>Methods of Ball valve operation</b>			
<b>NPS</b>	<b>Pressure class rating</b>		
	<b>150</b>	<b>300</b>	<b>600</b>
2,3, 4	W	W	W
6	W	W	G
8,10, 12	G	G	G
16	G	G/A	G/A
20,24	G	G/A	A
30,32,36,40,42,48,56	--	--	A
W: WRENCH/LEVE                      G: GEAR BOX                      A: ACTUATOR			

Gear boxes shall be in accordance with IGS-M- PL-009(0) and supplied by the valve manufacturer when specified.

Actuator mechanism (hydraulic, pneumatic or electric) and manufacturer shall approved by purchaser in advance. Gas over Oil Actuator shall be as per IGS-M-PL-007(0).

Valve operating test shall be done with the recommended actuator /gear box at maximum class pressure differential (MPD).The output of actuator/gear box shall be at least 1.25 -1.50 times of the valve's torque.

Manufacturer shall provide the following data to purchaser:

- break to close (BTC) torque, running to close (RTC) torque and end to close (ETC) torque
- break to open (BTO) torque, running to open (RTO) torque and end to open (ETO) torque
- maximum allowable stem thrust or torque (MAST).
- Output to input ratio and number of turns to open/close of gear box

## **5.6 Pigging**

### **(Sub.)**

Purchaser shall specify the piggability of valve (full bore) in purchase order.

## **5.7. Valve Ends**

### **5.7.1 Flanged Ends**

#### **(Add.)**

End flanges shall be integrated with the body furnished with raised face (RF) and serrated finish (SF) as per MSS SP-6.

## 5.7.2 Welding Ends

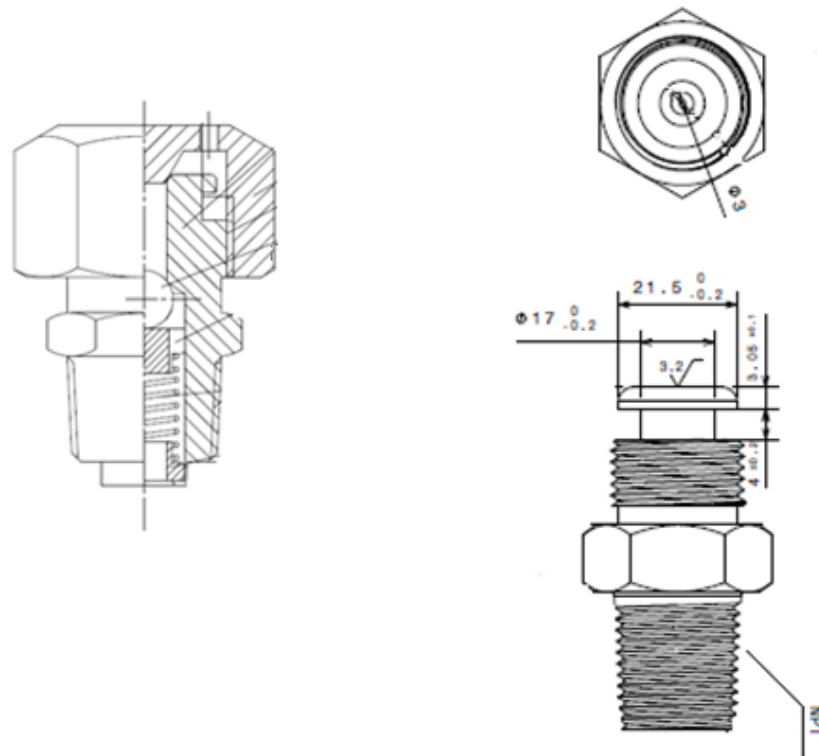
### (Mod.)

Purchaser shall specify the mating pipe for welding ends valve. End preparation shall be in accordance with ASME B31.8 or ASME B 16.25.

## 5.10 Injection Points

### (Add.)

All trunnion mounted ball valves with NPS  $\geq 6$  (all classes) and valve 4", class 600 shall be supplied with emergency sealing injection for both seats and stem (packing injection may be supplied for stem). The sealing injection fittings shall be as below figures.



