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# **KITZ**

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## **Operation Manual**

For

**Brass Floating Type 3-Pieces Ball Valves**

**(Threaded & Solder Ends)**

Thank you for having chosen KITZ products.

For safe and trouble-free function and performance of the product, ensure to read and understand all items of this manual before valve mounting and operation.

Keep this manual in a convenient place for your valve operators' easy access.

This manual applies to the KITZ threaded or solder ends floating type 3-pieces ball valves made of bronze or brass.

This manual is prepared for manual valve operation.

For electric or pneumatic valve operation, refer to the operation manual prepared by the manufacturers of relevant valve actuators.

## CAUTION AND WARNING

To ensure safe and trouble-free function and performance of the product, please read all items of this manual before handling, transportation, mounting and operation of valves. Keep this manual in a convenient place for your valve operations' easy access.

The signal words "WARNING" and "CAUTION" are defined as follows:



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



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



Indicate prohibition of an action.



Indicate mandatory implementation of an action.

## NOTES TO USERS

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

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

Any information provided in this operation manual is subject to revision at any time without notice. This edition cancels all previous issues.

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CHAPTER  
Construction and Design Features

Construction and Design Features



1. Construction and Design Features

1.1 The typical valve design is as illustrated below.

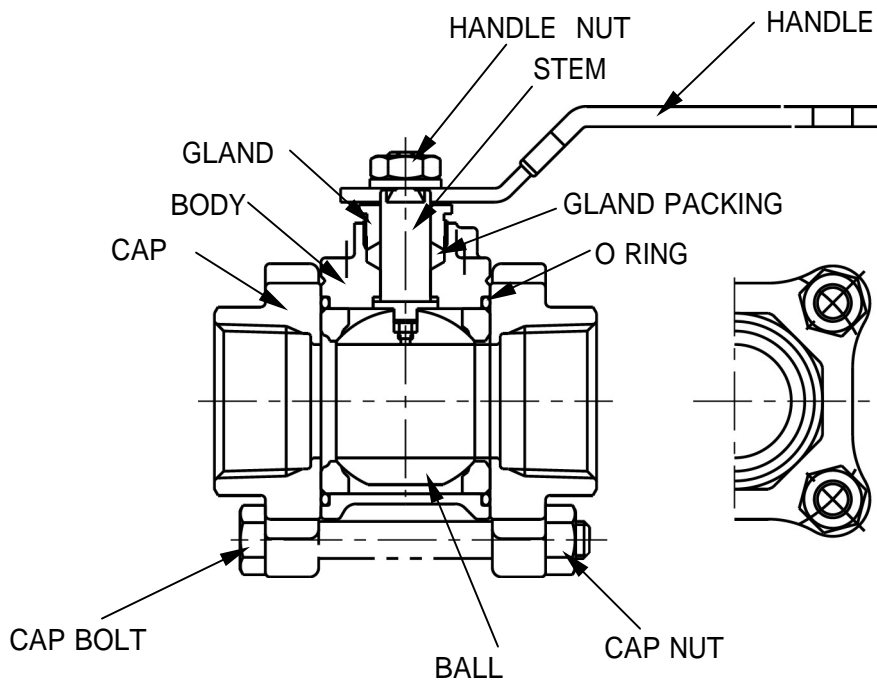
1.2 Range of operation from full opening to full closing is 90 ° .

1.3 These ball valves are designed for use in the full open or full closed position only.

1.4 The ball is supported by both ball seats. When the valve is pressurized, the ball moves against the downstream seat to complete the seal, shutting off flow of the line fluid.

 <b>WARNING</b>	
	(1) DO NOT use these valves for flammable or toxic gas service.

1.5 This ball valve design may be used on applications where a bi-directional flow is needed.



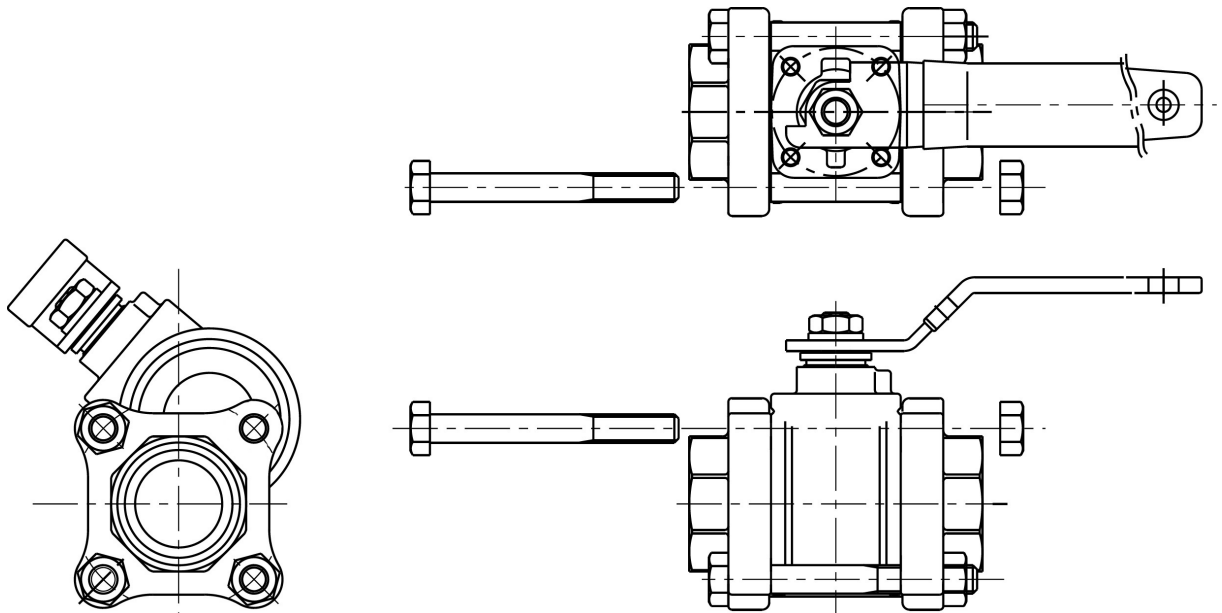
This illustration represents a typical construction.

