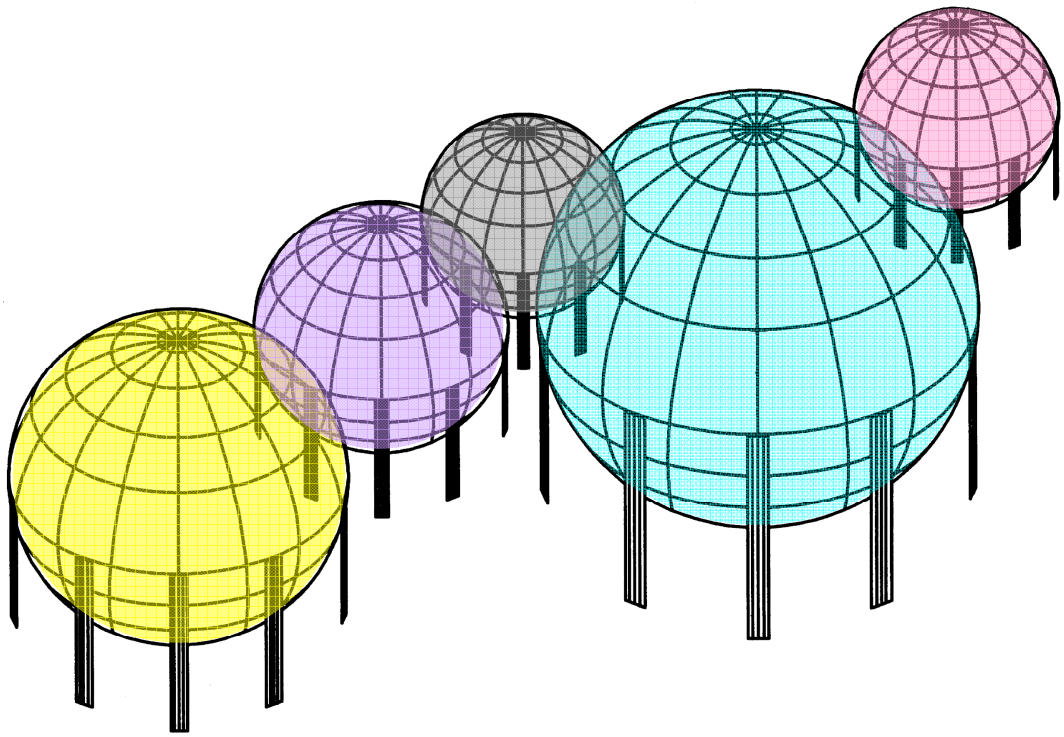
E199802-11

# FORGED STEEL VALVE USER GUIDE

## PRESSURE SEAL BONNET (PSB) TYPE



SHORITSU SEISAKUSHO CO., LTD.

Cover designed by Mr. Mitsuo Nakane

- Cover design is the sketch of the image of LPG (Liquefied Petroleum Gas) Plant.

# FOREWORD

Thank you really for purchasing our valves. Read this valve user guide thoroughly to use our valve properly. Keep this valve user guide in the place where handling person can use immediately.

**REQUEST**

- As for your inconvenience which occurred by the mentioned items of this valve user guide weren't observed, and please consent in advance because our company is hardly responsible.
- Please contact the following our Sales Department if there are unclear and noticeable points, though we made and expected with assurance about the contents of this valve user guide.
- For the details of specifications and parts of product, please refer to the assembly drawings with respective valve.

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This valve user guide covers gate, globe and check valves with Pressure Seal Bonnet (PSB) type.

# Safety and Safety Signs

When handling of valve is improper, the harm and the damage will be occurred. The degree of the harm and the damage is classified in the "Warning" and the "Caution" indications, and the contents of the indication throughout this valve user guide are as follow.


Indicates a potentially hazardous situation, which could result in death or serious injury if you do not follow instructions.


Indicates a potentially hazardous situation, which if not avoided, may result in minor injury or property damage.

Be sure to KEEP it because they are important contents about the safety.

# CONTENTS

# Section 1
# CHARACTERISTIC

- The pressure seal bonnet valves aim at preventing fluid leakage effectively by inducing the surface pressure of the fluid inside the body, outside the bonnet, and inside and outside the seal ring. Compared to the conventional gasket type, the higher the fluid pressure, the more effective the sealing function becomes.

- It is not necessary to consider the creep (Note 1) on bolts at high temperature and the high pressure.

- There is a fault which easy to occur external flaws and deformations on the contact surfaces (Note 2) of the seal ring and the bonnet.

- When pressure rating is above class 1500, the thickness of flange becomes very thick, and the weight of valve becomes heavy too much. To make up for this fault, pressure seal bonnet type valves are widely used. The structure of pressure seal bonnet valves has self-seal by using internal pressure.

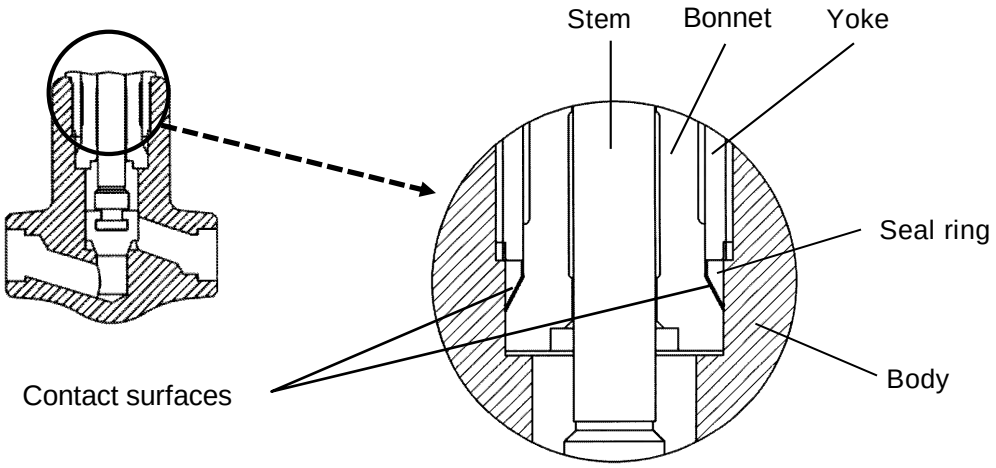


Figure 1.1 Detail of the Contact Surfaces between the Seal Ring and the Bonnet for Pressure Seal Bonnet Type (Globe Valve)

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(Note 1) The phenomenon that the deformation progresses with the elapse in the times during long-term use even under the minute force.

(Note 2) The enlargement of the contact surfaces of the seal ring and the bonnet is shown in Figure 1.1.

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# Section 2
# STRUCTURE AND FUNCTION

## 1. Gate Valve

- Structure

  The names of each part and the structure are as shown in the Figure 2.1.

- Function

  - Mainly, gate valve is used for the cutting-off the fluid.

  - To open and close the gate valve, the valve stem and disc shall be up and down by rotating the hand wheel. Clockwise rotation of the hand wheel shall close the gate valve. Counter-clockwise rotation of the hand wheel shall open the gate valve.

  - When gate valve is in fully open position, the pressure loss of gate valve is little in comparison with globe valve.

  - Do not use gate valve in half-opened position. If used, there will occur turbulent at the back of valve disc and resistance of flow becomes large and will occur vibration and corrosion of valve disc.

  - Especially, there is no direction against the fluid flow except for some valves.

