LADISH VALVES

INSTALLATION, OPERATION, MAINTENANCE MANUAL FOR

MANUALLY OPERATED STOP CHECK VALVE

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CHAPTER 1 - GENERAL INFORMATION

1.1 General

This manual contains maintenance instructions with pertinent illustrations for servicing corrosion resistant steel alloy and manually operated stop check valves. This manual is divided into two chapters with the first covering general information and the second covering maintenance and service instructions for stop check valves.

1.2 Description

The manually operated stop check valves covered by this manual are of the bolted type bonnet, having plug type disc with four bottom guide legs (except the 8" which has a single center guide) and non-rotating, but rising stem with a non-rising hand wheel. Each stop check valve is supplied with a fully trapped gasket between the bonnet and the valve body.

Please refer to Figure 1 for all part number reference throughout this manual.

NOTE: Stop check valves may be supplied with PTFE gaskets and packing. Not to be used with service temperatures exceeding 450°F.

1.3 Packaging

The stop check valves are shipped in the closed position to prevent damage to the seating surface during handling and shipping and should be maintained in the closed position until they are installed. No internal blocking is used on the stop check valves.

1.4 Installation

Preparation for Installation. It is highly recommended that before you install a valve, you check the valve and determine it is in a satisfactory condition. Some suggested items are:

1. Look for special warning tags and the identification plate to assure the valve is suitable for the intended service.
2. Remove the end caps and ensure that the valve is reasonably clean and free of foreign material.
3. Open and close the valve to ensure that no damage has occurred in transporting the valve.

Prior to installing the valve, clean out the dirt and foreign matter from inside the piping system.

Check for adequate clearance around the valve to ensure that it may be operated properly and that enough free space is available for maintenance of the valve.

The valve body is a rugged structure but it is not intended to be a means for aligning improperly fitted pipe. Care must be taken to ensure that any stress caused by improper pipe alignment is relieved elsewhere in the piping system. The valves should be supported, as necessary, to prevent unnecessary stresses induced by the connecting piping.

Installation. The following general rules should be followed when installing the valve in the pipeline.

1. Keep pipe ends free of dirt, spatter or grit. Check for any damages on butt weld valve ends.
2. Handle the valve only with apparatus that will adequately support it using a safe and proper technique.
3. Install the valve using good piping practices (included the ones listed in the Manufacturers Standardization Society of the Valve and Fitting Industry Standard Practice MSS-SP-92 and as governed by applicable Industry Codes and Specifications. Assure that all bolting or welding (including preheat and post-weld heat treatment) associated with the installation of the valve in the piping system is in compliance with applicable codes and standards.

Stop Check Valves. Installation for the stop check valves is with the valve in a horizontal line with the stem positioned vertically above the valve's centerline.

CAUTION: Stop check valves should never be installed with the stem pointed down because the valve will not operate properly.

Stop Check Valves are marked with either bridge wall markings, or flow arrows, because it is recommended that the valves be installed with the flow pressure under the disc.

1.5 Operation

Opening and closing of the stop check valve is accomplished by operating the valve handwheel as desired. Flow only occurs if there is sufficient differential pressure across the disc to establish flow.

The stem is not attached to the disc so it moves up (away from) or down (toward) the disc which is guided by a key. The stop check valve can be used for throttling purposes as well as on-off services. Since closure is accomplished by forcing the disc against the stream rather than across it, problems of chatter, erosion and excessive wear are minimized. In addition, the short travel of the disc allows for fast closing time.

CHAPTER 2 - MAINTENANCE INFORMATION

2.1 General

This section covers necessary maintenance instructions for the manually operated stop check valves, including routine maintenance, trouble shooting, disassembly, inspection, reassembly and recommended spare parts. Your maintenance function should develop procedures to ensure that the valve is maintained and in satisfactory and safe operating conditions at all times.

CAUTION: FACILITY DECONTAMINATION PROCEDURES SHOULD BE FOLLOWED PRIOR TO ANY MAINTENANCE.

