

MT-05

Operation Manual
for
KITZ
High Performance Steel Ball Valves

10/150 SCTB Series

20/300 SCTB Series

10/150 SCTR Series

20/300 SCTR Series

10/150 UTB Series

20/300 UTB Series

10/150 UTR Series

20/300 UTR Series

Trim 3H : Hard graphite seated

Trim 5H/6H : Metal seated

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1. Introduction

Safe and efficient operation of industrial installations requires not only complete knowledge of the engineering and functioning of all machinery and equipment but their continuous proper maintenance as well. Improper operation or maintenance of one single valve may affect the whole plant operation. To help you achieve trouble-free valve performance, general information is provided here for the optimum operation and maintenance of your KITZ high performance steel ball valves.

1-1 Scope

This operation manual applies to KITZ high performance ball valves made of carbon steel or stainless steel, ANSI Class 150 and 300, and JIS 10K and 20K as listed in Table 1.

1-2 Actuator

This operation manual covers manually operated ball valves only. For electric or pneumatic actuators, refer to the operation manuals prepared by the manufacturers of your actuators. For KITZ B-Series Pneumatic Actuators, Operation Manual No.901-E is available.

2. Handling Valves before Mounting

2-1 Prior to shipment, blind covers are placed on the end flanges of each valve for protection from mechanical damage and intrusion of foreign objects into the valve bore during transit. Do not remove these end protectors before valves are mounted.

2-2 For storage of valves, select a dust-free and well ventilated place with low humidity. Handle valves carefully not to damage valve stems. Storing valves directly on the ground or concrete floor is not recommended. Under no circumstances should valves be left outdoors.

2-3 When moving with a crane, valves should be firmly held around the valve bodies and end flanges. The crane wire should not be in direct contact with valve stems and operational gears or actuators.

3. Valve Mounting

- 3-1 First of all, check nameplates, tags or any other identification marking measures of valves and make sure that the exact valves specified in your piping arrangement plan are prepared.
- 3-2 As piping sites are usually very dusty, be sure not to remove valve end protectors before your valves are ready for mounting.
- 3-3 After removal of end protectors, completely clean the inlets and outlets of both pipes and valves so that the gasket faces of flanges are free from dust that may affect sealing performance of valves.
- 3-4 The gasket contact face of valve and pipe flanges should be carefully checked for any scratch or defect. Repair such a scratch or defect with sand papers or grinding stones to have the smooth surface.
- 3-5 Before flange coupling, first align the bolt holes of valve flanges with those of pipe flanges, and then insert gaskets and tighten bolts. If the valve and pipes are not aligned accurately, unbalanced tightening will load an excessive stress on bolts. Keep in mind the extreme importance of the correct alignment.
- 3-6 Tighten bolts evenly and alternately on the tangential line (in the star pattern). The end of each tightened bolt should protrude equally beyond the nut.
- 3-7 After mounting the valve, be sure to recheck all bolts and nuts of the coupled flanges and tighten them if found loose.
- 3-8 Finally, the valve and pipe interior should be flushed to remove foreign objects, which may later cause fluid leakage.
- 3-9 Straightness of the pipelines should be assured to avoid unevenly loaded piping stress against valves.
- 3-10 Care should be also taken to assure that general stress of the pipeline is not concentrated on valves.

Note

Metal seated ball valves (Tirm 5H and 6H) are designed for uni-directional pressurization. Mount them with the body cap positioned to the downstream side at all times, following the arrow indicator marked on the valve body flange.

4. Valve Operation

- 4-1 Rotation of the valve stem by 90° fully opens or closes the valve. To close the valve, turn the operating handle clockwise according to the letter and mark indicating the direction. Counterclockwise rotation will open the valve. A position indicator is provided on the valve and valve actuation device for visual confirmation of the valve position.
- 4-2 On pilot run, be sure to check for any fluid leakage from the gland packing area, body-cap coupling flange gasket or pipe flange gaskets.
- 4-2-1 When leakage is detected from gland packings, first retighten gland bolts and check the result. Gland bolts should be tightened alternately with an even force. Care should be taken not to overtighten the bolts, as it would reduce elasticity and consequently affect sealing performance of packings. If retightening bolts cannot solve the problem, gland packings should be replaced with new packings.
- 4-2-2 Gland bolts should be retightened with the line pressure reduced to a considerably lower level. Otherwise, retightening bolts may cause another leakage. For replacement of gland packings, we recommend to completely depressurize the line for safety.
- 4-2-3 When leakage is detected from body-cap coupling flanges or pipe flanges, retighten flange bolts with an even force in the star pattern.

