

Consolidated®

INSTALLATION, OPERATION
AND MAINTENANCE MANUAL

Consolidated® Safety Relief Valve Type 13900-3 Turbine Reheater Pilot Operated



Industrial Valves

DRESSER

Industrial Valve Operation

Dresser Valve and Controls Division
Alexandria, Louisiana 71309-1430 (USA)

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Consolidated® Safety Relief Valves Turbine Reheater Pilot Operated - Type 13900-3

TYPE 13900-3 MAINTENANCE MANUAL CONTENTS

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Product Safety Sign and Label System

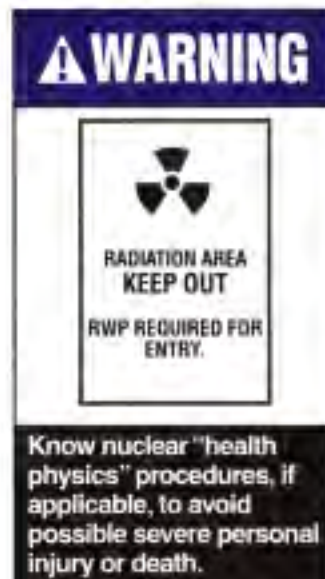
If and when required, appropriate safety labels have been included in the rectangular margin blocks throughout this manual. Safety labels are vertically oriented rectangles as shown in the *representative examples* (below), consisting of three panels framed by a narrow border. The panels can contain four messages which communicate:

1. The level of hazard seriousness.
2. The nature of the hazard.
3. The consequence of human, or product, interaction with the hazard.
4. The instruction, if necessary, on how to avoid the hazard.

The top panel of the format contains a signal word (**DANGER**, **WARNING**, or **CAUTION**) which communicates the level of hazard seriousness.

The center panel contains a pictorial which communicates the nature of the hazard, and the possible consequence of human or product interaction with the hazard. In some instances of human hazards the pictorial may, instead, depict what preventive measures to take, such as wearing protective equipment.

The bottom panel may contain an instruction message on how to avoid the hazard. In the case of human hazard, this message may also contain a more precise definition of the hazard, and the consequences of human interaction with the hazard, than can be communicated solely by the pictorial.



SAFETY ALERTS!

READ – UNDERSTAND – PRACTICE

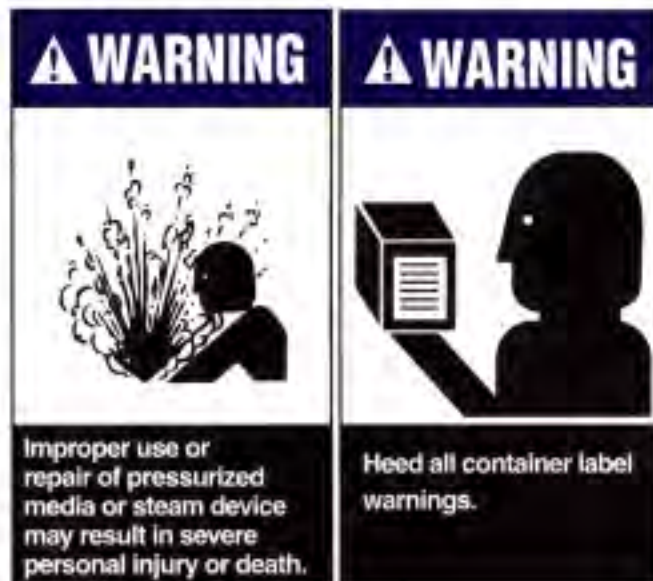
1. **DANGER:** High temperature/pressure can cause injury. Be sure all system pressure is absent before repairing or removing valves.
2. **DANGER:** Don't stand in front of valve outlet when discharging. **STAND CLEAR OF VALVE** to prevent exposure to trapped, corrosive media.
3. **DANGER:** When inspecting a pressure relief valve for leakage, **BE VERY CAREFUL!**



SAFETY ALERTS! Continued

READ – UNDERSTAND – PRACTICE

1. **WARNING:** Allow the system to cool to room temperature before cleaning, servicing or repairing the system. Hot components or fluids can cause severe personal injury or death.
2. **WARNING:** Always read and comply with safety labels on all containers. Do not remove or deface the container labels. Improper handling or misuse could result in severe personal injury or death.
3. **WARNING:** Never use pressurized fluids/gas/air to clean clothing or body parts. Never use body parts to check for leaks or flow rates or areas. Pressurized fluids/gas/air injected into or near the body can cause severe personal injury or death.
4. **WARNING:** It is the responsibility of the owner to specify and provide guarding to protect persons from pressurized or heated parts. Contact with pressurized or heated parts can result in severe personal injury or death.
5. **WARNING:** Do not allow anyone under the influence of intoxicants or narcotics to work on or around pressurized systems. Workers under the influence of intoxicants or narcotics are a hazard both to themselves and other employees and can cause severe personal injury or death to themselves or others.
6. **WARNING:** Incorrect service and repair could result in product or property damage or severe personal injury or death.

