
KITZ

Operation Manual

For

SCHBSL Type Butterfly Valves

【Lug Type】

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 the valve operating personnel.

KITZ CORPORATION

This operation manual applies to the manually operated KITZ SCHBSL type butterfly valves (lug type).

For automated operation, refer to the operation manual prepared by the manufacture of the 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.

Both "Warning" and "Caution" indicate important safety instructions. Please be sure to follow them.



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 the 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.

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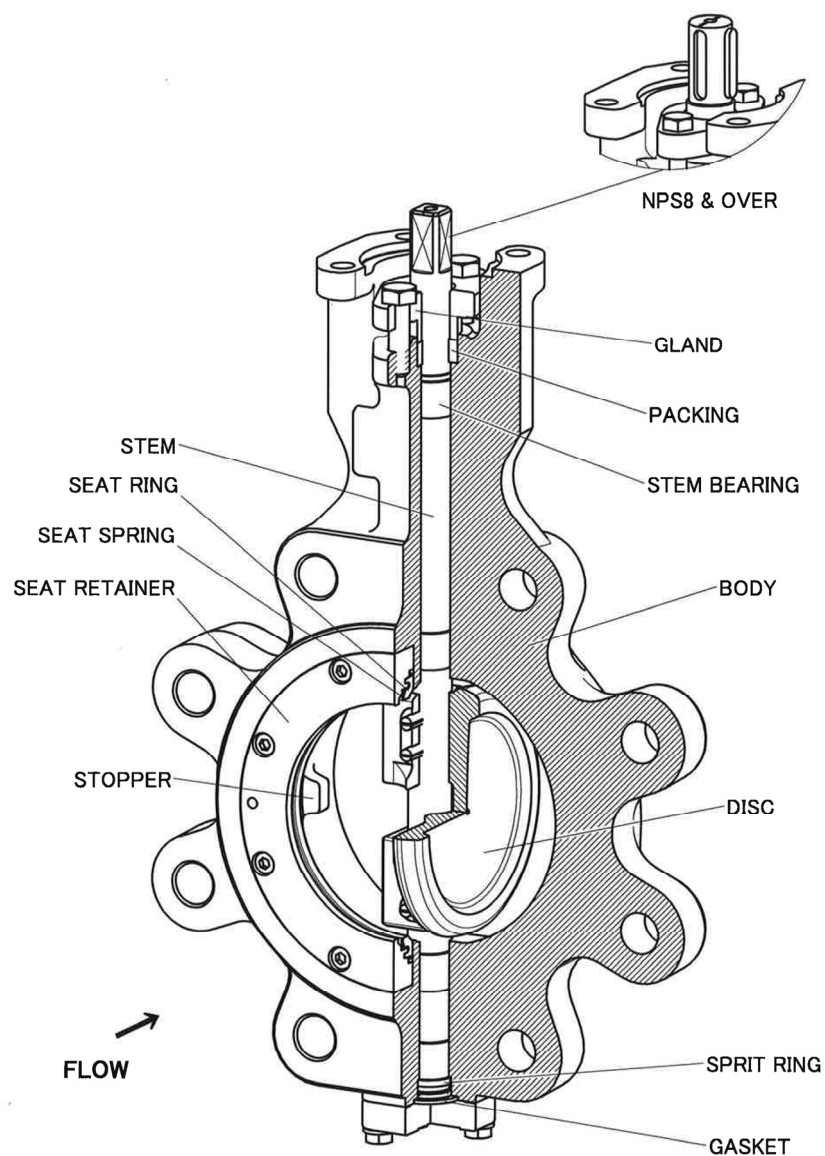
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I . Construction and Design Features

I . Construction and Design Features

1. Construction and Function

- 1.1 A typical construction of the SCHBSL type butterfly valves (lug type) is as shown below.
- 1.2 Rotation of the stem by 90° opens and closes the valve.
- 1.3 Designed for use in the fully open, fully closed, or intermediate position for flow control.
- 1.4 Double offset structure is adopted for smooth opening and closing operation.
- 1.5 Both direct flow and reverse flow can be shut off. However, the flow from the retainer side is recommended.



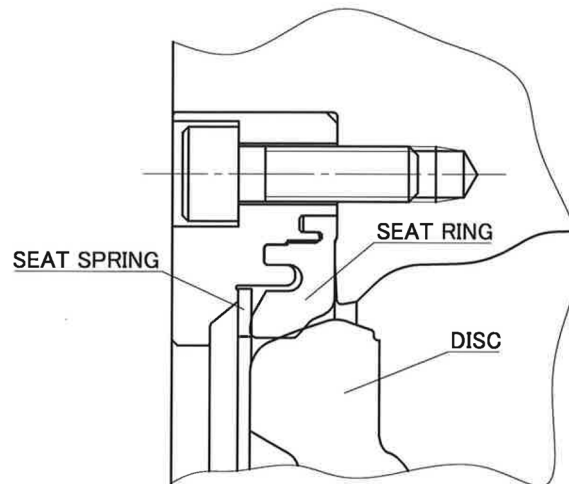
This illustration shows a typical construction.

I . Construction and Design Features

2. Features

2.1 Seat structure for both flows

Sheet structure for both flows to maintain stable sealing performance.

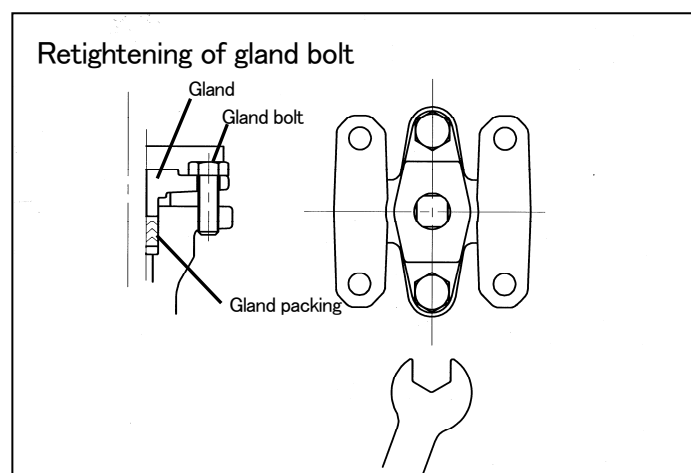


2.2 Long life RPTFE seat ring

Filler-containing fluororesin (RPTFE) which has long endurance performance as well as low friction and wear coefficients is adopted as the seat material. The seats have high durability and they are available for a variety of fluids. See the KITZ catalog for details.

2.3 Retightening of gland bolts

Gland bolts can be retightened quickly by directly applying a spanner to the gland bolts which are located between the upper part of the valve and the operating lever or gear unit.



2.4 Face-to-face dimensions

The face-to-face dimensions comply with MSS SP-68(API609 Class 300).
However, NPS 21/2B, 5B are the KITZ standard.

