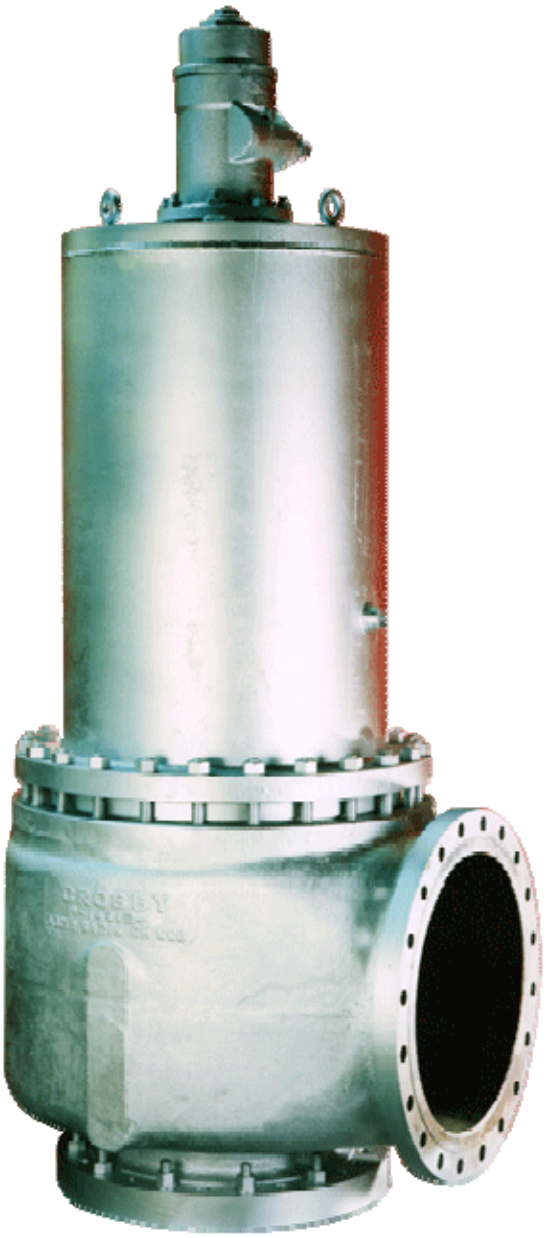
CROSBY

INSTRUCTION NO. IS-V-3175



Installation, Operating and Maintenance Instructions for Crosby Style JO and JB Above “T” Large Orifice Valves

tyco / Flow Control

Table of Contents

Figures

Crosby Safety Relief Valve Instructions
for
Installation, Maintenance and Adjustment

Storage

Safety Relief Valves are often on hand at the jobsite months before they are installed. Unless they are properly stored and protected, their performance may be seriously affected. Rough handling may damage flanges or cause misalignment of the valve parts. It is best to leave valves in their shipment cases and store them in a dry place under cover until they are to be used.

Installation

Inlet Piping

For best results the valve should be mounted vertically either directly on a nozzle from the pressure vessel or on a short connection fitting that provides direct and unobstructed flow between the vessel and the valve. Where rounded or beveled approaches cannot be provided ahead of the valve, it is recommended that one size larger riser or fitting be used. A valve should never be installed on a fitting having a smaller inside diameter than the inlet connection of the valve. Compliance with the above recommendations will assure clean, positive valve operation.

Many valves are damaged when first placed in service because of failure to clean the connections properly when they are installed. It is essential that the valve inlet, the vessel, and the line on which the valve is mounted be thoroughly cleaned of all foreign material. The inlet connection bolts or studs should be drawn down evenly to avoid unequal straining of the valve body or distorting the nozzle flange or base.

Outlet Piping

Discharge piping should be simple and direct. Where possible a short vertical pipe discharging into the atmosphere is the most desirable type of outlet piping, and affords little trouble. However, if this is impractical and the discharge must be piped to some definite place, the precautions listed below should be carefully considered.

1. Discharge piping should be designed so as to impose a minimum load on the valve. Excessive discharge piping loads may cause seat leakage or valve malfunction.

2. Where possible, open valve body drains should be provided to prevent any accumulation of fluid in the valve body. Valve bodies are provided with pipe tap openings for this purpose.

3. When two or more valves are installed to discharge into a common header, the discharge pressure due to the opening of one (or more) valve(s) may affect the opening pressure of the remaining valves in the system.

4. Bonnets of safety relief valves on steam service should be vented to atmosphere or to a suitable safe location. This will prevent build-up of pressure in the bonnet which may cause the valve to open and close rapidly or "chatter". The threaded bonnet vent holes should never be plugged.

Valve Operation

Gases and Vapors

The safety relief valve, when operating correctly on gas or vapor, will open with a sharp clear pop at the pressure for which it is set. When pressure accumulates above the set pressure, the lift will increase until maximum lift and valve capacity are obtained. When the pressure drops the lift will decrease until the valve reseats. Accumulation (overpressure) is usually 10%.

Capacity

The capacity of a safety relief valve is very important. The valve, or group of valves, selected should have a relieving capacity equal to or slightly greater than the rated capacity of the vessel or system it is to protect. Selection of valves having excessive capacities should be avoided as this may lead to operating difficulties on some installations.

Hydrostatic Testing of Vessel

It is recommended that the hydrostatic test of the system should be made with the valve mounting connecting flange blanked, and the valve installed after the hydrostatic test. Gagging of valves of large size for hydrostatic tests may result in excessive loading on the gag, spindle and working parts of the valve, causing damage.