Construction and Design Features

2. Design features

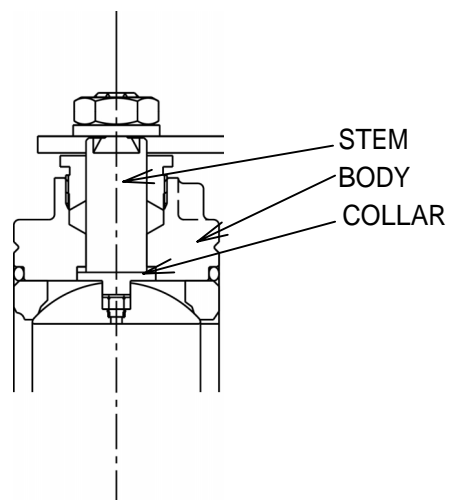
2.1 Body construction (Swing-away type)

Body is divided 3 parts and it can dismantle according losing 4 hexagonal bolting and remove one bolt. Therefore it is easy to be clean, check and maintenance of valve internal.



2.2 Stem Blowout Proof

The lower end of the stem is designed with an integral collar to be stem blowout proof. It also functions as the backseat for assumed stem sealing.



CHAPTER  
Valve Operating Device

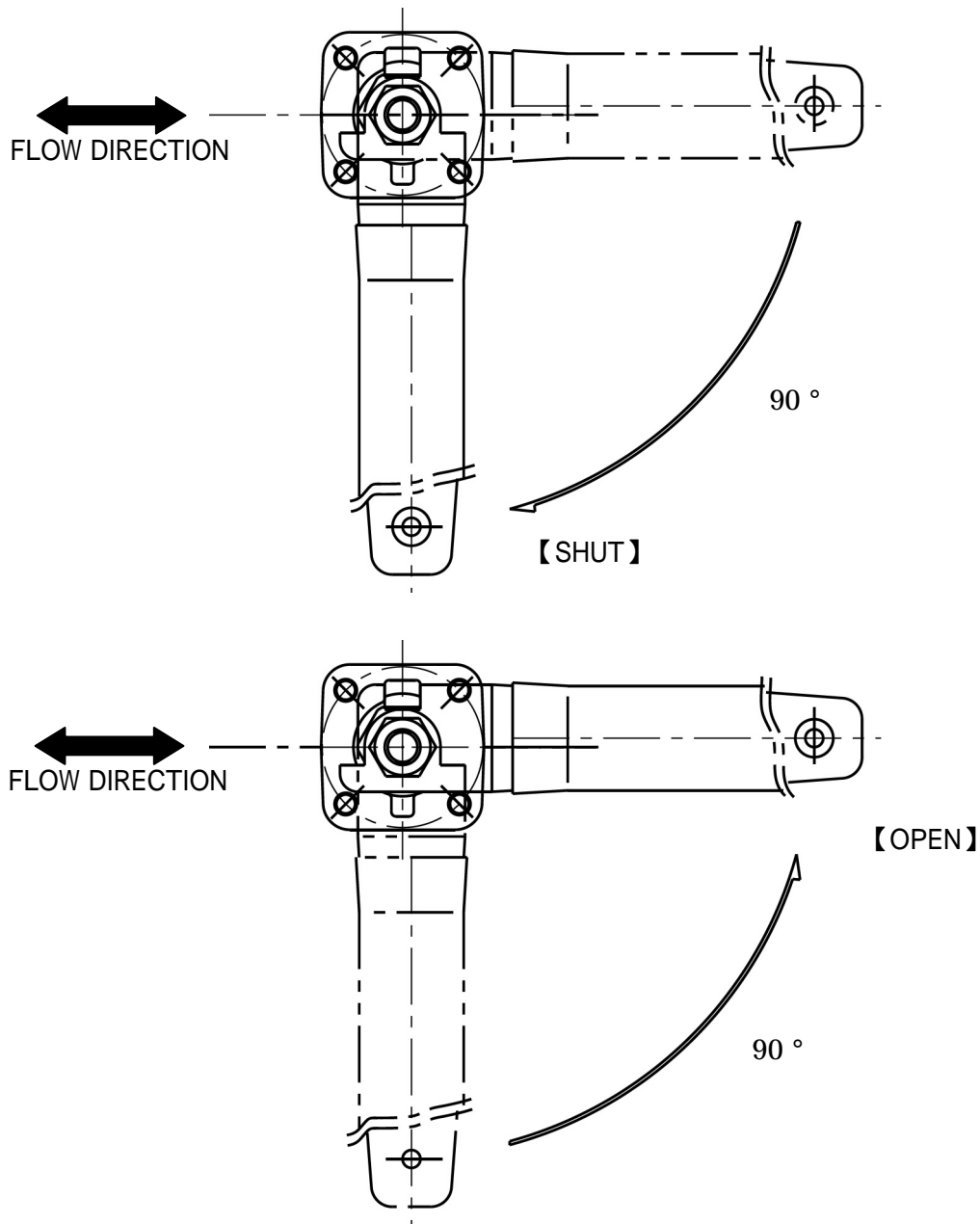
Valve Operating Device

1. Lever Handle

1.1 The lever handle is directly mounted on the valve stem.

1.2 Rotating the lever handle by 90 ° fully opens and fully closes the valve.

Turning the lever handle clockwise closes the valve, and counterclockwise opens it.







CHAPTER  
Transportation and Storage

Transportation and Storage

## 1. Transportation

## 1.1 Caution for transportation

 <b>CAUTION</b>	
	(1) Take care the handling and storage of carton packed. The high humidity may damage the cartons, which may lead to damaging valves.

## 1.2 Transportation




## 1.2.1 Keep packages as they are delivered just before installation.

If the protective covers are found missing during transportation, provide appropriate type of protective covers.

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

## 2. Storage

## 2.1 Caution for storage

 <b>CAUTION</b>	
	(1) DO NOT storage valves in the corrosive environment, which may cause corrosion on threaded portions of valves.  (2) DO NOT place any other objects on valves, and DO NOT step on them. Over loading may damage valves.  (3) DO NOT carelessly pile up products to avoid risk of product damage and personal injury caused by unstable pilling.
	(4) Keep the valves in the open position during storage. Storing the valves in halfopened position may deform the ball seats, leading to the internal leakage.

