

JIS

JAPANESE INDUSTRIAL STANDARD

General rules for inspection of valves

JIS B 2003—1994

Translated and Published

by

Japanese Standards Association

**In the event of any doubt arising,
the original Standard in Japanese is to be final authority.**

JAPANESE INDUSTRIAL STANDARD

J I S

General rules for inspection of valves

B 2003-1994

1. Scope This Japanese Industrial Standard specifies the general rules for inspection of valves specified in JIS B (Mechanical Engineering) Division.

The rules are also applicable to other valves of 63 K or under in nominal pressure for general use.

Remarks 1. The standards cited in this Standard are given in the following:

JIS B 0100 Glossary of terms for valves

JIS B 0253 Gauges for taper pipe threads

JIS B 2001 Nominal size and bore of valves

JIS B 2002 Face-to-face and end-to-end dimensions of valves

JIS B 2004 General rules for marking on valves

JIS B 2203 Tolerances for pipe flanges

2. The International standard corresponding to this Standard is given in the following:

ISO 5208-1982 Industrial valves—Pressure testing for valves

3. The units and numerical values given in { } in this Standard are in accordance with the traditional units, and are appended for informative reference.

4. The nominal size given in () in this Standard are of nominal size series B.

2. Definitions For the purposes of this Standard, the definitions given in JIS B 0100 apply.

3. Inspection items The inspection items of the valves shall be as given in the following:

- (1) Structural inspection
- (2) Dimensional inspection
- (3) Visual inspection
- (4) Material inspection
- (5) Pressure inspections
 - (a) Shell test
 - (b) Seat leakage test
 - (c) Back seat leakage test
- (6) Other inspections

Remarks: The inspections on individual valves shall be specified selecting necessary inspection items from the items mentioned below for respective standards.

4. **Structural inspection** The structural inspection of the valves shall be carried out under the condition of no load as follows:

- (1) The handle shall be capable of being operated easily and the valve stem and disc shall be securely connected.
- (2) The valve shall work smoothly when operated for opening and closing.
- (3) In the globe and angle valves, the disc and valve seat shall be concentric, and when the valve is closed, the disc shall be seated correctly on the valve seat.
- (4) The gate valve shall be so constructed that the centre of valve seat face of disc is situated higher than the centre of valve seat face of valve body when the valve is completely closed and that any part of the disc does not stay in the bore of valve seat when the valve is full open.
- (5) In the check valve, the disc shall be opened to the stopper fitted on cover or valve body, and shall return to the closed position by its own weight.
- (6) In the cock, the direction of plug bore shall coincide with the groove mark. The plug shall be so assembled as to have a clearance sufficient for the wear of grinding faces or for regrinding.

5. **Dimensional inspection** The dimensional inspection shall be carried out using the surface plate, vernier caliper, dial gauge, etc. as follows:

- (1) **Flanged end valve** The flanged end valve shall be as given in the following:
 - (a) The dimensional tolerances of the flange shall be in accordance with JIS B 2203.
 - (b) The tolerances on the parallelism and perpendicularity of the both end flanges shall be in accordance with Fig. 1 and Table 1.
 - (c) The tolerances on the face-to-face dimension shall be in accordance with JIS B 2002.
 - (d) The dimensional tolerances on the bore shall be in accordance with JIS B 2001.

Fig. 1. Parallelism and perpendicularity of flanges of flanged end valve
Parallelism of flange of straight type Perpendicularity of flange of angle type