Relief Valve Troubles

The troubles encountered with safety relief valves often vitally affect the life, operation and performance and should be corrected as soon as possible. Some of the frequent troubles and the recommended corrective measures are discussed in the following paragraphs.

Leakage

When a safety relief valve is leaking at the operating pressure, it is important that corrective action be taken as soon as possible. Failure to correct this condition may otherwise damage the working parts of the valve. Following are possible causes of leakage:

1. Seats damaged by foreign matter: Obviously every precaution should be taken to clean the entire system before operating the valves. Hard particles trapped between the seats will cause the valve to leak. Opening the valve by pressure (or by lifting lever when provided) may blow out the trapped material, stopping leakage. However, if leakage continues, the seats are damaged and must be reconditioned.

2. Distortion from piping strains: Leakage can be stopped by removing excessive piping loads, by proper anchoring, counterbalancing, or other changes in the discharge piping.

3. Incorrect maintenance involving reconditioning, cleaning, reassembling and testing may result in a leaking valve.

4. Incorrectly adjusted lifting gear: A space of 1/6 inch ***minimum*** should always be provided between the lifting cam and the spindle nut. Failure to provide this may result in inadvertent contact between these parts resulting in opening the valve slightly. On valves with pull-up levers, the lever must be placed so as to keep the lifting cam away from the spindle nut when the valve is closed.

Faulty Operation

Chattering

When a relief valve opens and closes with a high frequency the effect is commonly termed “chatter”. This condition is the result of 1) excess valve capacity, 2) a restricted inlet, or 3) a faulty piping installation.

Excess valve capacity may be cured by the use of smaller valves. A restricted inlet “starves” the valve when it opens, causing variable pressures on the inlet side which, if of sufficient magnitude, will result in damage to the valve. This condition can only be cured by removing the restriction.

If discharge piping develops high back pressure, it may be due to undersizing or poor piping practices resulting in excessive pressure drop. If this is the case, the piping should be redesigned.

Valve Maintenance

The functioning and life of a safety relief valve depend primarily upon the methods used in its maintenance. For this reason, the recommended steps for maintenance are discussed below. Many of these recommended steps may appear obvious, simple, and unnecessary, but experience has proven them successful.

Dismantling

When possible, it is best to take a safety relief valve into the shop for repair. In any event, the proper procedure for dismantling is as follows:

General

1. Several flat metal gaskets are employed for sealing joints. Care must be exercised when dismantling not to damage or lose these gaskets as they can be reused. Gasket locations can be determined by referring to the assembly drawing for the particular valve being dismantled.

2. Nozzle ring and guide ring set screws are custom fitted to each valve and should not be interchanged.

3. Spring washers are custom fitted to each end of the spring. The spring and its washers should be kept intact as a unit.

4. When the valve has a two-piece disc, the disc insert must be removed from the holder before lapping. If the disc insert is damaged too badly to be reconditioned by lapping, it should be replaced by a new disc insert because machining the insert will change critical dimensions and affect the action of the valve.

5. Due to the weight of the parts of these large valves, adequate rigging and lifting equipment should be provided, along with necessary working tools.

Style JO Valves

It is recommended that the assembly drawing shown in Figure 1 be studied carefully to insure familiarity with the parts of the valves, to clarify the descriptive material in the steps outlined below, and to provide information for careful planning of the work to be done.

1. Remove the cap (24), or lifting gear. (See applicable type construction.)

2. If the valve has a lifting gear, the spindle nut should be removed.

3. Remove the adjusting and nozzle ring set screws (4, 11). Check location of the nozzle and guide (adjusting) ring (3, 10) as follows:

   Nozzle Ring: Turn it to the right by means of a large screwdriver or pointed rod, until it touches the disc holder, counting each notch. This is zero position of the nozzle ring.

   Guide Ring: Turn it to the left until the lower edge of the ring is even with the lower face of the disc holder. This is zero position for the guide ring.

   Record the location of these rings from the zero position.

4. Release the spring load by loosening the adjusting bolt (22). Note: Valves with orifice sizes larger than “Z”, due to the magnitude of the spring load, must have it removed or adjusted using hydraulic cylinders. For information covering this service equipment, contact any Anderson Greenwood Crosby branch or main office. In order to restore the set pressure to its original value when reassembling, the location of the adjusting bolt should be recorded. This can be done by measuring the distance from the top of the bolt to the shoulder on the bonnet, or by counting the number of turns from the initial fixed position to the point where the spring load is completely released.

5. Loosen the nuts (21) holding the bonnet (19) to the body (1). Lift the bonnet up to clear the spindle and spring. Eye-bolts are provided for the purpose of lifting the bonnet. Care should be exercised that it is lifted vertically straight to avoid tilting the spindle and spring assembly, causing damage to the seat.

6. Remove the spring (14) and washers (15, 16) and keep them as a unit.

7. Lift the spindle (13) and disc assembly (6, 8) out of the guide (9). Place it in a safe place to prevent accidental damage to the seat. To separate the spindle from the assembly, lift it and unscrew from mating threads in the disc holder.

8. Remove disc insert (8) from disc holder by unscrewing from mating threads.

9. Lift the guide and guide ring from the body. The guide should fit snugly in the body but not tightly. When it is tight, tapping the side of the valve body near the top will usually free it. If the guide flange is damaged, a light machine cut should be taken to assure alignment and tightness at the body-bonnet joint.