## 2.2 Storage

## 2.2.1 Storage valves at a dust free, least humid and well ventilated places.

Indoor storage is recommended.

## 2.2.2 Storage of valves directly on the ground or concrete floor is not recommended.




## 2.2.3 Take appropriate measures to prevent valves from direct exposure to dust, rain and sunlight, if valves should be stored outdoors.




CHAPTER  
Valve Installation

Valve Installation (Threaded valves)

## 1. Threaded Type

## 1.1 Cautions for Valve installation

 <b>WARNING</b>	
	<p>(1) The sealing materials determines the characteristic of service fluid and service range of pressure and temperature.</p> <p>Check the valve specifications with the catalogs and/or marking on the valve. Service beyond the valve specifications may cause fluid leakage and valve malfunctions.</p>
	<p>(2) DO NOT install for pipe end service, which may cause the external leakage. In such a case, the valve end shall be tightly plugged to prevent the leakage.</p>

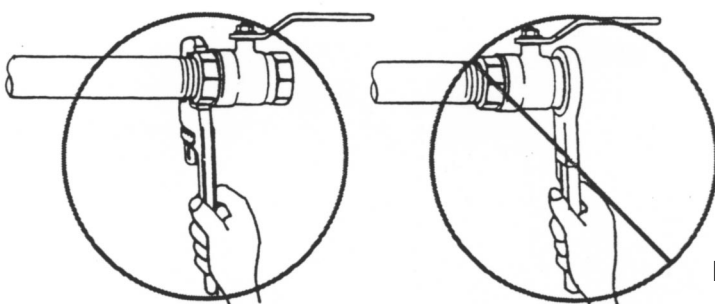
 <b>CAUTION</b>	
	<p>(1) Keep a secure footing for valve installation and operation.</p> <p>(2) Sufficient lighting should be prepared for valve operation.</p> <p>(3) Piping should be properly supported, if needed.</p>
	<p>(4) DO NOT use in corrosive environment such as underground for valve, which is used brass material to the body.</p>

- 1.1.1 Allow sufficient room for safe and easy operation, installation and subsequent maintenance of valves.
- 1.1.2 For smooth operation, inspection and maintenance of valves take appropriate measures for valves, which are forced to be installed in small spaces.
- 1.1.3 Try not to install valves in the places where valve functions may be hampered by such outer forces as vibrations and others.
- 1.1.4 It is recommended to install valves on horizontal piping in a upright position.