**Details of sealing injection fitting**

These fittings shall be connected to the body by threading method as per bellow Table:

Thread Size for body connection of Injection Fittings	
Type	Connection Thread <sup>1</sup>
I	1/4-18 NPT
II	3/8- 18NPT
III	1/2- 14NPT
<i>1- as per ASME B 1.20.1</i>	

Each injection fitting shall be equipped with an Inner/outer check valve to prevent escape of sealant meanwhile sealant fitting maintenance/ replacement.

**Table 2- Thread/Pipe Sizes for Drains (Mod.)**

Nominal Size Of Valve	Drain & Vent
NPS	Thread <sup>1</sup> /Pipe Size in
2 to 8	1/2
>8	1
<i>Notes:</i> 1- thread shall be as per ASME B 1.20.1 2-for below ground valves shall be seal welded	

### **5.11. Drains, Vent and sealant Lines (Add.)**

All trunnion mounted ball valves shall have a vent and drain. For valves with stem extension, the drain, vent and injection lines shall be extended to operating level. The injection line shall be one piece, sch40 seamless carbon steel pipe as per ASME B36.10 and ASTM A106. The connections for below ground valves shall be seal welded.

## **5.12 Drain, Vent, and Sealant Valves**

### **(Add.)**

Drain and vent connections of ball valves with NPS  $\geq 6$ , shall be equipped with high pressure ball valve.

## **5.13. Hand wheel and wrenches/levers**

### **(Sub.)**

Wrench operated ball valves shall be driven by flat head as per ISO 5211.

The length of the wrench or diameter of the hand wheel for direct or gear operated valves shall not be longer than twice the face –to-face / end-to-end of the valve or 800mm (whichever is less). Spokes shall not extended beyond the perimeter of the hand wheel.

The maximum force required at the hand wheel or wrench to apply the breakaway torque to open / close the valve under MDP shall not exceed 33 lbf (150 N).

## **5.14. Locking Provision**

### **(Sub.)**

If specified in purchase order, valve shall be equipped with locking devices in fully open and/or fully closed position.

## **5.16. Position Indicator**

### **(Sub.)**

All valves shall be furnished with position stops and position indicator to show open position in the direction of flow and close position perpendicular to direction of flow. The "SHUT/CLOSE" and "OPEN" terms (in English) shall be embossed / engraved in a visible location.

The closing direction for hand wheel or wrench shall be clockwise. The design shall be such that the components of the indicators and/or wrench cannot be assembled to falsely indicate the valve position. It shall be impossible to re-assemble the ball and stem such that the stem is 90° out of phase with the ball.

## **5.18. Actuator, Operators, and Stem Extensions**

### **5.18.1. General**

#### **(Add.)**

For gear /actuator operated valves, driving interface flange adapter (Top flange) shall be in accordance with ISO 5211. For welded body valves, the top flange shall be integrated or welded to the body.

### **5.18.5. Protection of Extended Stems and Shafts in Belowground Services.**

#### **(Sub.)**

For valves with stem extension, all lubricant/ sealant, vent and drain lines shall be extended to operating level. The detachable extended stem and its

components shall be protected by a fully enclosed extension casing. The enclosure shall be water-proof.

The stem extension length, design, drawings, materials, and connection details shall be approved by purchaser.

### 5.19. Lifting

#### (Sub.)

Lifting lugs shall be provided for valves with NPS  $\geq 6$ . Design of these lugs shall be include of additional weight of actuator / gear box as far as possible.

Valves with weight  $\geq 200$ kg shall have support and leveling base.

### 5.21. Stem Retention/ Anti Blow out Stem

#### (Add.)

The stem shall be of the Anti Blow-out type with at least two or more separate independent stem seals. The top seal shall be replaceable while the valve is in open position without flow interruption. The stem sealing system shall be equipped with emergency sealant injection and supported by fire resistance back-up seal/ packing.