10. Remove the nozzle ring. Unless the nozzle seat is severely damaged, the seat can be reconditioned by lapping in place. Should the seat be severely damaged, the body must be placed on a boring mill and the seat remachined.

Style JB Valves

It is recommended that the assembly drawing shown in Figure 2 be studied carefully to insure familiarity with the parts of the valves, to clarify the descriptive material in the steps outlined below, and to provide information for careful planning of the work to be done.

1. Remove the cap (24) or lifting gear. (See applicable type construction.)

2. If the valve has a lifting gear, the spindle nut should be removed.

3. Remove the nozzle ring set screw (4). Check location of nozzle ring (3) as follows:

   Nozzle Ring: Turn it to the right by means of a large screwdriver or pointed rod, until it touches the disc holder, counting each notch. This is zero position of the nozzle ring.

   Record the location of the ring from the zero position.

4. Release the spring load by loosening the adjusting bolt (22). Note: Valves with orifice sizes larger than "Z", due to the magnitude of the spring load, must have it removed or adjusted using hydraulic cylinders. For information covering this service equipment, contact any Anderson Greenwood Crosby branch or main office. In order to restore the set pressure to its original value when reassembling, the location of the adjusting bolt should be recorded. This can be done by measuring the distance from the top of the bolt to the shoulder on the bonnet, or by counting the number of turns from the initial fixed position to the point where the spring load is completely released.

5. Loosen the nuts (21) holding the bonnet (19) to the body (1). Lift the bonnet up to clear the spindle and spring. Eye-bolts are provided for the purpose of lifting the bonnet. Care should be exercised that it is lifted vertically straight to avoid tilting the spindle and spring assembly, causing damage to the seat.

CAUTION

When removing the bonnet, caution should be used to insure that the spindle guide (51) is not lifted with the bonnet. If this does occur, however, some protective means (such as pieces of wood) should be placed between the spindle guide (51) and bellows protector (10), since the spindle guide will be released from the bonnet when lifting of the bonnet is continued and contact is made between the lower spring washer and spindle guide.

6. Remove the top spring washer and bearing (18), spring (14) and spring washers (15, 16). This can be done most advantageously by placing support members (steel bars) under the lower spring washer (15) and attaching slings to the support members to lift straight upward, removing the spring (14) and spring washers (15, 16) as a complete assembly. Care should be observed that the assembly does not strike the spindle (5) so as to cause movement of the disc insert (13) on the seat.

7. The spindle (50) may be removed from the disc holder by lifting and turning counterclockwise. Remove the spindle guide assembly (51, 52). The bellows (9) and disc holder assembly and disc insert may be lifted out of the valve as a complete unit.

8. Remove the nozzle ring (3).

9. Remove the disc ring pin (12) by driving it inward with a punch of proper size. This permits the disc ring (11) to be removed from the disc holder (6), exposing the edge of the disc insert (13). The disc insert (13), when installed properly, is threaded in the disc holder (6) and the threads on the insert fall into the groove provided in the disc holder. The method of engagement can be checked by the relative looseness of the disc insert (13) in the disc holder (6). When removing the disc insert from the disc holder, lift and turn until the threads are engaged. The disc insert may now be screwed out of the disc holder.

Cleaning

External parts such as body, bonnet and cap should be cleaned by immersion in a bath such as hot oakite solution or equivalent. The internal parts such as the guide, disc, nozzle and spindle should be cleaned in a solution such as Varsol.

Inspection of Parts

Inspect parts for wear and/or damage and repair or replace as necessary.

Lapping of Seats

Good seating surfaces are a prerequisite for a good operating, tight valve. All Crosby nozzle relief valves have flat seats, and if certain steps are followed, their reconditioning does not require great skill, but proper equipment is essential.

Lapping Blocks

A lapping block is made of a special grade of annealed cast iron and lapped optically flat. It is essential that it remain flat to produce a truly flat seating surface. In checking the lapping block and for restoring flatness after use, a lapping block reconditioner should be used.

Lapping Compounds

The following lapping compounds, or their commercial equivalent, are suggested:

Abrasive	Grit Size	Average Micron Size	Description	Mfg. Trade Name or Equivalent
Silicon Carbide	320	31	Medium Coarse	US Products No. 2F Crystolon
Silicon Carbide	400	22	Medium	US Products No. 3F Crystolon
Silicon Carbide	600	16	Fine	US Products No. A600 Crystolon
Hard Alumina or Aluminum Oxide	900	9	Polish	US Products No. 38-900A

Experience has proven that three grades of compound – medium, fine and polish – will properly condition almost any damaged valve seat, unless of course, remachining is necessary. A medium coarse compound may be used for fast cutting as a first operation if desired.

Lapping Procedure

Different individuals have different methods of lapping valve seats, but certain essential steps must be taken to get satisfactory results. The following procedure is suggested for lapping of valve seats:

1. Never lap the disc against the nozzle. Lap each part separately against a cast iron lapping block of the proper size. These blocks hold the lapping compound in their surface pores but must be recharged and reconditioned frequently.

2. Check the lapping block frequently on a good lapping block reconditioner to make certain it is perfectly flat.

3. If considerable lapping is required, spread a thin coat of medium lapping compound on the block. After lapping with this compound, lap again with a fine compound. Unless much lapping is called for, the first step can be omitted. Next, lap again using a polish compound.

4. Lap the block against the seat. Never rotate the block continuously, but use an oscillating movement, as in grinding automobile valves.