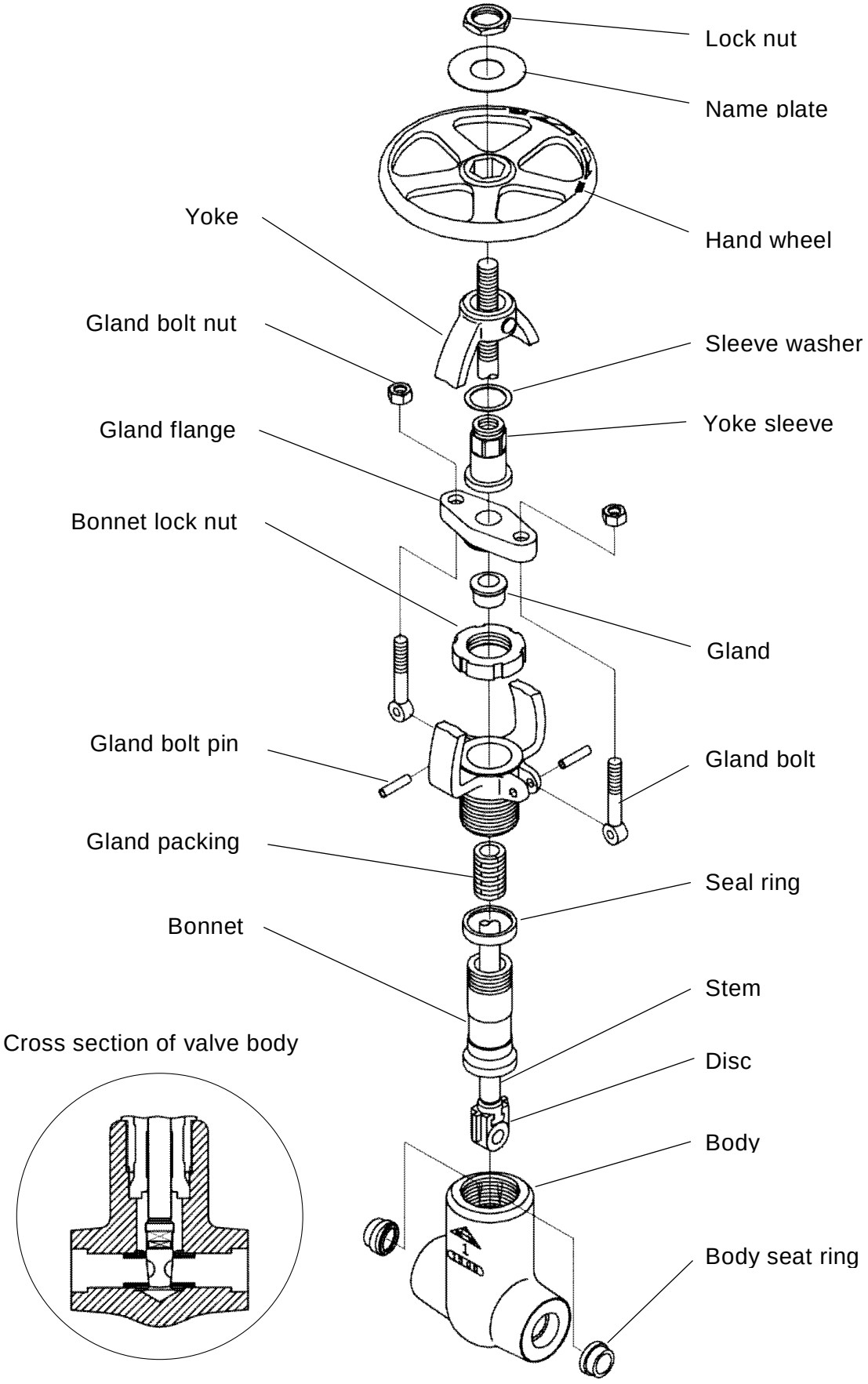


Figure 2.1 Typical Example for Class 1500 Gate Valve

## 2. Globe Valve

- Structure

  The names of each part and the structure are as shown in Figure 2.2.

- Function

  - To open and close the globe valve, the valve stem shall be up and down by rotating the hand wheel. Clockwise rotation of the hand wheel shall close the globe valve. Counter-clockwise rotation of the hand wheel shall open the globe valve.

  - The center line of inlet and outlet of valve is in the straight line and the flow of fluid is S letter-shaped. Globe valve has high shut-off efficiency due to the closure the valve disc against the flow of the fluid.

  - The quantity of flow and fluid pressure can be adjusted by using the globe valve under the condition of half-way open position.

  - The flow direction shall be one direction.

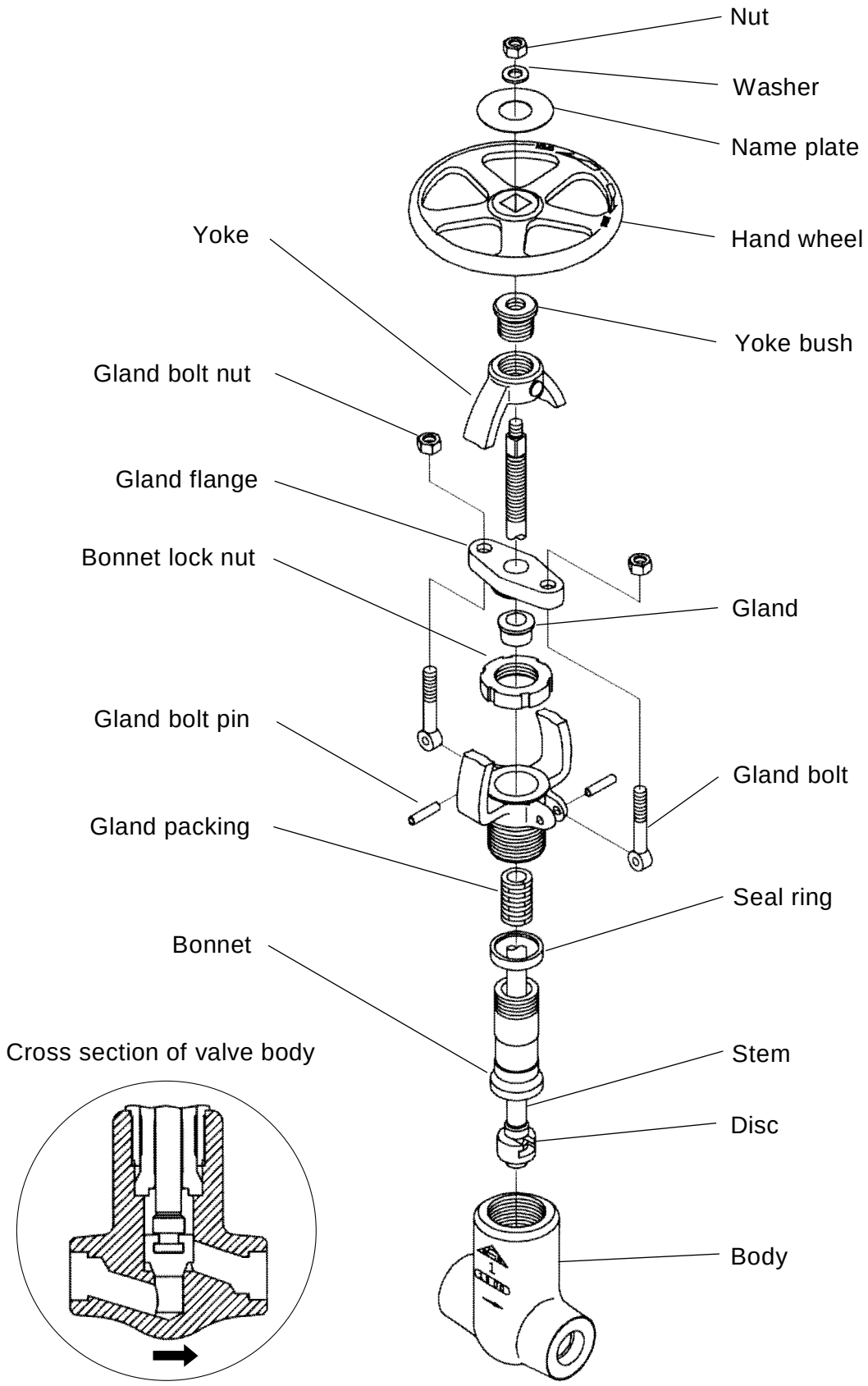


Figure 2.2 Typical Example for Class 1500 Globe Valve

3. Check Valve

- Structure

  The names of each part and the structure are as shown in Figure 2.3.

