

## Product warranty

### 1. Warranty period

The warranty period of delivered product shall be two years after shipment from our factory or one year after start of trial run of the plant, whichever comes first.

### 2. Warranty scope

The warranty period shall apply to our products if they are used under the specified maximum operating conditions.

Therefore, cases to which any one of the following items is applicable shall not be covered by the warranty even within the warranty period.

- (1) Any damage or trouble caused by use beyond the specifications or selection conditions of the product or use under unspecified inappropriate conditions or environment
- (2) Any damage or trouble caused by salt damage or natural disaster (such as flood, earthquake or typhoon, etc.)
- (3) Any damage or trouble caused by consumption of consumable components (such as seal components, stem nuts or sliding components)
- (4) Any damage or trouble caused by disassembly, inspection, repair or modification performed by any contractor other than our company
- (5) Any damage or trouble caused by wear, corrosion, thickness reduction, coating removal or rusting of components
- (6) Any damage or trouble caused by failure to carry out maintenance or inspection described in the instruction manual or failure to detect abnormality
- (7) Any damage or trouble caused by improper installation, operation or handling of the product
- (8) Any damage or trouble caused by external factors (malfunction caused by excessively large reaction force or vibration of piping, residual foreign substance in piping or electrical trouble)
- (9) Any damage or trouble caused by failure to perform maintenance or inspection suitable for high-frequency use
- (10) Any damage or trouble caused by improper thermal insulation
- (11) Contamination, flaws or deformation unrelated to the functions of the product
- (12) Any damage or trouble caused by improper storage method until start of operation
- (13) Any damage or trouble related to an unknown cause
- (14) Dirt around the floor by dripping grease applied to valve stem and bearings

### 3. Warranty costs

If any trouble occurs due to any defect attributable to our company within the warranty period, we will replace with a substitute product or repair of the product will be carried out at our cost (only in Japan).

In addition, any warranty costs shall apply only to the damaged or troubled product, and not include any of the following costs induced by this damage or trouble.

- ① Costs required for removal and installation of the product, transportation costs and standby labor costs
- ② Compensation for lost time and operating loss caused by damage or trouble of the product

In principle, the upper limit of the warranty costs shall be within a range that does not exceed the sales price of the valve.

4. Discontinuation of production and change in structure, etc.

The product may be subject to discontinuation of production or change in structure, etc., without prior notice. Parts of the discontinued product may not be supplied and the product may not be replaced with an identical product.

## Safety Precautions

### ✦ Meanings of Displays and Symbols Used

 **Danger** : An immediate danger that could result in the user's death or serious injury, if instructions are not observed.

 **Warning** : A danger that could result in the user's death or serious injury, if instructions are not observed.

 **Caution** : A danger that could result in the user's injury or physical damage, if instructions are not observed.

These precautions describe important instructions regarding safety in handling valves. Please read this Instruction Manual before using the valves to ensure your safe handling.

Make sure that the valves are always handled by licensed personnel who have received safety education and training.

#### 1. Transport and Storage

- Never walk or stand under the suspended load. The accident will lead to death or serious injury.  **Danger**
- Eye bolt installed on the actuator does not have capacity to hang up the whole of valve. It is provided for actuator only. The accident will lead to death or serious injury. Never use it to hang the valve.  **Warning**
- Check the mass of the valve before lifting it and use the lifting equipment suitable for the mass. Unsuitable equipment may causes accidents such as death or serious injury.  **Warning**
- Products packed in cartons may collapse due to a decrease in packing strength if made damp. Always store packed products indoors at low humidity.  **Caution**
- Never stack products unstably.  **Caution**