Valve Installation (Threaded valves)

1.2 Caution for Installation

<b>⚠ WARNING</b>	
<b>!</b>	(1) Keep off the valve lifting area to prevent personal injury caused by unsecured valves.

<b>⚠ CAUTION</b>	
<b>⊘</b>	(1) DO NOT disassemble valves during installation.
<b>!</b>	<p>(2) Take care not to damage threaded areas and seat surfaces during installation.</p> <p>(3) Use appropriate sealing materials in threaded areas, considering temperature, types and other conditions of the media.</p> <p>(4) DO NOT use pipe wrenches on valves. Use spanner or other proper tools for valve installation.</p> <p>(5) Apply a spanner to the valve end on the connecting pipe side. DO NOT apply a spanner on the other side.</p> <div style="text-align: center;">  <p style="text-align: right;">Prohibition</p> </div> <p>(6) DO NOT overly thread pipes into the valves. Excessive insertion of pipes into the valves may damage the valve seats.</p> <p>(7) Keep valves fully open position during valve installation in order to protect the ball surface.</p> <p>(8) Retighten the gland before operation. Packing tightening force may be lowered due to the stress relaxation, which may take place during transportation and storage, leading to the occurrence of leakage through the gland area.</p>

Valve Installation (Threaded valves)

- 1.2.1 Check the following items before valve mounting :
- (1) Service conditions should be within the valve specifications.
  - (2) Valve threads should correspond with pipe threads.
  - (3) No damage should be found on valve and pipe threads.
  - (4) Make sure pipe threads comply with the relevant standards by using thread gauges.
- 1.2.2 Before installation, the inside and threaded areas of the connecting pipes should be cleaned to remove any foreign object such as sand, dust or cutting oil.
- 1.2.3 Handle valves carefully so that they may not fall or drop on the ground. Any extraordinary mechanical impact should be avoided.
- 1.2.4 Remove the protection covers just before installation.
- 1.2.5 Check all threaded areas after installation and retighten them, if needed.
- 1.2.6 Flush piping after installation with all valves fully opened, to assure removal of any foreign object. DO NOT operate the valves during flushing.

Valve Installation (Threaded valves)

## 1.3 Valve installation procedure

- 1.3.1 Ensure the connecting areas of pipes to valves are threaded.
- 1.3.2 Remove all foreign objects such as cuttings and oil from pipes, inside pipes and threaded connections of valves by using detergents and waste cloth.
- 1.3.3 Apply sealing agents, including seal tapes, to the threads of pipes.
- 1.3.4 Use appropriate tools to thread pipes into the valves.
- 1.3.5 Do not apply an excessive torque, when threading pipes into the valves. Torque should not exceed the value shown below.

Nominal Pipe Size	1/4	3/8	1/2	3/4	1
Torque (N-m)	20 - 29	20 - 29	20 - 29	39 - 49	49 - 59

Nominal Pipe Size	1-1/4	1-1/2	2
Torque (N-m)	59 - 69	69 - 78	78 - 88

- 1.3.6 Check the cap bolting after installation and retighten them, if needed. Torque should not exceed the value shown below. These values apply to reassembly.

**Tightening Torque**

unit: N-m




Figure No.	Nominal Pipe Size							
	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2
AK3TM C3TM	3.7 - 4.7				8 - 10	16 - 20	28 - 34	46 - 52



- 1.3.7 Gradually increase the pressure and temperature of pipelines, when conducting test run. Retighten all threaded areas of valves, if needed.

Valve Installation (soldering valves)

2. Solder end Type

2.1 Caution for Valve installation

 <b>WARNING</b>																													
	<p>(1) The sealing materials determines the characteristic of service fluid and service range of pressure and temperature. Check the valve specifications with the catalogs and/or marking on the valve. Service beyond the valve specifications may cause fluid leakage and valve malfunctions.</p> <p>(2) The maximum service pressure and temperature of solder jointed valves are limited by the properties of solder material or valve themselves whichever smaller value. Information on typical solder material is provided below.</p> <p style="text-align: center;">Maximum service pressure (Mpa)</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Solder</th> <th rowspan="2">Temp.</th> <th colspan="3">Nominal Pipe Size</th> </tr> <tr> <th>1/4 to 1</th> <th>1 1/4 to 2</th> <th>2 1/2 to 4</th> </tr> </thead> <tbody> <tr> <td rowspan="4" style="text-align: center;">Tin - silver 96.5 - 3.5</td> <td style="text-align: center;">38</td> <td style="text-align: center;">3.45</td> <td style="text-align: center;">2.76</td> <td style="text-align: center;">2.07</td> </tr> <tr> <td style="text-align: center;">66</td> <td style="text-align: center;">2.76</td> <td style="text-align: center;">2.41</td> <td style="text-align: center;">1.90</td> </tr> <tr> <td style="text-align: center;">93</td> <td style="text-align: center;">2.07</td> <td style="text-align: center;">1.72</td> <td style="text-align: center;">1.38</td> </tr> <tr> <td style="text-align: center;">121</td> <td style="text-align: center;">1.38</td> <td style="text-align: center;">1.21</td> <td style="text-align: center;">1.03</td> </tr> </tbody> </table> <p>(3) Copper tubes should not be used for saturated steam service.</p>				Solder	Temp.	Nominal Pipe Size			1/4 to 1	1 1/4 to 2	2 1/2 to 4	Tin - silver 96.5 - 3.5	38	3.45	2.76	2.07	66	2.76	2.41	1.90	93	2.07	1.72	1.38	121	1.38	1.21	1.03
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	<p>(4) Servicing fluid velocity of 3m/sec. or more might cause erosion to copper tubes. Limit the service velocity to 2m/sec. For higher velocity, contact KITZ for technical advice.</p>																												