- Function

  - The opening of check valve is due to the pressure of flowing fluid against the weight of disc.
  - The closing of check valve is due to own weight of disc.
  - Check valves shall be installed in the horizontal pipeline where valve disc moves vertically by valve guide in valve body. Don't install it in the vertical pipeline.
  - Allow for only one direction of the fluid flow, and design for the purpose of preventing the reversed flow.
  - Be careful the check valve in low flow velocity because chattering (Note 1) is easy to cause.
  - Please consult before you order when the difference pressure between inlet and outlet of valve is little.

Note 1: Chattering means the phenomenon that a valve disc strikes a valve seat repeatedly when the valve is in slight-open position.

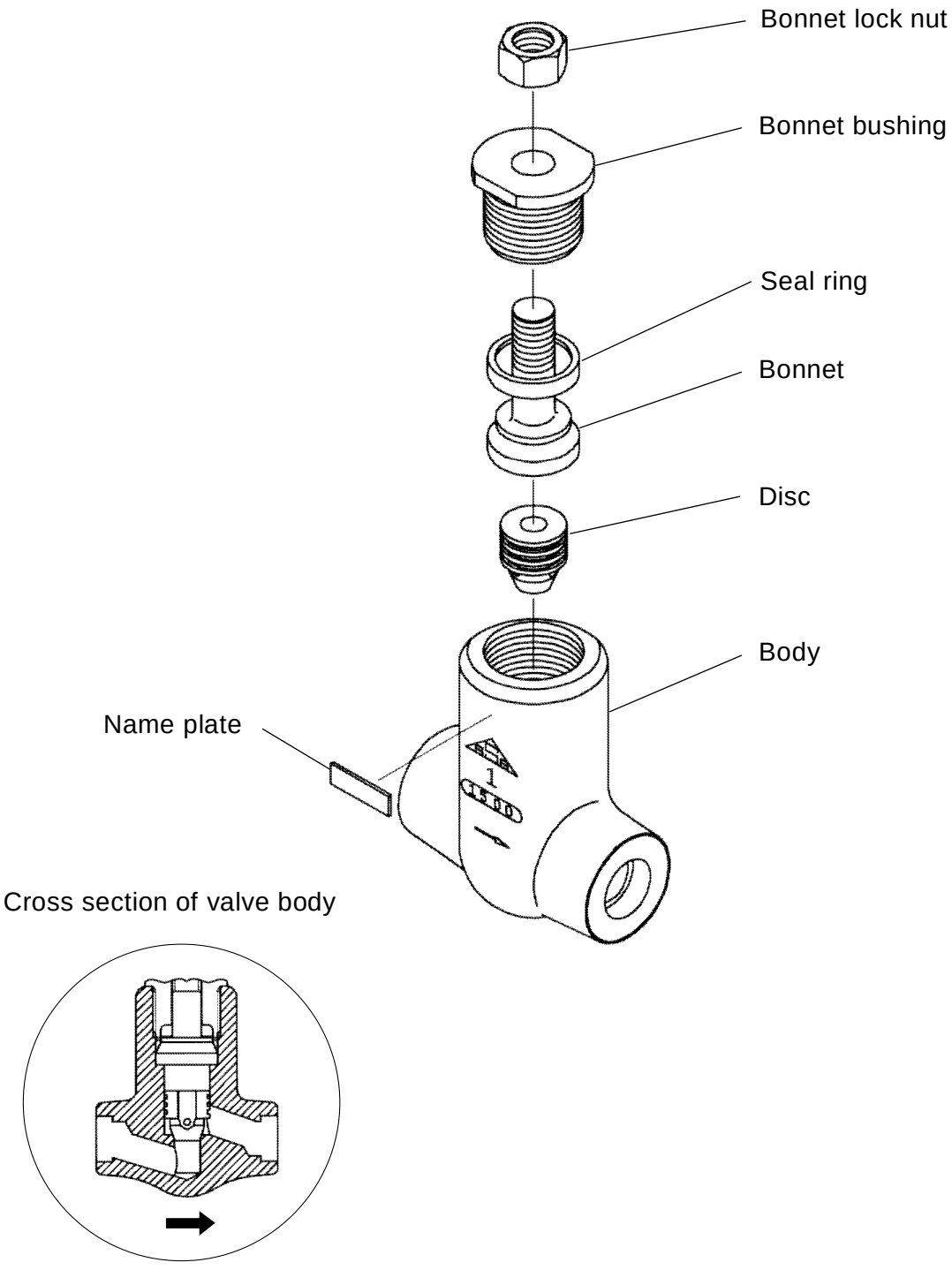


Figure 2.3 Typical Example for Class 1500 Check Valve

## Section 3
## INSTALLATION

■ Caution to installation of valve

| ⚠ CAUTION |
| --- |
| ● Hand wheel, gland and stem should not be used as lifting points, when hanging the valve.<br>● For safety, do not allow to enter any people under hanging load, when hanging the valve.<br>● Do not use the hand wheel of valve as a foothold. It may cause damage the valve.<br>● Perform the work after securing the surrounding safety. |

■ About the installation

- When install the welding end valve in the pipeline by welding, the valve shall be opened slightly.

- As the construction of the gate valve has nothing to do with the direction of flow, either of the inlet port or the outlet port can be joined to the pipe line regardless of the direction of flow. However, the globe valve is sensitive to the direction of flow because it is designed to flow of fluid from the downstream side of valve disc. If the outlet port and the inlet port are connected wrongly, these valves will not function properly. (Note 1)

- Install the check valve in accordance with the arrow mark of the flow direction on the body. (Note 2)

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(Note 1) If the globe valve is installed in wrong direction, the deterioration of gland packing has become quickly in normally closed position. In normally open position, the corrosion may occur at the connection of valve stem and valve disc. Please consult our company, if the globe valve will be installed the opposite direction of the arrow mark of flow direction. Globe valve shall be designed, produced and inspected in accordance with your requirements.

(Note 2) If it isn't installed as indicated flow direction, the function of back flow prevention can't be fulfilled. And, the fluid doesn't flow even through proper flow.