5. When all nicks and marks have disappeared, remove all the compound from the block and seat. Apply polish compound to another block and lap the seat with this. As the lapping nears completion, only the compound left in the pores of the block should be present. This should give a very smooth finish. If scratches appear, the cause is probably dirty lapping compound. These scratches should be removed by using compound free from foreign material.

6. Extreme care should be taken throughout to make certain that the seats are kept perfectly flat.

Assembling

General

1. Before assembling all parts should be clean.

2. Nozzle threads should be lubricated with Coppermol and all flat metal gaskets should be lubricated with John Crane Thred-Gard or an equivalent lubricant sealer.

3. The spindle ball and spring washer contact surfaces should be lubricated with Thred-Gard or equivalent.

4. Body stud and nut threads, nut washer faces, and adjusting bolt threads should be lubricated with Molykote G or equivalent.

5. Assembly drawings should be referred to when assembling valves.

Style JO Valves

1. Screw the nozzle ring onto the nozzle, making certain that it is below the top surface of the nozzle seat.

2. Wipe the nozzle seat with a clean cloth and then place the guide and guide ring in the valve body. The guide should fit snugly in the body without binding. Guides with vent holes should be installed with the holes facing the outlet.

3. Clean the disc seat and place the disc and spindle assembly in the guide.

4. Place the spring and washers on the spindle, keeping the spindle in a vertical-central position.

5. Lower the bonnet into place, using care to prevent any damage to the seats or spindle. The bonnet is automatically centralized on the guide flange but must be tightened down evenly to prevent unequal strain and possible misalignment.

6. Apply the spring load by tightening the adjusting bolt.

7. Locate nozzle and guide rings in accordance with settings recorded during disassembly for the particular valve.

8. Tighten the set screws on the rings. The end of the set screw should fit into a notch on the ring so as to lock but not bind.

Style JB Valves

1. Assemble the disc holder (6) and bellows assembly (9), disc ring (11) and disc insert (13) in the reverse order from that described in the disassembly section of this instruction, lubricating the threads on the disc insert prior to assembly.

2. Lubricate the nozzle ring threads on the nozzle and screw the nozzle ring (3) to nozzle (2) until the top of the nozzle ring is below the seat.

3. Lubricate the gasket surfaces on the body bellows protector and spindle guide.

4. Wipe the nozzle and disc seats clean with a lint-free cloth, carefully insert the assembled unit, bellows assembly (9), disc holder (6), disc ring (11), disc insert (13), etc., into valve body (1).

5. Place spindle guide (51) in place on bellows protector (10), lifting with a sling in the holes provided.

6. Lubricate spindle ball and threads and assemble spindle (50) to disc holder (6) by turning until spindle thread drops into recess provided in disc holder and spindle makes contact with disc bushing (8). Proper assembly will allow the spindle to rotate freely.

CAUTION

Assembly of spindle should be done with care so guiding surfaces of spindle guide are not damaged.

7. Lubricate spring washer to spindle contact surfaces and place the spring (14) and spring washers (15, 16) on the spindle (50) and lower the bonnet (19) into place, using care to prevent any damage to the seats or spindle (50). The bonnet (19) is automatically centralized on the guide flange but must be tightened down evenly by tightening bonnet stud nut (21) uniformly to prevent unnecessary strain and possible misalignment.

8. Apply the spring load by tightening the adjusting bolt (22) down to its original position as marked prior to dismantling. This must be done using the hydraulic cylinders used in disassembly on orifice sizes larger than “Z”. Contact any Anderson Greenwood Crosby branch or main office for information on this equipment. (See paragraphs on disassembly procedure.)

9. Move the nozzle ring (3) up (to the right) until it touches the disc ring (11); then lower it to the original setting recorded in Paragraph 2 of disassembly.

   Tighten the nozzle ring set screws (4) on the nozzle ring (3). The set screw point should fit into a notch on the ring so as not to cause binding.

10. The spindle nut (33) and cap (24) may then be assembled to the valve.

Adjusting and Testing

1. Test Stand Set Pressure Test

After a relief valve has been reconditioned, it is necessary to adjust the set or opening pressure and check the valve for tightness. To check the opening point properly, the test medium should be air for a valve which is to be used on gas or vapor service.

It is essential that the testing medium be clean and free of any impurities. Solids or other foreign material in the test medium can severely damage the seating surfaces and negate all the care exercised in reconditioning the valve. The valve should be set to open at the desired pressure. This is done by tightening the adjusting bolt to increase, or loosening to decrease, the spring compression. These adjustments should be made using the same hydraulic device referenced in the section covering valve assembly and disassembly. After each adjustment, the lock nut should be tightened. The adjusting bolt should never be turned when the pressure under the disc is near the popping pressure of the valve. At this point, the spring load and the inlet pressure load are almost equal. Any movement of the adjusting bolt is likely to cause one seat to turn on the other, damaging the seating surfaces.

The nozzle setting for this test should be its lowest locked position for Styles JO and JB valves and the guide ring for Style JO valves should be level.

Seat tightness of Crosby nozzle relief valves can best be checked with air on the inlet side and the seats covered with water on the discharge side. Satisfactory tightness at a pressure 10% (but not less than five pounds) below the set pressure is readily attainable.

2. Installation Set Pressure Test and Operational Test

Set Pressure Adjustments

The opening point of a safety relief valve can be checked in place by gagging all but one of the valves on the installation and raising pressure to the popping point of the valve. Readings of opening pressure and reseating pressure should be taken using a calibrated test gage.