Before attempting any disassembly or packing replacement, the line should be depressurized to prevent possibility of personal injury or equipment damage. As an added safeguard, the valve should be opened and the body relived of any residual pressure.

2.2 Routine Maintenance

To ensure satisfactory valve operation, a routine maintenance check should be performed at regular intervals. The following actions should be taken:

1. Operate the valve through a complete cycle several times, checking for smoothness of action and absence of any leakage.

2. Close the valve check for leakage using a sonic leak detection device.

3. Lubricate the exposed threads of the stems of the manually operated stop check valves.

4. Check all the bonnet stud bolt nuts for proper torque values and tighten the nuts as necessary to meet requirements of Table 1.

5. Replace packing ring sets and the gasket if damaged or exposed to temperatures higher than maximum allowed.

6. Check the body and bonnet wall thickness using an ultrasonic wall thickness tester. If under ASME B16.34 requirements, remove valve from service and either replace or repair, if economical.

2.3 Trouble Shooting

Following are the common troubles of the stop check valve operation, together with the probable cause and recommended remedies. Observance of these procedures

prior to valve disassembly will prevent unnecessary maintenance time and personnel involvement. Index numbers used in the listing refer to Figure 1.

Trouble:
Leaking at the body/bonnet joint

Probable Cause:

1. Loose or improperly tightened bolt nuts (20).
2. Damaged or improperly seated gaskets (4).

Remedy:

1. Tighten nuts in accordance with Table 1 and Figure 2, observing the entire sequence of tightening.

NOTE: Tightening should be performed with the valve depressurized.

2. Break the body/bonnet joint and replace the gasket. Tighten nuts. Refer to Table 1 and Figure 2 for the bolt tightening procedure.

Trouble:
Leaking through valve seats.

Probable Cause:

1. Worn or damaged seating surfaces on disc (2) and/or body(1).
2. Stem (3) bottom is not allowed to push down on disc (2) by stem stop (21).

Remedy:

1. Disassemble valve and inspect all seating surfaces for wear and mechanical damage. Polish minor damage. Remachine or replace components if damage is heavy OR
2. Disassemble valve and reposition the stem stop (21).

Trouble:
Leaking at stuffing box

Probable Cause:

1. Loose or improperly tightened gland stud nuts (11).
2. Gland follower (9) improperly seated.
3. Corrosion or mechanical damage of stem (3) in stuffing box area.
4. Worn or damaged packing (8).

Remedy:

1. Tighten gland stud nuts (11), alternating at ¼ turns, to torque valve of 15 to 30 ft/lbf or just enough to stop any leakage. Do not tighten nuts excessively.
2. Reposition gland follower on packing rings. It may be necessary to replace or install additional packing rings.

CAUTION: Ladish does not recommend the practice of backseating the valve and repacking the valve under pressure. This is an emergency feature only. In the event that the backseat fails to seal properly, a leak path to atmosphere is generated which constitutes a potential safety hazard to personnel.

3. Minor corrosion or damage of stem can be polished out. Replace the stem if the damage is major.

Trouble:
Rough or difficult operation

Probable Cause:

1. Scored or otherwise damaged threads on stem (3).
2. Damaged yoke bushing (12).
3. Excessively tight gland stud nuts (11).

Remedy:

1. Minor scoring or damage of stem can be polished out. Replace if stem damage is major.
2. Inspect the bushing for damaged threads or scoring. Polish out minor damage or replace the bushing for major damage.
3. Loosen nuts and then tighten to a torque value of 15 to 30 ft/lbf. In order to maintain even pulldown, you should alternate tightening at ¼ turn intervals.

Trouble:
Valve does not back seat

Probable Cause:

1. Scored backseat surfaces on stem (3) or bonnet (5).
2. Stem (3) is not allowed to back seat by stem stop (21).

Remedy:

1. Disassemble valve and inspect all seating surfaces for wear and mechanical damage. Polish minor damage. Remachine or replace components if damage is heavy.
2. Disassemble valve and reposition the stem stop (21).