## Section 4
## SHIPPING, UNPACKING, AND STORAGE

- Caution to shipping

| **CAUTION** |
| --- |
| ● Be careful the handling of product packed in corrugated cardboard when it is wet in the water, the strength of corrugated cardboard is declined, and packing is broken, and the product will be damaged.<br>● Do not allow to enter any people under the load during transfer and shipment of valve with hoist and hook.<br>● Do not load under unstable condition.<br>● Handle the valve carefully during unloading. |

- Caution to unpacking

| **CAUTION** |
| --- |
| ● Confirm the weight of valve, and do not allow to enter any people under the load during raising the valve.<br>● Do not shock the valve due to the drop, the turnover, and so on. |

- About unpacking
  - Confirm the contents of the package of valve by the shipping instruction.
  - The kind of valve, the material of valve body and bonnet, trim material, nominal pressure and nominal diameter of valve shall be confirmed by name plate which attached on the hand-wheel of the valve.
  - Please refer to ”Section 9, NAME PLATE SPECIFICATION” for how to read the name plate.

- Caution to the storage of valves

**CAUTION**

- The polyethylene caps on the inlet and outlet end of valves shall not be removed until immediately prior to valve installation. It may cause damage to valve seats when the entering of the foreign materials within the metal touch of valve seats.
- The valves shall not be kept outdoors nor in humid and dusty places. They shall be kept indoors, well ventilated places.
- Coat rust preventives again to the inside and outside of the valve when keeping it in the period any further because coating effect declines when it passes through three months, though rust preventives is applied to the inside and outside of the valve.
- To avoid keeping it on the ground floors or the concrete floor directly, and to keep away from the moisture by placing them on adequate blocks or sleepers.

# Section 5
# HANDLING AND OPERATION

## 1. Handling

- Caution about the Valve Handling

> **CAUTION**
>
> - Do not use gate valve at half opened position. The gate valve can be damaged because the repetitive collisions or impact force of the fluid is given to valve body and valve stem, and, consequently, vibrations may be occurred.
> - Do not apply the excessive force and impact force in the opening and closing operation of the valve. The function of the valve is likely to be spoilt.
> - Handle the valve gradually so that water hammer may not occur and confirming that there is no vibration, noise and leakage in the valve.

- Handling of Valve

  - Valves can be opened and closed by turning the handwheel to the direction of “0” and “S” markings on it, respectively. After valves are fully opened or closed, they shall not be additionally opened or closed by using auxiliary levers such as the wrench. Additional opening or closing may cause damage to seat surfaces. The gate valve shall be used at the full open position or the full close position, and it shall not be used at half-opened position. In that case, valve disc becomes under unstable condition, and valve may cause damage due to the force of fluid flow.

  - When the valve can not close fully, open the valve first, and then close it. It is possible that owing to foreign matters such as scale, which has come into the seat surface, the valve does not close. In such cases, open the valve and blow the foreign matters off. If the valve can not still close satisfactorily, repeat the above operation several times.

  - When the valve is put into services, it is necessary to adjust the tightness to the gland packing by tightening the gland bolt nuts. For increasing the tightness, care must be given so that the tightening force should be added evenly. Too much tightening may cause the trouble to movement of the hand wheel. Tighten the gland packing adequately so as to stop the leak of the fluid.

  - Apply grease periodically to the valve stem thread. Although the stem is made of the rust resistant material, it is still necessary to protect the stem against rusting. Lubrication is required also for smooth operation of the valves.

2. Operation

- Caution about the Valve Operation

| **CAUTION** |
| --- |
| ● Do not loosen lock nut of handwheel, gland bolt nuts and bonnet bolt nuts while the valve is under pressure.<br>● Take the measures of prevention of freezing when freezing of valve is predicted. |

- Operation of Valve

  ● Tightens up the bonnet lock nut when rising the temperature on the site,

  ● When tightening up the bonnet lock nut during the operation, perform carefully to avoid the outbreak of sparks.

3. Daily inspection

- About the Daily inspection

  The daily inspections are important to find out the signs of abnormal conditions of the operating valve in advance and to take measure the stoppage of operation. The daily inspection items in the valve operating condition are as follows;

| Condition | Type of Valve | Portion to be checked | Inspection Method | Troubleshooting in abnormal |
|---|---|---|---|---|
| Leakage to the outside of valve | Common | Surface of valve | Visual Soap water | ● Replace the whole valve |
| | | Seal ring | Visual Soap water | ● Tightening up the bonnet lock nut |
| | Gate valve Globe valve | At the gland | Visual Soap water | ● Tightening up the gland bolt nuts<br>● Replace the relative parts |
| Abnormal noise | Common | The whole valve | Listening | ● Contact the responsible person and department, and troubleshooting |
| Defective appearance | Gate valve Globe valve | Hand wheel | Visual | ● Replace when the hand wheel is damaged |
| | Common | The whole valve | Visual | ● Apply rust preventive after removal of rust when rust occurs. |
| Improper motion | Common | Movable parts | Touch by fingers | ● Apply grease on the movable parts, however, oxygen service valve is coated only grease for oxygen service. |

## Section 6
## ROUTINE INSPECTION

- About Routine Inspection

  - Perform the routine inspection of the valve once in one year at least under the installed condition.

  - Confirm the condition of valve that it is under smooth operation and there is no hindrance of safety.

- Inspection when disassembling

  Perform valve leakage test, operation test, disassembling inspection, and so on if necessary when the equipment that a valve was installed is opened for the inspection of public safety. Perform disassembling inspection and necessary troubleshooting when there are leakage inside of the valve, inferior operation, imperfect function, and so on.

- Caution to disassembling the valve

**⚠ WARNING**

- Disassemble the valve carefully and slowly, after confirming that the pressure in pipe line falls down completely and there is no remaining pressure inside of the valve and pipe line.
- Be sure to wear safety belt on your waist when dismantling work. Tie up the safety belt without fail when dismantling work in elevation.
- Be careful the safety of work and take the measures that no permit to enter under working.

**⚠ CAUTION**

- Perform the work by person who learned sufficient skill and technical knowledge.
- Perform the work with protection guards (protection glasses, gloves for the work, safety shoes).
- Use suitable tools properly.

■ Disassembling

Refer to 「Section 7, DISASSEMBLING AND ASSEMBLING」 for disassembling the valve.

■ Inspection Items when disassembling

The methods of the inspection and troubleshooting for the valve defects are as follows.

| Name of Part | Kind of Valve | Portion to be Inspected | Inspection Method | Criterion | Trouble-shooting |
|---|---|---|---|---|---|
| Valve body | Common | Seat surface | Visual Inspection | No corrosion, No crack | Replace |
| | | | | No damage | Lapping the seat surface |
| | | | PT inspection | No crack, No pinhole | Replace |
| | | Inside surface | Visual Inspection | No foreign materials | Cleaning and air-blow the inside surface |
| Valve bonnet | Gate valve and globe valve | Stuffing box | Visual Inspection | No corrosion No damage | Replace |
| Valve disc | Common | Surface | Visual Inspection | No damage | Machining after stellite welded and change |
| | | Contact surface | Visual Inspection | Good lapping | Machining after stellite welded and change |
| | Gate valve and globe valve | Valve disc and stem and relative part | Visual Inspection | No corrosion, No wear | Replace |
| | Check valve | Operability | Touch by fingers | Smooth operability | Cleaning |

| Name of Part | Kind of Valve | Portion to be Inspected | Inspection Method | Criterion | Trouble-shooting |
|---|---|---|---|---|---|
| Valve Stem | Gate valve | Valve stem, disc and relative parts | Visual Inspection | No corrosion, No wear | Replace |
| | | Screw parts | Visual Inspection | No rupture No damage No wear | Replace |
| | | Outside surface | Visual Inspection | No corrosion, No wear No bending | Replace |
| | | Shape | Visual Inspection | No bending No damage in threads | Replace |
| Yoke sleeve and yoke bush | Gate valve and globe valve | Valve stem and moving face | Touch by fingers | Smooth operation | Apply grease |
| | | Screw parts | Visual Inspection | No wear | Replace |
| | | Flange parts | Visual Inspection | No crack, No bending | Replace |
| Gland packing | Gate valve and globe valve | The whole | Visual Inspection | — | Replace |
| Seal ring | Common | The whole | Visual Inspection | — | Replace |
| Gland and gland flange | Gate valve and globe valve | The face of gland | Visual Inspection | No damage, No crack, No bending | Replace |

■ Assembling

Refer to ”Section 7, DISASSEMBLING AND ASSEMBLING” for assembling the valve.