Adjustments to popping pressure are made by turning the adjusting bolt (22) using the same method described in the section covering valve assembly and disassembly. To increase set pressure, turn the adjusting bolt clockwise (right) and to decrease set pressure turn counterclockwise (left). The adjusting bolt nut (23) should be locked after each adjustment. One turn of the adjusting bolt will change the opening pressure approximately 4-5 psi.

Ring Adjustments

CAUTION

Never make any ring adjustments when the vessel is under pressure without gagging the valve properly. Prior to removing the nozzle ring set screw, the valve outlet or downstream pressure should be checked to be sure it is at atmospheric pressure. Care should be taken to use only sufficient torque on the gage to hold the valve closed. Overgagging may damage the valve internals.

If the blowdown (valve reseating pressure) is not as desired when the set pressure has been obtained, it will be necessary to adjust the rings.

Style JO Valves

The upper or guide (adjusting) ring is the principal blowdown control ring. To change its position, remove the guide (adjusting) ring set screw on the back of the valve body. Insert a screwdriver or similar tool and engage one of the notches (these can be seen through the set screw hole). The ring can then be turned to the right or left as desired. The guide (adjusting) ring should never be turned more than ten (10) notches either way without retesting the valve. After each adjustment always replace and tighten the set screw, being careful that its point engages a notch and does not rest on the top of a tooth (Figure 7).

Turning the guide (upper) ring to the right raises it and shortens the blowdown.

Turning the guide (upper) ring to the left lowers it and lengthens the blowdown.

If the guide (adjusting) ring is raised too high in attempting to shorten the blowdown, it will no longer control the valve, and further raising will have no effect. The opening lift may be very low and the closing may be indistinct and dragged out. This can be corrected by lowering the ring.

Style JB Valves

The Style JB valve is fitted with a lower or nozzle ring (3) which is used in obtaining proper blowdown of the valve. This ring setting is carefully determined before the valve is installed and rarely needs any further adjustment. However, in case the valve does not have the desired blowdown, the nozzle ring (3) may be used to change the valve reseating pressure.

The nozzle ring (3) is adjusted by removing the nozzle ring set screw (4) and turning ring with a screwdriver. Turning it to the right raises it and results in a stronger “pop” action and will increase blowdown. Turning it to the left lowers the ring and decreases the blowdown and may result in a warn or simmer if carried too far. The valve performance should be checked after each adjustment.

Whenever ring adjustments are changed on either Style JO or JB valves, a record should be kept of the number of notches and the direction in which the ring is moved. This will make it possible to return to the original setting in case of error.

The factory ring setting is stamped on all valves on the top of the bonnet under the cap. It is recommended that this stamping be changed reflecting the new setting.

After the valve has been adjusted to open and close at the desired pressures, make certain that the adjusting bolt nut (23) and the nozzle ring are tight. Then install the lifting gear and make sure the dog (37) is free, and engages the spindle nut (33) when the lever (44) is rotated. The pull cable or easing gear mechanism, if used, should be adjusted or counterbalanced so as to maintain clearance between dog (37) and spindle nut (33) under normal operating conditions.

3. Test With Auxiliary Set Pressure Device

The opening point of a safety relief valve can also be checked by means of an auxiliary set pressure device, which measures the spring load differential when the system pressure under the valve is less than the popping pressure. It may be used for system pressures as low as 80 percent of popping pressure.

For information concerning this method of testing, consult the factory.

Spring Pressure Ranges and Selection

Springs in Crosby nozzle relief valves are designed to cover definite pressure ranges in any given size and style, and complete information is available immediately at any Anderson Greenwood Crosby branch office or representative.

Each spring is numbered to permit positive identification of material and rating.

When springs are replaced, washers should be ordered because they are custom fitted to each spring.

Spare Parts

When ordering spare parts, the assembly number should be given together with the set pressure. On the valve nameplate, the assembly number is shown as “Shop Number”. Recommended spare parts are as follows:

Style JO Valves

Disc Insert (8)
Disc Holder (6)
Spindle (13)

Style JB Valves

Disc Holder (6)
Bellows (9)
Bellows Protector (10)

The bellows assembly is a welded fabrication of the bellows, disc holder and bellows protector. This assembly may be returned to Anderson Greenwood Crosby for the installation of a new bellows since neither the disc holder or bellows protector are normally damaged. The customer is recommended to stock a completed assembly, since this factory work is usually time consuming.