Trouble:
Valve will not open or close

Probable Cause:

Stem stop (21) missing or loose or stem (3) t-head broken off at diameter.

Remedy:

Tighten stem stop bolt nut (23) or disassemble valve and replace stem (3).

2.4 Disassembly

CAUTION: Before attempting any disassembly, the line should be depressurized to prevent possibility of personal injury or equipment damage. As an added safeguard, the valve should be opened and the body relieved of any residual pressure.

All internal parts of the stop check valve are made accessible by removal of the bolted bonnet (5) from the valve body (1). The disc (2) will be lifted out of the body when the bonnet is removed. The stem (3) is still assembled to the bonnet.

NOTE: Place parts on a clean surface as they are removed from the valve. Exercise care to avoid damages to parts through contact with hard objects.

Disassemble the stop check valve in accordance with the following sequence:

NOTE: Match-mark the bonnet flange and body flange before removing bonnet to ensure assembly of the parts in their original position.

1. Operate the valve to the fully open position. Remove the bonnet stud bolt nuts (20) and bonnet stud bolts (19) and lift the bonnet (5) and associated parts off the body (1) by raising the bonnet straight up. Then lift the disc (2) carefully to avoid striking its seating surface against the body chest and damaging the sealing surface. Remove and discard the gasket (4). If the only purpose of the maintenance procedure is to examine the condition of the disc (2) and body (1) seating surfaces, no further disassembly is necessary. DO NOT use any tool on the stem surface as this will damage the surface.

2. Loosen the gland stud nuts (11) and the stem stop bolts (23) nut a minimum of two turns. Grasping the portion of the stem (3) extending below the bonnet (5) by hand, turn the stem until the threads are disengaged from the yoke bushing (12) and the stem stop (21) threads. Pull the stem (3) down through the stuffing box and out the underside of the bonnet. Remove the handwheel nut (16) and the handwheel (13).

3. Remove the gland stud nuts (11) from the gland stud (6) and lift off the gland flange (10) and the gland follower (9). Remove the packing rings (8) from the bonnet (5). Discard the packing rings.

2.5 Inspection

After disassembly of the stop check valve, all parts should be inspected for evidence of wear, distortion or mechanical damage. Perform the inspections listed on Table 2 to ensure satisfactory operation of the affected parts.

2.6 Reassembly

Reassembly of the stop check valve is performed essentially in the reverse order of disassembly observing the following special procedures: (See Figure 1)

1. Place the disc (2) into the body (1).

2. Push the stem (3) from the underside of the bonnet (5) through the stuffing box far enough so that the packing rings (8), gland follower (9) and gland flange (10) and stem stop (21) can be placed onto the stem.

3. Position the stem stop (21) ½" from the top of the yoke slot and align hole for stem engagement.

4. Install the packing (8) in the stuffing box. Lightly lubricate the stem threads and push the stem through the packing rings, glad follower, and gland flange until the stem threads contact the threads of the stem stop (21).

NOTE: The point where the stem stop attaches to the stem should be low enough on the stem to allow the stem to backseat against the bonnet. Yet, it should be high enough to allow the stem bottom to push against the disc.

Usage of the stem stop to regulate lift is not recommended by Ladish and may cause the valve not to operate properly.

5. Manually turn the stem (3) in the clockwise direction to engage the threads until contacting the yoke bushing (12). Manually turn the stem in the clockwise direction to engage the stem until it is far enough through the yoke bushing (12) so that the stem (3) backseats against the bonnet (5) and the handwheel (13) can be installed.

6. Tighten the stem stop bolt (22) with the nut (23).

NOTE: The primary function of the stem stop is to serve as an anti-rotation device for the stem, limiting it to an up or down motion only when the handwheel is rotated.

7. Install the handwheel (13) and handwheel key (14) and secure with the handwheel nut (16) tightening the nut with a wrench.

