



Toyo Valve

Operation Manual

for

Bronze and Brass Gate, Globe and Check Valves

[Threaded]

We appreciate your purchasing our products.
Ensure to read all the contents of this manual before piping and using them.
Also keep this manual to the
place accessible to the operator.

KITZ CORPORATION

This manual applies to manual operation of bronze and brass inside screw gate, inside screw globe and swing check valves.

CAUTION AND WARNING

To ensure safe and trouble-free function and performance, please read all the contents of this manual before handling, transportation, mounting and operation of the valves.

Keep this manual to the place accessible to the operator.

The signs "WARNING" and "CAUTION" are defined as follows:



WARNING

Indicating potentially hazardous conditions which may result in serious injury to personnel, if such warnings shall be ignored.



CAUTION

Indicating potentially hazardous conditions which may result in minor or moderate injury to personnel or property damage, if such conditions shall be ignored.



Indicates prohibition of an action.



Indicates mandatory implementation of an action.

NOTES TO USERS

This manual covers normal usage of our products. Technical data and instructions for operation, maintenance and inspection of the products are prepared in consideration of safety. However, they are good only to cover typical applications as a general guideline to users. If technical assistance beyond this manual is required, contact KITZ Corporation or its distributors.

The illustrations given in this manual do not introduce all details. If more detailed data are needed, refer to our relevant valve assembly drawings.

※ Any information provided in this manual is subject to change at any time without notice, which cancels all previous issues.

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I . Construction and design features

I . Construction and design features

1. Inside screw gate valve

1.1 The typical valve construction and parts names are as illustrated below.

1.2 There are rising stem type which stem threads are engaged with bonnet threads and non-rising stem which stem threads are engaged with disc threads.

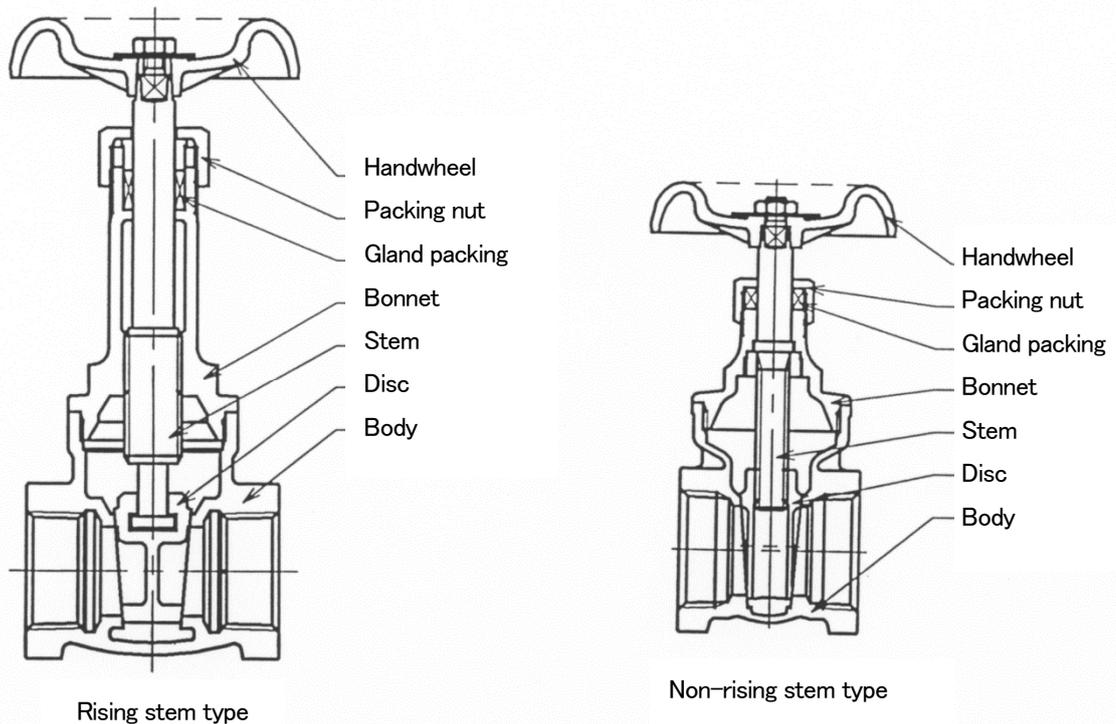
1.3 The space for rising stem is required for valve operation of rising stem type and not for non-rising stem type.