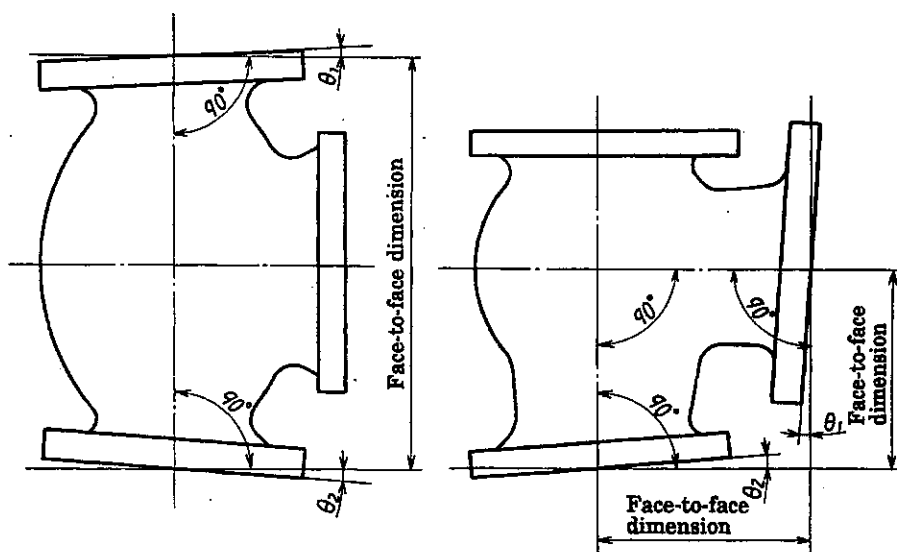


Table 1. Permissible values on parallelism and perpendicularity of both end flanges of flanged end valve

Unit: mm

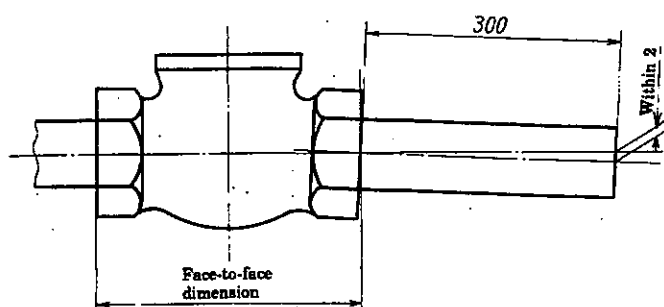
Nominal size	Permissible value ($\alpha = \theta_1 + \theta_2$)
100 or under	30
125 or over to and incl. 250	20
300 or over	15

- (2) Butt welding end valve The butt welding end valve shall be as given in the following:
- (a) The tolerances on the face-to-face dimension shall be in accordance with JIS B 2002.
 - (b) The dimensional tolerances on groove shape shall be as agreed between the parties concerned with delivery.
 - (c) The permissible values on parallelism and perpendicularity of the groove face of the both end butt welding part shall be as agreed between the parties concerned with delivery.
- (3) Threaded end valve The threaded end valve shall be as given in the following:
- (a) The pipe threads shall be inspected in accordance with JIS B 0253. In this case, the position of the gauge diameter shall be on the end face.
 - (b) The tolerances on the face-to-face dimension (in the case of end face machining) shall be in accordance with Fig. 2 and Table 2.
 - (c) The permissible value of the coaxiality or perpendicularity between the thread axial lines of both ends shall be 2 mm in respect to the distance of 300 mm from the threaded end (see Fig. 2.)

Fig. 2. Coaxiality and perpendicularity of thread axial line of threaded end valve

Unit: mm

Coaxiality of straight type



Perpendicularity of angle type

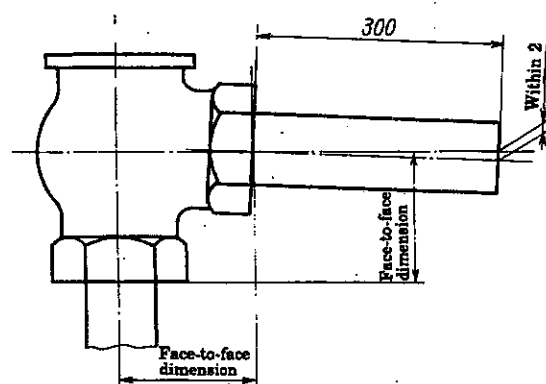


Table 2. Tolerances on face-to-face dimensions of threaded end valve

Unit: mm

Nominal size	Tolerances	
	Straight type	Angle type
40 (1 1/2) or under	±1.0	±0.8
50 (2) or over to and incl. 100 (4)	±1.5	±0.8

- (4) Others The permissible values of the eccentricity of circumference in the case of being as cast, at the flange coupling part of the valve body and bonnet, shall generally be as given in Table 3.