4-3 General Precautions for Trouble-free Valve Operation

4-3-1 High temperature service

The selection of KITZ high performance ball valves should be made, depending on the service temperatures as below :

Trim 3H : Max. 350°C in oxidized conditions
Max. 425°C in unoxidized conditions

Trim 5H : Max. 350°C unconditionally

Trim 6H : Max. 425°C unconditionally

For trouble-free operation, be sure to respect the pressure-temperature ratings specified by KITZ Cat.No.70410901 and related technical bulletin.

4-3-2 Abrasion Service

Trim 5H and 6H metal seated ball valves are fully prepared to handle all kinds of slurries and other highly viscous fluids, while Trim 3H carbon graphite seated ball valves are good only for low abrasion service due to the limited mechanical properties of the seat material. Regarding any questionable application, contact KITZ distributors for the technical assistance of Engineering Division of KITZ Corporation.

4-3-3 Throttling service

Trim 3H is not recommended for operation in half (or less) open position for a long period of time, because the seat material may erode due to the extremely high velocity of the fluid that passes the slit between the seat and the valve body. Unlike Trim 5H or 6H, Trim 3H is serviceable only in fully open or closed operation. Another technical problem encountered with throttling service in general is the vibration of the ball which may affect valve operating position, unless the valve is operated with a manual gear or a pneumatic actuator. Thus, lever handle operation is not recommended for throttling service.

5. Daily Valve Inspection during Operation

5-1 In order to operate your valves safely and satisfactorily, the daily inspection is very important. Here are the items essential to your daily inspection :

5-1-1 Fluid leakage

- (a) from the gland area
- (b) from the flange connections
- (c) through the valve body surface

5-1-2 Generation of abnormal noise

- (a) from the valve
- (b) from the loosened boltings
- (c) from the vibrated pipelines

5-1-3 Visual confirmation

- (a) of correct valve operating position
- (b) of securely tightened boltings

5-2 In case of detecting any of above problems, remedial measures are to be taken immediately as follows ;

5-2-1 Fluid leakage

To stop the leakage from the gland area or flange connection, refer to Section 4-2. For the leakage through the valve body surface, a valve repair specialist should be called.

5-2-2 Generation of abnormal noise

For the abnormal noise generated from the valve or the pipelines, your piping engineer should be called. Loosened boltings should be immediately retightened.

5-2-3 Make sure to confirm that Trim 3H carbon graphite seated ball valves are operated in fully open or closed position. No intermediate position is recommended, as explained in Subsection 4-3-3.

6. Periodic Valve Inspection

6-1 Inspection should be made periodically to detect wear of the balls, seats or stems, corrosion of the body or cap interior, and wear of the threads. Usually, the packings, gaskets and other non-metallic components are replaced after all periodic inspections as a part of basic maintenance procedures.

6-2 Valve Disassembly

6-2-1 Before dismantling the valve from the pipeline, mark it adequately with its location and mounting position to avoid confusion or mistake on subsequent remounting of the valve.

- 6-2-2 Completely depressurize the line, half open the valve and make it free from the fluid residue. Remove and collect internal residues, if any, and note the location. Subsequent examination of the records and collected residues may be found useful for better valve maintenance.
- 6-2-3 Mark the edges of the coupled flanges of the dismantled valve for correct and easy coupling of the valve body and cap on subsequent reassembly.
- 6-2-4 No special tool or apparatus is required for valve disassembly. If bolts and nuts are found stuck to each other, apply some lubricant and leave it for a while for easier unthreading. Bolts and nuts should be free from any soil or other foreign objects to avoid galling after the subsequent valve reassembly.
- 6-2-5 Fully close the valve, remove the valve operating device and place the valve on the bench with the valve cap flange facing upwards.
- 6-2-6 Disassembly procedures (Refer to Fig. 1 and 2)

- (1) Remove the cap nut(33).
- (2) Disassemble the cap(2) carefully.
- (3) Remove the flange gasket(19).