1.4 Open or close position cannot be checked outside the valve for non-rising stem type.

1.5 Gate valve is designed to be used at fully open or close position.

Usage at intermediate position should damage the valve disc and seats.

1.6 Fluid is bi-directional.

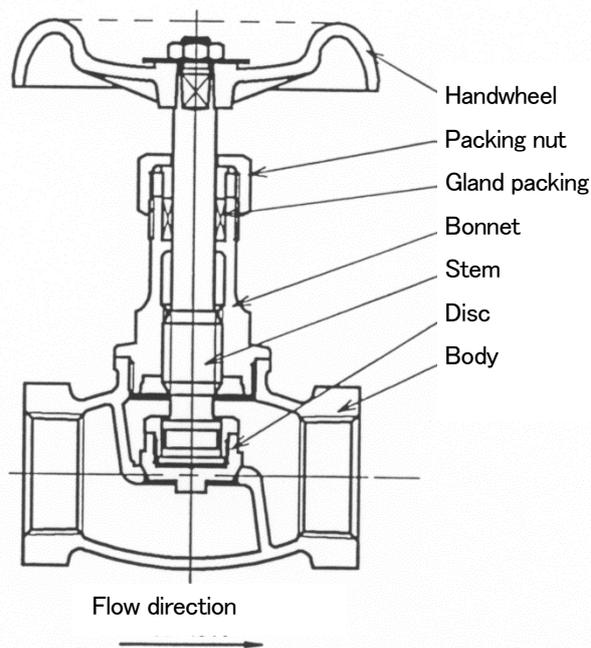


This illustration shows typical construction.

I . Construction and design features

2. Inside screw globe valve

- 2.1 The typical valve construction and parts names are as illustrated below.
- 2.2 Rising stem type which stem threads are engaged with bonnet threads.
- 2.3 The space for rising stem is required for valve operation.
- 2.4 Globe valve is designed to be used at fully open, fully close or intermediate position for flow control.
- 2.5 Globe valve has higher fluid resistance from its construction.
- 2.6 Globe valve requires higher operational torque to close the valve with full fluid resistance to the disc.
- 2.7 Fluid is uni-directional.



This illustration shows typical construction.

I . Construction and design features

3. Swing check valve

3.1 The typical valve construction and parts names are as illustrated below.

3.2 The hinge pin clamps the arm and disc.

The disc moves upwards uni-directionally with fluid flow.

3.3 Swing check valve is used to have uni-direction of fluid and to prevent back flow.

3.4 Fluid is uni-directional.

3.5 Swing check valve is used for both horizontal and vertical piping.

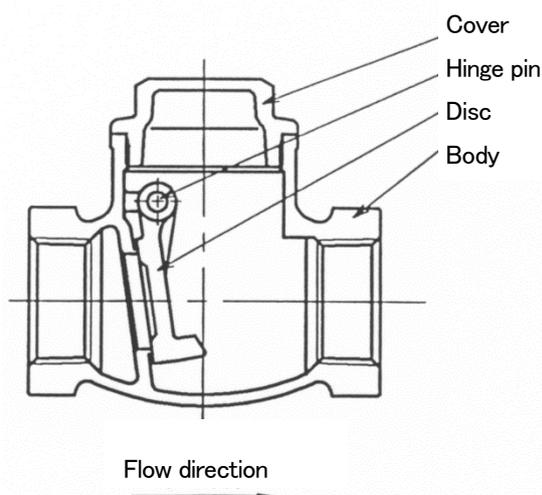
At vertical piping, the valve should have upward flow and be installed in accordance with the arrow on the body.

At horizontal piping, the valve should be installed with upright position.

3.6 When enough fluid flow cannot be obtained, the disc may flap the body seat to make a noise, known as chattering.

3.7 Fluid vortex, turbulence and pulsation are expected at pump outlet and downstream of reducer and elbow, which may damage the valves and result in shortening life cycles of the valves.

It is recommended to place valves at the distance of 6 times nominal size or further from these devices.



This illustration shows typical construction.