I . Construction and Design Features

2.5 Bidirectional flow

This valve can be used for shutting off both the direct flow and reverse flow. However, in order to avoid the deterioration of the seat sealing performance, please use this valve to seal a recommended flow direction.

3. Specifications and Pressure-Temperature Rating

3.1 Specifications

3.1.1 Maximum service pressure

Class 150	_____	1.96 MPa (285psi)
Class 300	_____	5.1 MPa (740psi)

3.1.2 Temperature range of service fluid

For use in air conditioning _____ -29 ~ +100°C (-20 ~ 212 °F)

For API PT ratings _____ -29 ~ +204°C (-20 ~ 400 °F)

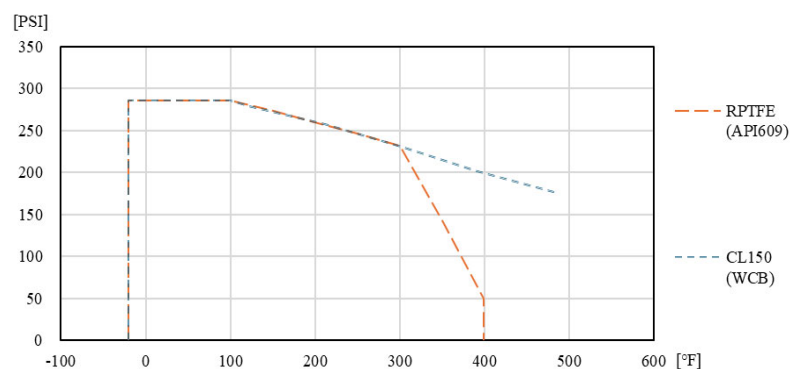
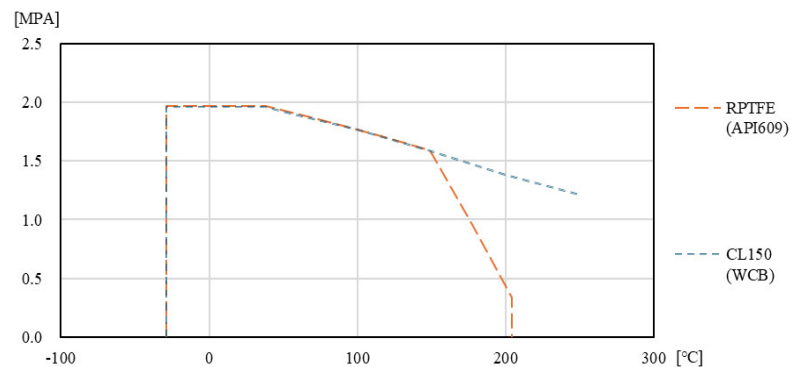
* Refer to P-T rating chart for more details. (No freezing of fluid)

3.1.3 Applicable flange

Class 150	_____	ASME B16.5	Class 150
Class 300	_____	ASME B16.5	Class 300

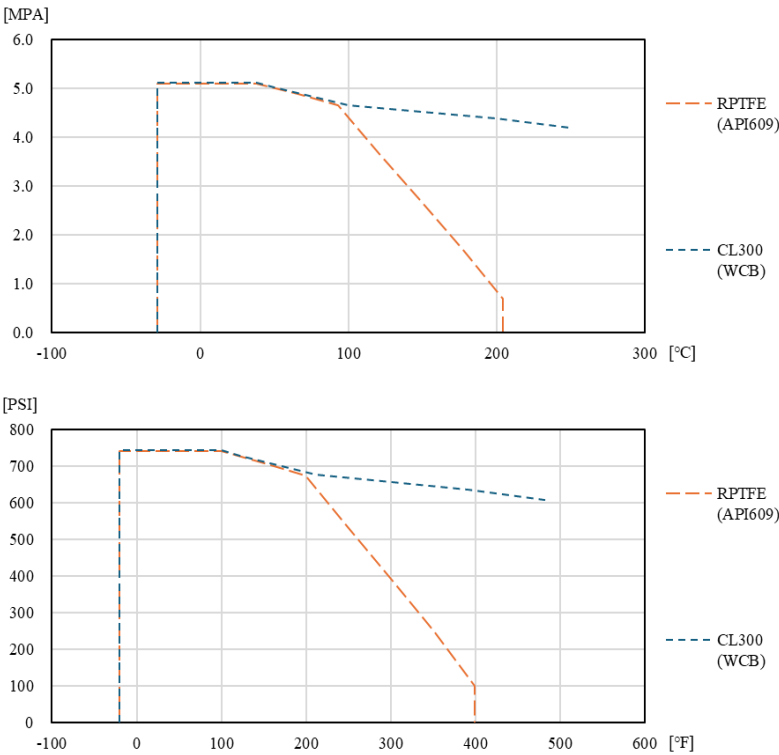
3.2 Pressure – Temperature Rating (P-T Rating)

•Class 150



I . Construction and Design Features

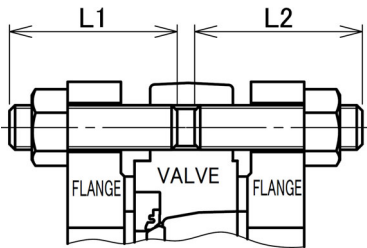
•Class 300



4. Size and Number of Piping Bolt and Nut (Hexagon Bolt)

The bolt length is the length when gasket and steel flange are used.

4.1 Stud Bolts & Nuts



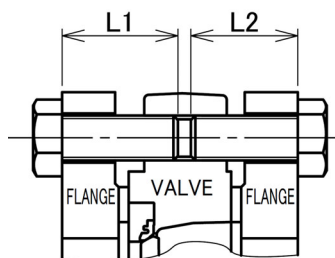
unit : mm (inch)

STUDS BOLTS&NUTS (NOTE 1)														
Nominal valve Size (NPS)	ASME Class150								ASME Class300					
	Thread	L1			L2			Thread	L1			L2		
	size	qty	Length		qty	Length		size	qty	Length		qty	Length	
			mm	inch		mm	inch			mm	inch		mm	inch
2 1/2	5/8-11UNC	4	70	2.75	4	70	2.75	3/4-10UNC	8	75	3	8	75	3
3	5/8-11UNC	4	70	2.75	4	70	2.75	3/4-10UNC	8	80	3.25	8	80	3.25
4	5/8-11UNC	8	75	3	8	75	3	3/4-10UNC	8	90	3.5	8	90	3.5
5	3/4-10UNC	8	75	3	8	75	3	3/4-10UNC	8	95	3.75	8	90	3.5
6	3/4-10UNC	8	75	3	8	75	3	3/4-10UNC	12	95	3.75	12	95	3.75
8	3/4-10UNC	8	80	3.25	8	80	3.25	7/8- 9UNC	12	115	4.5	12	110	4.25
10	7/8- 9UNC	12	95	3.75	12	95	3.75	1- 8UNC	16	130	5	16	120	4.75
12	7/8- 9UNC	12	100	4	12	100	4	1 1/8- 8UN	16	140	5.5	16	130	5