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# Section 7
# DISASSEMBLING AND ASSEMBLING

## 1. Gate Valves

### ■ Disassembling Procedure

Since all valves have been correctly assembled and tested, an easy-going disassembling of valves should be avoided.

- Caution to disassembling valve

**⚠ WARNING**

- Disassemble the valve carefully and gradually, after confirming that the pressure in pipe line falls down completely and there is no remaining pressure inside of the valve and pipe line.

**⚠ CAUTION**

- Perform the work by person who learned sufficient skill and technical knowledge.
- Perform the work with protection guards (protection glasses, gloves for the work, safety shoes).
- Use suitable tools properly.

### ■ Before Disassembling

- Keep necessary lighting in the disassembling workshop.
- Perform disassembling in the workshop where there is no vibration, no dust and nomoisture.
- To match for the direction of disc, make the match mark on the body joint by marking pen as shown in Figure. 7.1 before loosening the bonnet lock nut.

- Disassembling

1) Turn the handwheel of the fully closed valve to the left to obtain an intermediate valve opening. Since the body seat rings and disc of the closed gate valve are in close contact, it is difficult to disassemble the valve as it is. Therefore, it is necessary to open such valve to an intermediate position so it makes disassembling easier.
2) Loosen the bonnet lock nut by turning it to counter-clockwise under the condition as it is.
3) Loosen the yoke by turning it to counter-clockwise and remove the assembly of the valve disc, stem and bonnet from the body. If there is remaining pressure inside the valve, there is leakage together with the escaping sound at this moment. Leave the disassembling valve until the escaping sound disappears and confirm that remaining pressure disappears and keep the safety of work.
4) Make the match mark on the disc by marking pen as shown in Figure. 7.2 before remove the disc from the stem. When re-assembling the valve, match marks between the body and the disc shall be coincided. As it is, valve seat contact surfaces are coincided as before condition and valve leakage can be prevented.
5) When remove the disc from the stem, caution shall be so taken as not to cause damages to its seating faces.
6) Loosen the bonnet lock nut by turning it to counter-clockwise, and remove the yoke from the body. When the seal ring only to be replaced, put a new seal ring in place of old one, at this stage.

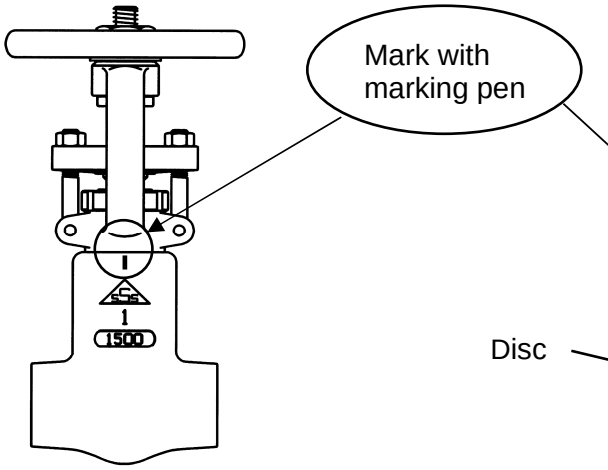


Figure 7.1 Example for Marking Method of Match Mark

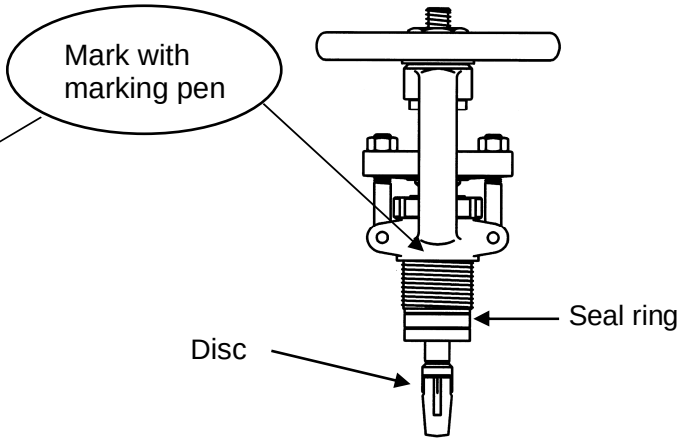


Figure 7.2 Example for Marking Method of Match Mark

7) Loose both sides of gland bolt nuts and hold the stem at the T-head end and pull out the stem downward by turning handwheel to the clockwise.
8) Remove the gland bolt nuts by turning them to the counter-clockwise and then loosen and pull up the gland flange and gland.

9) Hold the yoke by a holder (vice and etc.), and fix the handwheel by the handwheel key, and remove the lock nut by turning it to the counter-clockwise.
10) Remove the handwheel by pulling it upward while being tapped lightly. At the same time, the yoke sleeve, the sleeve washer can be removed. In normal, two sleeve washers are used. Caution shall be so taken as not to loose each part.
11) Remove the gland packing from the stuffing box, and a new packing rings set can be changed.

- Assembling Procedure

  - Caution to assembling

| **CAUTION** |
| --- |
| • Perform the work by person who learned sufficient skill and technical knowledge.<br>• Perform the work with protection guards (protection glasses, gloves for the work, safety shoes).<br>• Use suitable tools properly.<br>• Replace the new gasket and gland packings because they are damaged while disassembling. |

- Before assembling

  - Every part shall be assembled after have been cleaned and checked free from defects or damages. If there is defects or damages in assembled parts, do not use again and replace with new one.
  - Keep necessary lighting in the assembling workshop.
  - Perform assembling in the workshop where there is no vibration, no dust and no moisture.

■ Assembling

1) The assembling procedure shall be in the reverse order of the disassembling order.
2) Coincide the match marks indicated on the body and the disc in the same direction. If the directions of the body and the disc before disassembling and after assembling become opposite, valve leakage will be occur due to non-coincidence of seat contact surfaces.
3) The threads on the valve stem should be coated with grease (Note) in order to prevent it from the seizure and galling.
4) When insert the gland packings in the stuffing box, it can be done by inserting each packing ring successively by tightening up the gland each time. Make sure that there is no overlap of cut of gland packings, which must be staggered. Apply proper insert force on the gland when inserting.
5) When tightening up the gland bolt nuts, the handwheel should be turn now and then so to adjust the tightness of the gland packing , as shown in Figure 7.3. Tightening up the gland bolt nuts gradually and uniformly in order to avoid tendency to twist.