(Trim 3H)

(Trim 5H/6H)

- | | |
|--|--|
| <ol style="list-style-type: none"> (4) Remove the ball(4) with care not to scratch the surface. Wrap it in a soft cloth and keep it in isolation. (5) Remove the ball seats(30) and inner rings(150). (6) Remove the seat gaskets(176). (7) Remove the snap ring(48) and indicator/stopper(49). We recommend to use a special plier to prevent damage of the snap ring from being damaged. | <ol style="list-style-type: none"> Remove the seat gasket(176) and ball seat(30). Remove the ball(4) with care not to scratch the surface. Wrap it in a soft cloth and keep it in isolation. Remove the ball seat(30) and seat spring(143). |
|--|--|

- (8) Remove the gland bolts(36) and then the gland(7). Mark the position of the gland adequately.
- (9) Remove the stem(3) by pushing it straight downwards into the valve body interior. Take care not to scratch the body interior.
- (10) Remove the packing washer(20), stem bearing(67), thrust washer(47), gland packing(8) and gland bush(57). All these small components should be kept isolated each other for easier reassembly.

6-3 Examination of Valve Components

- 6-3-1 Soiled valve interior should be cleaned by means of water, steam, acid or oil before examination. Examine the internal area with a tube inspector or a small mirror and a flashlight. Liquid penetrant examination or radiographic inspection shall also be carried if found necessary.
- 6-3-2 Worn or corroded area or part shall be carefully examined visually or, if necessary, with magnifying glass. The wear or corrosion of the body or cap is extremely dangerous as it may develop fears of leakage rather quickly. Cracks should also be checked.
- 6-3-3 Wall thickness should be periodically measured and recorded to help the early detection of the undesired aging deterioration. Supersonic thickness gauges, electric thickness gauges and transfer calipers are some examples of the instrument used to measure the wall thickness.
- 6-3-4 Examination method, criteria and remedial measures are provided in Table 2.

6-4 Valve Reassembly

- 6-4-1 Valves should be assembled in the following sequence after all the component parts have been cleaned and new spare parts such as gland packings, gaskets, ball seats, stem bearings and thrust washers have been prepared. Be sure to remove rusts and other soils out of the seat retaining area of the body and cap to assure good sealing performance.

6-4-2 Reassembly procedures (Refer to Fig. 2 and 3, again)

- (1) Thread the flange bolts into the valve body.

(Trim 3H)

(Trim 5H/6H)

- (2) Place the seat gasket(176), inner ring(150) and ball seat(30) into the valve body. Place the seat spring(143) and ball seat(30) into the valve body.
- (3) Assemble the stem bearing(67) and thrust washer(47) on the stem(3) and insert the stem into the stem retaining bore of the body. Handle fragile bearings and washers with care.
- (4) Assemble the packing washer(20) and gland packing(8) carefully around the stem in the packing chamber.
- (5) Assemble the gland(7) to the stem with the gland bush(57). Thread the gland bolts(36) into the gland, not too tight.
- (6) Mount the indicator/stopper(49) with the snap ring(48), in the correct direction, on the stem. The snap ring should be placed on top of the indicator/stopper.
- (7) Set the stem to the "close" position and mount the ball(4) after applying a little lubricant to the ball seat(30) for smooth rotation of the ball. The ball seats and seat retaining area of the body should be free of dust or soil.

(Trim 3H)

(Trim 5H/6H)

- (8) Mount the flange gasket(19), seat gasket(176), inner ring(150) and ball seat(30) in the cap. Remember that incorrect alignment of the gasket may cause leakage. Mount the flange gasket(19), seat gasket(176) and ball seat(30) in the cap. Remember that incorrect alignment of the gasket may cause leakage.
- (9) Couple the cap with the body according to the identification marks of the flanges.

(10) Tighten the cap nuts evenly in the star pattern. KITZ ball valves employ metal-to-metal contact on the body-cap coupling flanges. Continue to tighten the nuts until this metal contact is achieved. The end of each tightened bolt should equally protrude beyond the nut.

Caution : Overtightening the nuts may cause deformation of the boltings.

(11) Lastly, tighten the gland bolts evenly and alternately to complete reassembly work of valves.

6-5 Pressurization for Trim 3H valves

To reassure smooth operation, 2-1/2" and larger carbon graphite seated valves should be pressurized after reassembly is completed, according to the following procedure :

6-5-1 Pressurize the fully closed valve for 60 seconds as follows :

Class 10K/150 : 2-1/2" to 8"FB : 25 kgf/cm²

Class 20K/300 : 2-1/2" to 5"FB : 50 kgf/cm²

6" and 8"FB : 40 kgf/cm²

6-5-2 Conduct above valve pressurization from both ends separately.

6-5-3 Measure the unloaded operating torque of the reassembled valve to confirm that the result is within the torque value ranges given below :

2-1/2" FB : 400 to 800 kgf-cm

3" FB : 600 to 1400 kgf-cm

4" FB : 1000 to 2000 kgf-cm

5" FB : 1500 to 3000 kgf-cm

6" FB : 1800 to 4000 kgf-cm

8" FB : 3000 to 9000 kgf-cm

6-5-4 If the valve operating torque is found higher than the maximum value provided above, repeat the pressurization of valves with 5 to 10 kgf/cm² higher pressure until the satisfactory result is confirmed.