Note 1) Nut: ASME B18.22 Heavy Hex Nut

I . Construction and Design Features

4.2 Machine Bolts



unit : mm (inch)

MACHINE BOLTS (NOTE 2)														
Nominal valve Size (NPS)	ASME Class150							ASME Class300						
	Thread	L1			L2			Thread	L1			L2		
	size	qty	Length		qty	Length		size	qty	Length		qty	Length	
			mm	inch		mm	inch			mm	inch		mm	inch
21/2	5/8-11UNC	4	45	1.75	4	45	1.75	3/4-10UNC	8	48	1.875	8	48	1.875
3	5/8-11UNC	4	48	1.875	4	48	1.875	3/4-10UNC	8	50	2	8	50	2
4	5/8-11UNC	8	50	2	8	50	2	3/4-10UNC	8	55	2.25	8	55	2.25
5	3/4-10UNC	8	50	2	8	50	2	3/4-10UNC	8	65	2.625	8	60	2.375
6	3/4-10UNC	8	50	2	8	50	2	3/4-10UNC	12	70	2.75	12	65	2.5
8	3/4-10UNC	8	55	2.25	8	55	2.25	7/8- 9UNC	12	80	3.125	12	75	3
10	7/8- 9UNC	12	65	2.5	12	65	2.5	1- 8UNC	16	90	3.5	16	85	3.375
12	7/8- 9UNC	12	70	2.75	12	70	2.75	11/8- 8UN	16	100	4	16	90	3.5

NOTE2) Bolt lengths are set based on the following conditions

- Gasket thickness of 1.6mm (0.06 inches).
- Minimum flange thickness of weld neck flanges per ASME B16.5

5. Pipes for Piping

The pipes shown in the table below with a mark “ O ” are applicable when the valve is installed to the welded flanges. Or the flanges shall be larger than the minimum pipe inside diameter.

Nominal valve Size (NPS)	ASME Class 150	ASME Class 300	Minimum inside diameter of pipe	
	Sch 40	Sch XS	mm	inch
21/2	O	O	53	2.07
3	O	O	73.5	2.88
4	O	O	93	3.66
5	O	O	121	4.74
6	O	O	143	5.63
8	O	O	191	7.51
10	O	O	236	9.27
12	O	O	286	11.25

I . Construction and Design Features

6. Gaskets for Piping

 CAUTION	
	● Installation of gasket between the pipe flange and the valve is required. Use the gasket as shown below. 【 Gasket Type 】 ▪ Joint seat gasket made of non-asbestos materials ▪ Tetrafluoroethylene (filler-containing) resin seat gasket ▪ PTFE wrapping gasket ▪ Spiral wound gasket 【 Gasket Configuration 】 ▪ Full face gasket for flat face or raised face flange 【 Dimension】 ▪ Compliance with ASME - Thickness of seat gasket shall be 1.5 mm (0.06 inches) and above.

Standard commercially available piping gaskets can be used or not as follows.

- Spiral gasket with inner and outer rings

Nominal valve Size (NPS)	ASME Class 150	ASME Class 300
21/2	×	×
3	×	△
4	○	○
5	○	○
6	○	○
8	○	○
10	○	○
12	○	○

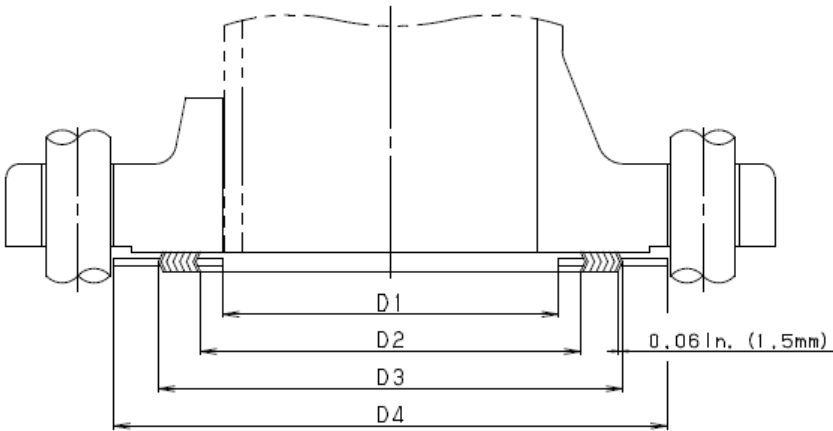
○ : Available

△ : Available (However, please ensure adequate centring with the body.)

× : Not available (standard commercial gaskets cannot be used. Prepare and use the special gasket in the table below.)

※ If you have any questions, please contact us.

I . Construction and Design Features



unit : mm (inch)

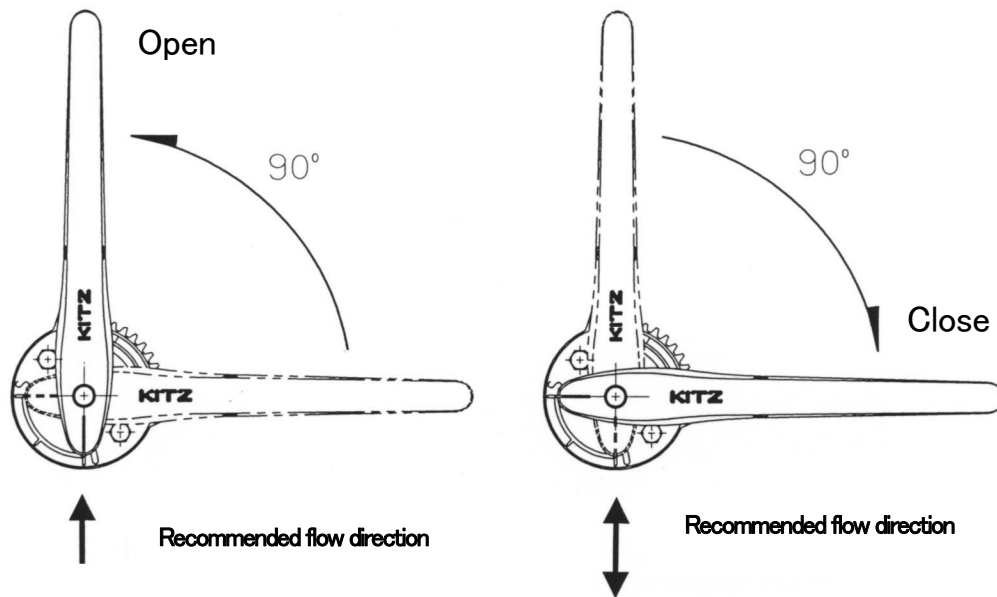
Nominal valve Size (NPS)	ASME Class 150								ASME Class 300							
	D1		D2		D3		D4		D1		D2		D3		D4	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
2 1/2	75	2.95	83	3.27	106	4.17	123	4.84	75	2.95	83	3.27	106	4.17	129	5.08
3	89	3.50	101	3.98	124	4.88	136	5.35	89	3.50	101	3.98	124	4.88	148	5.83