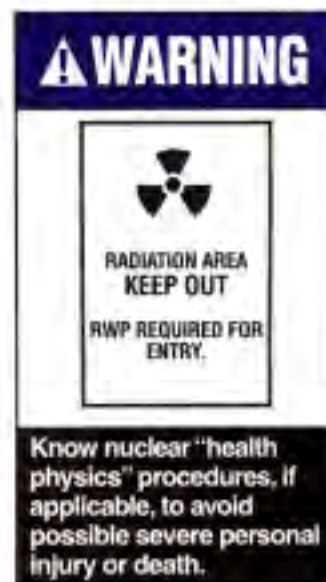


7. **WARNING:** These WARNINGS are as complete as possible but not all-inclusive. Dresser cannot know all conceivable service methods nor evaluate all potential hazards.
8. **WARNING:** Use of improper tools or improper use of right tools could result in personal injury or product or property damage.

SAFETY ALERTS! Continued

READ – UNDERSTAND – PRACTICE

9. **WARNING:** Some valve products manufactured by DVCD may be used in radioactive environments. Consequently, prior to starting any operation in a radioactive environment, the proper "health physics" procedures should be followed, if applicable.



1. **CAUTION:** Heed all service manual warnings. Read installation instructions before installing valve(s).
2. **CAUTION:** Wear hearing protection when testing or operating valves.
3. **CAUTION:** Wear appropriate eye and clothing protection.
4. **CAUTION:** Wear protective breathing apparatus to protect against toxic media.



NOTE:

Any service questions not covered in this manual should be referred to Dresser's Service Department. Phone: (318) 640-6055.

Consolidated® Safety Relief Valves

Turbine Reheater Pilot Operated - Type 13900-3

I. Terminology for Safety Relief Valves

- **Blowdown**

Blowdown is the difference between set pressure and reseating pressure of a pressure relief valve, expressed as a percentage of the set pressure, or actual pressure units.
- **Differential Between Operating and Set Pressures**

Valves in process service will generally give best results if the operating pressure does not exceed 90% of the set pressure. It is recommended that the valve be set as high above the operating pressure as possible.
- **Lift**

Lift is the actual travel of the disc away from the closed position when a valve is relieving.
- **Maximum Allowable Working Pressure**

Maximum allowable working pressure is the maximum gauge pressure permissible in a vessel at a designated temperature. A vessel may not be operated above this pressure, or its equivalent, at any metal temperature other than that used in its design. Consequently, for that metal temperature, it is the highest pressure at which the primary pressure safety relief valve is set to open.
- **Operating Pressure**

The operating pressure is the gauge pressure to which the vessel is normally subjected in service. A suitable margin is provided between operating pressure and maximum allowable working pressure. For assured safe operation, the operating pressure should be at least 10% under the maximum allowable working pressure or 5 psi (.34 bar), whichever is greater.
- **Pilot Operated Safety Relief Valve**

A pilot operated safety relief valve is a safety relief valve in which the major relieving device is combined with and is controlled by a self-actuated auxiliary pressure relief valve.
- **Rated Capacity**

Rated capacity is the percentage of measured flow at an authorized percent overpressure permitted by the applicable code. Rated capacity is generally expressed in pounds per hour (lb/hr) for vapors; standard cubic feet per minute (SCFM) or m³/min for gases; and in gallons per minute (GPM) for liquids.
- **Relief Valve**

A relief valve is an automatic pressure-relieving device, actuated by static pressure upstream from the valve, a relief valve is used primarily for liquid service.

Consolidated® Safety Relief Valves Turbine Reheater Pilot Operated - Type 13900-3

- **Safety Relief Valve**
A safety relief valve is an automatic pressure-relieving device which may be used as either a safety or relief valve, depending upon application. A safety relief valve is used to protect personnel and equipment by preventing excessive overpressure.
- **Safety Valve**
A safety valve is an automatic pressure-relieving device actuated by the static pressure upstream of the valve, and characterized by rapid opening or pop action. It is used for steam, gas or vapor service.
- **Set Pressure**
Set pressure is the gauge pressure at the valve inlet, for which the pressure relief valve has been adjusted to open under service conditions. In liquid service, set pressure is determined by the inlet pressure at which the valve starts to discharge. In gas or vapor service, the set pressure is determined by the inlet pressure at which the valve pops.

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II. General Handling, Storage and Preinstallation

1. The valve, either crated or uncrated, should always be kept with the inlet flange down, i.e., never laid on its side, to prevent possible misalignment and damage to internals.
2. Pressure relief valves should be stored in a dry environment to protect them from the weather. They should not be removed from the skids or crates until immediately prior to installation.
3. Flange protectors and sealing plugs should not be removed until the valve is ready to be bolted on to the installation.
4. Pressure relief valves, either crated or uncrated, should never be subjected to sharp impact. This would be most likely to occur by bumping or dropping during loading or unloading from a truck or while moving with a power conveyor, such as a fork lift truck. While hoisting to the installation, care should be exercised to prevent bumping the valve against steel structures and other objects.
5. Uncrated valves should be moved or hoisted by the three eye bolts located on the top flange of the valve (See Figure 4, Item 26). Crated valves should always be lifted with the inlet flange down.
6. When pressure relief valves are uncrated and the flange protectors removed immediately prior to installation, meticulous care should be exercised to prevent dirt and other foreign materials from entering the inlet and outlet ports while bolting in place.
7. "**Short Term Storage**" is defined as storage not exceeding six months from date of shipment. "**Long Term Storage**" is defined as storage not exceeding one year from date of shipment. "**Extended Storage**" is defined as storage exceeding one year from date of shipment.
8. For **Extended Storage**, items shall be stored within a fire resistant, tear resistant, envelope and stored in a weathertight, and well ventilated building or equivalent enclosure. Precautions shall be taken against vandalism. This area shall be situated and constructed so that it will not be subject to flooding; the floor shall be paved or equal, and well drained. Items shall be placed on pallets or shoring to permit air circulation. The area shall be provided with uniform heating and temperature control or its equivalent to prevent condensation and corrosion. Minimum temperature shall be 40°F (4.5°C) and maximum temperature shall not exceed 140°F (60°C). Valves or parts shall be stored in the original shipping container. The shipping container shall be kept in an upright position as indicated by the markings on the crate. **DO NOT STACK**. Level B storage requirements as specified in ANSI N45.2.2 shall apply. All material, upon receipt, should be inspected and all coatings and packaging damaged during shipping and handling shall be put into like new condition before storing.
9. For **Long Term Storage**, items shall be stored indoors or equivalent with all provisions and requirements as set forth in extended storage items except that heat and temperature control is not required. Level C storage requirements as specified in ANSI N45.2.2 shall apply.
10. For **Short Term Storage**, the storage requirements are the same as those specified for Long Term Storage.