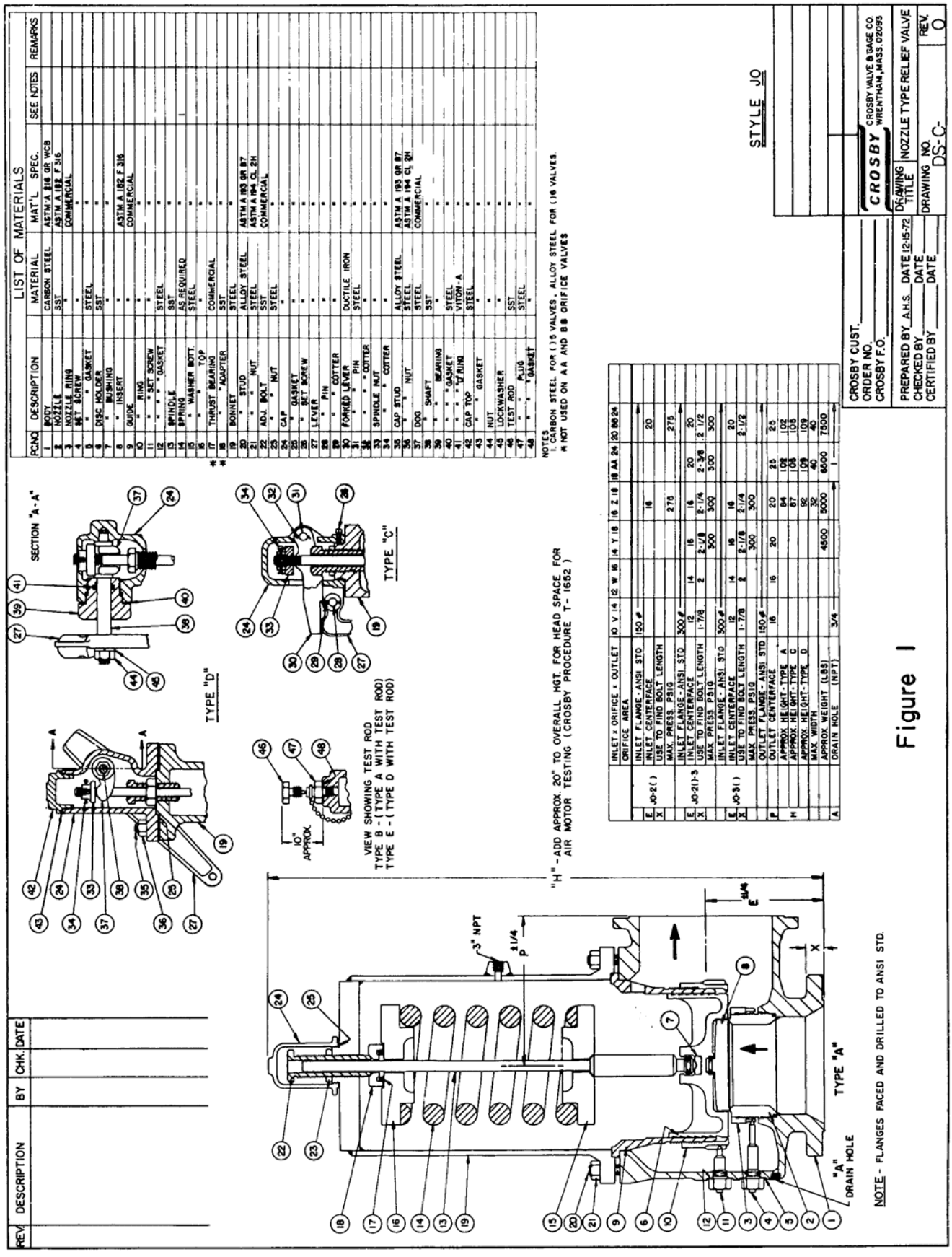
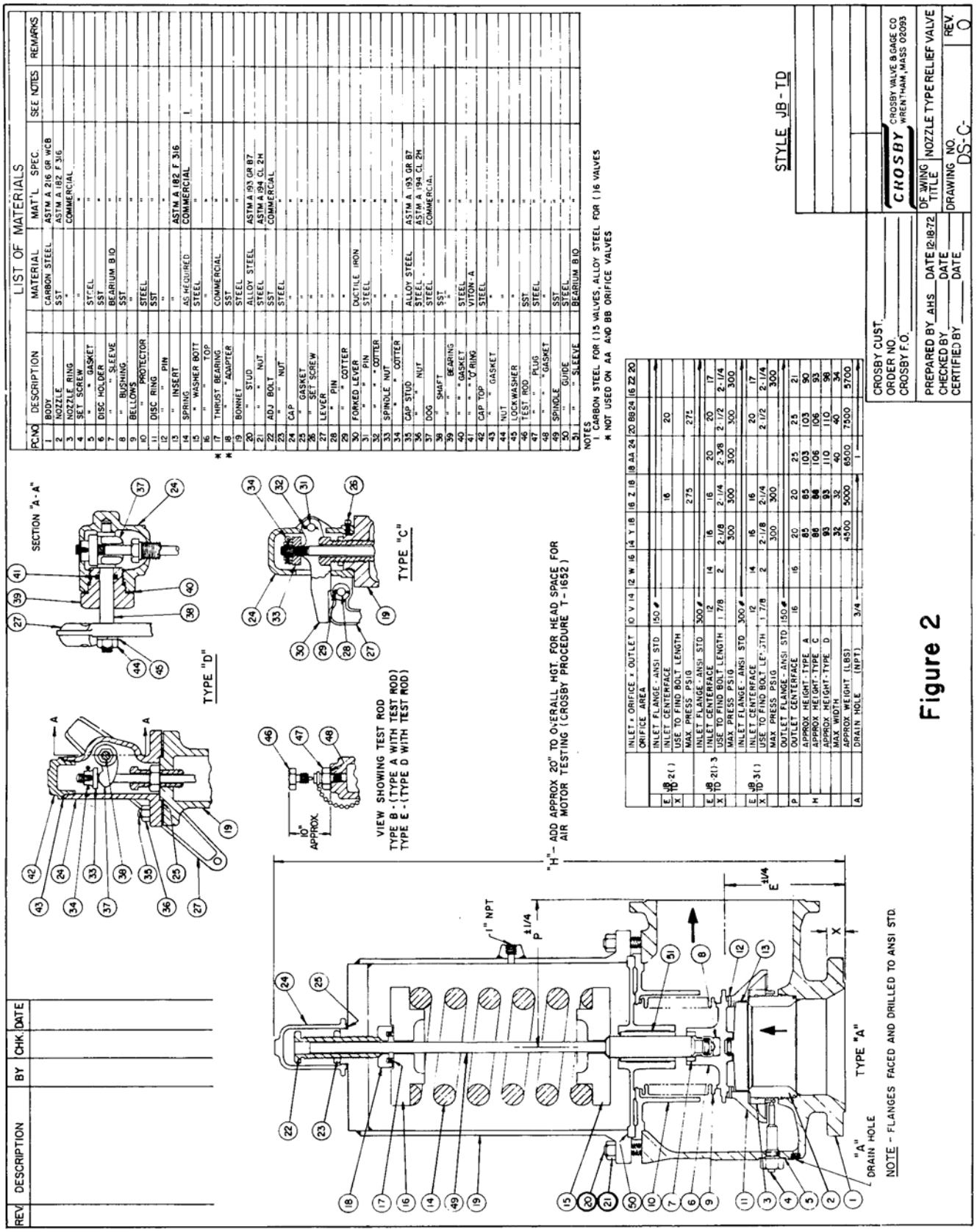