7. Valve Inspection

- 7-1 Check the smooth operating condition of reassembled valves by fully opening and closing several times. Make sure that the indicator/stopper exactly matches the extreme valve operating positions ("0" for fully opening position and "S" for fully closed position).
- 7-2 All reassembled valves should be subjected to hydrostatic shell test and pneumatic seat test to ensure that the sealing performance satisfies the designed evaluation criteria given below. No visible leakage should be detected on hydrostatic shell test.

7-2-1 Trim 3H carbon graphite seated ball valves

Test pressure (kgf/cm²)

Class	JIS 10K	JIS 20K	ANSI 150	ANSI 300
Hydrostatic shell test	21	51	S/S 30 C/S 32	S/S 78 C/S 80
Pneumatic seat test	3.6			

Maximum allowable seat leakage (ml/minute)

1/2"FB	0.09
3/4"FB	0.12
1"FB	0.15
1-1/4"FB	0.24
1-1/2"FB	0.30
2"FB	0.45
2-1/2"FB	0.60
3"FB	0.90
4"FB	1.70
5"FB	2.60
6"FB	4.00
8"FB	6.75

(According to ANSI/FCI 70-2 Class VI)

7-2-2 Trim 5H/6H metal seated ball valves

Test pressure (kgf/cm²)

Class	JIS 10K	JIS 20K	ANSI 150	ANSI 300
Hydrostatic shell test	21	51	S/S 30 C/S 32	S/S 78 C/S 80
Pneumatic seat test	4			

Maximum allowable seat leakage (ml/minute)

1/2"FB	0.01
3/4"FB	0.02
1"FB	0.03
1-1/4"FB	0.04
1-1/2"FB	0.05
2"FB	0.06
2-1/2"FB	0.08
3"FB	0.10
4"FB	0.13
5"FB	0.16
6"FB	0.19
8"FB	0.26

(According to IEC 534-4 Class IV-S2)

Table 1

KITZ High Performance Ball Valves : Product Codes

Class	Shell material	Bore	Trim 3H	Trim 5H	Trim 6H	
JIS 10K	Carbon steel	FB	10 SCTB 3H	10 SCTB 5H	10 SCTB 6H	
		RB				
	Stainless steel※	FB		10 UTB 3H	10 UTB 5H	10 UTB 6H
				10 UTB 3HM	10 UTB 5HM	10 UTB 6HM
		RB		10 UTR 3H	10 UTR 5H	10 UTR 6H
				10 UTR 3HM	10 UTR 5HM	10 UTR 6HM
ANSI Class 150	Carbon steel	FB	150 SCTB 3H	150 SCTB 5H	150 SCTB 6H	
		RB	150 SCTR 3H	150 SCTR 5H	150 SCTR 6H	
	Stainless steel※	FB		150 UTB 3H	150 UTB 5H	150 UTB 6H
				150 UTB 3HM	150 UTB 5HM	150 UTB 6HM
		RB		150 UTR 3H	150 UTR 5H	150 UTR 6H
				150 UTR 3HM	150 UTR 5HM	150 UTR 6HM
JIS 20K	Carbon steel	FB	20 SCTB 3H	20 SCTB 5H	20 SCTB 6H	
		RB				
	Stainless steel※	FB		20 UTB 3H	20 UTB 5H	20 UTB 6H
				20 UTB 3HM	20 UTB 5HM	20 UTB 6HM
		RB				
				20 UTR 3HM	20 UTR 5HM	20 UTR 6HM
ANSI Class 300	Carbon steel	FB	300 SCTB 3H	300 SCTB 5H	300 SCTB 6H	
		RB	300 SCTR 3H	300 SCTR 5H	300 SCTR 6H	
	Stainless steel※	FB		300 UTB 3H	300 UTB 5H	300 UTB 6H
				300 UTB 3HM	300 UTB 5HM	300 UTB 6HM
		RB		300 UTR 3H	300 UTR 5H	300 UTR 6H
				300 UTR 3HM	300 UTR 5HM	300 UTR 6HM

Trim symbol : 3H : Hard graphite seats for 500°C service
5H : Metal seats for 350°C abrasion service
6H : Metal seats for 425°C abrasion service

※Note : ASTM CF8 or JIS SCS13A stainless steel castings are used for valve shell. In case of using ASTM CF8M or JIS SCS 14A, all product codes are suffixed with "M" at the end.