Table 3. Permissible values of eccentricity of circumference of flange at coupling part of valve body and bonnet

Unit: mm

Nominal size	Permissible value
100 (4) or under	3.0
125 or over to and incl. 250	4.0
300 or over to and incl. 600	6.0

6. Visual inspection The visual inspection shall be carried out by naked eyes or the like as follows:

- (1) The castings shall be free from harmful cavities, casting fins, sand seizure, sand inclusion, scales, cracks, etc. both on inside and outside surfaces.
- (2) The forgings shall be free from overlaps, necking bruise, etc.
- (3) The machined surfaces shall be free from harmful defects and shall be uniformly finished.
- (4) The valve seat faces shall be free from harmful cavities and other defects.
- (5) The corners and nooks without designation of dimensions shall be appropriately chamfered, rounded and the like.
- (6) The portion through which the fluid passes shall have been finished appropriately and cleansed.
- (7) The valve shall be correctly indicated in accordance with JIS B 2004.

7. Material inspection The inspection on the materials of the valve shall be carried out in accordance with the respective material standards. However, for the materials of which qualities have been ascertained, the material test may be omitted.

8. Pressure inspections⁽¹⁾

Note ⁽¹⁾ The valve for water works and the faucet shall not be subjected to the pressure inspection specified herein, but shall be in accordance with the prescriptions of respective standards.

8.1 General The pressure inspection of the valve shall be as given in the following:

- (1) The pressure inspection shall be carried out after assembling of the valve. However, when shell test is supposed to adversely affect the internal components of the valve, it shall be as agreed between the parties concerned with delivery.
- (2) As to an oval body type gate valve which is liable to be deformed when it is subjected to the test pressure, it may be supported by a press or a stay bolt for preventing the deformation of its valve body due to the pressure. In this case, the fastening force of the press or stay bolt shall be to the extent not to cause deformation to the valve body.
- (3) Before the completion of the shell test, painting of valve or coating with materials for stopping up leakage shall not be performed. However, the inside lining and the chemical anticorrosive treatment of non-pressure sealing property may be processed.
- (4) In the case where a reinspection is required on the valve which has passed the shell test and finished painting, it may be inspected without removal of painting.

8.2 Shell test

8.2.1 Hydraulic test Hold a valve appropriately under opened condition, fill water in the valve body so that no air remains, and apply the test pressure of 1.5 times the maximum permissible pressure⁽²⁾. Maintain this test pressure for the duration given in Table 4, and examine the presence of water leakage.

Note (2) The maximum permissible pressure mentioned herein is defined as the highest pressure among the maximum permissible pressures specified for each conditions of fluid for the respective valves specified in the product standards.

Table 4. Duration of shell test

Unit: s	
Nominal size	Test duration
50 (2) or under	15
65 (2 1/2) or over to and incl. 200	60
250 or over	180

Remarks: The value of Table 4 indicates the minimum value of test duration after the test pressure has reached the specified pressure.

8.2.2 Pneumatic pressure test In the shell test of the valve of nominal size 50 (2) or under, the pneumatic pressure may be used instead of the hydraulic pressure, and the test shall be carried out in accordance with the hydraulic test as appropriate. The test pressure in this case shall be 0.59 MPa (6 kgf/cm²).

In this case, the test may be carried out immersing it into the water under the condition where the specified test pressure has been applied. However, when pneumatic pressure is used, the representative tests by hydraulic pressure shall have been performed on respective types, nominal sizes and nominal pressures.

8.2.3 Judgement of test results No leakage, oozing and the like shall be found from the surface and the like of the valve. However, in the case of the hydraulic test, when the leakage from the gland packing part is found, it shall be judged as agreed between the parties concerned with delivery.