#### 2. Installation

- Never walk or stand under the suspended load. The accident will lead to death or serious injury.  **Danger**
- Eye bolt installed on the actuator does not have capacity to hang up the whole of valve. It is provided for actuator only. The accident will lead to death or serious injury. Never use it to hang the valve.  **Warning**
- Check the mass of the valve before lifting it and use the lifting equipment suitable for the mass. Unsuitable equipment may causes accidents such as death or serious injury.  **Warning**
- When performing work, ensure safety of the surrounding environment and avoid work in unstable places. Otherwise the worker will be get death or serious injury result from fall, misstep and touch.  **Caution**
- Never use the hand-wheel as scaffolding since it rotates. This act will not only break it but also maybe getting harm by fall.  **Caution**
- Before performing any work which may catch fire such as grinder tasks or welding operations, take fire prevention measures such as by placing a noncombustible sheet around the products.  **Caution**

### 3. Operation

- Never replace or add a gland packing while the backseat is activated during operation.  
The internal fluid may be ejected from the gland and result in personal injury.  Warning
- Never touch the hot section which is 40°C or more on the valve external surface with bare hands.  
When the need for making contact arises, wear heat-resistant gloves and perform work carefully while exercising caution so as not to suffer burns.  Caution

### 4. Maintenance and Check

- Before performing work, make sure that there is no residual pressure in piping. In addition, make sure that persons who are in charge of the connecting systems are kept well informed to prevent internal fluid from flowing in from upstream or downstream during work. The worker received spurt maybe get injury or physical damage.  Warning
- Electric equipments such as actuator or limit switch should be treated after cut off power source. Otherwise the worker maybe get to death or serious injury by receiving an electric shock.  Caution
- Never touch the hot section which is 40°C or more on the valve external surface with bare hands. When the need for making contact arises, wear heat-resistant gloves and perform work carefully while exercising caution so as not to suffer burns.  Caution
- With regard to the disposal of consumables, comply with ordinances enacted by your local government and properly dispose of them. Especially, use care to prevent inhalation and diffusion dust in gland packing or gasket, and perform the disposal of them with specified procedures.  Caution

## Valve Handling

### 1. Transport and Storage

- (1) Never lift any valves by the hand-wheel, gland, stem, or yoke. The valves may be deformed or damaged due to their mass.
- (2) Eye bolt installed on the actuator does not have capacity to hang up the whole of valve. It is provided for actuator only. Never use it to hang the valve.
- (3) We carefully inspect valves after completion. After placing caps on the ends of valves and packing them in a specified manner, we deliver those valves. Therefore, you must pay close attention to prevent sand or dirt from entering into the valves and adhering on the stem exposure part. Never remove the caps on the ends until installing valves on the piping.
- (4) Store (temporarily place) the valve in a clean and dry indoor area with little change in temperature. In this case, use a wood block, etc., to stabilize the valve for storage without directly placing it on floor.
- (5) The space heater will not function when power is not connected to the electric actuator, therefore, condensation will easily form inside the switch cover, resulting in rust and electric trouble. Store the valve in an environment where condensation does not occur.
- (6) If the valve is stored in an environment where rust is a concern because of long-term storage, apply rust-proof oil on internal and external surfaces of the valve.
- (7) With regard to the packing and gasket sealing parts, corrosion is likely to occur in contact areas due to electric corrosion or crevice corrosion. Therefore, in the case of long-term storage, remove the packing and gasket and store them.
- (8) At least once every six months, check for rust and condensation and take necessary measures.
- (9) Apply recommended grease to thread parts.
- (10) For gasket and gland packing, refer to Chapter 6.

### 2. Installation

#### 2-1 General

- (1) Finished products are protected by the prescribed packing after a final check and then shipped. Therefore, be careful not to allow any foreign matter to get inside the valves when transporting them after unpacking. Avoid carelessly placing them outdoors or where there is a lot of dirt. In particular, be careful not to remove the caps from the ends until the time immediately before installation.
- (2) Before installing a valve on the piping line, check that the valve is the specified one by its marking, valve name, valve number, etc., on the body surface.
- (3) If foreign matter remains in the piping on which the valve is installed, the valve seat surface may be damaged and a seat leak may occur. Therefore, thoroughly clean the piping and equipment.
- (4) Check the flow-direction arrow on the valve body before installing the piping.
- (5) In the case of keeping heat in a valve, it is required to release heat from the stuffing box part. Therefore, never keep heat in this part. A leak may be caused due to early deterioration in the gland packing.