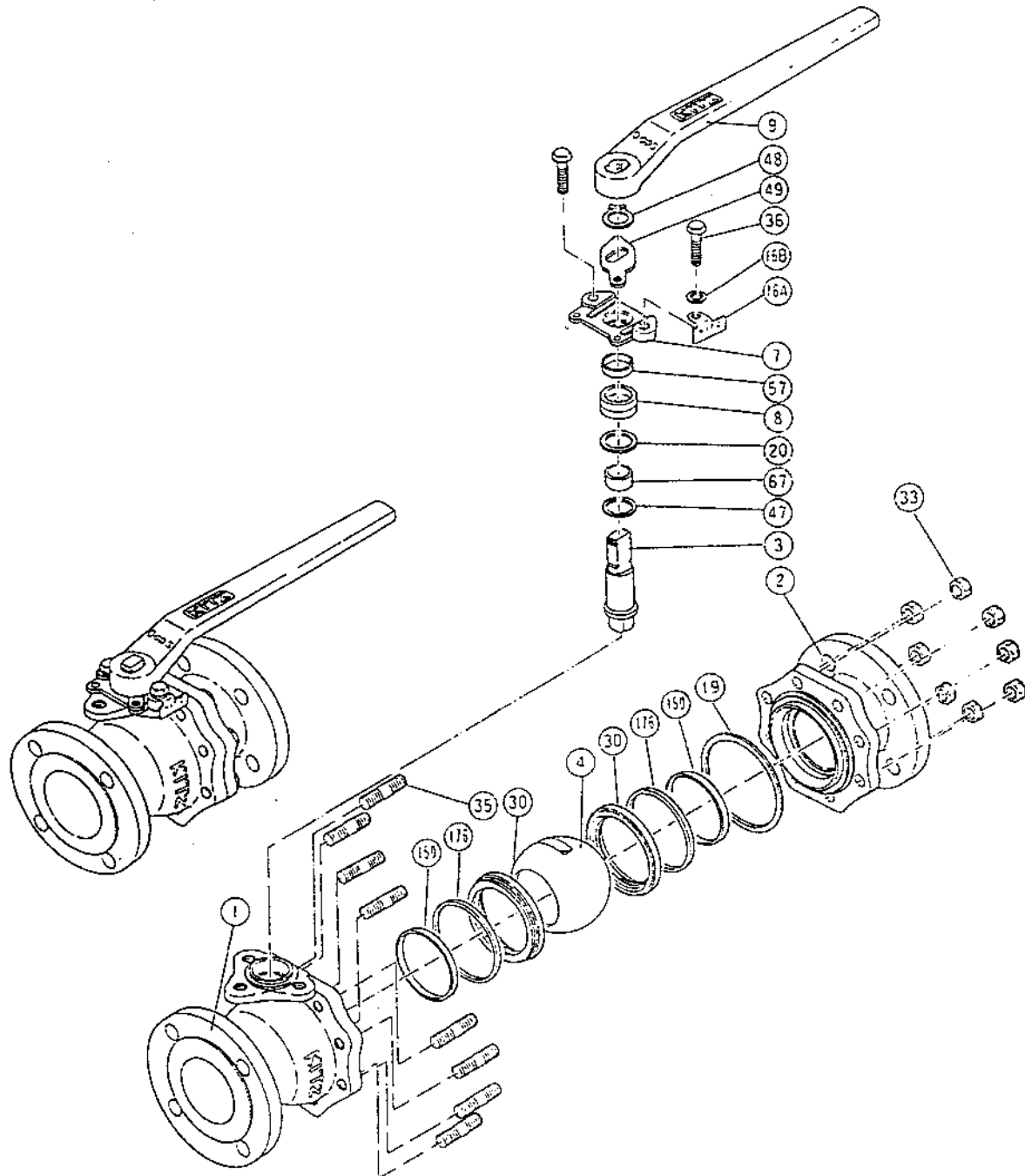
Parts	Areas	Examination Me
Bodies Caps	Flanges Wet parts	Visually inspected Wall thickness me Non-destructive 1
Balls	Surface	Visually inspected
Seats	Seating contact face	
Stems	Surface	
All other small components		

KITZ High Performance Ball Valves

Construction

JIS10K/20K ANSI150/300 Hard Graphite Seated Ball Valve

Fig.1



KITZ High Performance Ball Valves

Construction

JIS 10K / ANSI 150 Metal Seated Ball Valve

Fig.2

