Ladish Valves

Installation, Operation, and Maintenance Manual

Stop Check Valves

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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; first covering general information and second, covering maintenance and service instructions for stop check valves.

1.2 Description

NOTE

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

(Refer to Figure 1) 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 handwheel. Each stop check valve is supplied with a fully trapped gasket between the bonnet and the valve body.

Most check valves are allowed to have some leakage, according to API 598. The stop check is designed as a positive stop valve with zero leakage.

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 correct for the intended service.
2) Remove the end caps and ensure that the valve is reasonably clean and free from 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.

a. Keep pipe ends free of dirt, spatter or grit. Check for any damages on butt weld valve ends.

b. Handle the valve only with apparatus that will adequately support it using a safe and proper technique.

c. 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.

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.

CAUTION

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 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 2.

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. (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) or
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 nuts, 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 potentially safety hazard to personnel.

3. Minor corrosion or damage 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 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 15-30 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) or
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 or
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 as shown on Figure 2.

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 PTFE 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 bolt 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 threads (21). 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

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

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

3. 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.

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

5. 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.

6. 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.

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

8. Install the handwheel (13), the handwheel key (14) and ID plate (15) and secure with the handwheel nut (16) tightening the nut with a wrench.

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

NOTE

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

Carefully lower the bonnet (5) and the assembled parts onto the body, making sure the stem (3) bottom key engages the disc (2) slot.

11. Tighten the bonnet stud bolts (19) to the nuts (20) according to the following sequence and Figure 2:

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.

NOTE

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

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

Table 1.

Bolt Size (Dia.)	½ Torque (Ft/lbf)	Full Torque (Ft/lbf)
½”	15-20	30-45
9/16”	25-30	45-68
5/8”	35-40	60-90
¾”	55-75	110-165

Torque values based on bolts (studs) of ASTM A193 Grade B8 Class 2 with ASTM A194 Grade 8 or 8F nuts.

When all the bolts have been tightened to the ½ torque value, each bolt is tightened to the final torque value (Table 1) in the same sequence as previously used for initial torque.

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

NOTE

Although ½ torque values are listed in Table 1, it is strongly recommended using at least (4) 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 standard valve.

Table 2: Stop Check Inspection

Step	Part	Inspect For	Remarks
1	Body (1)	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 (2)	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 (3)	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 (12)	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 (9)	Evidence of wear or roughness on I.D.	Polish worn or rough areas or replace gland follower.