LIST OF MATERIALS
PC.NO. DESCRIPTION MATERIAL MAT'L SPEC. SEE NOTES REMARKS
1 BODY CARBON STEEL ASTM A 216 GR WCB
2 NOZZLE 316 SST ASTM A 182 F 316
3 NOZZLE RING 316 SST "
4 SET SCREW " COMMERCIAL
5 * GASKET STEEL "
6 DISC HOLDER 316 SST "
7 * BUSHING " "
8 * INSERT " ASTM A 182 F 316
9 GUIDE " COMMERCIAL
10 * RING " "
11 * * SET SCREW " "
12 * * GASKET STEEL "
13 SPINDLE 316 SST "
14 SPRING AS REQUIRED "
15 * WASHER BOTT. STEEL 1
16 * TOP " "
17 THRUST BEARING COMMERCIAL "
* 18 * ADAPTER 316 SST "
19 BONNET STEEL "
20 * STUD ALLOY STEEL ASTM A 193 GR B7
21 * * NUT STEEL ASTM A 194 CL 2H
22 ADJ. BOLT 316 SST COMMERCIAL
23 * * NUT STEEL "
24 CAP " "
25 * GASKET " "
26 * SET SCREW " "
27 LEVER " "
28 * PIN " "
29 * * COTTER " "
30 FORKED LEVER DUCTILE IRON "
31 * * PIN STEEL "
32 * * * COTTER " "
33 SPINDLE NUT " "
34 * * COTTER " "
35 CAP STUD ALLOY STEEL ASTM A 193 GR B7
36 * * NUT STEEL ASTM A 194 CL 2H
37 DOG STEEL COMMERCIAL
38 * SHAFT 316 " "
39 * * BEARING " "
40 * * * GASKET STEEL "
41 * * * 'V' RING VITON-A "
42 CAP TOP STEEL "
43 * * GASKET " "
44 NUT " "
45 LOCKWASHER " "
46 TEST ROD 316 SST "
47 * * PLUG STEEL "
48 * * * GASKET " "
NOTES
1. CARBON STEEL FOR ( )5 VALVES, ALLOY STEEL FOR ( )6 VALVES.
* NOT USED ON A A AND B B ORIFICE VALVES
SECTION "A-A"
TYPE "C"
TYPE "D"
VIEW SHOWING TEST ROD
TYPE B - (TYPE A WITH TEST ROD)
TYPE E - (TYPE D WITH TEST ROD)
10" APPROX.
"H" - ADD APPROX. 20" TO OVERALL HGT. FOR HEAD SPACE FOR AIR MOTOR TESTING (CROSBY PROCEDURE T- 1652)
INLET x ORIFICE x OUTLET | 0 V 14 | 12 W 16 | 14 Y 18 | 16 Z 18 | 18 AA 24 | 20 BB 24
ORIFICE AREA
J0-2( ) E INLET FLANGE - ANSI STD 150 # 16 20
X INLET CENTERFACE
USE TO FIND BOLT LENGTH
MAX. PRESS. PSIG 275 275
J0-2(1)-3 E INLET FLANGE - ANSI STD 300 # 12 14 16 16 20 20
X INLET CENTERFACE
USE TO FIND BOLT LENGTH 1-7/8 2 2-1/8 2-1/4 2-3/8 2 1/2
MAX. PRESS. PSIG 300 300 300 300
J0-3( ) E INLET FLANGE - ANSI STD 300 # 12 14 16 16 20
X INLET CENTERFACE
USE TO FIND BOLT LENGTH 1-7/8 2 2-1/8 2-1/4 2-1/2
MAX. PRESS. PSIG 300 300
P OUTLET FLANGE - ANSI STD 150 # 16 20 20 20 25
OUTLET CENTERFACE
H APPROX. HEIGHT - TYPE A 84 104 102
APPROX. HEIGHT - TYPE C 87 108 105
APPROX. HEIGHT - TYPE D 92 109 109
- MAX. WIDTH 38 40 40
- APPROX. WEIGHT (LBS) 4500 5000 6800 7300
A DRAIN HOLE (NPT) 3/4 1
STYLE JO
CROSBY CUST.
ORDER NO.
CROSBY F.O.
CROSBY CROSBY VALVE & GAGE CO. WRENTHAM, MASS. 02093
PREPARED BY A.H.S. DATE 12-15-72
CHECKED BY DATE
CERTIFIED BY DATE
DRAWING TITLE NOZZLE TYPE RELIEF VALVE
DRAWING NO. DS-C-
REV. Q
REV. DESCRIPTION BY CHK. DATE
TYPE "A"
"A" DRAIN HOLE
3" NPT
1 1/4 P
NOTE - FLANGES FACED AND DRILLED TO ANSI STD.