 <b>CAUTION</b>	
	<p>(1) Keep a secure footing for valve installation and operation.</p> <p>(2) Sufficient lighting should be prepared for valve operation.</p> <p>(3) Piping should be properly supported, if needed.</p>

2.1.1 Allow sufficient room for safe and easy operation, installation and subsequent maintenance of valves.

2.1.2 For smooth operation, inspection and maintenance of valves take appropriate measures for valves which are forced to be installed in small spaces.



2.1.3 Try not to install valves in the places where valve functions may be hampered by such outer forces as vibrations and others.




2.1.4 It is recommended to install valves on horizontal piping in a upright position.



Valve Installation (soldering valves)

## 2.2 Caution for installation

 <b>WARNING</b>	
	(1) Keep off the valve lifting area to prevent personal injury caused by unsecured valves.

 <b>CAUTION</b>	
	<p>(1) DO NOT use a solder material of tin-lead 50-50 rating, which is hazardous to human health.</p> <p>(2) DO NOT use a solder material with melting point of 450 or higher, because resultant crack on valve or copper tube surface may cause fluid leakage.</p> <p>(3) DO NOT connect other than ASTM B 88 "Seamless copper water tube" Type K, L or M.</p>
	<p>(4) Take care not to damage the seat surfaces and inside of socket during installation.</p> <p>(5) Prepare a solder material with melting point of 300 or lower.</p> <p>(6) A solder material of tin-silver 96.5-3.5 rating is recommended.</p> <p>(7) Keep valves fully open position during valve installation in order to protect the ball surface.</p> <p>(8) Piping should be no offset to prevent excess piping stress to the valve.</p> <p>(9) Sufficient lighting should be prepared for valve installation</p> <p>(10) Retighten the gland before operation. Packing tightening force may be lowered due to the stress relaxation, which may take place during transportation and storage, leading to the occurrence of leakage through the gland area.</p> <p>(11) Piping should be properly supported, if needed.</p>

## 2.2.1 Check the following items before valve mounting :




- (1) Service conditions should be within the valve specifications.
- (2) Appropriate solder material should be chosen.
- (3) Appropriate copper tube should be chosen.
- (4) No damage should be found on valve and pipe ends.

## 2.2.2 Before installation, the inside of the connecting pipes should be cleaned to remove any foreign object such as sand, dust, spatter or cutting oil.

Valve Installation (soldering valves)

- 2.2.3 Handle valves carefully so that they may not fall or drop on the ground. Any extraordinary mechanical impact should be avoided.
- 2.2.4 Remove the protection covers just before installation.
- 2.2.5 Retighten threaded parts after installation, if needed.
- 2.2.6 Flush piping after installation with all valves fully opened, to assure removal of any foreign object. DO NOT operate the valves during flushing.

2.3 Valve installation procedure

 <b>CAUTION</b>	
	<p>(1) DO NOT apply heat to the center of valve body, which may cause damage the packing or ball seats. Heating time for soldering work should be in any case minimized to protect damage the sealing material.</p> <p>(2) DO NOT place any other objects on valves, and DO NOT step on them. Over loading may damage valves.</p> <p>(3) DO NOT operate the soldered valve until the valve has been cooled down for protection of sealing materials.</p>
	<p>(4) Soldering should be carried out the by qualified person and procedure.</p> <p>(5) Wear appropriate protective item such as mask when soldering is carried out, because fume has toxic element and hazard for health.</p> <p>(6) After cooling down, retighten the gland to make sure leak-free performance of the valve. The gland might have been loosened due to thermal expansion of packing ring.</p>

- 2.3.1 Remove burrs from a cut edge of the copper tube with a reamer or a grinder. A deformed edge must be repaired.
- 2.3.2 Polish the external surface of the tube and valve socket to a glossy finish, using a sand paper or a steel wire brush, and clean them with clothes.
- 2.3.3 Apply some flux thinly and evenly to the polished surfaces of the tube. Make sure to use flux evenly when using a solder, which contains flux. No flux must be applied to the inside of the valve sockets.