- (6) After the completion of welding, remove slag and spatter, etc.  
Carry out the welding heat input and the construction method so as to keep a temperature rise in the valve as small as possible as a result of welding. Perform welding according to the prescribed method. In addition, when carrying out post-weld heat treatment (PWHT), do so only for the necessary part and with an appropriate temperature rise and drop speed.
- (7) If the allowable temperature limit of the packing, gasket, rubber O-ring, etc, is exceeded due to heat transmission during welding, preheating, or PWHT, replace the parts with new ones after completion of work. A temperature of 200°C serves as a guide for Teflon-based parts and 350°C for graphite-based parts. Since their sealing surfaces may be oxidized, perform appropriate maintenance.
- (8) When installing valve piping, consider the operation space, maintenance space, and the installation of chain blocks to lift heavy parts.
- (9) Before performing pipe welding for gate valves or globe valves, operate the valve to attain an opening of 20% or more.
- (10) Install the valve by a layout in consideration of daily walk round checks, lubrication, and maintenance.
- (11) Install effective supports in piping to prevent excessive bending or twisting from acting on the valve due to the valve outlet piping and the mass of highly-charged fluid.
- (12) Make sure all fittings should be firmly fixed after water seal pipe is connected to valve.
- (13) When installing the electric valve, immediately connect the power. The space heater will not function when power is not connected, therefore, condensation will easily form inside the switch cover, resulting in rust and electric trouble. Store the valve in an environment where condensation will not occur until operation starts.
- (14) When the stem is installed in a horizontal position, grease applied to the stem or bearing may drip and dirty the area around the floor.

## 2-2 Gate Valves

- (1) It is recommended to install gate valves in an upright position. Inverted position is not recommended by reason of some problems (risks)-accumulation of wastes in pipe, difficult maintenance works, and gland/bonnet leakage.
- (2) For valves without a flow-direction arrow display on the body or those with a double-headed arrow display on the body, there is no limitation on the outlet. However, the installation direction is specified in the case of valves with a balancing hole or balance valve on the disc, those with a bypass valve, motor operated valves, and manually gear operated valves. Install such valves after checking the flow-direction arrow.

## 2-3 Globe valves (including Angle Valves) and Flow Control Valves

- (1) It is recommended to install globe valves and flow control valves in an upright position. Inverted position is not recommended by reason of some problems (risks)-accumulation of wastes in pipe, difficult maintenance works, and gland/bonnet leakage.
- (2) Please note that the fluid flow of reversely installed valves will be opposite the flow-direction arrow display on the body. For reversely installed valves, the suspended plate of [INSTALLED WITH COUNTER-FLOW DIRECTION] is placed.

- (3) For valves with a valve opening indicator, check the direction of the valve opening indicator. Since a bonnet direction change involves bonnet bolt loosening, change the direction before the pressure testing in line. When the bonnet direction has been changed, always replace the gasket with a new one.

#### 2-4 Check Valves

- (1) Always use lift check valves in an upright position and swing check valves in horizontal piping or vertical piping (flow from downward to upward direction). However, using swing check valves in vertical piping causes chattering. Install piping horizontally whenever possible.
- (2) Secure a straight pipe length of  $3D$  ( $D$ : nominal diameter of piping) or more ahead and behind the valve. Directly connecting the valve to the elbow causes wear, galling, or a decrease in sealing performance due to violent vibrations of the disc as a result of cavitation or turbulent flow.