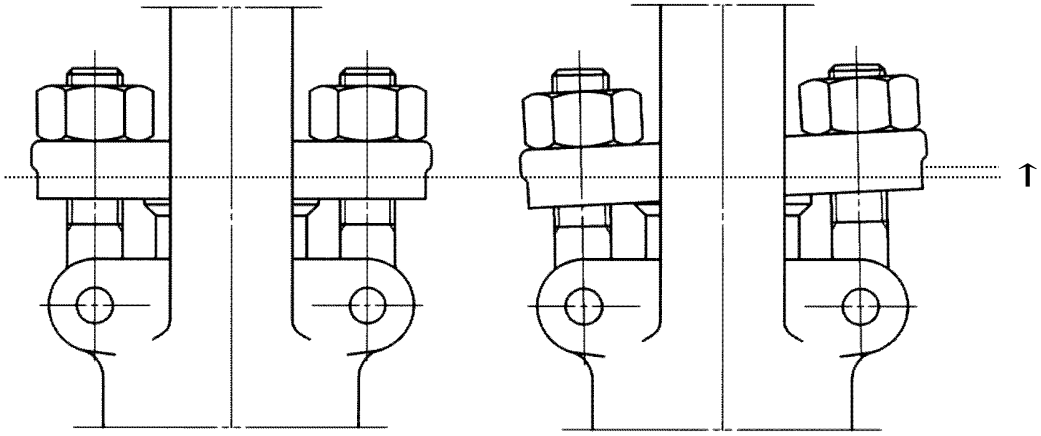


Figure 7.3 Examples for Adjustment (Tightening) of Gland Bolt Nuts

6) Tightening torque for gland bolt nut is as shown in the table 7.1.

Table 7.1 Tightening torque range (reference data) for gland bolt nut

| Class | Shoritsu's Valve Type No. | Unit | Nominal Size (Inch) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1/2 〃 | 3/4 〃 | 1 〃 | 1-1/2 〃 | 2 〃 |
| Class 1500 | 051 | kg f-cm | 230~250 | 230~250 | 230~250 | 430~450 | 560~580 |
| | | N-m | 23~ 25 | 23~ 25 | 23~ 25 | 43~ 45 | 56~ 58 |
| Class 1500 | 052 | kg f-cm | 230~250 | 230~250 | 230~250 | 430~450 | 660~680 |
| | | N-m | 23~ 25 | 23~ 25 | 23~ 25 | 43~ 45 | 66~ 68 |
| Class 2500 | K5 | kg f-cm | 260~280 | 260~280 | 260~280 | 520~540 | 800~820 |
| | | N-m | 26~ 28 | 26~ 28 | 26~ 28 | 52~ 54 | 80~ 82 |

2. Globe Valves

- Disassembling Procedure
  Since all valves have been correctly assembled and tested, an easy-going disassembling of valves should be avoided.

  - Caution to disassembling valve

**⚠ WARNING**

- Disassemble the valve carefully and gradually, after confirming that the pressure in pipeline falls down completely and there is no remaining pressure inside of the valve and pipe line.

**⚠ CAUTION**

- Perform the work by person who learned sufficient skill and technical knowledge.
- Perform the work with protection guards (protection glasses, gloves for the work, safety shoes).
- Use suitable tools properly.

- Before Disassembling

  - Keep necessary lighting in the disassembling workshop.
  - Perform disassembling in the workshop where there is no vibration, no dust and no moisture.

- Disassembling

1) Turn the hand wheel of the fully closed valve to the left to obtain an intermediate valve opening.
2) Loosen the bonnet lock nut by turning it to counter-clockwise under the condition as it is.
3) Loosen the yoke by turning it to counter-clockwise and remove the assembly of the valve disc, stem and bonnet from the body. If there is remaining pressure inside the valve, there is leakage together with the escaping sound at this moment. Leave the disassembling valve until the escaping sound disappears and confirm that remaining pressure disappears and keep the safety of work.
4) Remove the disc from the stem. Caution shall be so taken as not to cause damages to its seating faces.
5) Loosen the bonnet lock nut by turning it to counter-clockwise, and remove the yoke from the body. When the seal ring only to be replaced, put a new seal ring in place of old one, at this stage.
6) Loosen both sides of gland bolt nuts, remove the gland bolt nut, and remove the gland and gland flange.
7) Hold the yoke by a holder (vice and etc.), and fix the hand wheel by the hand wheel key, and remove the lock nut by turning it to the counter-clockwise.
8) Remove the hand wheel by pulling it upward while being tapped lightly. At the same time, the yoke sleeve can be removed. Caution shall be so taken as not to loose each part.
9) Remove the gland packing from the stuffing box, and a new packing rings set can be used.

■ Assembling Procedure

- Caution to assembling

**CAUTION**

- Perform the work by person who learned sufficient skill and technical knowledge.
- Perform the work with protection guards (protection glasses, gloves for the work, safety shoes).
- Use suitable tools properly.
- Replace the new gasket and gland packings because they are damaged while disassembling.

■ Before assembling

- Every part shall be assembled after have been cleaned and checked free from defects or damages. If there are defects or damages in assembled parts, do not use again and replace with new one.
- Keep necessary lighting in the assembling workshop.
- Perform assembling in the workshop where there is no vibration, no dust and no moisture.

■ Assembling

1) The assembling procedure shall be in the reverse order of the disassembling order.
2) The threads on the valve stem should be coated with grease (Note) in order to prevent it from the seizure and galling.
3) When insert the gland packings in the stuffing box, it can be done by inserting each packing ring successively by tightening up the gland each time. Make sure that there is no overlap of cut of gland packings, which must be staggered. Apply proper insert force on the gland when inserting.
4) When tightening up the gland bolt nuts, the hand wheel should be turn now and then so to adjust the tightness of the gland packing, as shown in Figure 7.3. Tightening up the gland bolt nuts gradually and uniformly in order to avoid tendency to twist.
5) Tightening torque for gland bolt nut is as shown in the table 7.1.

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Note: Unless otherwise specified,threads on the valve stem shall be coated with Molykote G-n Paste(anti-friction coating),
manufactured by Dow Corning Toray Co.,Ltd.

3. Check Valves

- Disassembling Procedure

  Since all valves have been correctly assembled and tested, an easy-going disassembling of valves should be avoided.

  - Caution to disassembling

**⚠ WARNING**

- Disassemble the valve carefully and gradually, after confirming that the pressure in pipeline falls down completely and there is no remaining pressure inside of the valve and pipeline.

**⚠ CAUTION**

- Perform the work by person who learned sufficient skill and technical knowledge.
- Perform the work with protection guards (protection glasses, gloves for the work, safety shoes).
- Use suitable tools properly.

- Before disassembling

  - Keep necessary lighting in the disassembling workshop.
  - Perform disassembling in the workshop where there is no vibration, no dust and no moisture.

- Disassembling

1) Loosen the bonnet lock nut fully by turning it to counter-clockwise.
2) Loosen the bonnet bushing gradually by turning it to counter-clockwise and remove from the body under the condition as it is. If there is remaining pressure inside the valve, there is leakage together with the escaping sound at this moment. Leave the disassembling valve until the escaping sound disappears and confirm that remaining pressure disappears and keep the safety of work.
3) Loosen the bonnet lock nut by turning it to counter-clockwise.
4) Loosen the bonnet bushing by turning it to counter-clockwise and remove from the bonnet. When the seal ring only to be replaced, put a new seal ring in place of old one, at this stage.
5) Remove the disc from the body.

- Assembling Procedure

  - Caution to assembling

| **CAUTION** |
| --- |
| • Perform the work by person who learned sufficient skill and technical knowledge.<br>• Perform the work with protection guards (protection glasses, gloves for the work, safety shoes).<br>• Use suitable tools properly.<br>• Replace the new gasket because they are damaged while disassembling. |

- Before assembling

  - Every part shall be assembled after have been cleaned and checked free from defects or damage. If there are defects or damages in assembled parts, do not use again and replace with new one.
  - Keep necessary lighting in the assembling workshop.
  - Perform assembling in the workshop where there is no vibration, no dust and no moisture.