Valve Installation (soldering valves)

2.3.4 Insert the tube into the valve socket until the end of the tube contacts the internal shoulder of the valve socket. Rotate the tube a few times so that the flux may be evenly applied. Make sure to fully opened position the valve before heating.




2.3.5 Soldering procedure is as follows;

- (1) During heating, cover the body with a wetted cloth to prevent damage of gland packing, o-rings and ball seats.
- (2) Preheat the tube evenly to 100 °C between 30 - 40 mm distance from valve end to joint area, using an open-flame torch.
- (3) Heat the jointed area to an adequate temperature and press a solder wire around the jointed area.
- (4) Check that, due to a capillary phenomenon, melted solder evenly penetrates into the jointed surface.
- (5) Visually check that the tube and the valve socket are now firmly jointed continuous fillet.
- (6) Cool the valve body with a wetted cloth, as soon as the solder becomes solid. Do not operate the valve until the valve body has been cooled down.
- (7) After cooling, remove all flux to prevent surface corrosion.
- (8) Flush the tube and valve interior with water to remove all internal residues, as soon as piping installation is completed.

CHAPTER  
Valve Operation

Valve Operation

## 1. Cautions for Safety

 <b>CAUTION</b>	
	<ul style="list-style-type: none"> <li>(1) DO NOT apply too excessive force to operate the valves by such methods as using a pipe or any other device.</li> <li>(2) Never loosen the gland and cap bolts of pressurized valves.</li> <li>(3) DO NOT use valves in an intermediate position. Such use may damage ball seats and cause internal through-bore leakage.</li> </ul>
	<ul style="list-style-type: none"> <li>(4) For valves with the gland packing design, retighten the gland before operation of valves. Check a handle torque while retightening the gland so that the operation won't become too difficult due to over-tightening..</li> <li>(5) Valve should be kept fully open during the line pressure test. Fully closing valves during the test may deform the ball seats, leading to the occurrence of internal through-bore leakage.</li> <li>(6) When service temperature fluctuates, retighten the gland after the temperature is stabilized in preparation for occurrence of stress relaxation of the gland packing.</li> <li>(7) Gradually open valves to prevent damage of pipes, when high temperature fluids such as steam are handled.</li> <li>(8) Take some appropriate measures to prevent freezing, as needed.</li> </ul>

## 2. Operation

## 2.1 Lever handle

Rotation of the valve stem by 90 ° fully opens or closes the valve. To close the valve, turn the lever handle clockwise according to the letters and the mark indicating the direction. Counterclockwise rotation will open the valve.

Valve Operation




## 3. Daily Inspection

In order to operate your valves safely and satisfactorily, the daily inspection is very important. Here are the inspection items.

Inspection items	Areas to be inspected	Inspection Method	Remedial Measure
External Leakage	Gland areas	Visual check with soap solution	Retighten the gland. Replace the gland packing.
	Body to cap flange areas	Visual check with soap solution	Retighten cap bolts/nuts. Replace the O-ring.
	Threaded areas	Visual check with soap solution	Retighten each threaded areas. Replace the parts as needed.
	Body surface	Visual check with soap solution	Replace the valve.
Abnormal Noises	Valve body	Auditory check	Consult a piping engineer.
	Loosened bolting	Auditory check	Retighten bolting.
	Pipe vibration	Auditory check	Consult a piping engineer
Loosened Bolting	Bolts and Nuts	Visual and Tactile check	Retighten bolts and nuts.
Internal thru-bore leakage			Remove foreign object. Disassemble and inspect the valve components. (Replace the ball seats) Replace the valve.
Valve operation	Valve operating position	Visual Check	Make sure that the valve is in predetermined position.
	Disturbed operation	Tactile check Auditory check	Disassemble and inspect the valve components.

Valve Operation

## 4. Trouble Shooting and Corrective Measures

 <b>CAUTION</b>	
	<p>(1) Wear the protective items such as goggles, gloves, working boots.</p> <p>(2) More stringent protective measures may be necessary when handling toxic, inflammable or corrosive media.</p> <p>(3) Ensure to reduce the line pressure to the atmospheric level, before retightening the gland or cap bolting, and loosening or replacing packing rings and O-rings.</p> <p>(4) When replacing the packing or o-ring, reduce the line pressure to the atmospheric level. Operation should be carried out at the position where operators do not get a direct exposure of the media, even if such a blowout occurs.</p> <p>(5) Ensure to reduce the line pressure to the atmospheric level, before loosing bolts and nuts. Operation should be carried out at the position where operators do not get a direct exposure of the media.</p>
	<p>(6) DO NOT apply the lubricant to the pipes and valves, which handles oxygen.</p>

## 4.1 Leakage from the gland area

Retighten the gland, if leakage from this area is detected. Adequate torque should be applied when retightening the gland so that the valve operation won't become difficult. If it does not stop the leakage, the packing rings should be replaced.

## 4.2 Leakage from the flanged areas

Evenly retighten the bolting alternately and gradually in a star pattern.