### 5.22. Fire testing

#### (Sub.)

Fire test certification shall be in accordance with API 6FA or ISO 10497. However, for soft seat ball valves, API 607 is acceptable as an alternate. The fire test certificate shall be submitted by an approval agency. The fire test certificate evaluated only for the proposed range of products which made by the manufacturer and satisfactory tested as per API 6D at the time of issue.

### 5.23. Antistatic Device

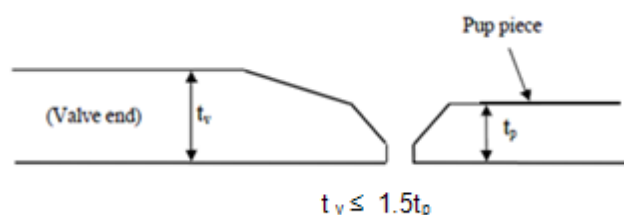
#### (Mod.)

Any type of ball Valves shall have an antistatic device. Testing of this device shall in accordance with Annex H (clause H.5) of API 6D.

### 5.25. Transition pieces

#### (Add.)

For valves with transition pieces (If specified in purchase order), the transition piece's length and valve mating pipe shall be specified by purchaser. These pieces shall be supplied and welded by the valve manufacturer under its responsibility. Welding process shall be carried out in open position according to criteria of ASME B31.8. Provision shall be taken for cooling and protecting of the seat rings from heating damage and welding splash. Longitudinal weld seams of the pup pieces shall be located in the top quadrant staggered from each other.



## **6. Materials**

### **(Add.)**

Metallic and non-metallic parts shall be as follow:

The related material certificates shall be issued by manufacturer.

**6.1 Body, ball and closures:** Carbon steel casting at least ASTM A216 grade WCB/WCC or forged carbon steel at least ASTM A105 .

**6.1.1** Body, ball and closure of all valves with class 600 and valves classes 150& 300 with NPS  $\geq$  16, shall be only made of forged carbon steel materials.

**6.2** Body /Closure (ends) of welding ends valves shall comply with the following chemistry requirements:

- a) The carbon content shall not exceed 0.23% by mass.
- b) The sulfur content shall not exceed 0.025 % by mass.
- c) The phosphorus content shall not exceed 0.025 % by mass
- d) The carbon equivalent, CE, shall not exceed 0.43 %.

**6.3.** Stem shall be made of forged carbon steel at least to ASTM A105 or alloy steel bar at least to AISI 4140.

**6.4.** Seat ring shall be made of forged carbon steel at least to ASTM A105 for all classes & sizes.

**6.4.1.** Spring shall be made of at least INCONEL X750

**6.4.2.** For NPS $\geq$ 10 (all classes), the hosing surfaces of seat ring on body / closure shall be protected from corrosion by weld deposit / metal spray or other techniques.

### **6.5. Plating**

Ball, seat rings and stem surfaces shall be hard chromium plated as ASTM B 650 or electro less nickel plated (ENP) as ASTM B733. They shall have final mirror finish preparation with minimum 50  $\mu$ m thickness. The hardness of plating shall be at least 800 HV.

### **6.6. Seal Material**

Sealing materials shall be selected based on actual maximum and minimum operating temperatures of the valves comply with the following Table. Seal materials other than those listed in this table may be proposed for purchaser approval as alternative materials. Such proposal must be substantiated by appropriate documentation on material properties and testing in the similar range of service.



<b>SEAL MATERIALS SELECTION</b>			
SEAL CATEGORY	Nature of Sea Material/Trade Mark	Designation	Operating Temperature Range(°C)
Elastomers	NITRIL RUBBER	NBR	0 to +80
	HYDROGENATED NITRIL RUBBER	HNBR	-10 to +150
	VITON® GLT	FKM	- 30 to +180
	KALREZ® or CHEMRAZ®	FFKM	-20 to +220
	SILICON (70 shore A)	VMQ	-60 to +220
	FLUORINATED SILICON (70 shore A)	FVMQ	-60 to +220
Thermoplastic polymers	TEFLON®(virgin or filled)	P T F E	-80 to +200
	KELF®	P C T F E	-150 to +100
	TEFLON® FEP	FEP	-80 to +140
	TEFLON® PFA	PFA	-80 to +200
	NYLON® 12	POLYAMIDE	-20 to +100
	VESPEL® SP 21	POLYAMIDE	-200 to+260
	DEVLON®	POLYAMIDE	-80 to+160
	PEEK®	POLYAMIDE KETONE	-80 to+160
TURCITE®243	POLYAMIDE KETONE	-200 to+250	
Other	Graphite		-240 to +550
	Metallic	Spiral wound	
		Ring Joint	