- Assembling

  1) The assembling procedure shall be in the reverse order of the disassembling order.

## Section 8
## TROUBLESHOOTING GUIDE

- Caution to disassembling valve

**CAUTION**

- Perform the work by person who learned sufficient skill and technical knowledge.
- Perform the work with protection guards (protection glasses, gloves for the work safety shoes).
- Use suitable tools properly.
- The practice of repacking under pressure is not recommended because the backseat of the valve which being used several years can not prevent the valve leakage.

| Trouble | Cause | Troubleshooting |
|---|---|---|
| Leakage from the gland | 1) Sealing efficiency of gland packing becomes inferior.<br>2) Lack of the tightening pressure on the gland. | 1) Open the valve fully so that the leakage will stop because of back seat.<br>2) Then, loosen gland bolt nuts, leave the valve as it is for five to ten minutes until the leakages disappear.<br>3) Retighten the gland bolt nuts in for additional compression of the gland packing.<br>4) If necessary, renew the gland packing. If necessary, add the gland packing. |

| Trouble | Cause | Troubleshooting |
|---|---|---|
| Fluid leakage from the seal ring | 1) Lack of the tightening pressure on the bonnet. | 1) The bonnet lock nut shall be re-tightened with care so as not to damage the screw portion of bonnet.<br>2) In case of leakage even after re-tightening of the bonnet lock nut, the seal ring must be renewed. In this case, stop the fluid flow once. |
| Seat leakage | 1) Foreign materials & scale accumulate and stick to the valve disc. | 1) Disassemble the valve and lap the valve, after the pressure in the pipe line falls down completely and confirm that there is no remaining pressure inside the pipe and valve.<br>2) Washing and cleaning the valve after valve lapping. |
| Operation is heavy | 1) Foreign material accumulates in the valve stem screw and at the bottom of valve body inside. | 1) Open the valve, and remove the accumulated foreign materials by the flow of fluid.<br>2) Disassemble and clean the valve when operation is still heavy. Refer to "Section 7, DISASSEMBLING AND ASSEMBLING" for the procedure of disassembling. |

## Section 9
## NAME PLATE SPECIFICATION

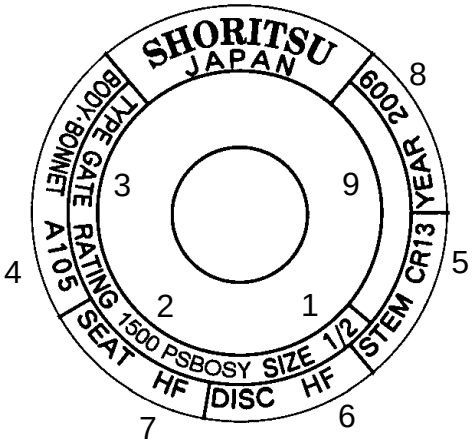
The name plate indicates manufacturer's name, country of origin, the kind and type of the valve, nominal size, applicable pressure rating at 100° F(38℃), body material and trim material. The position and method of attachment for name plate shall be as follows.

■ The position and method of attachment for name plate

| Kind of valve | Attached Position | Method for Attachment |
|---|---|---|
| Gate valve<br>Globe valve | Upper side of hand wheel | By fitting of hand wheel nut |
| Check valve | Front side of valve body | Spot welding, however, for low alloy steel valves, fix by machine screw. |

● Example of name plate for exported valve


Old name plate (manufactured until April, 2009)

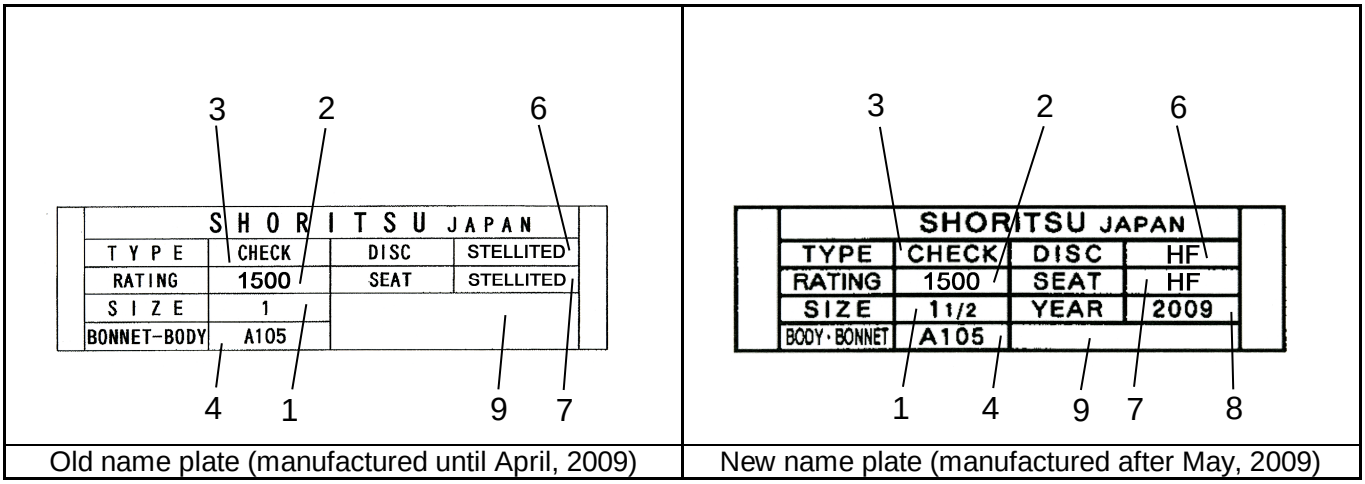



New name plate (manufactured after May, 2009)

Legend 1~9 of above figure represent as per following table.

| No. | Marking item | Meaning of marking | Example for Marking (old name plate) | Change existence | Example of Marking (new name plate) |
|---|---|---|---|---|---|
| — | Material | Material of name plate | Aluminum | Not changed | Aluminum |
| — | Thickness | Thickness of name plate | 0.5 ㎜ | Not changed | 0.5 ㎜ |
| — | Color of material | Color of material for name plate | Gray | → | White |
| — | Letter | Color of letter | Red | Not changed | Red |
| 1 | SIZE | Nominal size of valve (Inch) | 1 | Not changed | 1/2 |
| 2 | RATING | Rating | 1500 | Not changed | 1500 |
| 3 | TYPE | Marking for type in capital letter | GATE | Not changed | GATE |
| 4 | BODY BONNET | Body and bonnet material | A105 | Not changed | A105 |
| 5 | STEM | Stem material | CR13 | Not changed | CR13 |
| 6 | DISC | Disc seat material<br>■ Stellite on body seat<br>■ No stellite | STELLITED | → | HF |
| 7 | SEAT | Seat material<br>■ Stellite on body seat<br>■ No stellite | STELLITED | → | HF |
| 8 | YEAR | Year of manufacture (Christian era) | — | Standard specification | 2009 |
| 9 | VALVE NUMBER | Valve number | Not specified | Customer specification | Not specified |

● Example of name plate for exported check valve




Old name plate (manufactured until April, 2009) | New name plate (manufactured after May, 2009)

Legend 1~9 of above figure represent as per following table.