Valve Operation

## 5. Trouble Shooting

Defect	Possible causes	Remedial measure
Disturbed valve operation	Foreign objects may have choked up the valve body cavity and stock around the ball seats.	Disassemble and inspect the valve components.
Excessive valve operating torque	Foreign objects may have stuck to the stem.	Remove the foreign objects and check the valve.
	Foreign objects may have choked up the valve body cavity and stock around the ball seats.	Flush the built-up objects by the media with the valve slightly open. Disassemble and inspect the valve.
	The gland may have been overly tightened.	Loosen the gland once and adequately retighten it so that the leakage through the gland does not occur.
Leakage from the gland area	Loose gland..	Retighten the gland.
	Damage on the gland packing.	Replace the gland packing..
Internal through-bore leakage	Damage on the ball seats.	Disassemble and inspect the valve. Replace the ball seats.
Abnormal noise or vibration	Loose bolts and nuts.	Retighten the bolts and nuts.



## CHAPTER

### Periodic Inspection and Maintenance of Valves

Periodic Inspection and Maintenance of Valves

1. Periodic Inspection



- 1.1 A periodic inspection with valves mounted to pipelines is recommended at least once a year.
- 1.2 Ensure the smooth operation and safety of valves before inspection.
- 1.3 Inspection items and methods are same as daily inspection. See Chapter V for the items and methods suggested.
- 1.4 Where valves and adjoining piping are not daily inspected or not operated for a long period of time, a periodic inspection is also recommended. (A periodic inspection should be carried out on all valves.)
- 1.5 It is recommended to replace the gland packing and o-rings every time the periodic inspection is conducted.



Periodic Inspection and Maintenance of Valves

2. Inspection and maintenance

In case pipelines or facilities where valves are installed are shut down for the pipeline inspection, dismantle the valves from the pipelines and perform the shell tests and seat leakage tests as well as operation tests, if needed. If any defect is found, disassemble the valves for further inspection. The valves must pass required inspections before being sent back to the pipelines or facilities for reinstallation.

2.1 Cautions for dismantle of the valves from pipelines or installation of the valves on pipelines.

 <b>WARNING</b>	
	<p>(1) Discharge the fluid from the pipes and reduce the line pressure to the atmospheric level when dismantling valves. Trapped pressure or fluid is very dangerous and cause accidents resulting in personal injury. In case of installation of pipe end service, the fluid might enclose between the valve and the blank plugged end. Open the valve and discharge the fluid from the pipe before the blank plugged end removal.</p> <p>(2) Discharge the fluid and pressure trapped within the valve body with the valve intermediate position before dismantling.</p> <p>(3) In case fluid is toxic, inflammable or corrosive, remove the fluid completely from pipes and internal valves.</p> <p>(4) Take protective measures to prevent direct exposure to the fluid and catching fire.</p> <p>(5) Keep off the working area to prevent personal injury if valves are installed at higher places.</p>

 <b>CAUTION</b>	
	<p>(1) Wear the protective items such as goggles, gloves and working boots.</p> <p>(2) Keep a secure footing for valve dismantle and installation.</p>

Periodic Inspection and Maintenance of Valves

## 2.2 Assembly and disassembly

Refer to Chapter VII for assembly and disassembly procedure.

## 2.3 Test and Inspection



Refer to the following procedure for test and inspection.

### 2.3.1 Operation Test

- (1) Check smooth operation of valves without galling or sticking of internal valve components.
- (2) Check that the stem is firmly assembled with the ball.
- (3) Ensure that there should be no offset of the ball port and ball seats in the fully open position. The ball should not be protruded into the valve port other than the rounded surface of the ball port edges.

### 2.3.2 Shell Test and Seat Leakage Test

- (1) Care for shell test and seat leakage test

 <b>CAUTION</b>	
	<ol style="list-style-type: none"> <li>(1) Wear the protective items such as goggles, gloves and working boots.</li> <li>(2) Before shell test and seat leakage test begin, take some precautions for operators safety.</li> </ol>

- (2) Shell Test and Seat Leakage Test

All valves should be subjected to a hydrostatic or pneumatic shell test and seat leakage test at the required test pressures after reassembly.

Refer to JIS B 2003 or MSS SP-110 for test methods and procedures.



## CHAPTER



### Disassembly and Reassembly of Valves

Disassembly and Reassembly of Valves

1. Disassembly procedure

1.1 Care for disassembly

 <b>WARNING</b>	
	(1) Operator should take an appropriate caution for not being exposed to the fluid or catching fire.

 <b>CAUTION</b>	
	(1) Keep valves fully open position during valve swing-away in order to protect the ball surface. (2) Wear the protective items such as goggles, gloves and working boots. (3) Pay attention not to catch fingers during disassembly.

1.2 Before Disassembly

1.2.1 Place the valve in a dust-free place.

1.2.2 Take care not to damage the flange surface, ball, stem and other parts.

Disassembly and Reassembly of Valves

1.3 Disassembly procedure

1.3.1 Full open the valve.

1.3.2 Remove the cap bolts (35), then disassemble the body (1) and body cap (2).

It is available to swing away the body from the body cap loosening 4 bolts and remove one bolt.