8. Slide the gland studs (6) into the gland flange (10) and thread the gland stud nuts (11) onto the gland studs. Tighten the gland stud nuts to a torque value of 15 to 30 ft/lbf.

NOTE: Tighten gland stud nuts evenly to avoid forcing the gland follower or gland flange against the stem.

9. Install a new gasket (4) in the recessed groove in the flange of the body (1). Carefully lower the bonnet (5) and the assembled parts onto the body, making sure the stem (3) bottom key engages the disc (2) slot.

NOTE: Make certain that the bonnet is installed on the body in the same position as was noted during disassembly.

10. Tighten the bonnet stud bolts (19) to the nuts (20) according to the following sequence.

11. Hand tighten nuts. Observe the tightening sequence shown in Figure 2 and using a torque wrench with the required range, tighten each bolt to its value listed in Table 1.

12. All nuts should be evenly applied on stud and have full engagement.

NOTE: Although minimum torque values are listed in Table 1, it is strongly recommended using at least FOUR torque passes to arrive at final torque for bolts (studs) over 5/8" to ensure even pull down.

2.7 Spare Parts

The disc (2), stem (3), gasket (4), and packing rings (8) are the only recommended spare parts for a stop check valve.

TABLE 1: RECOMMENDED TORQUE VALUES

Bolt Size	B7 B16 L7		B7M L7M		B8 B8M Class 1		B8 B8M Class 2		Gr.660 A & B		N08020 (Alloy 20)		N05500 (K-Monel)		N10276 (Hastelloy C)	
	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max
1/4"-20 UNC	10.5	11.9	8.0	9.1	3.0	3.4	9.5	10.8	8.5	9.7	3.5	4.0	10.0	11.4	4.1	4.7
5/16"-18 UNC	20.9	23.7	15.9	18.1	6.0	6.8	18.9	21.5	16.9	19.2	7.0	7.9	19.9	22.6	8.2	9.3
3/8"-16 UNC	37	42	28	32	11	12	34	38	30	34	12	14	35	40	15	16
7/16"-14 UNC	58	66	44	50	17	19	53	60	47	53	19	22	55	63	23	26
1/2-"13 UNC	89	101	68	77	26	29	81	92	72	82	30	34	85	96	35	40
9/16"-12 UNC	127	144	97	109	36	41	115	130	103	116	42	48	121	137	49	56
5/8"-11 UNC	176	199	134	152	50	57	159	180	142	161	59	66	168	190	69	78
3/4"-10 UNC	310	351	236	268	89	100	281	318	251	285	103	117	295	335	121	137
7/8"-9 UNC	497	563	379	429	142	161	379	429	402	456	166	188	473	536	194	220
1"-8 UN	742	841	565	641	212	240	565	641	601	681	247	280	707	801	290	328
1 1/16"-8 UN	913	1,034	695	788	261	296	565	640	739	837	304	345	869	985	356	404
1 1/8"-8 UN	1,092	1,238	832	943	312	354	676	766	884	1,002	364	413	1,040	1,179	426	483
1 1/4"-8 UN	1,523	1,726	1,160	1,315	435	493	725	822	1,233	1,397	508	575	1,451	1,644	595	674
1 3/8"-8 UN	2,063	2,338	1,572	1,781	589	668	982	1,113	1,670	1,892	688	779	1,964	2,226	805	913
1 1/2"-8 UN	2,717	3,079	2,070	2,346	776	880	1,294	1,466	2,199	2,493	906	1,026	2,587	2,932	1,061	1,202
1 5/8"-8 UN	3,517	3,985	2,679	3,037	1,005	1,139	1,340	1,518	2,847	3,226	1,172	1,328	3,349	3,796	1,373	1,556
1 3/4"-8 UN	4,410	4,998	3,360	3,808	1,260	1,428	1,680	1,904	3,570	4,046	1,470	1,666	4,200	4,760	1,722	1,952
1 7/8"-8 UN	5,471	6,201	4,169	4,724	1,563	1,772	2,084	2,362	4,429	5,020	1,824	2,067	5,211	5,905	2,136	2,421
2"-8 UN	6,353	7,200	4,840	5,485	1,815	2,057	2,420	2,743	5,143	5,828	2,118	2,400	6,050	6,857	2,481	2,811
Notes	Stud threads and nut bearing face must be lubricated with a heavy graphite and oil mixture.															
	Non-lubricated bolt has an efficiency of about 50 percent of a well lubricated bolt and also that different lubricants produce results varying between the limits of 50 and 100 percent of the tabulated values.															