### **6.7. Bolts & Nuts**

Bolts & Nuts shall be in accordance with ASTM A193 Grade B7 & ASTM A194 Grade 2H. The threading of the bolting shall be in accordance with the "COARSE" series, class 2B, of ASME standard B 1.1. However, bolting to ISO standards, including metric threading, is allowed as an alternate. The assembling shall be incorporate with Anti-seize thread lubricant.

## **7 .Welding**

### **(Add.)**

Welding procedure (including weld repair/ repair of weld) and welding operator qualifications and acceptance criteria shall be performed in accordance with ASME BPVC Section VIII & IX and ASME B16.34.

### **7.5. Repair**

#### **(Add.)**

Weld repair of forged parts is not permitted.

Weld repair on castings shall not be permitted on:

- a) Ball.
- b) Castings that have leaked on hydrostatic test.
- c) Within 45mm of sealing surfaces.
- d) which the depth of any cavity prepared for repair welding exceed 20 % of the wall thickness or 25 mm whichever is smaller.
- e) Any weld repair area greater than 250 mm<sup>2</sup> for every millimeter of wall thickness provided that exceed 6500 mm<sup>2</sup>.

### **7.6 .Repair of weld**

#### **(Mod.)**

Repair of welds shall be made in accordance with ASME BPVC, Section VIII, Division1.

## **8 Quality Control**

### **(Sub.)**

### **8.1. NDE Requirements**

#### **8.1.1 .VT&UT & MT & PT of welding**

All welds shall be visually inspected in accordance with ASME BPVC Section V. Article 9. Defects such as cracks, pinholes, surface porosity, exposed slag shall be removed by mechanical means and re-welded as per ASME BPVC, Section VIII, and Division1 including any PWHT and NDE requirements.

Undercutting shall not exceed the dimensions given in below Table:

<b>Maximum dimension of undercutting</b>	
<b>Depth</b>	<b>Length</b>
> 1/32in.(0.8mm) or >12.5%of valve wall thickness, whichever is smaller	Not acceptable
>1/64in.(0.4mm)but≤1/32in.(0.8mm) or >6%but≤12.5% of valve wall thickness, whichever is smaller	2in.(50mm)in a continues 12in.(300mm)weld length or one-sixth the weld length, whichever is smaller
≤1/64in.(0.4mm) or ≤ 6% of valve wall thickness, whichever is smaller	Acceptable ,regardless of length

Any full penetration welds, regardless of size or pressure class, shall be ultrasonically examined on weldments in accordance with ASME BPVC, Section V, Article4. Acceptance shall be in accordance with ASME BPVC, Section VIII, Division 1,Appendix 12. Additionally, magnetic-particle test shall be carried out for detection of sub-surface defects. Examination shall be carried out in accordance with ASME BPVC, Section V, Article7. Acceptance shall be in accordance with ASME BPVC, Section VIII, Division 1,Appendix 6.

All other weld surface areas (vent / drain / injection / lifting lug / support / pressure equalizing line,etc.) shall be penetrating tested. Examination shall be carried out in accordance with ASME BPVC, Section V, Article 6. Acceptance shall be in accordance with ASME BPVC, Section VIII, Division 1, Appendix 8.