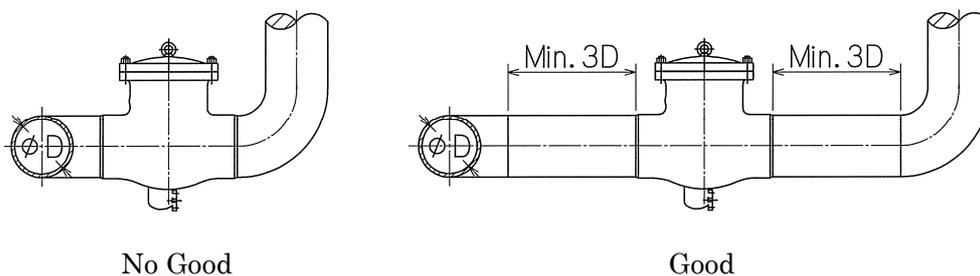


Fig. 2a Required straight pipe length at inlet and outlet sides of the valve

#### 2-5 Motor Operated Valves

- (1) Connect wires in electric system securely and correctly.  
Incorrect wire connection may result in stem deformation or seat surface damage due to a malfunction in the torque switches or limit switches.
- (2) With regard to indoors installed valves, seal the stem cap and connector securely to prevent intrusion of rainwater from such places.
- (3) When the direction of the actuator has been changed, always re-adjust the limit switches.
- (4) Testing of limit switches and torque switches should be performed in motor operation.

### 3. Testing and Normal Operation

#### 3-1 General

- (1) Make sure that the hydraulic test pressure will not exceed the valve test pressure.
- (2) When using the valve as a stop valve with pressure testing, make sure that the valve closure test pressure will not be exceeded.
- (3) If a leak is detected from the gland or gasket during a hydraulic test, immediately tighten it to stop a leak.
- (4) With regard to valve opening/closing operation, the valve will normally close in the clockwise rotation and open in the counterclockwise rotation toward the hand-wheel. Check the current opening/closing position of the valve carefully before performing operation.
- (5) Before starting up the plant, tighten the gland packing. For motor operated valves, make a motor-driven operational check after tightening.
- (6) Always tighten the gland bolts gradually and uniformly. If the gland ring contacts the stem, a gland leak may result due to damage to the stem.

- (7) If a leak occurs from the valve gland during operation, tighten it immediately. Leaving the condition as it is will increase a leak as a result of lost of constituent substance, for example expanded graphite, and even tightening will not stop a leak.
- (8) Use valves in a fully open or fully closed position excluding flow control valves. Using gate valves or globe valves in an intermediate open position may cause erosion or vibration wear, resulting in disc loss or stem breakage.
- (9) With regard to manual valves installed backseat, always return the hand-wheel by 1/4 to 1/2 turns (1.5 to 4.5 turns for the gear operation type) after a fully open position. If the valve undergoes a fluid temperature change while the backseat is activated, a large restraining force will be produced in the backseat due to a difference in the expansion coefficient of each part. This may cause damage to the backseat or stiff manual operation.
- (10) When the pressure seal bonnet valve had been installed in pipe line newly and has been re-assembled in the field, the bonnet lifting bolts/nuts will trend to become loose during the first pressure/temperature rising. Therefore, tighten them by the loosened amount.

### 3-2 Gate Valves

- (1) Always use gate valves in a fully open position. Always return the hand-wheel by 1/4 to 1/2 turns(1.5 to 4.5 turns for the gear operation type) after a fully close position.
- (2) In the case of gate valves (including motor operated valves) which have an adjusting nut (generally stopper) on top of the stem, if a seat ring leak does not stop due to line water pressure etc., remove the split pin and loosen the adjusting nut before tightening the valve. In this case, make sure to put the adjusting nut back to its original position after the test and fix it with a new split pin.
- (3) If the isolation valve is kept on closing after a pipeline hydraulic test and the plant starts up under the condition as it is, trapped water in the bonnet will expand due to heat transmission and abnormally high pressure will be encapsulated. This is called “excessive build up of pressure” and impossible valve opening operation, body or bonnet deformation, or a gasket leak may result. Performing hand-wheel operation by force under abnormal pressure rising may cause damage to the stem, disc, and other parts. In such a case, loosen the gland packing little by little and release pressure from the bonnet carefully to decrease pressure. Doing so will make valve operation available. Not only pressure seal bonnet but also bolted bonnet should be used care to prevent excessive build up of pressure.
- (4) Always use pressure valance valves in a fully open position during operation. Handle the valves properly so as not to perform a fully close operation by mistake.
- (5) If there is a seat leak, foreign matter may be entangled between the seats. Therefore, repeat quick-opening operation by slight lifting to blow off foreign matter without firmly tightening the disc and then perform a fully close operation. Lifting the disc a little may stop a leak.