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TABLE 2: STOP CHECK INSPECTION GUIDELINES

Step	Part	Inspect For	Remarks
1	Body	Evidence of wear or mechanical damage which could prevent tight sealing.	Minor damage (less than .0005") can be corrected by lapping the seat with the body line. Major damage or wear will necessitate removal of the body from the line for replacement and remachining.
2	Disc	Evidence of wear or mechanical damage to seating surface. Evidence of galling on the stem side of the disc, particularly where the bottom of the stem bears against the disc.	Minor damage (less than .0005") such can be corrected by lapping the seat surface. Major damage or wear will require remachining of the seating surface and may require replacement of the disc. If galling is evident, remachine or replace the disc.
3	Stem	Evidence of galling on bottom surface which bears against the disc. Evidence of wear on stem area which passes through packing rings.	Minor damage can be polished or repaired by machining, taking a very light cut. Major damage requires replacement of the stem. Minor damage can be polished out. Major damage requires replacement of the stem.
4	Yoke Bushing	Evidence of wear or roughness on the threads in bushing O.D.	If thread wear is evident, replace the yoke bushing and yoke bushing nut.
5	Gland Follower	Evidence of wear or roughness on I.D.	Polish worn or rough areas or replace gland follower.

FIGURE 1: STOP CHECK VALVE EXPLODED VIEW

Item	Description		Item	Description
1	Body		13	Handwheel
2	Disc		14	Handwheel Key
3	Stem		15	Identification Plate
4	Gasket		16	Handwheel Nut
5	Bonnet		17	Handwheet Nut Set Screw
6	Gland Stud		18	Grease Fitting
7	Gland Stud Pin		19	Bonnet Stub Bolt
8	Packing Rings		20	Bonnet Stub Bolt Nut
9	Gland Follower		21	Stem Stop
10	Gland Flange		22	Stem Stop Bolt
11	Gland Stud Nut		23	Stem Stop Bolt Nut
12	Yoke Bushing			