### **8.1.2. RT/UT & MT of welding ends**

20% of each individual order of welding end valves (forged/cast body ), at least one sample of each class and size, shall be 100% radio graphed on ends for a minimum length of 50mm or 1.5 times the mating pipe wall thickness, whichever is larger. Examination shall be carried out in accordance with ASME BPVC, Section V, Article2.Acceptance shall be in accordance with ASME BPVC,Section VIII, Division 1, Appendix 7

For wall thickness more than 50 mm, UT examine is acceptable instead of RT. Examination and acceptance shall be in accordance with ASME B 16.34, Appendix IV. Additionally, Magnetic particle examine shall be carried out after machining on beveled faces. Examination shall be carried out in accordance with ASME BPVC, Section V, Article7. Acceptance shall be in accordance with ASME BPVC, Section VIII, Division 1,Appendix 6.

### **8.1.3. VT of castings**

All casting surfaces shall be visually inspected in accordance with MSS-SP-55 with the following acceptance criteria:

- Type I: none acceptable
- Type II to XII: a and b only

Minor defects shall be removed by grinding provided there is a smooth transition between the grounded area and the original contour and the minimum wall thickness requirements are not affected.

#### **8.1.4. MT/ PT of casting Surfaces**

20% of each individual order of casted body, at least one sample of each class and size, shall be 100% examined by magnetic particle method. Examination shall be carried out in accordance with ASME Section V, Article 7. Acceptance shall be in accordance with ASME Section VIII, Division 1, Appendix 6.

If agreed, instead of MT, casting surface area can be PT examined according to ASME Section V, Article 6. Acceptance shall be in accordance with ASME Section VIII, Division 1, Appendix 7.

#### **8.1.5. VT of forgings**

All forging surfaces shall be visually inspected. Examination and acceptance shall be in accordance with ASME BPVC Section VIII, Division 1, UF-45 and UF-46.

#### **8.1.6. UT of Forged body and closures**

20% of each individual order of forged body, at least one sample of each class and size, shall be 100% ultrasonically tested. Examination and acceptance shall be in accordance with ASME B16.34, Appendix IV.

#### **8.1.7. MT/PT of Machined Surfaces**

100% of the machined surfaces area shall be magnetic particle examined according to ASME BPVC Section V, Article 7. Acceptance shall be in accordance with ASME BPVC Section VIII, Division 1, and Appendix 6.

If agreed casting surface area can be PT examined according to ASME BPVC Section V, Article 6 instead of MT method, .Acceptance shall be in accordance with ASME BPVC Section VIII, Division 1, Appendix 8.

#### **8.1.8 .RT of Transition piece welds**

If Transition pieces are to be welded, the Transition piece's longitudinal weld and the connection butt weld shall be %100 radio graphic tested. Examination shall be carried out in accordance with ASME BPVC Section V, Article 2. Acceptance shall be in accordance with ASME BPVC Section VIII, Division 1, UW-51 for linear indications and ASME BPVC Section VIII, Division, Appendix 4 for rounded indications.

## **9 Pressure Testing (Sub.)**

### **9.1. Hydrostatic Shell Test**

Each valve shall be hydrostatically shell tested as per 9.3 of API 6D with 1.5 times of the valve's pressure rating. No visible or any other evidence of leakage is permitted. For valves with extended stem, the vent and drain lines shall be hydro-tested simultaneously.

### **9.2. Hydrostatic Seat Test**

Each valve shall be hydrostatically seat tested on each side/seat as per 9.4 of API 6D with 1.1 times of the valve's pressure rating. No visible or any other evidence of leakage is permitted

**Note:** Valve shall be clean and any lubricant or sealant shall be removed from seats and obturator sealing surface. In case of fail, injection of sealant for sealing and leak tightening to pass the test is not permitted

### **9.3. Low-pressure Gas Seat Test**

Each valve shall be gas seat tested on each side/seat as per H.3.3, Type II of Annex H of API 6D. No leakage is permitted during the test duration.

**Note:** Valve shall be clean and any lubricant or sealant shall be removed from seats and obturator sealing surface. In case of fail, injection of sealant for sealing and leak tightening to pass the test is not permitted.