| No. | Marking item | Meaning of marking | Example for Marking (old name plate) | Change existence | Example of Marking (new name plate) |
|---|---|---|---|---|---|
| — | Material | Material of name plate | Stainless steel | Not changed | Stainless steel |
| — | Thickness | Thickness of name plate | 0.5 ㎜ | Not changed | 0.5 ㎜ |
| — | Color of material | Color of material for name plate | Ground (burnishing) | → | Ground (burnishing) |
| — | Letter | Color of letter | Red | Not changed | Red |
| 1 | SIZE | Nominal size of valve (Inch) | 1 | Not changed | 1 1/2 |
| 2 | RATING | Rating | 1500 | Not changed | 1500 |
| 3 | TYPE | Marking for type in capital letter | CHECK | Not changed | CHECK |
| 4 | BODY BONNET | Body and bonnet material | A105 | Not changed | A105 |
| 6 | DISC | Disc seat material<br>■ Stellite on body seat<br>■ No stellite | STELLITED | → | HF |
| 7 | SEAT | Seat material<br>■ Stellite on body seat<br>■ No stellite | STELLITED<br>— | → | HF<br>— |
| 8 | YEAR | Year of manufacture (Christian era) | — | Standard specification | 2009 |
| 9 | VALVE NIMBER | Valve number | Not specified | Customer specification | Not specified |

# Section 10
# GUARANTEE

- All valves have been correctly assembled and tested. Please contact to our company if and there are unclear points, troubles, repairs and your request.

- Guarantee period of the valve shall be in accordance with purchase order and an agreement between the purchaser and the manufacturer.

- Consult to our company if there are specification changes in accordance with customer's specification, new design, new product, and so on except for our product specification.

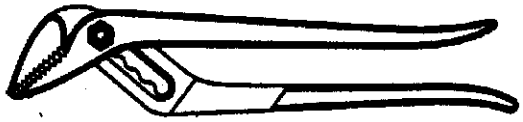
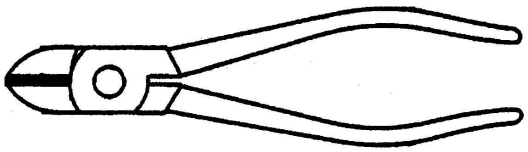
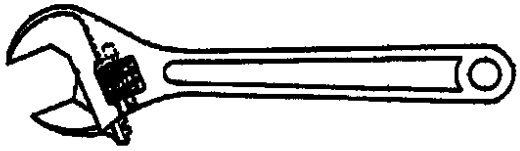
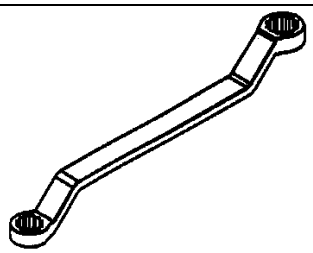
- Please inform the following information when the valve is required to repair and in trouble.

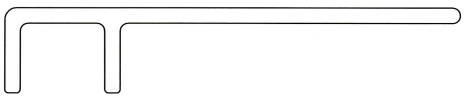
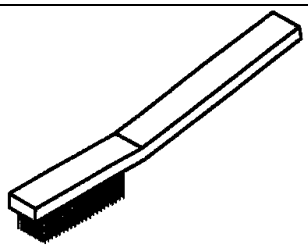
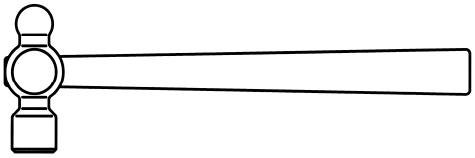
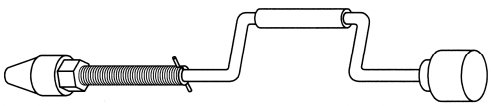
  1. Company name, address, telephone number, post and person in charge
  2. The address of the establishment place, telephone number, post and person in charge
  3. Product name (product type, kind of valve, nominal diameter and so on)
  4. Purchased date and established date
  5. The conditions of trouble and repair (as concretely as possible)
  6. The conditions of applications, the environment (kind of the fluid, pressure, temperature and frequency of application)
  7. The deadline or expected date for valves repair

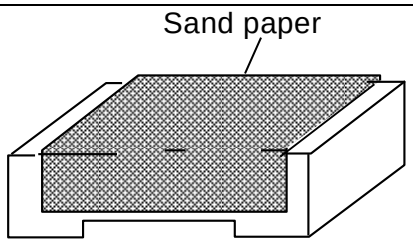
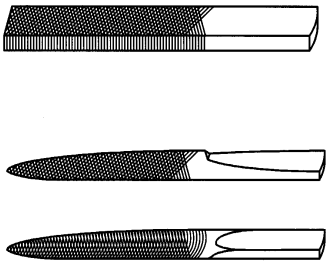
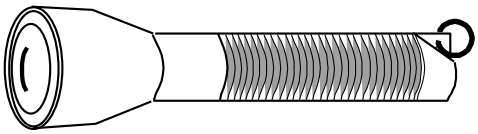
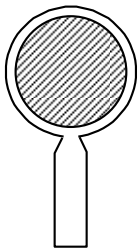
## Section 11
## NECESSARY TOOLS

Necessary tools to be used when disassembling, assembling and repairing are as shown in the Table.

Table. Necessary tools when disassembling, assembling and repair

| Tool Name | Typical Tool | Use |
|---|---|---|
| Water pump Pliers |  | Use for tightening and loosening the bolt. |
| Nipper |  | Use for cutting the gasket when it is expanded. |
| Pincers |  | Use for dismantling the gasket from the valve bonnet. |
| Adjustable Spanner |  | Use for tightening and loosening of hand wheel nut. |
| Offset Wrench |  | Use for tightening and loosening of bolts and nuts. |

| Tool Name | Typical Tool | Use |
|---|---|---|
| Hand wheel Key |  | Use for turning the hand wheel for additional force. |
| Extractors for gland packing |  | Use for extracting of gland packing. |
| Wire Brush |  | Use for removal of dust, rust, foreign materials and so on. |
| Pin Set |  | Use it as an auxiliary tools when cleaning the corner of valve body and the neighborhood of the hole for the valve disc. |
| Hammer |  | Use for installation and dismantling of the hand wheel. |
| Tool for valve lapping |  | the tool is used for valve seat lapping by rotating it which the water-proof abrasive paper puts on its surface end with double-stick tape. |

| Tool Name | Typical Tool | Use |
|---|---|---|
| Abrasive plate for Gate valve |  | Use for removal of flaw on the surface of valve disc by setting the abrasive paper on the abrasive plate. |
| Files |  | Use for removal of burrs. |
| Portable flashlight |  | Use it for the confirmation of the existence of the seat damage and, the scale in the corner. |
| Handy Mirror |  | Use it when the point can't be confirmed directly with the naked eyes, opposite and back sides of the view, and so on. |

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PRESSURE SEAL BONNET (PSB) TYPE

| | | |
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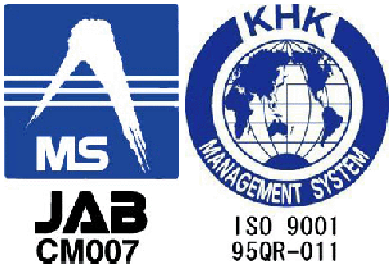


KHK ISO CENTER, QUALITY SYSTEM CERTIFICATE (ISO 9001)

PRODUCT/SERVICE RANGE : DESIGN AND MANUFACTURE OF FORGED STEEL VALVE

- Please contact the following our Sales Department if there are unclear and noticeable points.
- Keep this valve user guide in the place where handling person can use immediately.

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