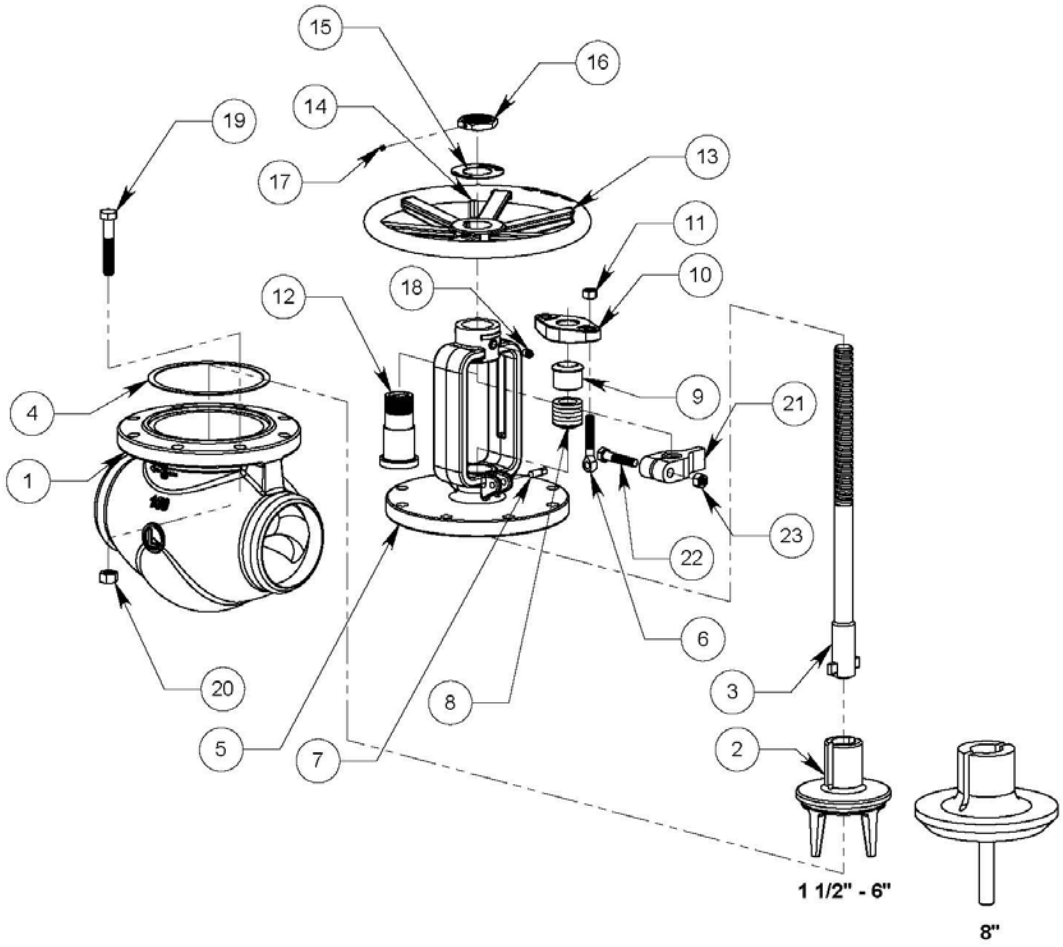
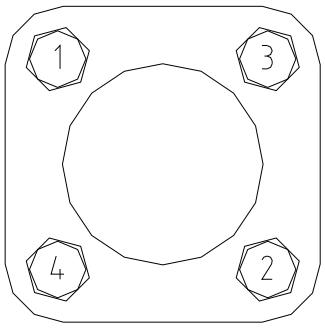
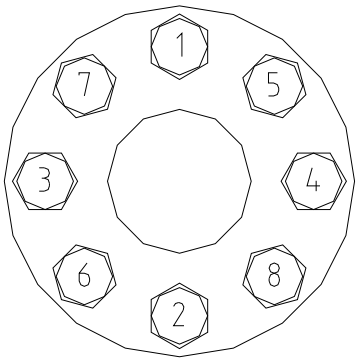


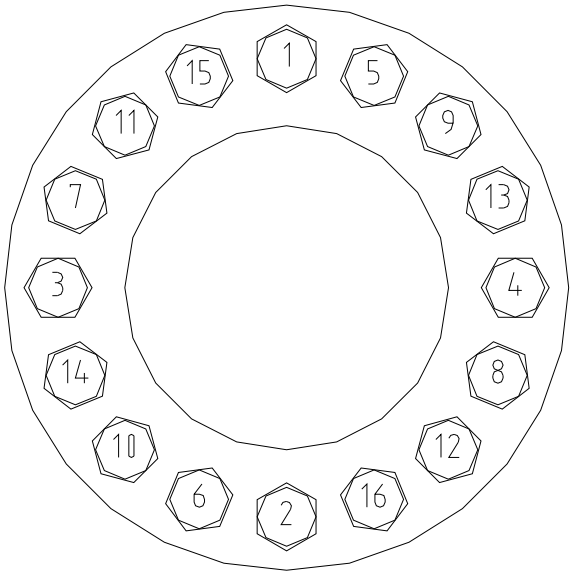
FIGURE 2: BOLT TIGHTENING GUIDELINES



Small Valves



Small Valves



Large Valves - Round Flange