Thank you for choosing KITZ products.

For safe and trouble-free function and performance of the product, make sure to read and understand all items in this manual before handling the product.

Keep this manual accessible to all valve operating personnel.
This manual applies to the manual operation of the KITZ cast steel through conduit gate valves. For automatic valve operation, refer to the operation manual prepared by the manufacturer of the relevant valve actuator.

SAFETY PRECAUTIONS

For the safe use of the product, read all of the safety precautions listed in this manual before handling the product.

The safety precautions in this manual are determined to ensure safe and proper use of the product and to prevent personal injury and property damage. This manual uses two terms, "Warning" and "Caution," according to the hazard level, to clearly indicate the extent and severity of the risk.

- "Warning" indicates an imminently hazardous situation that, if not avoided, may result in serious injury or death.
- "Caution" indicates a potentially hazardous situation that, if not avoided, may result in minor to moderate injuries or product damage.
- Indicates a "prohibited" action that must not be carried out.
- Indicates a "mandatory" action that must be carried out.

NOTES TO USERS

"This manual is designed to show an appropriate usage of the products for transportation, storage, installation, operation and maintenance. Be sure to read through this manual before handling the products."

"This manual does not cover the whole scope of conceivable usage of the products for transportation, storage, installation, operation and maintenance. If technical assistance beyond the scope of this manual is required, contact KITZ Corporation or its distributor."

"The specifications have been determined with safety considerations. Do not use products beyond the specifications."

"The illustrations given in this manual do not show all the details. If more detailed information is required, refer to the relevant approved drawings."

*Any information provided in this operation manual is subject to change without prior notice.*
I. Construction and Design Feature

II. Valve Operating Device

III. Transportation and Storage

IV. Valve Installation

V. Valve Operation

VI. Periodic Inspection

VII. Disassembly and Reassembly
I. Construction and Design Feature

1. Slab Gate Valve
   1.1 The disc has a circular opening whose diameter is equal to the flow passageway of the valve. Thus when the valve is in the fully open position, a fluid-carrying conduit, aligning with the flow passageway, is formed in the valve body.

   1.2 Left-handed rotation (in a counterclockwise direction) opens the valve and right-handed rotation (in a clockwise direction) closes the valve. The open/close position can be checked by the indicator on the upper side of the valve.

   1.3 The disc has a flexible structure that seals the fluid by applying the seating surface pressure, which is generated by the back pressure of the fluid, to the seating surface. (See the illustration below.) A clearance is provided in the back-pressure area of the disc to decrease thermal distortion of the body and disc.

   1.4 The guide plates, which are pressed to the disc by spring force (two springs for each guide plate), are provided to the both sides of the disc to prevent the intrusion of foreign materials and protect the seating surfaces of the disc. As the lower side of the disc is kept by the guide plate, the disc does not come off when it is in the fully open position. The disc is unlikely to be damaged during the open or close operation because of this spring device.

   1.5 The valve can be open or closed by the up and down movement of the stem threaded portion above the bonnet.

   1.6 Sufficient space shall be provided above the hand wheel because the stem moves upward and downward above the hand wheel during operations.

   1.7 Use in the fully open position or fully closed position is available. Use in the slightly open position or in the intermediate position may cause erosion of the disc or valve seat.

   1.8 Bidirectional flow is possible.
I. Construction and Design Feature

2. Expanding Gate Valve

2.1 The disc has a circular opening whose diameter is equal to the flow passageway of the valve. Thus when the valve is in the fully open position, a fluid-carrying conduit, aligning with the flow passageway, is formed in the valve body.

2.2 Left-handed rotation (in a counterclockwise direction) opens the valve and right-handed rotation (in a clockwise direction) closes the valve. The open/close position can be checked by the indicator on the upper side of the valve.

2.3 When the valve is in the fully open position, the back seat of the stem contacts with the back seat of the bonnet. When the valve is in the fully closed position, the disc contacts with the bottom cover and the stem presses the disc so that the disc, which has a wedging effect, is pressed against the seat ring for closure.

2.4 Sufficient space shall be provided above the hand wheel for the up and down movement of the stem and hand wheel.

2.5 The disc is a two-piece split type and each disc is connected by spring or centralizer. When the valve is in the fully open or closed position, the seating surface of the disc is pressed to the seating surface of the body by the wedge effect.

2.6 The outside screw and yoke type has a resistance against wear and corrosion better than that of the inside screw type because the stem threads do not directly contact with the service fluid.

2.7 Use in the fully open, fully closed or intermediate position is available for flow control.

2.8 Only unidirectional flow is possible.

This illustration shows a typical construction.
II. Valve Operation Device

1. Handwheel Type
   1.1 A handwheel is directly mounted to the valve stem.
   1.2 The valve is opened or closed by turning the handwheel counterclockwise or clockwise respectively, according to the arrow and letter on the handwheel.