Ⅱ . Valve Operating Device

II. Valve Operating Device

1. Lever Handle Type

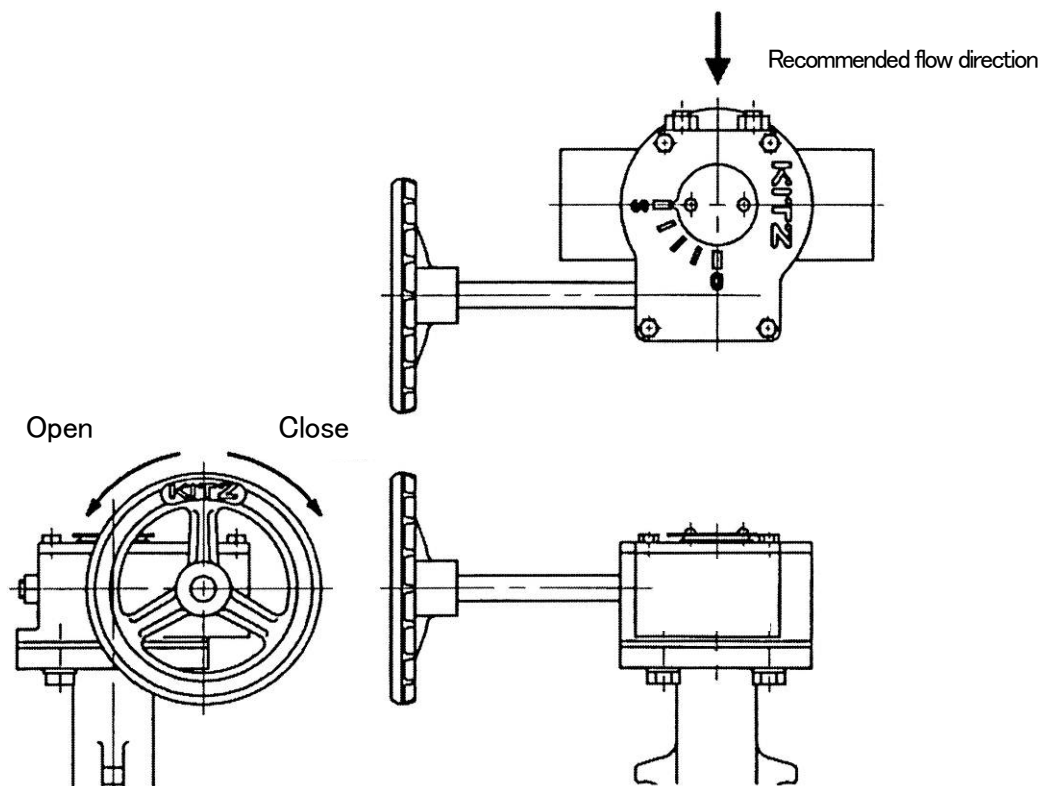
- 1.1 A lever handle is directly mounted to the valve.
- 1.2 Turning the lever handle by 90 degrees clockwise will close the valve, and turning the lever handle by 90 degrees counterclockwise will open the valve.



II. Valve Operating Device

2. Gear Type

- 2.1 A gear operator (reduction gear) is mounted to the valve.
- 2.2 According to the letter or arrow on the handwheel, turning the handwheel clockwise will close the valve and turning the handwheel counterclockwise will open the valve.
- 2.3 The handwheel operating torque varies between the fully closed position and fully open position and with the valve size.
- 2.4 The gear operator is a device to transmit a large torque to the valve stem by converting the torque from the drive shaft by means of the reduction gears.



III. Transportation and Storage

III. Transportation and Storage

1. Transportation

1.1 Precautions

 WARNING	
	● Keep off the valve lifting area to prevent personal injury when a valve is lifted for removal or installation.

 CAUTION	
	● Take care not to damage the painted surfaces of the valve. Repair the damaged portions as required to prevent corrosion. ● Pay attention to handling and storage of carton-packaged products. High humidity may damage the carton and the product.

1.2 Transportation

1.2.1 Keep valves in the original packages during transportation and until just before installation.

If the dustproof/protection cover comes off or it is lost during transportation, immediately take measures for valve protection.

1.2.2 Never apply any excessive impact to the valve by throwing, dropping, or dragging it.

III. Transportation and Storage

2. Storage

2.1 Precautions

 CAUTION	
	● DO NOT store the valve in a corrosive environment. It may cause corrosion in the threaded portions of the valve. ● DO NOT remove the dustproof/protection cover until just before the installation. Take measures to prevent dust from entering the valve and damaging the internal parts such as seat ring. ● DO NOT apply any heavy load to the valve. Overloading may damage the valve ● DO NOT pile up the products carelessly. The products may be damaged and personal injury may occur due to the collapse of cargo.

2.2 Storage

- 2.2.1 Store valves in a dust-free and well ventilated indoor area with low humidity, avoiding direct sunlight.
- 2.2.2 Store valves in box and put it on a pallet or rack. Storing valves directly on the ground or concrete floor shall be avoided.
- 2.2.3 When valves are stored outdoors unavoidably, protect them from rain, direct sunlight or dust with a waterproof sheet.

IV. Valve Installation

IV. Valve Installation

1. Precautions for Installation

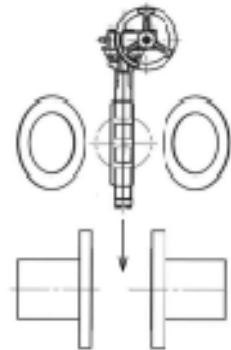
 WARNING	
	● Check the valve specifications with the catalog and/or the attached nameplate. The valve trim and seat materials determine the operating pressure, fluid and the temperature range. When the valve is used beyond the specifications, it may result in failure such as leakage.

 CAUTION	
	● Keep a secure footing when removing and mounting a valve. ● Sufficient lighting shall be provided for valve installation. ● Use a support stand when the valve is heavy.
	● DO NOT directly install the valve to a check valve or pump. The disc may hit against the connecting device and cause damage to the disc.

- 1.1 Allow sufficient space for operation, installation, disassembly and subsequent maintenance of the valve.
- 1.2 For a smooth operation, inspection and maintenance, take appropriate measures for the valve installed in a small space.
- 1.3 Valves shall not be installed in a place where valve functions may be hampered by the outer forces such as vibrations.