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II. General Handling, Storage and Preinstallation (continued)

11. For any reason should it be necessary to store the valve in an uncrated condition, the valve shall be stored in an upright position on the inlet flange, making certain the inlet flange is protected from damage. Never lay the valve on its side as damage to the internals and misalignment may be incurred. The valve, when removed from the shipping container, shall have the protectors left intact to prevent entrance of foreign materials. Use all precaution to prevent the entrance of dirt and foreign material into the valve.

12. Lift the valve using all three eye bolts located on the top flange (See Figure 4, Item 26). Eye bolts must be fully engaged in top flange. **CAUTION: DO NOT ALLOW LIFTING CHAIN OR SLING TO EXERT ANY SIDEWAYS THRUST ON THE PILOT VALVE OR DAMAGE TO PILOT VALVE WILL RESULT.**

III. General Description

Modern nuclear power plants have given rise to systems which cycle extremely large quantities of steam at relatively low pressures. This is particularly true in the reheat portion of the turbine cycle.

These requirements have exceeded the feasible limits of conventional spring loaded safety valves. In response to this requirement, the Consolidated® 13900 series pilot operated safety relief valves were developed for ASME Code Section VIII service providing discharge orifice sizes up to 200 square inches with minimum overall height and weight.

The pilot senses pressure internally through the main valve eliminating the need for external pressure lines which normally are subject to mechanical damage, fouling or rupture.

The combination of conventional spring loaded pilot and an internal sensing tube meet all Code requirements for a Fail Safe Device.

As an additional safety feature, the pilot discharge can be vented to the outlet of the main valve if required. This is accomplished by the use of a discharge tube from the pilot valve outlet to the main valve outlet.

An effort has been made to provide a valve which requires a minimum of maintenance upkeep and can be actually repaired on its installation site.

Factors which contribute to minimum maintenance requirements of the Main Valve consist of: 1) no metal sliding surfaces; 2) use of Teflon seals for good high temperature sealing characteristics; and 3) metal to metal load bearing characteristics of Consolidated's O-ring seat seal which will not deform the seat seal anymore than required for pressure sealing.

When maintenance work is necessary, the following features offer advantages in reducing the amount of labor required: 1) all parts of the valve are top inserted; 2) it is not necessary that the valve be removed from its installation site or that the outlet piping be removed, unless the seat bushing requires rework; 3) large diameter soft seats do not require the "Excellence of Technique" needed to get leakproof large diameter metal seats; and 4) the pilot valve can be removed and be reworked and readjusted on a separate small test facility.

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IV. Valve Operation

Inlet pressure, identified as P_1 , enters the main valve at "A", flows through the sensing tube "B" and through the clearance formed by the sensing tube and the floating washer on the main valve disc to pressurize chamber "C". Additional flow occurs between the top of the sensing tube and the pilot disc, down into chamber "C" through an annular region formed by the sensing tube and pilot base. Pressure in chamber "C" will now be designated P_2 .

When the set pressure is reached and the pilot opens, pressure is exhausted through tube "D" into the main valve outlet "E" or is exhausted directly into the atmosphere depending on if the pilot valve outlet is equipped with a discharge tube. Flow past the pilot seat will allow the P_2 pressure to exhaust and reduce to a value of approximately 58% of P_1 , producing a lifting force on the main disc causing it to open.