2. Gear Operator Type
   2.1 A gear operator (reduction gear) is mounted to the valve stem.
   2.2 The valve is opened or closed by turning the handwheel counterclockwise or clockwise respectively, according to the arrow and letter indicated on the handwheel.
   2.3 A gear operator is a device to transmit a greater torque to the valve stem by converting the torque from the drive shaft by means of a reduction gear unit.
   2.4 A hammer blow mechanism (clearance/backlash is used to increase operation force by impact) is provided to the gear operator.
III. Transportation and Storage

1. Transportation

1.1 Precautions for transportation
- Keep off the valve lifting area to prevent personal injury.
- Take care not to damage painted valve surfaces during transportation. All damaged surfaces shall be properly repaired to prevent corrosion.

1.2 Transportation

1.2.1 Keep valves in the original packaging during transportation and until just before installation. Provide appropriate protective covers if they are found missing during transportation.

1.2.2 Handle valves carefully. Any extraordinary impact on the valve by throwing, dropping or dragging shall be avoided.
III. Transportation and Storage

2. Storage

2.1 Precautions for storage

- DO NOT store valves in a corrosive environment. Otherwise, it may cause corrosion on the threaded portions.
- DO NOT remove flange protective covers until just before the installation. The protective covers prevent foreign materials from intruding into the valve interior.
- DO NOT give any excessive load to the valve. Overloading may cause product damage.
- DO NOT pile up valves for storage. Unstable piling may damage the valve or cause personal injury.

2.2 Storage

2.2.1 Store valves in a dust-free, low humidity and well-ventilated indoor place.
2.2.2 Place packaged valves on pallets or racks for storage. Storing valves directly on the ground or concrete floor shall be avoided.
2.2.3 Take appropriate measures to protect valves from direct exposure to dust, rain or sunlight if valves are stored outdoors.
IV. Valve Installation
IV. Valve Installation

1. Flanged End

1.1 Precautions for installation

- Check the valve specifications with the name plate or the catalog before installation. Use of the valve beyond the specifications will lead to a failure such as internal or external leakage.
- Do not install the valve in a terminal of a pipeline as it may cause leakage. Install a blank flange to the open end of the valve in such a case.
- Keep a secure footing for valve installation and operation.
- Provide adequate lighting for valve installation.
- Pipes shall be supported to prevent damage to the pipe by excessive stress by the valve weight or operation.

1.1.1 Allow sufficient space for operation, installation, disassembly and subsequent maintenance work in consideration of the valve size and the stem direction.

1.1.2 Take appropriate measures for valves which are installed in limited access locations.

1.1.3 Where possible, avoid installing valves in locations where external forces, such as vibrations, hamper the valve function.

1.1.4 Install a valve in the upright position on the horizontal piping.
### IV. Valve Installation

#### 1.2 Precautions for piping

- Keep off the valve lifting area to prevent personal injury.
- Be careful not to catch your fingers between the connecting parts.
- Take care not to damage the flange surfaces and the valve seats.
- Use support stands for alignment of the upstream and downstream pipes.
- Leakage from the packing area may occur if the gland bolts or nuts are loosened during transportation or storage. Retighten the gland bolts and nuts before operation.
- Use new gaskets when installing a valve.
- If the valve is used at high temperatures (≥200°C or higher), retighten the bolts after the valve has reached its working temperature to restore the surface stress of the valve sealing areas (hot bolting).
IV. Valve Installation

1.2.1 Check the following before installation.

1. The service conditions are within the range of the valve specifications.
2. The valve flanges match the pipe flanges.
3. The flange surfaces of the valve and pipe are free from scratches or damages.
4. The appropriate distance is provided between the pipe flanges for the valve face-to-face dimensions (including the gasket thickness of both sides).
5. The upstream pipe and the downstream pipe are aligned accurately.
6. The pipe flanges are parallel. Bolt holes of the flanges are symmetrically arranged such that they are lined up against the centerline of the flanges.

1.2.2 Clean the connecting pipe interior and remove foreign materials such as sand, dust and welding spatters before installation.

1.2.3 Any excessive impact on the valve, such as throwing, dropping or dragging, shall be avoided.

1.2.4 Remove the protective covers just before installation.

1.2.5 Check all the screwed parts after installation and retighten them, as required.

1.2.6 After installation, fully open all the valves on the pipeline and flush the pipe interior to remove foreign materials. Never operate the valves while flushing.
IV. Valve Installation

1.3 Valve installation

1.3.1 Align the upstream pipe and downstream pipe.

1.3.2 Check that the appropriate distance is provided between the pipe flanges for the valve to be installed.

1.3.3 Place the valve between the pipe flanges. Insert the bottom bolts through the bolt holes and set the bolts temporarily.