IV. Valve Installation

2. Precautions for Piping

 CAUTION	
	● Install the valve after the flanges and pipe weld connections have been completely cooled down. ● Edges of the flange welded areas shall be thoroughly chamfered to protect the valve surface. ● Remove any foreign objects such as sand, dust and weld spatter from the connecting piping. ● Flange surfaces shall have no damage, deformation or irregularities. ● Align the upstream side flanges and the downstream side flange accurately. Inaccurate alignment may cause pipe leakage.
	 ● Install the valve so that the arrow on the body show the flow direction as shown below. High pressure (upstream) side when valve is fully closed ➔ Low pressure (downstream) side when valve is fully closed In the case the valve is used for bidirectional flow service, the arrow shall show the flow direction from the side with the higher differential pressure. ● Make sure to install a new gasket when installing a valve. ● Installation to stub end flanges (wrap joint, stainless steel pipe fittings with collared end) is not allowed. ● Install or remove the valve with the valve in the fully closed position. ● Retighten the gland bolts properly so that the valve operating force does not become too great. Tighten the gland bolts alternately with an even force to avoid over-tightening. If leakage is observed from the gland section due to stress relaxation, retighten the gland bolts. ● If insulation of the valve is necessary, insulate the valve not to cover the gland section so that the gland bolts can be retightened.

IV. Valve Installation



- Lug type butterfly valves are available to use the dead end service on following conditions.
 - a)Non-shock water
 - b)Lever or gear operated type(not automatic operated type)
 - c)Maximum pressure;Full working pressure of the valve
 - d)To be locked on full closed position
 - e)Within 4 days(Note1)

Note1)It is recommended to use the blank flange for long period of time beyond 4 days.

If the valve is used beyond of these conditions,it may cause the external leakage.

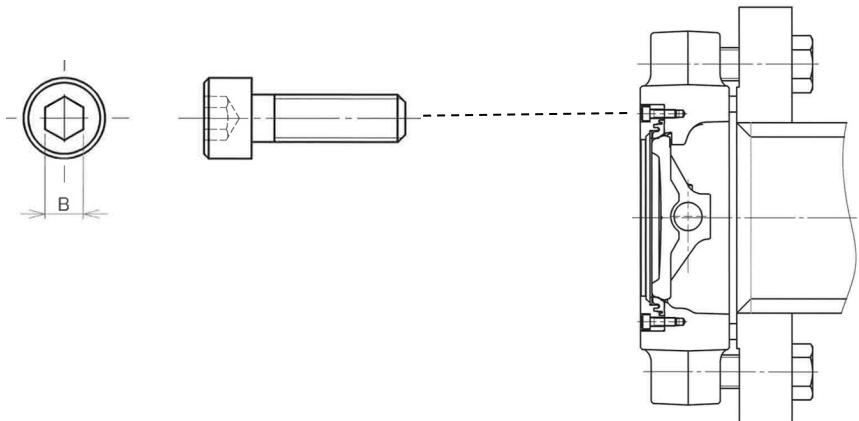
- When leakage occurs near the retainer bolt in the dead-end service in the reverse flow direction.

Retighten the retainer bolt with a hexagonal wrench using the tightening torque shown in the table below.

If the leakage does not change even after retightening, replace the sheet after removing the fluid from the piping.



VALVE SIZE (NPS)	Retainer Bolt	Opposite side dimension B		Tightening torque	
	(nominal diameter)	mm	inch	Nm	lbf·in
2 1/2~3	M4	3	0.118	3.5	31
4	M5	4	0.157	7	62
5-6	M6	5	0.197	12	106
8	M8	6	0.236	30	266
10-12	M10	8	0.315	55	487



Reverse pressure dead-ended service

IV. Valve Installation

3. Installation

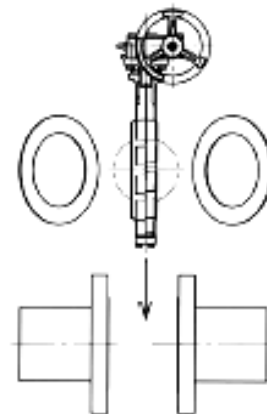
- 3.1 Set jack bolts, if required, to adjust the dimension between the pipe flanges. The dimension between the pipe flanges shall be 6 to 10 mm (0.2 to 0.4 inch) wider than the face-to-face dimension of the valve.

- 3.2 [When sandwiching the valve between the flanges on both sides]

Install the valve between the flanges. Set two bolts and nuts in the lower section temporarily and insert a gasket to each side of the valve. Then set two bolts and nuts in the upper section temporarily.

[when mounting for each flange on one side]

Adjust the valve to the flange. Temporarily tighten the two lower bolts, insert a gasket between the valve and the flange, and temporarily tighten the two upper bolts.



sandwiching between the flanges
on both sides

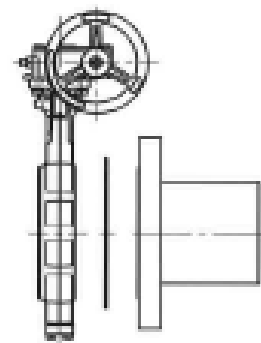
- 3.3 Loosely tighten two upper bolts and two lower bolts. Adjust the valve in the correct position.

- 3.4 Before tightening the bolts for piping, fully open the valve and make sure that the disc does not hit against the inside of the flanges.

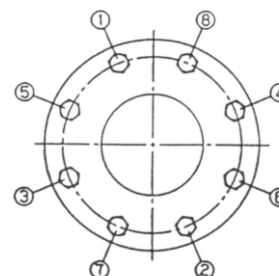
- 3.5 Attach all of the remaining bolts and nuts.

- 3.6 Tighten the bolts evenly and alternately to avoid uneven tightening.

- 3.7 Raise the line temperature and pressure gradually during the test operation. Retighten the bolts as required.



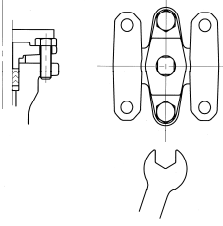
mounting for each flange on one side



V. Valve Operation

V. Valve Operation

1. Precautions

 CAUTION	
	● DO NOT loosen the bolts on the gland and piping section while the fluid is under pressure. ● DO NOT use a fully-closed valve as a blank flange.
	 ● Retighten the bolts of the gland section before use. At this time, while operating the handle, tighten it to the extent that the operating force does not become extremely heavy. When retightening the gland, take care not to tighten it unnecessarily. ● Fully open the valve when a pressure test (with the maximum allowable pressure × 1.5 at maximum) is performed on the pipeline. ● The lever handle or handwheel must be operated by hand. Use of a tool such as a pipe or wrench may cause damage to the valve. ● When the valve is used at the slightly open position by 30 degrees or less, contact KITZ for technical advice. 

2. Open–Close Operation

2.1 Lever handle type

A clockwise rotation of the lever handle by 90 degrees closes the valve and counterclockwise rotation by 90 degrees opens the valve.

2.2 Gear type

A clockwise rotation of the handwheel according to the arrow closes the valve and counterclockwise rotation opens the valve.

V. Valve Operation**3. Daily Inspection**

Carry out daily maintenance and inspection on the valves in use.

Inspection items are as shown below.