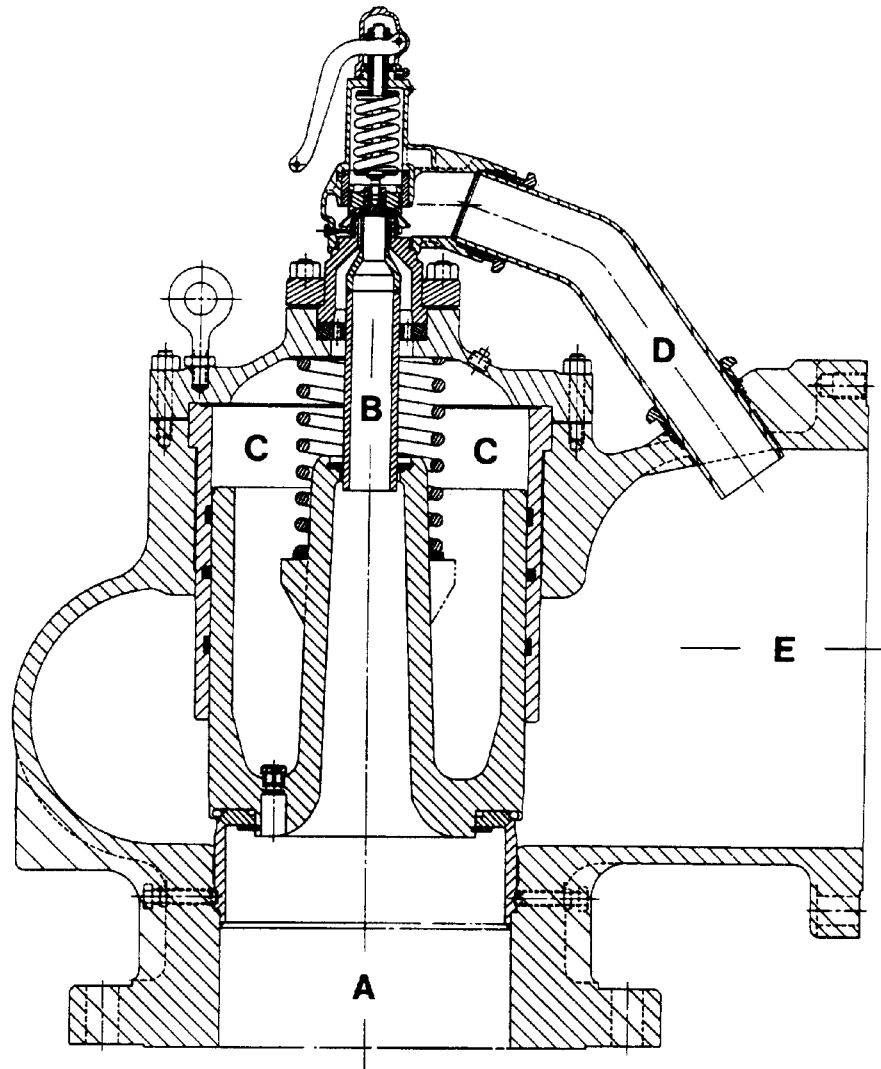


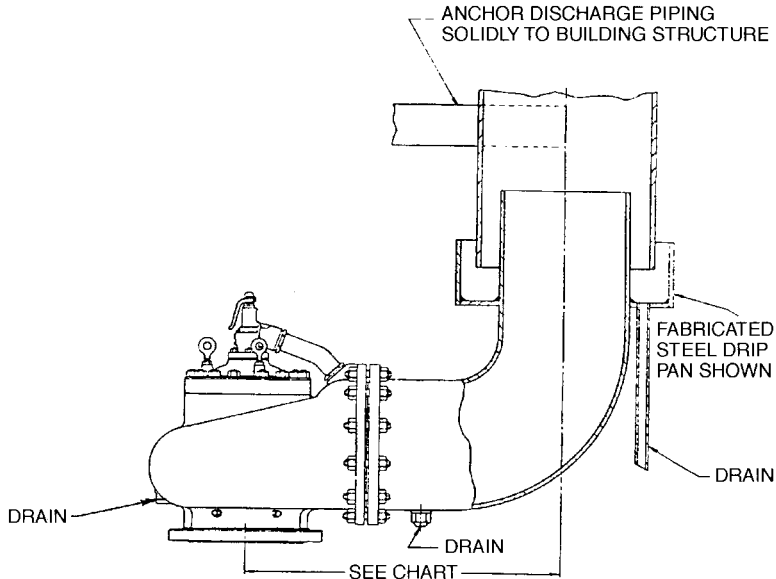
FIGURE 1
VALVE FLOW DIAGRAM

Consolidated® Safety Relief Valves Turbine Reheater Pilot Operated - Type 13900-3

IV. Valve Operation (continued)

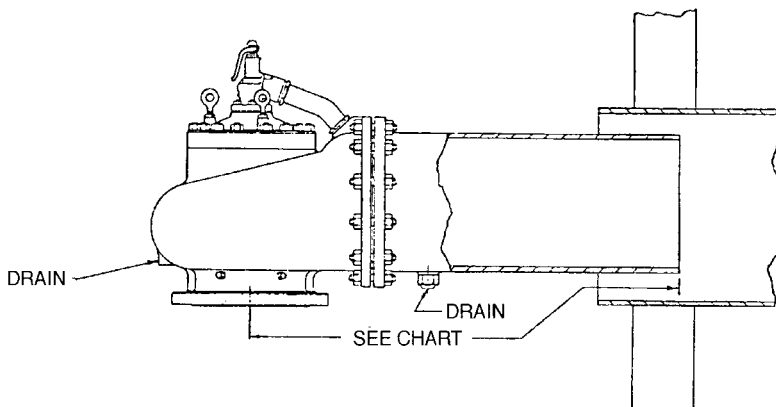
Once inlet pressure P_1 has dropped to an appropriate predetermined value, the pilot valve will close and steam will flow into chamber "C" and will immediately repressurize the backside of the main disc, closing the main valve.

The backside of the main valve disc exposed to chamber "C" has a larger area than the main seat producing an additional force on the main seat to maintain tightness.