1.3.4 Insert the gasket between the valve flange and the pipe flange. It is recommended to apply lubricant (gasket paste) to the gasket surfaces.

1.3.5 Make sure that the gaskets have been placed in the correct position.

1.3.6 Attach the remaining bolts and nuts to the flanges and temporarily tighten them.

1.3.7 Tighten the bolts evenly and alternately in a star pattern as shown below. The end of the tightened bolt should protrude equally beyond the nut.

1.3.8 Raise the line temperature and increase the pressure gradually during the test operation. Retighten the screwed parts as required.
V. Valve Operation
V. Valve Operation

1. Precautions for Valve Open/Close Operation

- DO NOT apply excessive force to the valve operating device.
- DO NOT loosen the bolts for the gland, bonnet and piping when the valve is pressurized.
- DO NOT use gate valves in the intermediate position. Otherwise the disc and stem may be damaged.
- Open or close the valve gradually to prevent the damage of pipes when the valve handles high temperature fluid such as steam.
- Take appropriate measures against freezing.

2. Valve Open/Close Operation

2.1 The valve is closed by rotating the handwheel clockwise and open by rotating the handwheel counterclockwise according to the marks and the arrows indicating the direction.

2.2 The handwheel operating torque varies with a number of factors, such as the valve opening position and valve type.

2.3 After the valve is fully closed, turn the hand wheel to the open direction by about 90°. By doing so, the thermal stress on the pipe is relaxed and the valve can be opened with a small operating force.
### V. Valve Operation

#### 3. Daily Inspection

Carry out daily maintenance and inspection on the valves in use. Inspection items are as shown below.

<table>
<thead>
<tr>
<th>Problem Area to be Inspected</th>
<th>Inspection Method</th>
<th>Remedial Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gland area</td>
<td>Visual check</td>
<td>Retighten the gland bolts/nuts. Replace the gland packing.</td>
</tr>
<tr>
<td></td>
<td>Soap water</td>
<td></td>
</tr>
<tr>
<td>Flange area</td>
<td>Visual check</td>
<td>Retighten the flange bolts. Replace the gaskets.</td>
</tr>
<tr>
<td></td>
<td>Soap water</td>
<td></td>
</tr>
<tr>
<td>Threaded portion</td>
<td>Visual check</td>
<td>Retighten each threaded portion. Replace the parts.</td>
</tr>
<tr>
<td></td>
<td>Soap water</td>
<td></td>
</tr>
<tr>
<td>External Leakage</td>
<td>Valve surface</td>
<td>Replace the valve.</td>
</tr>
<tr>
<td></td>
<td>Visual check</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Soap water</td>
<td></td>
</tr>
<tr>
<td>Valve operation failure</td>
<td>Auditory check</td>
<td>Consult with a piping engineer.</td>
</tr>
<tr>
<td></td>
<td>Operating device</td>
<td>Apply lubricating oil or grease to the moving parts.</td>
</tr>
<tr>
<td></td>
<td>Tactile check</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Auditory check</td>
<td>Disassemble and inspect the valve.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Lapping of the seat surface) Replace the valve.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open/Close position</td>
<td>Visual check</td>
<td>Make sure that the valve is in the predetermined position.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valve operation failure</td>
<td>Operating device</td>
<td>Apply lubricating oil or grease to the moving parts.</td>
</tr>
<tr>
<td></td>
<td>Tactile check</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Auditory check</td>
<td>Disassemble and inspect the valve.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inject grease to the yoke sleeve if the valve has a grease nipple.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(See the illustration on the next page.) Check and adjust the gland packing tightening torque.</td>
</tr>
</tbody>
</table>
4. Precautions for Troubleshooting

- Wear protective equipment such as goggles, gloves and safety footwear.
- Take appropriate safety measures against toxic, flammable or corrosive fluids.
- Reduce the pipe internal pressure to the atmospheric level before retightening bolts and nuts.
- Take protective measures to prevent direct exposure to the fluid leaking from the flanged area due to unexpected failure.
- Reduce the pipe internal pressure to the atmospheric level before replacing packing or gaskets or before loosening bolts and nuts. If the valve handles a volatile fluid, loosen the gland bolts gradually avoiding direct exposure to the fluid.
- When replacing the packing using a backseat function, check that there is no leakage caused by foreign materials in the packing section. Replace only one or two pieces of packing in the upper section or just add some packing without replacing. Replace all the packing at the next maintenance period.
- DO NOT apply any lubricant to the valve that handles oxygen.