### **9. 4. Double Block and Bleed Test**

Each trunnion mounted ball valve shall be Double Block and Bleed tested as clause H.9 of Annex H.

### **9.5 Hydrostatic Test of pup pieces.**

For valves with extended ends, following the valve hydrostatic shell test and pup pieces welding, the whole valve shall be hydrostatic shell tested with operation pressure again.

### **9.6 Top seal replacement of stem**

For at least one sample of each class and size, while the test valve is under operating pressure, removing of the gland and replacing of the top o-ring of stem without serious leakage shall be applicable. Related certificate shall be submitted by manufacturer.

**10. Coating/Painting****(Sub.)****10. Coating/Painting****(Sub.)**

Coating / painting shall be externally carried out at final stage after all tests and examinations. Before painting/ coating, valve shall be completely drained of test fluid and thoroughly dried. Purchaser shall specify surface preparation and coating / painting specifications which compatible with the pipe service condition and coating system. Flange face and actuator mounting flange sealing surfaces and exposed stems shall not be coated. Welding end valves shall have the entire surface coated/painted except for ends cut back (A) as per following Table:

<b>A - welding ends cut back length</b>	
Valve size (NPS)	Uncoated bevel end (mm)
$2 \leq \text{NPS} \leq 6$	25
$8 \leq \text{NPS} \leq 12$	50
$16 \leq \text{NPS} \leq 24$	100
$\text{NPS} > 24$	150

**11. Marking****(Add.)**

The nameplate minimum letter size shall be 3mm or larger.

**12. Preparations for Shipment****(Add.)**

Only those valves which have been inspected and certified by Purchaser's inspector (Client inspector/ relevant third party inspector) shall be shipped .Before shipment, valve's body cavity shall be drained. Valves shall be suitably packed in open position in wooden box or crates individually or collectively to protect the valves against all damages or defects which may occur during transit and extended tropical open air storage. Both ends of welding end valve shall be closed with slip-on recessed end cap. Flange end valves shall be fitted with plywood covers. All machined surfaces shall be coated with a removable rust preventative material. Care shall be taken to prevent damage to the valve/ stem extension coating which may occur during transit. If required, the purchase number shall be specified on valve and the relevant gear box/actuator. The packing procedure shall be submitted by manufacturer and approved by purchaser

### **13. Documentation**

#### **13.3 Technical evaluation document**

**(Add.)**

Vendor shall supply documentation including all correspondence, literature, drawings and data as per ISO documentation prepared in English. The attached valve data sheet in Appendix I should be filled for each item by purchaser and the attached data sheet in Appendix II shall be completed for each item by manufacturer.

Required documents:

- Original technical catalogue and manual.
- API 6 D monogram.
- Fire test certificate
- Operating Torque
- Sectional drawings and bill of materials.
- Sub vendor part –list
- Quality control plan (QCP)
  
- Weight of valve and operator.
- Related data sheet (Appendix II)

### **15. Quality Assurance Provisions**

**(Add.)**

Manufacturer shall establish quality assurance and quality control system with all applicable procedures in accordance with ISO 9001 / 29001. The certificates shall comply with ISO 10474 /EN 10204 types 3.1 or 3.2.