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			

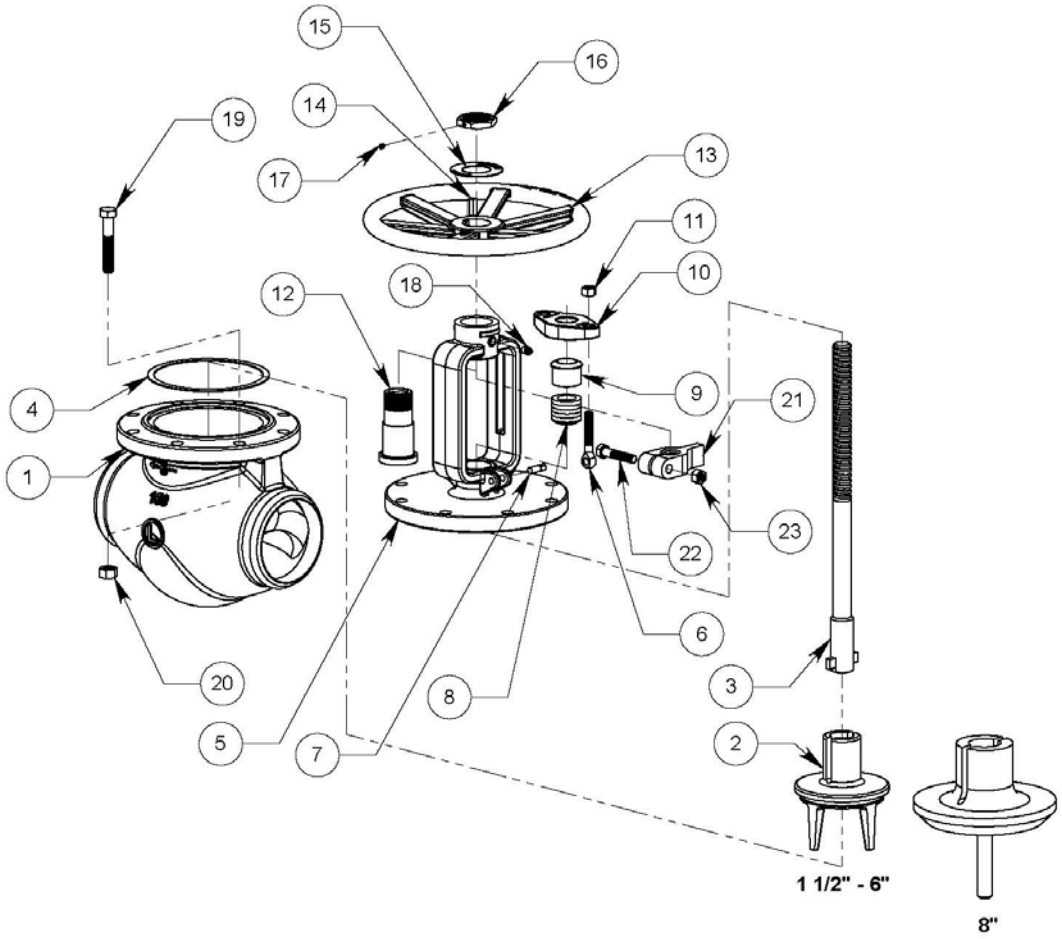
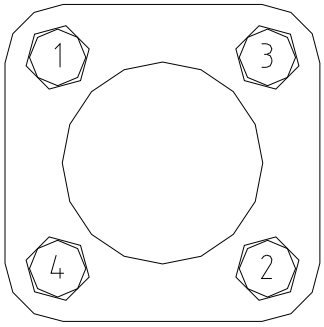
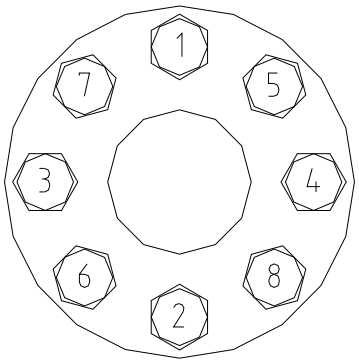


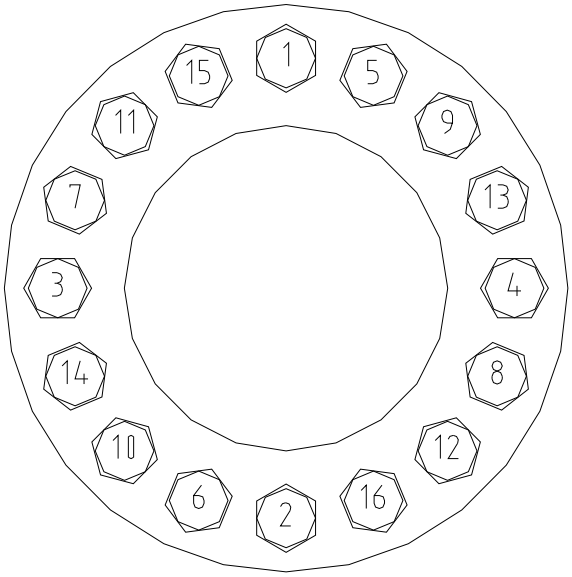
FIGURE 1. TYPICAL STOP CHECK - EXPLODED VIEW



Small Valves



Small Valves



Large Valves - Round Flange

FIGURE 2. BOLT TIGHTENING SEQUENCE