---

**CAUTION**

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- •
- •
- •
- •
- •
- •
- •

**NOTICE**

- •
5. Valve Operation

4.1 Leakage from gland area
Retighten the gland bolts and nuts if leakage from the gland area is detected. Retighten the bolts and nuts evenly as shown below. If leakage persists even after retightening, replace the packing.

4.2 Leakage from flange area
Tighten the bolts evenly, gradually and alternately in a star pattern as shown below.
### Troubleshooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Remedial Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>The stem threads have stuck after leaving the valve in a fully open or closed position for a long time.</td>
<td></td>
<td>Apply lubricant to the fitting part of the yoke sleeve and stem threaded portion. <em>Inject grease to the yoke sleeve when the valve has a grease nipple. (See the illustration on page 17.)</em></td>
</tr>
<tr>
<td>Opening/Closing failure</td>
<td>Excessive valve operating torque</td>
<td>Slightly open the valve and flush out the foreign materials.</td>
</tr>
<tr>
<td>Foreign materials are caught in the valve seat.</td>
<td></td>
<td>Remove the foreign materials and check the stem area to make sure that there is no other problem. Then, evenly apply lubricating oil or grease to the threaded portion.</td>
</tr>
<tr>
<td>Foreign materials get into the stem.</td>
<td></td>
<td>Slightly open the valve and flush out the foreign materials.</td>
</tr>
<tr>
<td>Foreign materials are piled up in the bottom of the valve body.</td>
<td>Excessive valve operating torque</td>
<td>Loosen the gland bolts and nuts and retighten them properly.</td>
</tr>
<tr>
<td>The gland packing bolts are over-tightened.</td>
<td>Excessive operation torque being applied.</td>
<td>Replace the damaged parts.</td>
</tr>
<tr>
<td>Damage or bend of stem</td>
<td>The gland packing bolts are not tightened properly.</td>
<td>Retighten the gland bolts and nuts.</td>
</tr>
<tr>
<td>The gland packing is unevenly tightened.</td>
<td></td>
<td>Tighten the gland bolts and nuts evenly.</td>
</tr>
<tr>
<td>The gland packing is damaged.</td>
<td></td>
<td>Replace the gland packing.</td>
</tr>
<tr>
<td>Leakage from gland area</td>
<td>The stem is damaged.</td>
<td>Replace the stem.</td>
</tr>
<tr>
<td>The seats are damaged.</td>
<td></td>
<td>Consult with a piping engineer.</td>
</tr>
<tr>
<td>Seat leakage in the fully-closed position</td>
<td>The seats are deformed by external force from the pipe.</td>
<td>Consult with a piping engineer.</td>
</tr>
<tr>
<td>Noise or vibration</td>
<td>The bolts and nuts are loosened.</td>
<td>Retighten the bolts and nuts.</td>
</tr>
</tbody>
</table>
VI. Periodic Inspection
VI. Periodic Inspection

1. Periodic Inspection

1.1 Conduct a periodic inspection on the valve installed to the piping at least once a year.

1.2 Check the smooth and safe operation of the valve.

1.3 The inspection items and methods are the same as those for daily inspections. See Chapter V of this manual for details.

1.4 Conduct a periodic inspection on the valves that are not inspected or not operated for a long period or not subjected to daily inspection. (Periodic inspections shall be carried out on all the valves.)

1.5 Thorough checks are required for the valves if:
   a) the operation failure of the valve could result in a major shutdown of an entire plant unit.
   b) the fluids are adhesive and easy to clog.
   c) corrosion or erosion due to the service fluid is likely to occur.

1.6 It is recommended to replace the gland packing during a periodic inspection.
VI. Periodic Inspection

2. Maintenance and Inspection

When inspections are conducted on the pipeline facilities where valves are installed, perform a leakage test on the valve seats and a valve operation test, as required. If any defect is found, disassemble the valve for further inspection. Disassembled valves shall pass the required inspections.

2.1 Precautions for valve removal and reinstallation

- Before removing a valve from the pipe, discharge the fluid from the pipe and reduce the line pressure to the atmospheric level and check that the valve temperature is at room temperature. Also, before removing a blank flange, open the valve and discharge any residual fluid from the pipe.

- Before removing a fully closed valve, partially open the valve and relieve the pressure and discharge the fluid.

- When the valve handles a toxic fluid, flammable fluid or corrosive fluid, remove the fluid from the pipe and valve completely.

- Take preventive measures against fire and direct exposure to the fluid.

- Keep off the valve lifting area to prevent personal injury.

- Wear protective equipment such as goggles, gloves and safety footwear.

- Keep a secure footing when removing and installing valves.

- Use support stands for the correct alignment of downstream and upstream pipes.