1.3.3 Remove the o-ring (45) and ball seats (30) from the body (1).

1.3.4 Full close the valve, and remove the ball (4) from the body (1).

1.3.5 Remove the handle nut (10), washer (16), lever handle(9) and gland from the stem(3) or the body(1).

1.3.6 Push the stem (3) down into the body cavity to remove it from inside the body (1).




1.3.7 Remove the packing (8) from the body (1).

1.3.8 Remove the thrust washer (47) from the stem (3) or the body (1).

Disassembly and Reassembly of Valves

## 2. Reassembly procedure

## 2.1 Care for reassembly

 <b>CAUTION</b>	
	(1) DO NOT apply the lubricant to the pipes and any parts of contact with fluid, which handles oxygen.
	(2) Wear the protective items such as goggles, gloves and working boots. (3) No open flame or smoking should be allowed in the working area. (4) Take care not to catch fingers in flanges during assembly. (5) Soft parts such as packing, o-ring, ball seat and thrust washer shall be replaced to the new one. It may cause the leakage when they are reused.

## 2.2 Before Assembly

- 2.2.1 Check all parts before assembly. If any problem is detected, replace the valve.
- 2.2.2 Prepare new soft parts (ball seat, packing, o-ring and thrust washer) before assembly.
- 2.2.3 Clean all parts for reuse to thoroughly remove dust and other foreign objects.
- 2.2.4 Assemble the valve in a dust-free area.
- 2.2.5 Take care not to damage all parts especially the ball, ball seats and stem.
- 2.2.6 Keep in mind that all threads should be securely tightened.



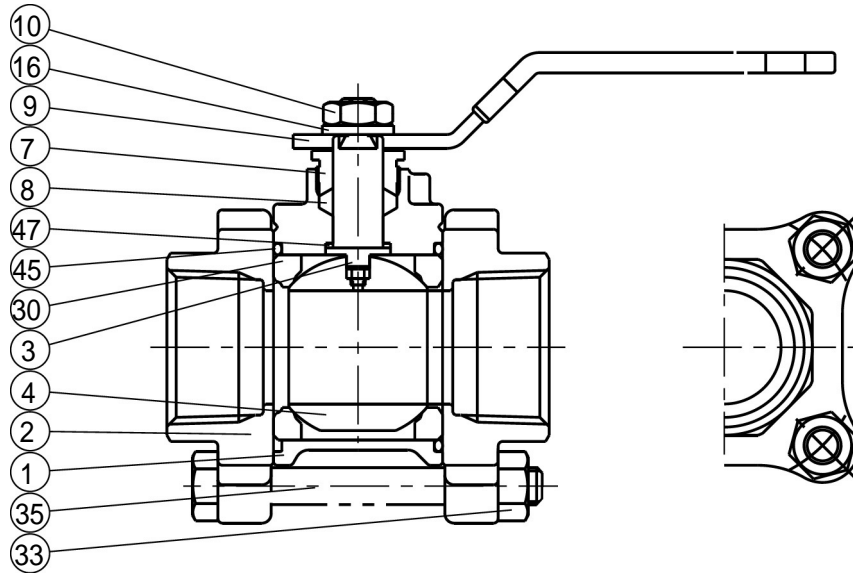
Disassembly and Reassembly of Valves

## 2.3 Reassembly procedure

- 2.3.1 Mount the thrust washer (47) on the stem (3).
- 2.3.2 Assemble the stem (3) into the body (1) from the body interior. Ensure that the stem collar securely contacts the body and place the stem (3) in closed position.
- 2.3.3 Assemble the packing (8) to body (1), and tighten it by the gland (7).
- 2.3.4 Assemble the lever handle (9) and washer (16) to the stem (3), then tighten the handle nut (10) temporary. Keep the valve fully closed position.
- 2.3.5 Place the ball (4) into the body (1) with connecting to stem.
- 2.3.6 Open the valve then assemble the ball seats (30) and o-rings (45) on the body (1).
- 2.3.7 Securely screw the 4 hexagonal bolts (35) and nuts (33) after body (1) install between the two body caps. Bolts/nuts should be tightened evenly, gradually and alternately in a star pattern. Concerning tightening torque, refer to the table of Chapter section 1.3.6 of this manual.
- 2.3.8 Adjust the gland(7). If needed.
- 2.3.9 Tighten the handle nut (10).

Disassembly and Reassembly of Valves

3. Cross-sectional assembly drawing.



No.	Parts Name	No.	Parts Name
1	Body	30	Ball Seat
2	Cap	33	Cap Nut
3	Stem	35	Cap Bolt
4	Ball	45	O-ring
7	Gland	47	Thrust Washer
8	Gland Packin		
9	Lever Handle		
10	Handle Nut		
16	Spring Washer		

This drawing introduces a typical construction of the valve.  
Refer to the approval drawing before disassembly and assembly.