Inspection Items	Areas to be inspected	Inspection Methods	Countermeasures
External leakage	Gland area	Visual check Soap water	Retighten the gland bolts. Change the gland packing.
	Pipe connections	Visual check Soap water	Retighten the piping bolts and nuts. Replace the gasket.
	Valve surface	Visual check Soap water	Replace the valve.
Abnormal noise	Valve body	Auditory check	Consult a piping engineer.
	Looseness of bolts	Auditory check	Retighten the bolts and nuts.
	Vibration of piping	Auditory check	Consult a piping engineer.
Looseness of bolts and nuts	Bolts and nuts	Visual check Tactile check	Retighten the bolts and nuts.
Seat leakage	–	–	Remove foreign objects from the valve. Disassemble and inspect the valve. (Replace the seat ring.) Replace the valve.
Operational failure	Open/Closed position	Visual check	Put the valve is in the predetermined open/closed position.
	Lever handle Handwheel	Tactile check Auditory check	Disassemble and inspect the valve.

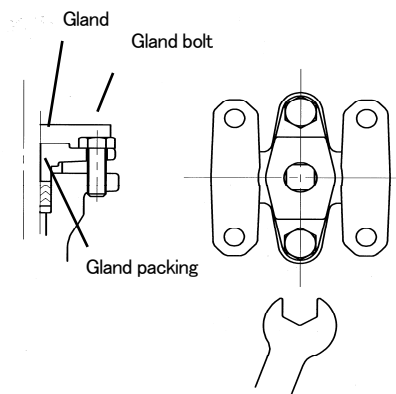
V. Valve Operation

4. Precautions and Countermeasures

 CAUTION	
	● Wear protective equipment such as goggles, gloves and safety footwear. ● Take adequate safety measures against toxic, inflammables or corrosive fluid. ● Reduce the line pressure to the atmospheric level before retightening the packing and gaskets. ● When retightening the pipe flanges, take protective measures against the direct exposure to the fluid caused by the damage of gasket. ● Reduce the line pressure to the atmospheric level when the packing and gaskets are replaced or bolts and nuts are loosened.

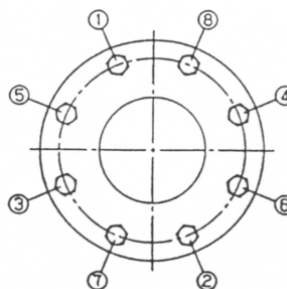
4.1 Leakage from gland

Retighten the gland bolts if leakage from the gland area is detected. Evenly tighten the bolts alternately as shown below. When retightening the bolts, apply adequate torque so that the valve operation will not be impaired. If it does not stop the leakage, replace the packing.



4.2 Leakage from pipe flange

Retighten the flange bolts evenly and alternately in a star pattern as illustrated.



V. Valve Operation

5. Troubleshooting

Defects	Possible Causes	Countermeasures
Excessive valve operating torque	Foreign objects around the stem	Remove the foreign objects and check the valve.
	Foreign objects around the seat ring	Flush the valve bore with the valve slightly open and remove the foreign objects. Disassemble and inspect the valve.
	Overtightening of gland packing	Loosen the gland bolts and adequately retighten them.
Leakage from the gland area	Loose gland bolts	Retighten the gland bolts.
	Uneven tightening of the gland bolts	Evenly retighten the bolts.
Leakage from the seat when in the fully closed position	Damage on the seat ring.	Disassemble and inspect the valve. (Replace the seat ring.)
Back leak (For reverse pressure dead-ended service)	Loose retainer bolt	Retighten retainer bolt.
	Deformation of the seat ring	Disassembly and inspection.
Abnormal noise or vibration	Loose bolts and nuts	Retighten the bolts and nuts.

VI. Periodic Inspection

VI. Periodic Inspection

1. Periodic Inspection

- 1.1 Carry out periodic inspection about once a year with the valve installed on the piping.
- 1.2 Make sure that the valve operates smoothly and safely.
- 1.3 Refer to “V. Daily Inspection” for the inspection items and inspection methods.
- 1.4 Carry out periodic inspection of the valves which are not operated for a long period of time or not daily inspected. (Check all the valves.)
- 1.5 It is particularly important to thoroughly check the valves used for the following service.
 - a) Where performance failure of valves may result in a major shutdown of the entire unit.
 - b) Where the fluid has high viscosity and may get stuck to and built up inside the valves.
 - c) Where corrosion and/or wear by the fluid is expected.

Remove the valve from the pipeline and disassemble the valve for inspection, if needed.

- 1.6 Replace the gasket and gasket with new ones when necessary during the periodic inspection.

VI. Periodic Inspection

2. Maintenance and Inspection

When the piping facilities to which the valve is installed are to be set open for periodic maintenance and inspection, carry out the seat leakage test and external leakage test and operation test as required.

If any defect is found, disassemble the valve for further inspection. The valve must pass the required inspections.

2.1 Precautions

 WARNING	
	● Discharge the internal fluid from the piping and reduce the line pressure to the atmospheric level when removing the valve from the piping. It is dangerous to remove the valve under the pressure or with some fluid trapped inside the valve. Spout of residual fluid may cause personal injury. ● Take measures for maintenance of the valves which handles toxic, flammable, corrosive or explosive fluid. For storage and discard of such valves, take appropriate safety measures so that nobody touches untreated valves. ● For the valves with an electric or pneumatic actuator, refer to the operation manuals prepared by the actuator manufacturer before use. ● Keep off the valve lifting area to prevent personal injury when a valve is lifted for removal or installation.

 CAUTION	
	● Wear protective equipment such as goggle, gloves and safety footwear. ● Keep a secure footing for removal and installation of valve. ● Use a support stand to firmly hold and align the valve and piping. ● Before removing a valve from the piping, mark the original position on the valve body and the coupled pipe flanges to make the reassembly easy. ● Install a new gasket when the valve is installed.

VI. Periodic Inspection

2.2 Disassembly and Reassembly

Disassemble and reassemble the valve according the instruction in Section VII of this manual.

2.3 Test and Inspection

Check the following for the test and inspection.

2.3.1 Operation test

- (1) The valve shall be operated smoothly with the lever handle or gear operator without galling or sticking.
- (2) The stem shall be firmly connected to the disc.
- (3) When the valve is in the fully open position, the disc shall be parallel to the fluid flow.

2.3.2 Shell test and seat leakage test

(1) Precautions

 CAUTION	
	● Wear protective equipment such as goggles, gloves and safety footwear. ● Conduct shell test and seat leakage test with attention to safety.

(2) Shell test and seat leakage test

All valves are subject to a hydrostatic or pneumatic shell test and seat leakage test at the required pressure after they are reassembled. Refer to the MSS SP-61 or API 598 for test methods.

VII. Disassembly and Reassembly

VII. Disassembly and Reassembly

1. Disassembly

1.1 Precautions

 WARNING	
	● Use caution not to be exposed to the remaining fluid in the valve and not to catch fire.