- Put matchmarks on the pipe flanges and valve flanges before removing the valve from the pipe. The valve shall be reinstalled by aligning the matchmarks.

- Replace gaskets with new ones when reinstalling a valve.

### WARNING

- Any gas leakage or fluid flow from the pipeline must be immediately reported and stopped. Failure to follow these instructions may result in serious accidents.

- Before removing a valve from the pipe, discharge the fluid from the pipe and reduce the line pressure to the atmospheric level and check that the valve temperature is at room temperature. Also, before removing a blank flange, open the valve and discharge any residual fluid from the pipe.

- Before removing a fully closed valve, partially open the valve and relieve the pressure and discharge the fluid.

- When the valve handles a toxic fluid, flammable fluid or corrosive fluid, remove the fluid from the pipe and valve completely.

- Take preventive measures against fire and direct exposure to the fluid.

- Keep off the valve lifting area to prevent personal injury.

- Wear protective equipment such as goggles, gloves and safety footwear.

- Keep a secure footing when removing and installing valves.

- Use support stands for the correct alignment of downstream and upstream pipes.

- Put matchmarks on the pipe flanges and valve flanges before removing the valve from the pipe. The valve shall be reinstalled by aligning the matchmarks.

- Replace gaskets with new ones when reinstalling a valve.

### CAUTION

- Do not attempt to remove or install valves without proper training and certification.

- Always ensure that the pipeline is secure and stable before attempting to remove or install valves.

- Do not use excessive force when removing or installing valves, as this can cause damage to the valve or the pipeline.

- Always follow proper procedures for removing or installing valves, including the use of appropriate tools and equipment.

- Always ensure that the pipeline is secure and stable before attempting to remove or install valves.

- Always follow proper procedures for removing or installing valves, including the use of appropriate tools and equipment.
VI. Periodic Inspection

2.2 Disassembly
Disassembly work shall be performed according to "VII Disassembly and Reassembly".

2.3 Inspection items
Inspect each valve according to the table below.

<table>
<thead>
<tr>
<th>Part to be inspected</th>
<th>Area to be inspected</th>
<th>Detection method</th>
<th>Acceptance criteria</th>
<th>Remedial measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flange</td>
<td>Corrosion</td>
<td>Visual check</td>
<td>No sign of corrosion, damage or crack</td>
<td>Repair by welding or disposal if unrepairable.</td>
</tr>
<tr>
<td></td>
<td>Scratch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crack</td>
<td>Measuring of wall thickness</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-destructive test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid contact areas</td>
<td>Corrosion</td>
<td>Visual check</td>
<td>No sign of corrosion</td>
<td>Repair by welding or disposal if unrepairable.</td>
</tr>
<tr>
<td></td>
<td>Scratch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crack</td>
<td>Measuring of wall thickness</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-destructive test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body Disc</td>
<td>Disc guide</td>
<td>Visual check</td>
<td>Smooth operation</td>
<td>Repair by welding and machining</td>
</tr>
<tr>
<td>Seat surfaces</td>
<td>Corrosion</td>
<td>Visual check</td>
<td>No sign of corrosion or damage</td>
<td>Lapping</td>
</tr>
<tr>
<td></td>
<td>Scratch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crack</td>
<td>Measuring of wall thickness</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Erosion</td>
<td>Visual check</td>
<td>Good lapping</td>
<td>Replace the disc.</td>
</tr>
<tr>
<td>Disc guide</td>
<td>Corrosion</td>
<td>Visual check</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Erosion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valve seat</td>
<td>Disc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stem-disc connection</td>
<td>Corrosion</td>
<td>Visual check</td>
<td>No sign of corrosion or deformation</td>
<td>Replace the disc.</td>
</tr>
</tbody>
</table>
## VI. Periodic Inspection