**FIGURE 2
INSTALLATION PIPING**

Valve Seat Area		Maximum Allowable Span	
Inches ²	cm ²	Inches	Meters
114	735	45	1.14
143	923	62	1.58
176	1136	55	1.4
200	1290	55	1.4



**FIGURE 2A
INSTALLATION PIPING**

Consolidated® Safety Relief Valves Turbine Reheater Pilot Operated - Type 13900-3



V. Installation Inlet and Exhaust Piping

Safety relief valve discharges should be located or piped in such a manner that the discharged fluid is carried clear of manways. Referring to Figure 2, a drain should be provided at the low point of the discharge elbow where condensate may discharge. An open gravity drain is also supplied on the backside of the valve body casting which is below the level of the valve seat to remove condensate in the body bowl.

Exhaust piping and drain lines must be installed so that they will not impose undue stress on the safety relief valve. Stresses set up in the body from any source may cause distortion and leakage at pressures below the set point. If standard drip pans are used (See Figure 2), sufficient clearance must be provided to allow for movement of the valve due to expansion and contraction of the unit on which it is installed. If blow back around the drip pan occurs, the vent piping is inadequate and its design should be investigated.

If the valves are to exhaust through horizontal piping then the distance from the valve centerline to the end of the horizontal pipe must not exceed the dimension shown on the chart in Figure 2A.

If discharge piping is required beyond the length limit specified in Figure 2 or Figure 2A, then a length of larger diameter piping should be provided into which the valve discharge piping should extend. Sufficient clearance should be allowed for the expansion and contraction of the unit on which the valve is installed. If this larger discharge piping extends through a wall to the outside it must be adequately fastened to the building to prevent breaking free when the valve is blown.

Cold air blowing into the valve body through the discharge pipe can cause the valve to leak. To prevent this from happening the discharge pipe should point downwind. If this is not possible, then a 90° elbow, or a "T", should be installed.

CAUTION: ALL DISCHARGE PIPING SHALL HAVE SUFFICIENT AREA TO ACCOMMODATE THE FULL CAPACITY OF THE SAFETY VALVE WITHOUT CAUSING STEAM TO ESCAPE BACKWARD INTO THE DRIP PAN.

Flexible metal hoses, if used to connect safety relief valve outlets to discharge stacks, must have sufficient length and must be designed and installed in such a manner that they will not become "solid" in any position of the valve. Better results are obtained if the hoses are installed so that they will permit movement by bending rather than by stretching and compressing along their length.

Steam flowing vertically out of the discharge elbow produces a downward reaction on the elbow, depending on the quantity of steam flowing and its velocity. In large, high capacity valves this force can equal several thousand pounds and can produce severe stresses in the valve neck. The bending stresses are determined by the amount of the reactive force, combined with the moment arm or horizontal distance between the vertical centerlines of the outlet elbow and the valve. The pilot operated 13900 safety relief valve is designed so that as long as the moment arm distance from the centerline of the valve to centerline of the vent piping is held within the limits stated in Figure 2, neck stresses will be within code allowable values.

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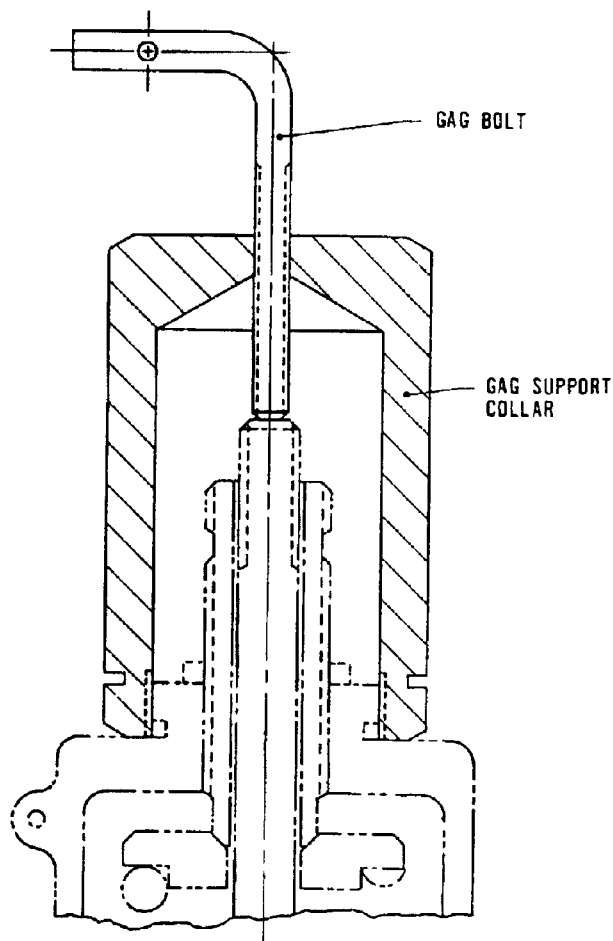
V. Installation Inlet and Exhaust Piping (continued)

When installing the valve, the inlet flange bolts should be pulled down evenly to prevent inlet flange distortion and effect a leak tight flange seal (See Section XIX. Torque Requirements, Figure 13). For outlet flanges, refer to Figure 14A.

It is recommended that the valve be insulated with a minimum of two inches (50.8 mm) insulation.