<b>Appendix I</b>			
<b>This Data Sheet Form should be completed for each item by purchaser</b>			
Enquiry No:	Item No:	Quantity:	
<b>General</b>			
Nominal Size :	Pressure Class:	Design Pressure :	Design Temperature:
Maximum operating pressure:	Maximum differential pressure:		
Minimum service temperature:	Maximum service temperature:		
Service medium:	non-sour natural gas <input type="checkbox"/>		
Function requirements: usual service <input type="checkbox"/> pig ability <input type="checkbox"/> drain <input type="checkbox"/> blow down <input type="checkbox"/> Hot taping <input type="checkbox"/>			
<b>Valve Specification</b>			
Body construction:	Fully welded <input type="checkbox"/> /	Top Entry <input type="checkbox"/> / Side Entry <input type="checkbox"/>	2 pieces <input type="checkbox"/> 3 pieces <input type="checkbox"/>
Ball type:	Floating <input type="checkbox"/>	Trunnion mounted <input type="checkbox"/>	Internal trunnion support <input type="checkbox"/>
Bore Type:	Full <input type="checkbox"/>	Reduced <input type="checkbox"/>	Minimum port diameter(mm):
Top seal of stem shall be replaceable under pressure <input type="checkbox"/>			
Stem with two seals <input type="checkbox"/>			
Sealing System: Soft Seat <input type="checkbox"/> PMSS <input type="checkbox"/> Metal-to-metal <input type="checkbox"/>			
Seat sealing facility: Double Block & Bleed <input type="checkbox"/>			
Body and closure: Forged <input type="checkbox"/> Cast <input type="checkbox"/>			
Ball : Forged <input type="checkbox"/> Cast <input type="checkbox"/> solid <input type="checkbox"/>			
Valve installation: above ground <input type="checkbox"/> belowground <input type="checkbox"/>			
External coating /painting:			
Lifting lugs: yes <input type="checkbox"/> No <input type="checkbox"/>			
Valve support <input type="checkbox"/>	Type: Ribs <input type="checkbox"/>	Legs <input type="checkbox"/>	
Drain <input type="checkbox"/>	Vent <input type="checkbox"/>		
<b>End connection:</b>			
Flanged end <input type="checkbox"/> Welding end <input type="checkbox"/>			
For welding end type:			
Matching pipe:	OD:	Thickness:	Material:
Transition pieces <input type="checkbox"/> Transition piece length(mm):			
For flanged end:			
raised face <input type="checkbox"/> other type:			
size & class as per : ASME B 16.5 <input type="checkbox"/> MSS SP-44 <input type="checkbox"/> ASME B16.47,series A <input type="checkbox"/>			
<b>Valve operation:</b>			
Lever <input type="checkbox"/>	Gear Box <input type="checkbox"/>	Actuator <input type="checkbox"/>	
Position of wrench/Lever /hand –wheel: horizontal <input type="checkbox"/> vertical <input type="checkbox"/> locking device <input type="checkbox"/>			
Actuator Mechanism: Hydraulic <input type="checkbox"/> pneumatic <input type="checkbox"/> electric <input type="checkbox"/>			
Stem extension <input type="checkbox"/> Stem extension Length(mm):			
Extended drain <input type="checkbox"/> MAOP:			
Extended vent <input type="checkbox"/> MAOP:			
Extended injection line <input type="checkbox"/> MAOP: Seamless A106 <input type="checkbox"/> Sch40 <input type="checkbox"/> One piece <input type="checkbox"/>			
Automatic Line Break System :Yes <input type="checkbox"/> Setting Range(bar/Min):			