<table>
<thead>
<tr>
<th>Part to be inspected</th>
<th>Area to be inspected</th>
<th>Detection</th>
<th>Inspection</th>
<th>Acceptance criteria</th>
<th>Remedial measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stem</td>
<td>Corrosion</td>
<td>Visual check</td>
<td>No sign of corrosion, scratch or distortion</td>
<td>Replace the damaged parts.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Erosion</td>
<td>Dimension check</td>
<td>No sign of erosion</td>
<td>Replace the damaged parts.</td>
<td></td>
</tr>
<tr>
<td>Threaded portion</td>
<td>Corrosion</td>
<td>Visual check</td>
<td>No sign of corrosion</td>
<td>Replace the damaged parts.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Erosion</td>
<td>Visual check</td>
<td>No sign of erosion</td>
<td>Replace the damaged parts.</td>
<td></td>
</tr>
<tr>
<td>Stuffing box</td>
<td>Stem-sliding surface</td>
<td>Visual check</td>
<td>No sign of corrosion, erosion or scratch</td>
<td>Replace the damaged parts.</td>
<td></td>
</tr>
<tr>
<td>Outer periphery</td>
<td>Corrosion</td>
<td>Visual check</td>
<td>No sign of corrosion</td>
<td>Replace the damaged parts.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Erosion</td>
<td>Visual check</td>
<td>No sign of erosion</td>
<td>Replace the damaged parts.</td>
<td></td>
</tr>
<tr>
<td>Gland packing</td>
<td>Wear</td>
<td>Visual check</td>
<td>Yearly replacement</td>
<td>Replace the damaged parts.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Degradation</td>
<td>Visual check</td>
<td>Yearly replacement</td>
<td>Replace the damaged parts.</td>
<td></td>
</tr>
<tr>
<td>Sliding area</td>
<td>Operability</td>
<td>Tactile check</td>
<td>Smooth operation</td>
<td>Repair and lubricate the parts.</td>
<td></td>
</tr>
<tr>
<td>Threaded portion</td>
<td>Abrasion</td>
<td>Visual check</td>
<td>No abrasion</td>
<td>Replace the damaged parts.</td>
<td></td>
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<tr>
<td>Yoke sleeve</td>
<td>Collar</td>
<td>Visual check</td>
<td>No crack</td>
<td>Replace the damaged parts.</td>
<td></td>
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<td></td>
<td>Distortion</td>
<td>Visual check</td>
<td>No distortion</td>
<td>Replace the damaged parts.</td>
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</table>

2.4 Assembly

Assemble the valve according to the instructions for each valve type in this manual.

VI. Periodic Inspection

2.5 Tests and inspection

Perform the required tests and inspections as shown below.

2.5.1 Operation test

(1) Check that the operation of the handwheel is smooth without galling or sticking.

(2) Check that the stem is securely connected with the disc.

2.5.2 Shell tests and seat leakage tests

(1) Precautions

- Wear protective equipment such as goggles, gloves and safety footwear.
- Pay attention to safety when performing a shell test and seat leakage test.

(2) Shell tests and seat leakage tests

All reassembled valves are subject to the specified hydrostatic or pneumatic shell test and seat leakage test at the designated test pressures.

Refer to API 6D for test methods and procedures.

⚠️ CAUTION

- Wear protective equipment such as goggles, gloves and safety footwear.
- Pay attention to safety when performing a shell test and seat leakage test.

Reference procedures for testing and inspection are in accordance with API 6D.
VII. Disassembly and Reassembly

1. Slab Gate Valve

1.1 Disassembly

1.1.1 Precautions for disassembly
- Take preventive measures against fire and direct exposure to the fluid.
- Wear protective equipment such as goggles, gloves and safety footwear.
- Be careful not to catch your fingers between the connecting parts.
- Use an appropriate lifting machine when handling a heavy valve.

1.1.2 Before disassembly
- Perform disassembly in a clean environment.
- Take care not to damage seat surfaces, stem threads, gasket surfaces and flange surfaces.
- Before disassembly, put matchmarks on the connections to align parts correctly in the subsequent reassembly process. Pay attention to the installation direction of the disc and body when reassembling them. They shall be installed in the original position.

⚠️ WARNING

- The valve components must be handled with care to prevent damage during disassembly.

⚠️ CAUTION

- The valve components must be handled with care to prevent damage during disassembly.
- The valve components must be handled with care to prevent damage during disassembly.
- The valve components must be handled with care to prevent damage during disassembly.
VII. Disassembly and Reassembly

1.1.3 Disassembly

Perform disassembly by referring to the structure drawing.

1) Place the valve upright on the worktable. Prepare a box to put disassembled parts in the box.

2) Remove the set screw (38) and the cap (37).

3) Loosen the nut (40) and then remove the indicator (39) from the stem (4).

4) Pull out the pin (36) and remove the stopper nut (35).

5) Remove the hand wheel (33) and key (34).

6) Remove the set screw (31) and nut (30).

7) Remove the yoke sleeve (28) and the thrust bearing (29) from the stem (4).

8) Remove the nut (27) and the remove the yoke (5) by lifting it.

9) Remove the nut (25) and then remove the gland (23) and gland bush (22) together. In the case that removing the gland (23) and gland bush (22) is not easy due to the adherence of a material such as silica, use the nut (25) to detach the gland (23) and gland bush (22).

10) Remove the bolt (24) and use it to lift the bonnet. Remove the nut (14) and lift the bonnet (2) and remove it.