I . Construction and design features

4. Lift check valve

4.1 The typical valve construction and parts names are as illustrated below.

4.2 The disc moves vertically to the seats along the cover guide.

4.3 Lift check valve is used to have uni-direction of fluid and to prevent back flow.

4.4 Fluid is uni-directional.

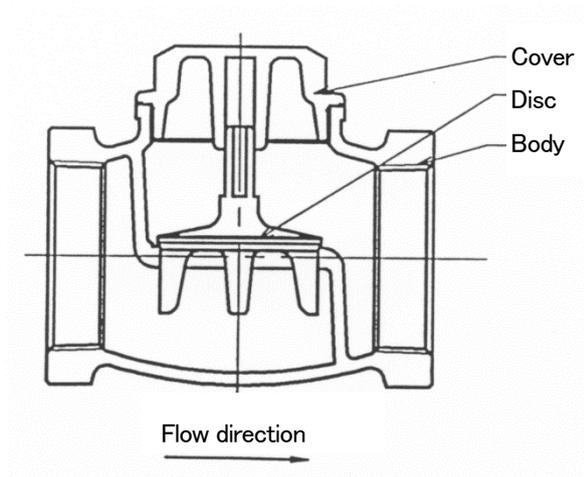
4.5 Lift check valve is used for horizontal piping only.

The valve should be installed with upright position.

4.6 When enough fluid flow cannot be obtained, the disc may flap the body seat to make a noise, known as chattering.

4.7 Fluid vortex, turbulence and pulsation are expected at pump outlet and downstream of reducer and elbow, which may damage the valves and result in shortening life cycles of the valves.

It is recommended to place valves at the distance of 6 times nominal size or further from these devices.



This illustration shows typical construction.

I . Construction and design features

5. Lift check valve with spring

5.1 The typical valve construction and parts names are as illustrated below.

5.2 The disc moves vertically to the seats along the cover guide.

The spring reduces water hammer occurrence by making disc holder closing movement smooth.

5.3 Lift check valve is used to have uni-direction of fluid and to prevent back flow.

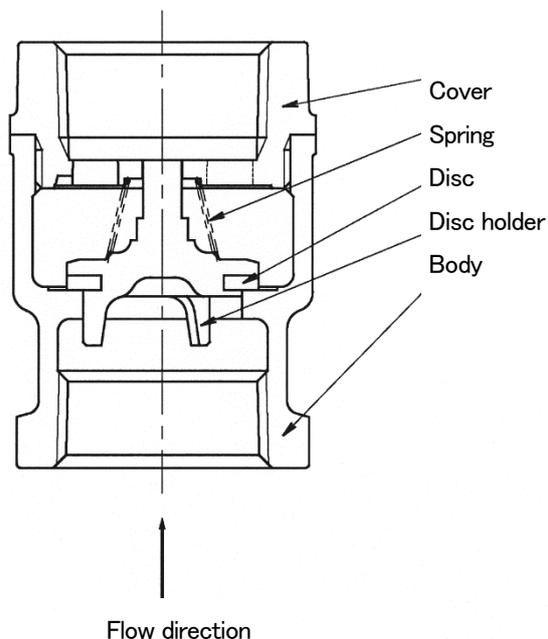
5.4 Fluid is uni-directional.

5.5 At vertical piping, the valve should have upward flow.

5.6 When enough fluid flow cannot be obtained, the disc may flap the body seat to make a noise, known as chattering.

5.7 Fluid vortex, turbulence and pulsation are expected at pump outlet and downstream of reducer and elbow, which may damage the valves and result in shortening life cycles of the valves.

It is recommended to place valves at the distance of 6 times nominal size or further from these devices.



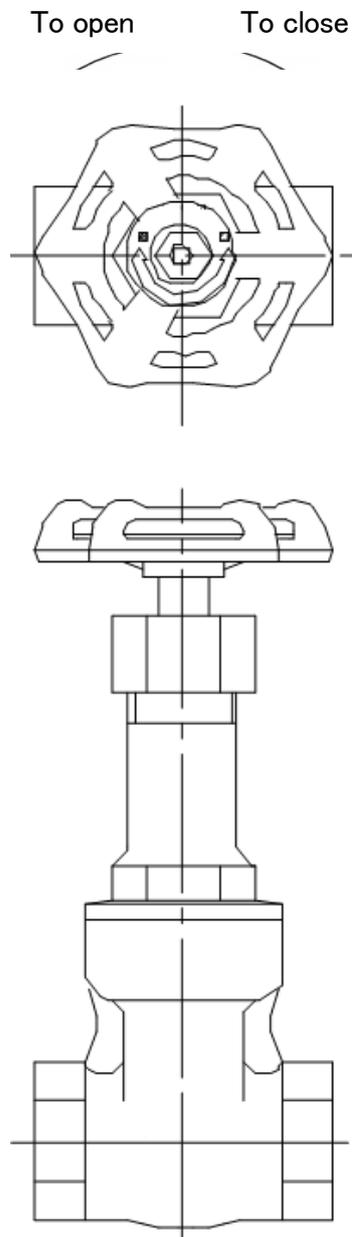
This illustration shows typical construction.