8.3 Seat leakage test

8.3.1 Hydraulic test In this test, apply the test pressure of 1.1 times the maximum permissible pressure⁽²⁾. In this case, expel the internal air in advance. Maintain this test pressure for the time given in Table 5, and examine the presence of the water leakage of the ground surface and interior of valve. When any leakage is found on a valve to which a small leakage volume of water is permissible, maintain the test pressure succeeding for a time enough to carry out the measurement of leakage volume of water.

Furthermore, the method to apply the test pressure shall be in accordance with the following depending on the type of the valve.

- (1) For globe valve and angle valve Close the valve, and apply the pressure from the upstream side of the valve.
- (2) For gate valve Fill it with water, close the valve so that the test pressure is applied to the inside valve body and bonnet, and carry out testing by opening one side under the condition as it stands.

In addition, test the valve seat of the opposite side in the same manner as above. However, for the valves of 100 or under in nominal size or as agreed between the parties concerned with delivery, close the valve after the pressure has been applied to the inside valve body and bonnet, and the test may be carried out under the conditions where the both sides are opened.

- (3) For lift check valve and swing check valve Fill the downstream side of the valve with water, apply the specified test pressure at first, and then lower the pressure to $\frac{1}{3}$ gradually.
- (4) For cock Tighten the plug to such a degree as capable of operating with handle, apply lubricating oil to the minimum so as to prevent ground surface from being scratched, and test at the closed position.

Table 5. Test duration of valve seat leakage

Unit: s

Nominal size	Test duration
50 (2) or under	15
65 (2 1/2) or over to and incl. 200	30
250 or over to and incl. 450	60
500 or over	120

- Remarks 1. The value of Table 5 indicates the minimum value of test duration after the test pressure has reached the specified pressure.
2. The duration of Table 5 applies also to the ground surface leakage test of the cock.

8.3.2 Pneumatic pressure test In the seat leakage test, if particularly required, the pneumatic pressure may be used instead of hydraulic pressure, and the test shall be carried out in accordance with the case of hydraulic test as appropriate. The test pressure in this case shall be 0.59 MPa (6 kgf/cm²), and the check valve shall be tested without reducing the pressure as it stands.

Furthermore, the test may be performed on the condition of applying the specified testing pressure and filling water into the side opposite to the pressured side.

8.3.3 Division and permissible volume of leakage and judgement of test results The division and permissible volume of the seat leakage shall be given in Table 6. The judgement of the test results shall be specified by respective product standards on the basis of Table 6.

Table 6. Division and permissible volume of seat leakage

Test fluid	Division		
	Rate 1	Rate 2	Rate 3
Water	0.1 mm ³ /s × Nominal size of valve	0.01 mm ³ /s × Nominal size of valve	To be free from leakage.
Air	30 mm ³ /s × Nominal size of valve	0.3 mm ³ /s × Nominal size of valve	

Remarks 1. For nominal size of the valve, the nominal size series A shall be used.

2. The permissible volume of the leakage only applies when discharging to the atmosphere.

8.4 Back seat leakage test For that having the back seat, the presence of leakage of its portion shall be tested as required. Its method and the judgement of the results shall be as agreed between the parties concerned with delivery.

9. Other inspections Other inspections such as steam inspection, nondestructive inspections⁽³⁾, etc. shall be carried out when particularly specified by the purchaser.

The methods of inspection and the judgement of test results shall be as agreed between the parties concerned with delivery.

Note ⁽³⁾ The nondestructive inspections mentioned here are as follows:

- (1) Radiographic inspection
- (2) Magnetic particle inspection
- (3) Liquid penetrant inspection
- (4) Ultrasonic inspection

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B 2003-1994
Edition 1

Japanese Text

Established by Minister of International Trade and Industry

Date of Establishment: 1968-03-01

Date of Revision: 1994-11-01

Date of Public Notice in Official Gazette: 1994-11-01

Investigated by: Japanese Industrial Standards Committee

Divisional Council on Machine Elements

**This English translation is published by:
Japanese Standards Association
1-24, Akasaka 4, Minato-ku,
Tokyo 107 Japan
© JSA, 1995**

**Printed in Tokyo by
Hohbunsha Co., Ltd.**