Figure 1


LIST OF MATERIALS
P.NO. DESCRIPTION MATERIAL MAT'L SPEC. SEE NOTES REMARKS
1 BODY CARBON STEEL ASTM A 216 GR WCB
2 NOZZLE SST ASTM A 182 F 316
3 NOZZLE RING " COMMERCIAL
4 SET SCREW " "
5 " " GASKET STEEL "
6 DISC HOLDER SST "
7 " " SLEEVE BEARIUM B10 "
8 " BUSHING SST "
9 BELLOWS " "
10 " PROTECTOR STEEL ASTM A 193 GR B7
11 DISC RING SST ASTM A 194 GR 2H
12 " " PIN " "
13 " INSERT " ASTM A 182 F 316
14 SPRING AS REQUIRED COMMERCIAL 1
15 " WASHER BOTT STEEL " "
16 " " TOP " "
* 17 THRUST BEARING COMMERCIAL " "
* 18 " " ADAPTER SST " "
19 BONNET STEEL " "
20 " " STUD ALLOY STEEL ASTM A 193 GR B7
21 " " NUT STEEL ASTM A 194 GR 2H
22 ADJ BOLT SST COMMERCIAL
23 " " NUT STEEL "
24 CAP " "
25 " GASKET " "
26 " SET SCREW " "
27 LEVER " "
28 " PIN " "
29 " COTTER " "
30 FORKED LEVER DUCTILE IRON " "
31 " " PIN STEEL " "
32 " " COTTER " "
33 SPINDLE NUT " "
34 " " COTTER " "
35 CAP STUD ALLOY STEEL ASTM A 193 GR B7
36 " " NUT STEEL ASTM A 194 GR 2H
37 DOG STEEL COMMERCIAL
38 SHAFT SST "
39 " BEARING " "
40 " " GASKET STEEL "
41 " " " O RING VITON - A "
42 CAP TOP STEEL "
43 " GASKET " "
44 NUT " "
45 LOCKWASHER " "
46 TEST ROD SST "
47 " " PLUG STEEL "
48 " " GASKET " "
49 SPINDLE SST "
50 " GUIDE STEEL "
51 " " SLEEVE BEARIUM B10 "
NOTES
1 CARBON STEEL FOR ( ) 5 VALVES, ALLOY STEEL FOR ( ) 6 VALVES
* NOT USED ON AA AND BB ORIFICE VALVES
SECTION "A-A"
TYPE "D"
TYPE "C"
VIEW SHOWING TEST ROD
TYPE B - (TYPE A WITH TEST ROD)
TYPE E - (TYPE D WITH TEST ROD)
10" APPROX.
"H" - ADD APPROX 20" TO OVERALL HGT. FOR HEAD SPACE FOR AIR MOTOR TESTING (CROSBY PROCEDURE T-1652)
INLET - ORIFICE - OUTLET | 10 V 14 | 12 W 16 | 14 Y 18 | 16 Z 18 | 18 AA 24 | 20 BB 24 | 16 Z 20 | 18 Z 20
ORIFICE AREA
E JB-2( ) INLET FLANGE - ANSI STD 150 # 16 20
X TD-2( ) INLET CENTERFACE
USE TO FIND BOLT LENGTH
MAX. PRESS PSIG 275
E JB-2( ) 3 INLET FLANGE - ANSI STD 300 # 275
X TD-2( ) 3 INLET CENTERFACE 12 14 16 16 20 20 17
USE TO FIND BOLT LENGTH 1 7/8 2 2-1/8 2-1/4 2-3/8 2-1/2 2-1/4
MAX. PRESS PSIG 300 300 300 300
E JB-3( ) INLET FLANGE - ANSI STD 300 # 12 14 16 16 20 17
X TD-3( ) INLET CENTERFACE
USE TO FIND BOLT LEFGTH 1 7/8 2 2-1/8 2-1/4 2 1/2 2-1/4
MAX. PRESS PSIG 300 300 300
OUTLET FLANGE - ANSI STD 150 # 16 20 20 25 25 21
P OUTLET CENTERFACE
APPROX. HEIGHT - TYPE A 85 85 103 103 90
H APPROX. HEIGHT - TYPE C 86 86 106 106 93
APPROX. HEIGHT - TYPE D 93 93 110 110 98
MAX. WIDTH 32 32 40 40 34
APPROX. WEIGHT (LBS) 4500 5000 6500 7500 5700
A DRAIN HOLE (NPT) 3/4 1
"A" DRAIN HOLE
TYPE "A"
NOTE - FLANGES FACED AND DRILLED TO ANSI STD.
Figure 2
STYLE JB-TD
CROSBY CUST.
ORDER NO.
CROSBY F.O.
CROSBY CROSBY VALVE & GAGE CO WRENTHAM, MASS 02093
PREPARED BY AHS DATE 12-18-72
CHECKED BY DATE
CERTIFIED BY DATE
DF WING TITLE NOZZLE TYPE RELIEF VALVE
DRAWING NO. DS-C-
REV. 0
REV. DESCRIPTION BY CHK. DATE

CROSBY

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