VI. Hydrostatic Testing and Gaging Valves

In the event that it becomes necessary to gag the valves during a hydrostatic test, it will be required to first remove the lifting lever cap arrangement. Referring to Figure 5, remove cotter pin and lever pin (38) and lifting lever (33). Unscrew the cap lock screw (39) and remove the cap (37). Install the gag cap and gag as shown in Figure 3. Gag assemblies can be furnished by "DVCD", Dresser Valve and Controls Division.



**FIGURE 3
GAGGING ARRANGEMENT**

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VI. Hydrostatic Testing and Gagging Valves (continued)

Care must be taken to prevent overgagging which will bend the spindle. In applying gags, remember that the valve spring will hold the valve closed against its set pressure. The additional gag load applied should be only enough to insure that the valves do not lift at the expected overpressure.

Unit pressure should be brought up to within 80% of the pressure of the low set valve before applying the gags.

Ref. No.	Nomenclature	Ref. No.	Nomenclature
1	MAIN BASE	31	SPINDLE ASSEMBLY
2	SEAT BUSHING	31A	SPINDLE
3	SEAT BUSHING SCREW JAM NUT	31B	SPINDLE COLLAR
4	RETAINER LOCK RING	32	TOP SPRING WASHER
5	"O" RING SEAT SEAL RETAINER	33	LEVER
6	DISC DRAIN PLUG	34	COMPRESSION SCREW LOCKNUT
7	MAIN DISC	35	RELEASE NUT
8	MAIN GUIDE	36	RELEASE LOCKNUT
9	BACK-UP RING	37	CAP
10	SEAT BUSHING RETAINER SCREW	38	LEVER PIN
11	"O" RING SEAT SEAL	39	CAP LOCK SCREW
12	TUBE FITTING "O" RING	40	COMPRESSION SCREW
13	GUIDE SEAL	41	SPRING
14	FLOATING WASHER	42	PILOT DISC ASSEMBLY
15	FLOATING WASHER RETAINER	42A	DISC
16	FLOATING WASHER RETAINER LOCK RING	42B	DISC HOLDER
17	SENSING TUBE ASSEMBLY	42C	DISC COLLAR
17A	UPPER TUBE	42D	RETAINER RING
17B	LOWER TUBE	43	DISCHARGE TUBE ASSEMBLY
17C	TUBE FLANGE	43A	FITTING
18	BONNET GASKET	43B	DISCHARGE TUBE
19	BONNET	44	BONNET STUD
20	PILOT BASE	45	BONNET STUD NUT
21	PILOT BASE FLANGE	46	MAIN BONNET PLUG
22	BASE STUD	47	MAIN NAMEPLATE (NOT SHOWN)
23	BASE STUD NUTS	48	PILOT NAMEPLATE (NOT SHOWN)
24	EYE BOLT LOCK NUT	49	MAIN BASE DRAIN PLUG (NOT SHOWN)
25	PILOT BONNET GASKET	50	MAIN NAMEPLATE SCREWS (NOT SHOWN)
26	EYE BOLT	51	PILOT NAMEPLATE SCREWS (NOT SHOWN)
27	ADJUSTING RING PIN	52	SENSING TUBE FLANGE GASKET
28	ADJUSTING RING	53	ADJUSTING RING PIN GASKET
29	PILOT BONNET ASSEMBLY	54	SEAL (NOT SHOWN)
29A	BONNET	55	SEAL WIRE (NOT SHOWN)
29B	GUIDE	56	DISC SPRING
29C	PIN	57	DISC SPRING RING
30	BOTTOM SPRING WASHER		

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Tighten the gag with only a light force applied to the gag bolt.

Upon completion of the hydrostatic test, the valve should be allowed to set up approximately one hour so that liquid back of the main valve disc can drain out completely. Gag and gag cap should be removed and the lever cap, etc., installed in reverse sequence of the disassembly.