11) Thread the yoke sleeve (28) into the stem (4) and lift the stem (4) using the projecting portion of the yoke sleeve (28). Slowly lift the stem (4) with the disc (3) and remove them together, taking care not to damage the seat surface by the guide plates (7) which are pressed to the disc (3) by the spring (11).

12) Pull out the gland packing (21) using a packing tool, and then pull out the lantern ring (20) and packing washer (19) in order.

13) Remove the guide plates (7) from the body (1). Remove the weldment from the spring assembly attached to the guide plates (7) using a tool such as a grinder, as required. Then, remove the guide support (8), spring support (10), spring seat (9) and spring (11).

14) Remove the nut (18) and cover (15).

15) Contact KITZ if the seat rings (6) need to be removed.
VII. Disassembly and Reassembly

1.2 Reassembly

1.2.1 Precautions for reassembly

- Wear protective equipment such as goggles, gloves and safety footwear.
- Take precautions against fire.
- Be careful not to catch your fingers between the connecting parts.
- Replace the gland packing and gasket with new ones when the valve is reassembled. Reuse of these parts may cause leakage.
- Use an appropriate lifting machine when handling a heavy valve.
- DO NOT apply any lubricant to the fluid contact areas if the fluid is oxygen.

1.2.2 Before reassembly

1. Replacement parts shall be prepared before reassembly.
2. Remove dust, oil, moisture or other foreign materials from the reuse parts before reassembly.
3. Perform a reassembly in a clean environment.
4. Take care not to damage seat surfaces, stem threads, gasket surfaces and flange surfaces.
5. Reassemble the valve by aligning the matchmarks marked during disassembly.
6. Replace the gland packing and gaskets with new ones.
7. Tighten the bolts and nuts evenly and alternately.
8. Apply anti-seize lubricant or grease to bolts and nuts and the threaded portion of the stem.
VII. Disassembly and Reassembly

1.2.3 Reassembly

1) Attach the guide plates (7), which are assembled with the spring assembly, to the body (1). In order to make the installation of the disc (3) easy, fix the upper side and lower side of the guide plates (7) using a tool such as a jack. (Refer to the figure below).

2) Hang the jack with a wire, etc. to prevent dropping. If the jack is dropped, take it out from the lower part of the body.

3) Install the disc (3) so that it comes out of the upper flange of the body (1) to be connected with the stem (4). Support the disc (3) with a bar hanged between the valve bores.

4) Remove the jack when installing the disc (3).

5) Put the stem (4) through the bonnet (2) and install the packing washer (19), gland packing (21), lantern ring (20) and gland packing (21) in order.

6) Tighten the bonnet (2) and the body (1) with the bolt (13) and nut (14).

7) Install the gland (23) to the stem (4).

8) Tighten the yoke (5) and bonnet (2) with the bolt (26) and nut (27).

9) Install the yoke sleeve (28) and thrust bearing (29) to the yoke (5).

10) Install the yoke sleeve (28) to the yoke (5) and tighten them with a set screw (31).

11) Install the key (34) to the yoke sleeve (28) and install the hand wheel (33).

12) Install the end nut (40) and pin (36) to the stem (4) and then install the indicator (39).

13) Install the cap (37) and secure it with the set screw (38).

Fix the guide plates with a jack.

Wire
VII. Disassembly and Reassembly

This illustration shows a typical construction.

Refer to the approved drawing for disassembly and reassembly.

---

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<td>STEM</td>
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<td>YOKE</td>
</tr>
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<td>SEAT RING</td>
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<td>GLAND BUSH</td>
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</table>
VII. Disassembly and Reassembly

2. Expanding Gate Valve

2.1 Disassembly

2.1.1 Precautions for disassembly

- Take preventive measures against fire and direct exposure to the fluid.
- Wear protective equipment such as goggles, gloves and safety footwear.
- Be careful not to catch your fingers between the connecting parts.
- Use an appropriate lifting machine when handling a heavy valve.

2.1.2 Before disassembly

(1) Perform disassembly in a clean environment.
(2) Take care not to damage seat surfaces, stem threads and flange surfaces.
(3) Before disassembly, put matchmarks on the connections to align the parts correctly in the subsequent reassembly process. Pay attention to the installation orientation of the disc and body when reassembling them. They shall be installed in their original position.
VII. Disassembly and Reassembly

2.1.3 Disassembly

Perform disassembly by referring to the structure drawing.

2.1.3.1 Spring type (Handwheel type)

1) Place the valve upright on the worktable. Prepare a box to put disassembled parts in the box.

2) Move the disc (3) to the intermediate position.

3) Remove the cap (37) from the yoke sleeve (28).

4) Remove the indicator (39) and the nut (40) from the stem (4).

5) Remove the stopper nut (35) and turn the hand wheel (33) to the closing direction. As the yoke (5) moves upward, remove it from the stem (4).