### 3-3 Globe Valves (including Angle Valves) and Flow Control Valves

- (1) Always use standard globe valves which are not of the flow control valve specifications in a fully open or fully closed position. If such valves are used in an intermediate full position, the disc loss or stem breakage may result due to the wear of the stem and disc.
- (2) In the case of high-pressure valves of a small diameter, hand-wheel operation becomes relatively heavy. However, this is not a malfunction. Loosen the gland bolt a little to reduce torque.
- (3) When performing hand-wheel operation by using an auxiliary hand-wheel, use the one with an appropriate length specified by the plant so as not to break the stem.
- (4) If there is a seat leak, foreign matter may be entangled between the seats. Therefore, repeat quick-opening operation by slight lifting to blow off foreign matter without firmly tightening the disc and then perform a fully close operation.
- (5) If flow control valves are used in a throttled state, stem breakage or a gland leak may result due to strong vibrations. Re-adjust the valve position not to cause vibrations.
- (6) Valves which handle high-temperature and high-pressure saturated water, such as continuous blow down valves, have a high risk of producing a Bishilite seat crack or erosion. Increase the check frequency to detect an abnormal condition at an early stage.

### 3-4 Check Valves

- (1) Check valves structurally sacrifice complete sealing in a fully closed position.
- (2) Chattering (a phenomenon in which the disc strikes against the seat surface near a fully closed position) and fluttering (a phenomenon in which the disc is under an unstable condition and flutters in an intermediate open position) are not functionally abnormal phenomena. However, a long-term continuation of such phenomena will cause wear of the connecting parts and leakage in seats and may break them. Take measures against such phenomena at an early stage.
- (3) If the maximum line pressure is applied to the check valve outlet side, make sure that pressure is always below the pressure during a seat ring leak test at the plant.

### 3-5 Motor Operated Valves

- (1) The drive unit is provided with a manual hand-wheel. Switching lever will enter the manual mode and make hand-wheel operation available. Switching on the motor under that condition will automatically change manual to motor. (Refer to the drive unit instruction manual since some types do not perform automatic restoration in some rare cases.)
- (2) Some drive unit types may reduce an operating force at a high gear ratio during manual operation or adopt a large hand-wheel. Even if hand-wheel operation is not performed by an excessive force, breaks in valve or actuator may occur. Always disc lift must be watched during manual operation and once a good tactile response has been provided to ensure a fully closed or opened position, never tighten further. On an intermediate way, when operator notices abnormal operating torque, hand-wheel operation should be stopped and the source of the trouble should be checked.

### 3-6 High-Frequency Use Valves (DSS Operation Valves)

With regard to high-frequency valves or similar operational valves, it is recommended to investigate the wear progression state of stem nut and stem threads in half a year or one year after the start of the first operation (including a trial run) and determine the check cycle for each valve.

Understand that the valves which have one or more reciprocation cycles of opening and closing every day, such as DSS (Daily Startup and Shutdown) operation valves, are in harsh working conditions.

These valves of high operation frequency are generally motor operated valves, and the most important precaution in maintenance is in the wear of the stem nut threads.

In order to prevent the wear of the stem side thread, soft material (copper alloy) is used on the stem nut side. Since this stem nut of high-frequency use valves is likely to become worn, the wear-resistant material recommended by the actuator manufacturer is generally used for DSS operation valves.

However, the stem nut cannot be used permanently even if this material is adopted.

The wear of the thread will always progress with operation, but the wear speed cannot be unfortunately predicted.

That is because the following items influence the wear speed in a complicated way:

- Slide distance (valve stroke)
- Operation frequency
- Load during stem operation (packing resistance and inner pressure)
- Adhesion of dust and foreign matter
- Valve installation environment
- Adhesion of wear debris
- Lubrication degree