 CAUTION	
	● Wear protective equipment such as goggles, gloves and safety footwear. ● Take care not to get your hands or finger caught during disassembly. ● When disassembling a large valve, use an appropriate machine to lift the valve. ● Be careful not to get your hand or fingers hurt with a screwdriver (tool for removal) when removing a seat ring and seat spring from the seat retainer.

1.2 Before Disassembly

- 1.2.1 Perform disassembly in a dust-free area.
- 1.2.2 Take care not to damage the flange contact surfaces, disc sealing surfaces, stem, etc.

VII. Disassembly and Reassembly

1.3 Disassembly

- 1.3.1 Put matchmarks on the stem (003) and disc (004) connecting portion. Then fully open the valve and remove the taper pins (110) which connect the stem (003) and the disc (004). When removing the taper pins, hit the split end of the taper pins (110) with a plastic hammer.
- 1.3.2 Put matchmarks on the operating device and the valve for reassembly in the correct direction. Remove the hexagonal bolts and nuts which connect the body (001) and the operating device (lever handle ^{Note 1)}, gear unit, pneumatic or electric automatic operating device) to remove the operating device.
- 1.3.3 Remove the key (060) from the stem (003) if the nominal size of the valve is NPS 8 and above.
- 1.3.4 Remove the gland bolts (036) from the body (001) and then remove the gland (007).
- 1.3.5 Remove the end plate bolts (035) and then remove the spring washers (145B), end plate (147), gasket (019) and thrust washer (047).
- 1.3.6 Hit the upper part of the stem (003) with a plastic hammer until the split rings (187) appear. Then remove the split rings (187).
- 1.3.7 Remove the stem (003) and packing(008) from the upper portion of the body (001). Then remove the retainer bolt (132), seat retainer (150), seat spring(143) and seat ring (030).^{Note 2, 3)}
- 1.3.8 Remove the disc (004), packing (008) and stem bearings (067A and 067E).

Note 1) When removing the lever handle, remove the fixing bolt on the top portion of the lever in the first place

Note 2) There is a packing washer for nominal size NPS 12

Note 3) When the seat ring (030) and seat spring(143) are stuck to the seat retainer (150), take an appropriate measure such as warming them in hot water and remove the seat ring from the seat retainer with a flathead screwdriver (or an eyeleteer). Be careful not to hurt your hand with the screwdriver.

VII. Disassembly and Reassembly

2. Reassembly

2.1 Precautions

 CAUTION	
	● Wear protective equipment such as goggles, gloves and safety footwear. ● Take care not to catch fire during reassembly. ● Take care not to get your hands or fingers caught during reassembly. ● Use new packing or gaskets. Reuse of these parts may cause leakage. ● When reassembling a large size valve, use an appropriate lifting machine.

2.2 Before Reassembly

- 2.2.1 Check all the necessary parts before reassembly. If the valve function is dissatisfactory, replace the valve.
- 2.2.2 Prepare the consumable parts such as seat ring, seat spring, packing, gasket, cap screw and thrust washer before reassembly.
- 2.2.3 When the parts are reused, clean the reusing parts and completely remove the oil, dust or other foreign objects.
- 2.2.4 Perform reassembly in a dust-free place.
- 2.2.5 Take care not to damage the gasket contact surface, disc sealing section, stem and seat ring.
- 2.2.6 Tighten all the bolts and nuts securely.

VII. Disassembly and Reassembly

2.3 Reassembly

- 2.3.1 Apply rust inhibitor to the upper and lower stem holes on the body (001). Attach the stem bearings (067A) to the stem (003) and insert the stem bearing (067E) in the stem hole on the body.
- 2.3.2 Apply rust inhibitor to the groove of the seat retainer (150) and install the seat spring (143) and the seat ring (030) to the groove of the seat retainer (150) so that the notches on the seat ring (030) face toward the tapped holes on the seat retainer.
- 2.3.3 Apply rust inhibitor to the groove of the seat retainer attaching portion on the body (001). Then install the above-mentioned seat retainer assembly to the valve, apply anti-galling coating CALFOREX to the retainer bolt (132) screws, and temporarily fix the seat retainer to the extent that it will not fall off.
- 2.3.4 Set the disc (004) temporarily on the body (001) and align the stem holes on the disc (004) and the body (001). Then insert the stem (003) from the upper portion of the body by using a plastic hammer.
- 2.3.5 Install the split rings (187) to the stem (003) which protrudes from the lower portion of the body (001), and then push in the protruding stem. Attach thrust washer (047) and gasket (019) to the end plate (147) and install them to the stem hole on the body (001). Secure the end plate (147) with the end plate bolts (035) and spring washers (145B).
- 2.3.6 Align the position of the taper pin holes on the stem (003) and the disc (004) by matching the matchmarks. Then insert the taper pins (110) and securely fix them by spreading the tip of the taper pins.
- 2.3.7 Insert the packing (008) in the stuffing box of the body (001) and then install the gland (007) and tighten the gland with the gland bolts (036). For the valve in nominal size NPS 12, insert the packing washer (020) first, and then insert the packing (008).
- 2.3.8 For the valves in nominal size NPS 8 and above, install the key (060) to the stem (003). Fully open the valve and make sure that the operating device is in the open position. Then securely fix the operating device with the hexagon bolt and nut by aligning the matchmark positions.
- 2.3.9 Fully close the valve, tighten the retainer bolt (132) securely, and fix the seat retainer.

Note 1) Note 2)