6) Remove the nut (14), bonnet (2), disc (3) and stem (4) carefully not to damage the seat surface by the guide plates (7).

7) Remove the disc (3) and the stem (4) from the bonnet (2).

8) Remove the stem (4) from the disc (3).

9) Remove the nut (25) and then remove the gland (23) and gland bush (22) from the bonnet (2). If removing these parts is not easy, use the nut (25) under the gland (23) to detach the parts with a jack.

10) Remove the gland packing (21), lantern ring (20) and packing washer (19).

11) Remove the guide plates (7).

12) Contact KITZ if the seat rings (6) need to be removed.
VII. Disassembly and Reassembly

2.1.3 2 Center Riser Type (Gear operator type)

1) Place the valve upright on the worktable. Prepare a box to put disassembled parts in the box.

2) Move the disc (3) to the intermediate position.

3) Remove the cap of the gear unit (31).

4) Remove the bolt (36) and stopper nut (35).

5) Remove the bolt (33) and turn the hand wheel to the closing direction. As the gear unit (31) moves upward, remove it from the stem (4).

6) Remove the nut (27) and yoke (5).

7) Remove the nut (14), bonnet (2), disc (3) and stem (4) carefully not to damage the seat surface by the guide plates (7).

8) Remove the disc (3) and the stem (4) from the bonnet (2).

9) Remove the stem (4) from the disc (3).

10) Remove the nut (25) and then remove the gland (23) and gland bush (22) from the bonnet (2). If removing these parts is not easy, use the nut (25) under the gland (23) to detach the parts with a jack.

11) Remove the gland packing (21), lantern ring (20) and packing washer (19).

12) Remove the guide plates (7).

13) Contact KITZ if the seat rings (6) need to be removed.
VII. Disassembly and Reassembly

2.2 Reassembly

2.2.1 Precautions for reassembly

- Wear protective equipment such as goggles, gloves and safety footwear.
- Take precautions against fire.
- Be careful not to catch your fingers between the connecting parts.
- Replace the gland packing and gasket with new ones when the valve is reassembled. Reuse of these parts may cause leakage.
- Use an appropriate lifting machine when handling a heavy valve.
- Do not apply any lubricant to the fluid contact areas if the fluid is oxygen.

2.2.2 Before reassembly

(1) Replacement parts shall be prepared before reassembly.
(2) Remove dust, oil, moisture or other foreign materials from the reuse parts before reassembly.
(3) Perform a reassembly in a clean environment.
(4) Take care not to damage seat surfaces, stem threads and flange surfaces.
(5) Reassemble the valve by aligning the matchmarks marked during disassembly.
(6) Replace the gland packing and gaskets with new ones.
(7) Tighten the bolts and nuts evenly and alternately.
(8) Apply anti-seize lubricant or grease to bolts and nuts and the threaded portion of the stem.
VII. Disassembly and Reassembly

2.3 Reassembly

2.3.1 Spring Type (Handwheel Type)

1) Assemble the stem (4) to the disc (3).
2) Install the guide plates (7) to the body (1) and install the disc (3) and stem (4) to the body (1).
3) Install the bonnet (2).
4) Install the gland packing (21), lantern ring (20) and packing washer (19).
5) Install the gland (23) and gland bush (22).
6) Install the hand wheel (33) and yoke sleeve (28) to the yoke (5). Then, turn the hand wheel (33) to the opening direction and install the hand wheel (33) to the stem (4).
7) Install the indicator (39) and stopper nut (35) to the stem (4).
8) Install the cap (37) to the yoke sleeve (28).

2.3.2 Center Riser Type (Gear Operator Type)

1) Assemble the stem (4) to the disc (3).
2) Install the guide plates (7) to the body (1) and install the disc (3) and stem (4) to the body (1).
3) Install the bonnet (2).
4) Install the gland packing (21), lantern ring (20) and packing washer (19).
5) Install the gland (23) and gland bush (22).
6) Install the yoke (5).
7) Install the gear unit (31). Turn the hand wheel to the opening direction and assemble the gear unit (31) to the stem (4).
8) Install the stopper nut (35) to the stem (4).
This illustration shows a typical construction. Refer to the approved drawing for disassembly and reassembly.

### Expanding Gate Valve

#### Spring Type (Handwheel Type)

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<th>No.</th>
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<th>Name of Parts</th>
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**FLOW**

**SEALITE FADED**

**WELDED**

*KITZ CORPORATION*
**Center Riser Type**

This illustration shows a typical construction. Refer to the approved drawing for disassembly and reassembly.

### Expanding Gate Valve

#### Center Riser Type (Gear Operator Type)

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**Kitz Corporation**