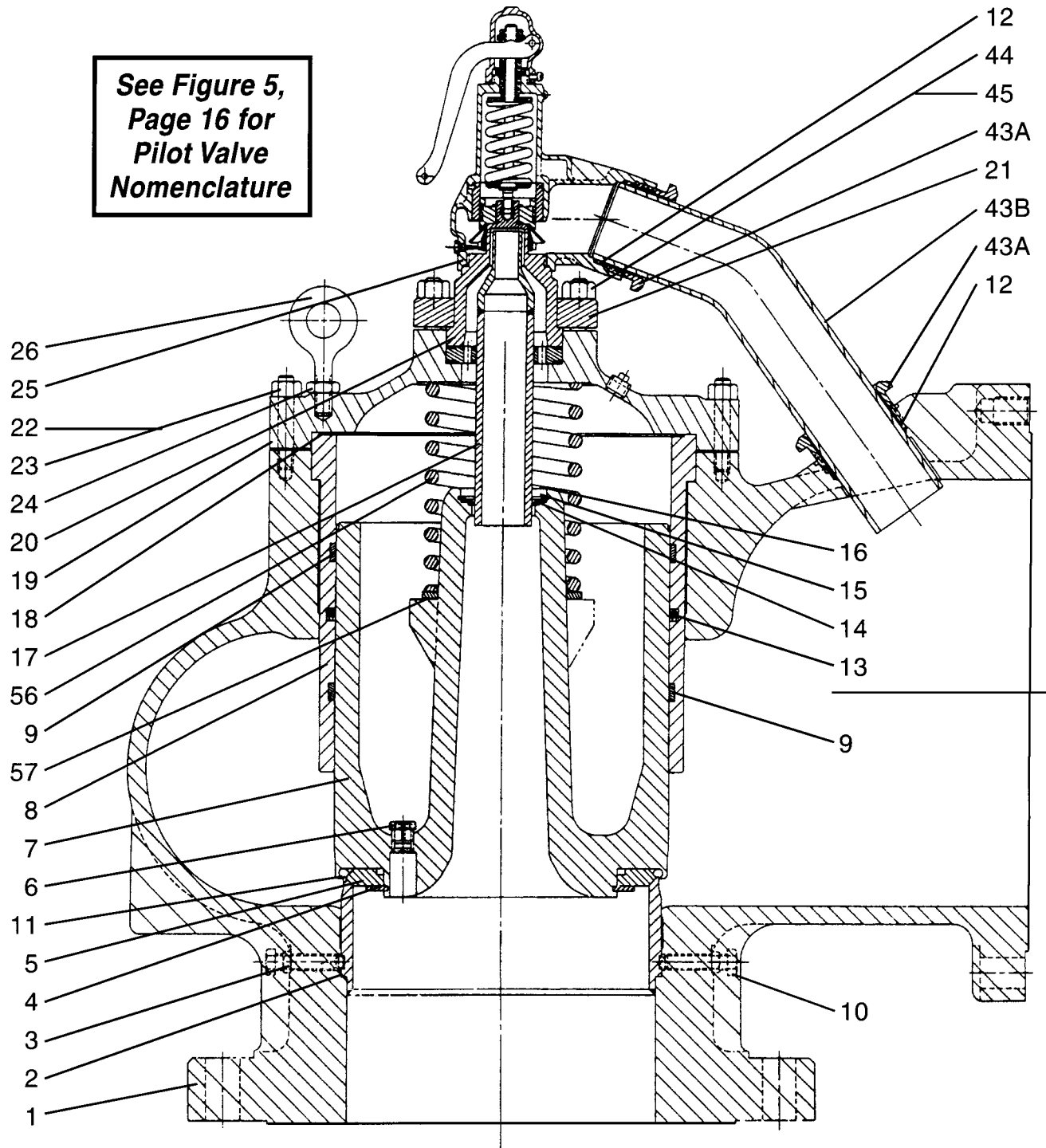


FIGURE 4

Consolidated® Safety Relief Valves Turbine Reheater Pilot Operated - Type 13900-3



VII. Disassembly of Pilot from Main Valve

NOTE: Many pressure vessels that are protected by Consolidated® Safety Relief Valves contain dangerous materials. Decontaminate and clean the valve inlet and outlet and all external surfaces in accordance with the cleaning and decontaminating recommendations in the appropriate Material Safety Data Sheet.

With reference to Figure 4 and Figure 5 and their nomenclature, proceed in accordance with the following steps. If a discharge tube is not supplied, omit steps 1 and 2.

1. With an appropriate tool and counterclockwise rotation, remove tube fittings (43A) from main valve base (1) and pilot bonnet (29A).
2. Remove discharge tube (43B) from pilot outlet by pushing tube into main valve base.
3. Remove six bonnet stud nuts (45) from pilot flange (21) and raise pilot valve and flange from bonnet studs (44).
4. Remove pilot valve base gasket (52).
5. Remove sensing unit (17) and also the lower gasket (52).

VIII. Disassembly of Pilot Valve

Refer to Figure 5 for the following: remove cotter pin and lever pin (38) and lifting lever (33). Unscrew the cap lockscrew (39) and remove the cap (37). Remove the release nut (35), and release locknut (37).

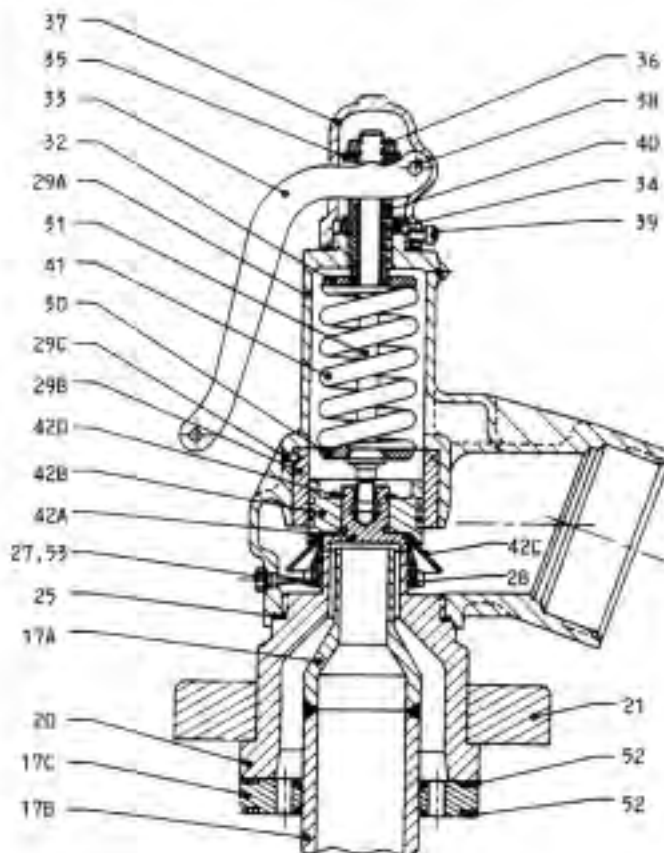


FIGURE 5

Consolidated® Safety Relief Valves Turbine Reheater Pilot Operated - Type 13900-3

Removing adjusting ring pin (27) and gasket (53). Observing through the outlet of the valve, rotate adjusting ring (28) counterclockwise one notch at a time until contact is made with the disc (42A). Record the number of notches from original position to contact with disc.