II . Operator

II . Operator

1. Handwheel

- 1.1 Handwheel is directly mounted on the valve stem.
- 1.2 Clockwise operation of handwheel closes the valve and counterclockwise operation of the handwheel opens the valve as indicated on the handwheel arrow.
- 1.3 Handwheel operating torques are different by the valve types and the opening degrees.



III. Transportation and storage

III. Transportation and storage

1. Transportation

1.1 Caution at transportation

|  CAUTION | |
|--|--|
|  | <ul style="list-style-type: none">● Pay attention to handling and storage of carton packed products. The high humidity may damage the cartons. |

1.2 Transportation

1.2.1 Keep the packings as they are during transportation. Provide appropriate protection covers if they are found missing during transportation.

1.2.2 Handle valves carefully so that they may not fall or drop on the ground. Any extraordinary mechanical impact should be avoided.

2. Storage

2.1 Caution at storage

|  CAUTION | |
|--|---|
|  | <ul style="list-style-type: none">● DO NOT store valves in the corrosive environment, which may cause corrosion from the valve threaded areas.● DO NOT place any objects on valves, and DO NOT step on them. Overloading may cause damage to valves.● DO NOT pile up products carelessly to avoid damage to the products and personal injury caused by unstable piling. |

2.2 Storage

2.2.1 Store valves at dust-free, least humid and well ventilated places. Indoor storage is recommended.

2.2.2 It is not recommended to store valves directly on the ground or concrete floor.

IV. Piping and mounting

IV. Piping and mounting

1. Installation (threaded)

1.1 Caution at installation

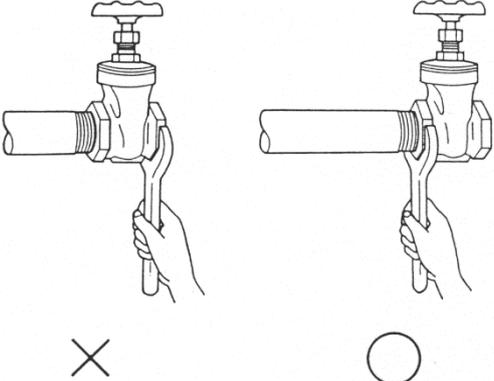
|  CAUTION | |
|--|---|
|  | <ul style="list-style-type: none">● Keep a secure footing for valve installation and operation.● Sufficient lighting should be prepared for valve operation.● Piping should be properly supported, if needed. |

- 1.1.1 Allow sufficient room for operation, installation and subsequent maintenance of valves, considering the valve height and the stem direction.
- 1.1.2 Take appropriate measures for smooth operation, inspection and maintenance of valves if they are forced to be installed in small spaces.
- 1.1.3 Try not to install valves in the places where valve functions may be hampered by outer forces such as vibrations.
- 1.1.4 It is recommended to install valves to horizontal pipes in upright positions.
- 1.1.5 Fluid flow should be upward for swing check valves if they are installed to vertical piping.
- 1.1.6 Lift check valves should be installed to horizontal piping only.
- 1.1.7 Fluid flow should be upward for lift check valves with springs if they are installed to vertical piping.

