

## TECHNICAL STANDARD

# API6D Ball & Plug Valve Inspection & Test Procedure



## 1 Scope

This standard provides specific inspection items to be performed on all ball & plug valves. The valves shall be provided with a serial numbering system and will be documented for traceability purposes.

### 1.1 Valve Range

Type: Floating & trunnion ball and lubricated plug  
Body: Split body 2p & 3p and top entry  
Material: Cast & forged, carbon steel, stainless steel, alloy steel & duplex steel  
Pressure rating: ASME Class 150, 300, 600, 900, 1500  
Bore dia: NPS 1 to 24 full bore  
NPS 3 to 24 reduced bore

### 1.2 Applicable Code and Standard

Valve Design: API6D, ASME B16.34, API607, API608  
Face to Face Dimension: ANSI B16.10  
End Flange Dimension: ASME B16.5  
Inspection and Test: API6D  
Non Destructive Examination (NDE): ASME B16.34 (if required on purchase order)  
Radiographic Examination (RT)  
Liquid Penetrant Examination (PT)  
Magnetic Particle Examination (MT)  
Ultrasonic Examination (UT)

## 2. Inspection Items

Inspection items are as follows:

Material test;  
Visual inspection;  
Dimensional check;  
Assembly/performance test;  
Pressure test;  
(1) Hydrostatic Shell Test  
(2) High Pressure Valve Closure Test  
(3) Low Pressure Valve Closure Test  
Final Inspection,  
NDE (if required)

### 3. Material Test

The materials of body, body cap, ball and stem shall be confirmed to meet the respective material specifications on the basis of respective mill certificates.

**GSL/QTY-JH-03**

### 4. Visual Inspection

Check visually that:

**GSL/QTY-JH-06**

- 4-1. Casting surfaces (both the exterior and interior) are free from holes, burrs, scale, cracks, etc. in accordance with MSS SP55.
- 4-2. Machined faces and all surfaces are free from flaws or unevenness on finished surfaces.
- 4-3. The fluid passage is finished appropriately and free from foreign debris.
- 4-4. Angles and corners the dimensions of which are no specified in the drawings and standards are chamfered and rounded appropriately.
- 4-5. The nominal pressure, nominal diameter, and other necessary information should be properly indicated on the body surface and label.
- 4-6. The flow direction shall be properly indicated when restricted.
- 4-7. Bore should be unobstructed when valve is in full open position.

5. Dimensional Check **GSL/QTY-JH-05**  
 5-1. Dimensions shall be checked in accordance with the drawings and specified values.  
 5-2. The dimensional tolerance of flanges shall be as specified in ASME B16.5, butt weld end to ANSI B16.25.  
 5-3. The tolerance of the face-to-face dimension shall be in accordance with API6D (Table 1).

Table 1 Face-to-face dimensional tolerance (unit: mm)

Nominal diameter of valve	Dimensional tolerance
NPS 10 less than	± 2 mm
NPS 12 to 24	± 3 mm

6. Assembly/Torque Test **GSL/QPS8.2-02**  
 6-1. The valve operating torque shall be determined prior to pressure test, without load and in dry condition.  
 The operating torque shall be within the GSL specified range.  
 6-2. Both the directions of the hole in the ball and the two faces of the stem of the flow direction indication at the stem top shall coincide with each other.

7. Pressure Test **GSL/QPS8.2-01**

Testing Requirements

Item	Ball & Plug Valve
Hydrostatic Shell Test	Yes
High Pressure Closure Test (Hydrostatic)	Yes
High Pressure Closure Test (Gas)	Yes

- 7-1. Hydrostatic Shell Test  
 With the valve kept half open, fill the body with water and apply test pressure shown in Table 2. Make sure that the connections are tight then use leak detector spray on all body joins & body surfaces to ensure zero leakage and all parts are free from leakage.  
 At this time, the test duration shall be as shown in Table 3.  
 For stainless steel and the duplex stainless steel valves, the chloride content of test water shall not exceed 30 ppm by mass.

Table 2 Shell test (API6D/ASME B16.34) [unit MPa]

Material of Shell	150lb	300lb	600lb	900lb	1500lb
WCB/A105N	3.14	7.58	15.4	23.14	38.44
LCB/LF2	2.84	7.26	14.51	21.77	36.09
CF8, CF8M/316/304	2.94	7.65	15	22.46	37.27
LC3/LF3	3.14	7.85	15.59	23.34	38.83

Table 3 Test duration for shell test and closure test (API6D) [unit min]

Size (NPS)	Testing Item	Hydrostatic Shell Test	High Pressure Valve Closure Test (Hydrostatic)	Low Pressure Valve Closure Test (Gas)
1/2 ~ 4		2	2	2
6 ~ 10		5	5	5
12 ~ 18		15	5	5
≥ 20		30	5	5

7-2. High Pressure Valve Seat Test (Hydrostatic)

With the valve closed fully, test in both directions, one direction at a time at pressure given in Table 4.1. Use leak detector spray on entire area to ensure zero leakage.

The test duration shall be as shown in Table 3.

Note: For stainless steel and the duplex stainless steel valves, the chloride content of test water shall not exceed 30 ppm by mass.

Table 4.1 All valves (API6D/ASME B16.34) [unit MPa]

Pressure	150lb	300lb	600lb	900lb	1500lb	2500lb
NPS						
1/2 ~ 24	2.26	5.79	11.46	17.16	28.54	62.1

7-3. Low Pressure Valve Seat Test (Gas)

With the valve closed fully, test in both directions, one direction at a time at pressure of 0.6Mpag. Use leak detector spray on entire seal area to ensure zero leakage.

The test duration shall be as shown in Table 3.

7-4. Acceptance Criteria of Closure Test (ISO5208)

Seat	Soft Seated	Metal Seated
Leakage Rate	0 Leakage (A)	$\geq 01\text{mm}^3/\text{SxDN (D)}$

7-5. After Pressure Testing

The test water is to be entirely evacuated from valve bore.

For carbon steel valves, the interior of the valve is to be sprayed or coated with rust preventative oil to prevent rust and corrosion during transit and storage.

8. Final Inspection

**GSL/QPS8.2-04**

8-1. Paint Check

1) The paint check shall be made after the above mentioned tests have been completed.

2) Check that finished coast is free from peeling, unevenness, blistering, etc.

3) Specification and colour shall be in accordance with customer's specifications. Unless otherwise specified, it shall be in accordance with the GSL standards.

8-2. Ensure that all marking and tagging are correct.

8-3. Body finish of casting/forging to be physically inspected in accordance with MSS-SP55.

9. Non Destructive Examination (Supplementary Examination)

**GSL/QPS7.5-02**

Supplementary types of non destructive examination are required only if specified in the purchase order and only to the extent specified.

Magnetic Particle, Radiographic, Liquid Penetrant and Ultrasonic Examination of steel castings or forgings shall be in accordance with specification in client purchase order.

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