<b>Appendix II</b>	
<b>This Data Sheet Form should be completed for each item by manufacturer</b>	
Manufacturer:	Enquiry No: Purchaser:
Drawing No:	Tender/Job NO:
<b>General</b>	
Item No:	Quantity:
Size :	Class:
Original Country of Row Material and Complete valve:	
Design and calculation as per ASME B16.34: Yes <input type="checkbox"/> No <input type="checkbox"/>	
Design and testing as per API 6D: Yes <input type="checkbox"/> No <input type="checkbox"/>	
Ball Valve Model:	Weight:
<b>Valve operation:</b>	
Operating device Lever <input type="checkbox"/> Length: mm	
Gear Box <input type="checkbox"/>	
Actuator <input type="checkbox"/> Weight:	
Break away torque of valve:	
For gear box: Gear box Manufacturer: Gear Box Model: Hand – wheel diameter: .....mm Gear Box Weight: :	
For actuator : Mechanism: Hydraulic <input type="checkbox"/> pneumatic <input type="checkbox"/> electric <input type="checkbox"/> Manufacturer: Model: remote control <input type="checkbox"/> Automatic Line Break System <input type="checkbox"/> L.B.Setting Range(bar/Min): Min.&Max.Operating torque :	
<b>Valve Specification</b>	
Body construction: Fully welded <input type="checkbox"/> Top entry <input type="checkbox"/> Side entry <input type="checkbox"/> 2pieces <input type="checkbox"/> 3pieces <input type="checkbox"/>	
Ball: Floating <input type="checkbox"/> Trunnion mounted <input type="checkbox"/> Internal trunnion support <input type="checkbox"/>	
Bore Type: Full <input type="checkbox"/> Reduced <input type="checkbox"/> port dia.(mm):	
End connection: Flanged end <input type="checkbox"/> Welding end <input type="checkbox"/>	
Anti blow out stem: Yes <input type="checkbox"/> No <input type="checkbox"/> number of stem seals:	
Anti Static Device <input type="checkbox"/>	
Sealing System: Soft Seat <input type="checkbox"/> PMSS <input type="checkbox"/> Metal- to- metal <input type="checkbox"/>	
Top seal replacement of stem under pressure <input type="checkbox"/>	
Secondary sealing for stem : Yes <input type="checkbox"/> No <input type="checkbox"/> For seat: Yes <input type="checkbox"/> No <input type="checkbox"/>	
For welded end: Valve End to end dimension (mm): End Bevel Preparation: SME B31.8 <input type="checkbox"/> ASME B16.25 <input type="checkbox"/> Mating Pipe: OD: Thickness: Material: Weld ability with mating pipe <input type="checkbox"/> Transition piece <input type="checkbox"/> Thickness: Material: length:	

For flanged end: Flange Size &Class: As per: B 16.5 <input type="checkbox"/> MSS SP-44 <input type="checkbox"/> ASME B16.47,series A <input type="checkbox"/> Flanged face: raised face, <input type="checkbox"/> other: Face to face dimension(mm):			
Drain <input type="checkbox"/>	Vent <input type="checkbox"/>	Injection for stem <input type="checkbox"/>	Injection for seats <input type="checkbox"/>
Support requirement:		Ribs <input type="checkbox"/>	Legs <input type="checkbox"/>
<b>Stem extension:</b> Yes <input type="checkbox"/> No <input type="checkbox"/>		Length(mm):	
Double Block & Bleed in open and closed position:		Yes <input type="checkbox"/>	No <input type="checkbox"/>
External Valve Coating/ painting:			
<b>Material</b>			
Body:		Cast <input type="checkbox"/>	Forged <input type="checkbox"/>
		Standard:	
Soft seat for seat:		Soft seat for stem:	
Closure/ cover :		Cast <input type="checkbox"/>	Forged <input type="checkbox"/>
		Standard:	
Ball:		Cast <input type="checkbox"/>	Forged <input type="checkbox"/>
		Standard:	
Solid: Yes <input type="checkbox"/> No <input type="checkbox"/>			
Ball Coatings:			
Minimum Coatings Thickness:			
Stem:			
Forged <input type="checkbox"/> Alloy Steel Bar <input type="checkbox"/>			
Standard:			
Stem Coatings:			
Minimum Coatings Thickness:			
Seat Ring:			
Forged <input type="checkbox"/>			
Standard:			
Seat Ring Coating:			
Minimum Coating Thickness			
Seat ring hosing protected from corrosion by : metal deposit <input type="checkbox"/> welding overlay <input type="checkbox"/> Other:			
<b>Certificates</b>			
API6D Monogram Certificate: Yes <input type="checkbox"/> No <input type="checkbox"/>		Certificate Number:	Valid Date:
API6D Certificate: Yes <input type="checkbox"/> No <input type="checkbox"/>		Certifying body :	Certificate Number: Valid Date:
Fire safe Certificate: Yes <input type="checkbox"/> No <input type="checkbox"/>		Fire safe standard :	Certifying body :
Certificate Number: Valid Date:			
<b>Deviations:</b>			
Notes			
1- This Data Sheet Form should be completed for each item by manufacturer.			
2- Any deviation from this specification shall clearly specified by manufacturer.			
3- This Data Sheet Form shall be signed and stamped by manufacturer, authorized employee for purchaser approval.			