IV. Piping and mounting

1.2 Caution at piping and mounting

| | |
|------------------|--|
| ⚠ WARNING | |
| ! | <ul style="list-style-type: none"> ● Keep off the working area to prevent personal injury if valves are installed at higher places. |

| | |
|------------------|--|
| ⚠ CAUTION | |
| ! | <ul style="list-style-type: none"> ● Pay attention not to damage threaded areas and seat surfaces during mounting work. ● DO NOT disassemble valves during mounting work. ● Check valves are provided with fillers inside for seat damage protection during transportation. Ensure to remove them completely before mounting valves. ● Globe and check valves should be mounted in accordance with arrows indicated on valve bodies. ● They should be centered properly so that the piping be straight lines to prevent excessive pipe stress to the valves. ● Use sealing materials applicable to the temperature and the fluid at threaded areas. ● Use spanners or any other appropriate tools. It is prohibited to use a pipe wrench for valves.. ● Fit spanners on the valve ends to be connected with pipes. Do not fit them on the other ends. <div style="text-align: center;">  </div> <ul style="list-style-type: none"> ● Do not overtighten piping, which may damage valve internals. ● Retighten gland packings before operation. Packing tightening stress may be lowered due to the stress relaxation during transportation and storage, which may cause leakage. |

IV. Piping and mounting

1.2.1 Check the followings before valve mounting.

- (1) Service conditions should be within the valve specifications.
- (2) Valve threads should correspond with piping threads.
- (3) No damage should be found on valve and piping threads.
- (4) The threads dimensions should correspond with the applicable standards.

1.2.2 Remove foreign objects such as sand, dust and welding spatters from the connecting pipe interior before valve mounting.

1.2.3 Handle valves carefully so that they may not fall or drop on the ground. Any extraordinary mechanical impact should be avoided.

1.2.4 Remove protection covers just before valve mounting.

1.2.5 All tightened areas should be checked after valve mounting. Retighten them, if needed.

1.2.6 The valve and pipe interior should be flushed to remove foreign objects. DO NOT operate valves during flashing.

IV. Piping and mounting

1.3 Piping and mounting (threaded)

1.3.1 Make sure that valves and pipes should be threaded properly.

1.3.2 Remove all foreign objects such as cutting oil and spatters from pipe internals and threaded areas with detergent or waste cloth.

1.3.3 Apply sealing material such as sealing tape to the pipe threads.

1.3.4 Use appropriate tools to thread valves into pipes.

1.3.5 Do not apply any excessive torques to thread pipe ends into valves. The torques should be within the following ranges.

| | | | | | | |
|---------------|-------|-------|-------|-------|-------|-------|
| Size | 1/8 | 1/4 | 3/8 | 1/2 | 3/4 | 1 |
| Torque N-m | 20~29 | 20~29 | 20~29 | 20~29 | 39~49 | 49~59 |

| | | | | | |
|---------------|-------|-------|-------|---------|----------|
| Size | 1-1/4 | 1-1/2 | 2 | 2-1/2 | 3 and up |
| Torque N-m | 59~69 | 69~78 | 78~88 | 108~118 | 127~137 |

1.3.6 Increase line temperature and pressure gradually at test operation. Retighten the threaded areas, if needed.

V. Valve operation

V. Valve operation

1. Caution at operation

|  CAUTION | |
|--|--|
|  | <ul style="list-style-type: none"> ● DO NOT apply excessive torque to the valve operating device. Manual valve should be operated manually not by special tool. ● DO NOT loosen bolts and nuts of gland and bonnet of pressurized valves. ● Avoid usage of gate valves at intermediate position, which may damage stem and disc. |
|  | <ul style="list-style-type: none"> ● Retighten packing nut or gland nut before operation. Packing tightening pressure may be lowered due to the stress relaxation during transportation and storage, which may cause leakage from packing or gland area. ● Open the valve gradually to prevent damage to pipes when the valve handles high temperature fluid such as steam. ● Close the valve gradually to prevent water hammer if the valve handles liquid. ● Take appropriate measures not to freeze pipes and valves. |

2. Valve operation (gate and globe valves)

- 2.1 Clockwise operation of handwheel closes the valve and counterclockwise operation of handwheel opens the valve as indicated on the handwheel arrow.
- 2.2 Handwheel operating torques are different by the valve types and the valve opening degrees.
- 2.3 Turn the handwheel of gate valve to the open direction by about 90° after reaching fully close position to remove thermal stress to the pipes, which makes the valve reopening easier and smoother.