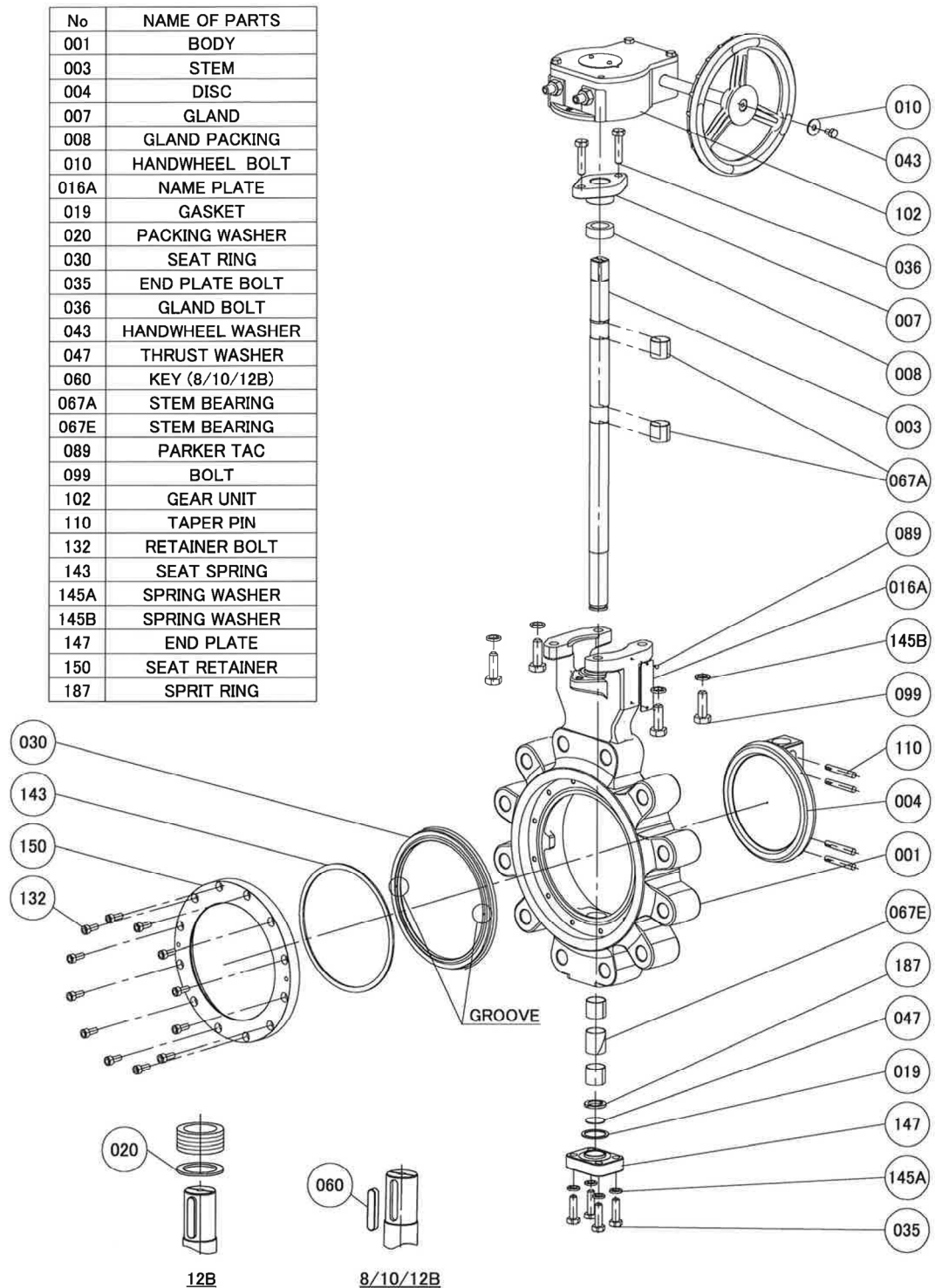
Note 1) Retainer bolt (132) shall not stick out from the body face-to-face dimension.

Note 2) Tightening torque for the retainer bolt (132) shall be as shown in the table below.

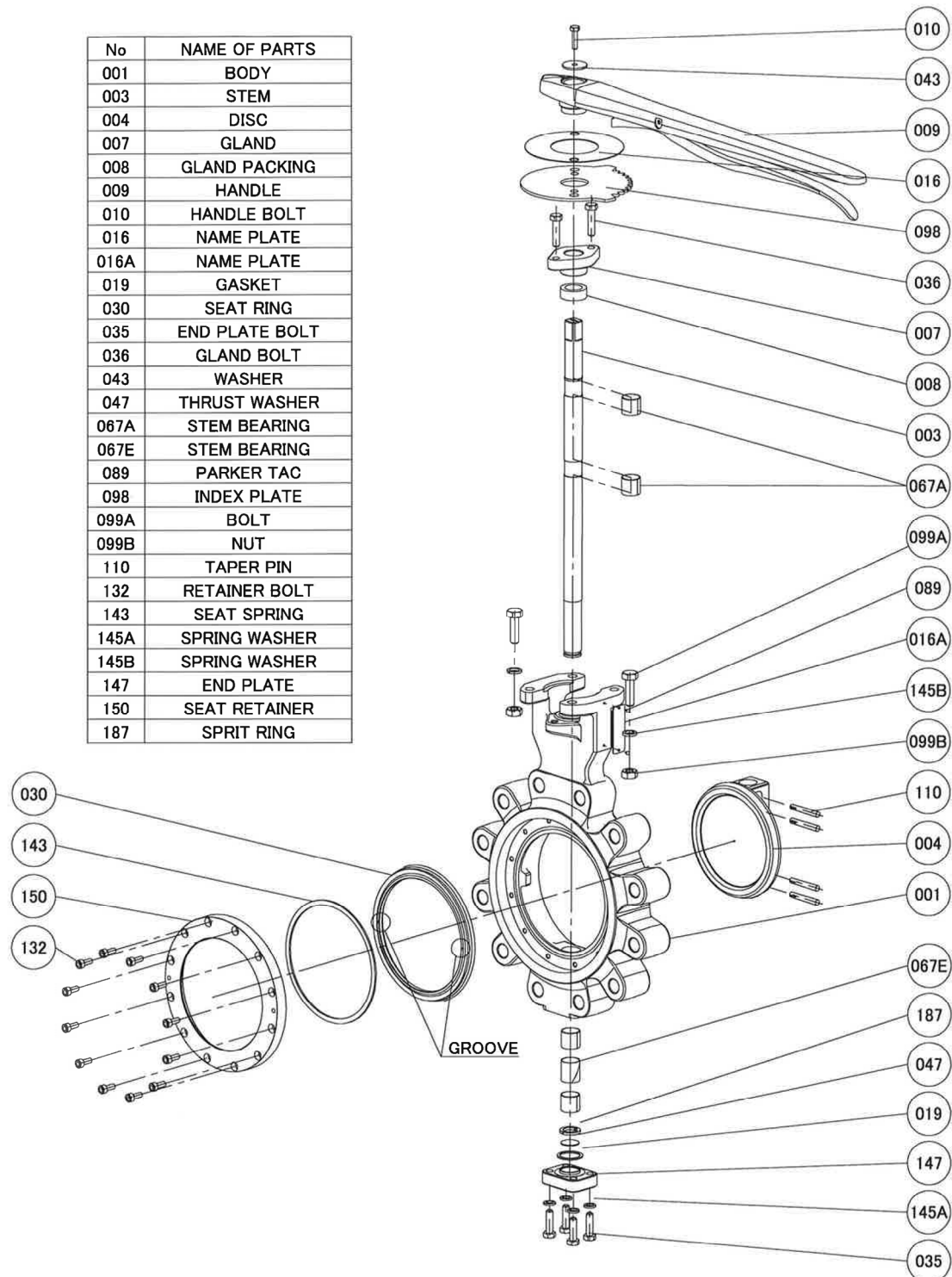
Valve Size (NPS)	Bolt Nominal Diameter	Bolt Tightening Torque	
		Nm	lbf·in
2 1/2~3	M4	3~3.5	27~31
4	M5	6~7	53~62
5~6	M6	11~12	97~106
8	M8	27~30	239~266
10~12	M10	50~55	443~487

VII. Disassembly and Reassembly

3. Construction



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

VII. Disassembly and Reassembly

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