V. Valve operation

3. Daily inspection

Daily inspection is very important for safe and satisfactory operation of valves. The followings are inspection to be performed daily and during operation.

| To check | Valve type | Area | Method | Measure |
|------------------|---------------|----------------------|-----------------------|--|
| External leakage | Gate Globe | Gland | Visual Liquid soap | Retighten packing nut |
| | All | Threads | Visual Liquid soap | Retighten all threads Replace the related parts |
| | | Body surface | Visual Liquid soap | Replace the valve |
| Abnormal noise | All | Valve body | Listening | Contact a piping engineer |
| | | Loosened threads | Listening | Retighten all threads |
| | | Pipe vibration | Listening | Contact a piping engineer |
| Loosened threads | All | Threads | Visual Touch | Retighten all threads |
| Seat leakage | All | — | — | Remove foreign objects Replace the valve |
| Valve operation | Gate Globe | Operating position | Visual | Make the position as instructed |
| | All | Not smooth operation | Touch Listening | Disassembling inspection Replace the valve |

(NOTE) Don't reuse the valve that is not using gasket between body and body cap.

In this case, change the valve to the new one.

V. Valve operation

4. Remedial measure

| | |
|------------------|--|
| ⚠ CAUTION | |
| ! | <ul style="list-style-type: none"> ● Wear protective items such as goggles, gloves and working boots. ● Reduce line pressure to the atmospheric level before retightening. |

4.1 Leakage from gland area

Retighten packing nut to not excessively heavy level when leakage is found from gland packing area.



5. Trouble shooting

| Trouble | Possible cause | Measure |
|--------------------------------------|---|--|
| Operation impossible | Foreign objects stuck to seat | Flash out the foreign objects with fluid flow |
| Excessive operation torque | Foreign objects stuck to stem threads | Remove the foreign objects and check the valve |
| | Foreign objects are piled up at the valve body bottom | Flash out the foreign objects with fluid flow |
| | Over-tightened gland packing | Loosen packing nut and retighten them adequately |
| Leakage from packing | Too loose gland packing | Retighten gland packing |
| | Damaged gland packing | Contact a piping engineer Replace the gland packing |
| | Damaged stem | Replace the valve |
| Seat leakage at fully close position | Damaged stem (by cavitation) | Contact a piping engineer |
| | Deformed seat | Contact a piping engineer |
| Noise and vibration | Loosened threads | Retighten threads |

VI. Periodic inspection

VI. Periodic inspection

1. Periodic inspection

- 1.1 Carry out periodic inspection of the valves mounted to piping approximately once a year.
- 1.2 Ensure smooth operation and sufficient function of the valves.
- 1.3 Refer to daily inspection page for inspection items and methods.
- 1.4 Carry out periodic inspection of the valves which are not operated for long period or not inspected daily.

2. Maintenance inspection

Perform seat leakage, shell leakage and operation tests, if needed, at maintenance inspection of the facility. If any defects are found, replacement of the valve is recommended.

2.1 Warning and caution at dismantling and mounting valves

|  WARNING | |
|--|--|
|  | <ul style="list-style-type: none"> ● Discharge the fluid from piping and reduce line pressure to the atmospheric level when dismantling valves. ● Discharge the fluid and pressure trapped within the valve body with the valve intermediate position before dismantling. ● Operator should take protective measures against the spouting fluid and igniting. ● Keep off the working area to prevent personal injury if valves are installed at higher places. |

|  CAUTION | |
|--|---|
|  | <ul style="list-style-type: none"> ● Wear protective items such as goggles, gloves and working boots. ● Keep a secure footing at dismantling and mounting valves. |

VI. Periodic inspection

2.2 Test and inspection

Refer to the followings.

2.2.1 Operation test

- (1) The valve should be operated smoothly without galling or sticking.
- (2) The center of the disc should be located upward from the center of the body seat at fully close position for gate valve. There should be no disc remained in the valve port.
- (3) The disc should be seated to the body seat completely at fully close position for globe valve. No offset of disc and seat center should be acceptable.
- (4) The disc should move to the stopper of the valve body at fully open position and move smoothly for check valve.

2.2.2 Shell test and seat leakage test

- (1) Caution at shell test and seat leakage test

|  CAUTION | |
|--|--|
|  | <ul style="list-style-type: none">● Wear protective items such as goggles, gloves and working boots.● Take sufficient precautions before shell test and seat leakage test for operation safety. |

- (2) Shell test and seat leakage test

All valves are subject to hydrostatic or pneumatic shell test and seat leakage test at the specified test pressures. Refer to JIS B2003 and other standards for testing conditions.