Measure the distance from the top of the compression screw (40) to the top of the pilot bonnet (29A) with a caliper or depth micrometer and record this information to restore compression during assembly. Loosen the locknut (34) and turn the compression screw (40) counterclockwise until compression is removed from spring.

Place the pilot valve with its inlet flange on the main valve bonnet (19) and secure in place with nuts to prevent the pilot base (20) from rotating.

Using a suitable wrench, break loose the pilot bonnet and rotate counterclockwise to remove the bonnet from the pilot base. Lift the pilot bonnet vertically from its base and set aside. Remove the spring assembly, disc assembly, and spindle from pilot base.

Remove disc assembly (42A, 42B, 42C, 42D) from the spindle by lifting on the spindle (31) and engaging the drop out threads in disc. Rotate the spindle counterclockwise until the spindle and disc assembly separate.

IX. Pilot Valve Cleaning

DANGER... follow recommendations for safe handling in the solvent's Material Safety Data Sheet.

13900 Series Safety Relief Valve internal parts may be cleaned with industrial solvents, cleaning solutions and wire brushes. If you are using cleaning solvents, take precautions to protect yourself from potential danger from breathing fumes, chemical burns, or explosion. See the solvent's [Material Safety Data Sheet](#) for safe handling recommendations and equipment.

It is not recommended to "sand blast" internal parts as it can reduce the dimensions of the parts. The base, bonnet and cap castings may be sand blasted with care not to erode or damage machined surfaces.

X. Pilot Valve Seat Repairing and Lapping

Reconditioning of the seat surface of the disc and base is accomplished by lapping with a flat cast iron ring lap coated with Grade No. 1000 KWIK-AK-SHUN Silicon-Carbide compound, or equivalent. A 2-1/8" (54 mm) diameter lap should be used.

To recondition the disc seat by lapping, it is necessary to disassemble the disc assembly. This is done in the following manner: referring to Figure 6A, the disc is contained in the disc holder by a Truarc retaining ring. The ring may be removed using a Truarc Plier, Dresser Part No. 5153302. After removing the Truarc ring, the disc and disc collar can be removed from the disc holder.

Lapping a flat seat is simple. No special skill is required and the technique is readily apparent after a few minutes of actual lapping.

The following precautions and hints will enable anyone to do a professional job of lapping seats.

1. Keep the work clean.
2. Always use a fresh lap. If signs of wearing (out of flatness) are evident, recondition the lap.
3. Apply a very thin layer of compound to the lap. This will prevent rounding off the edges of the seat.
4. Keep the lap squarely on the flat seat and avoid any tendency to rock the lap which will cause rounding of the seat.



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X. Pilot Valve Seat Repairing and Lapping (continued)

5. When lapping, keep a firm grip on the lap to prevent the possibility of dropping it and damaging the seat.
6. Lap, using a reciprocating motion in all directions, at the same time applying light uniform pressure and rotating the lap slowly.
7. Replace the compound frequently after wiping off the old compound, and apply more pressure to speed the cutting action of the compound.
8. To check the seating surfaces, remove all compound from both the seat and the lap. Then shine up the seat with the same lap using the lapping motion described above. Low sections on the seating surface will show up as a shadow in contrast to the shiny portion. If shadows are present, further lapping is necessary, and only laps known to be flat should be used. Only a few minutes will be required to remove the shadows.
9. When the lapping is completed, any lines appearing as cross scratches can be removed by rotating the lap, which has been wiped clean of compound, on the seat about its own axis.
10. The seat should now be thoroughly cleaned with alcohol, using a lint-free cloth or tissue paper.

FIGURE 6
13900 TURBINE REHEATER PILOT DISC AND BASE SEAT DIMENSIONS

	SIZE	A	B	C	D	F	G	H	J	M
IN.	2	1.511	1.634	1.794	31/64	1.680	1.465	.062	2.449	.284
MM	50.8	38.38	41.5	45.57	12.29	42.67	37.21	1.57	62.2	7.21

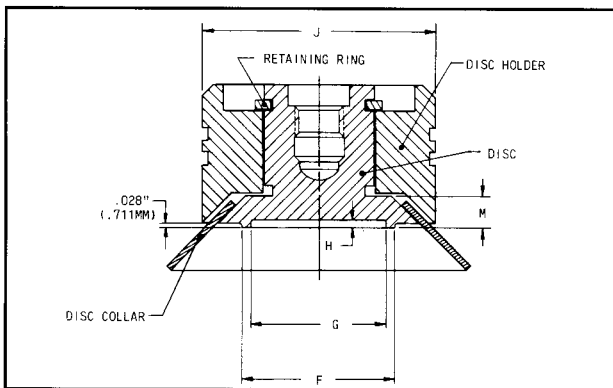
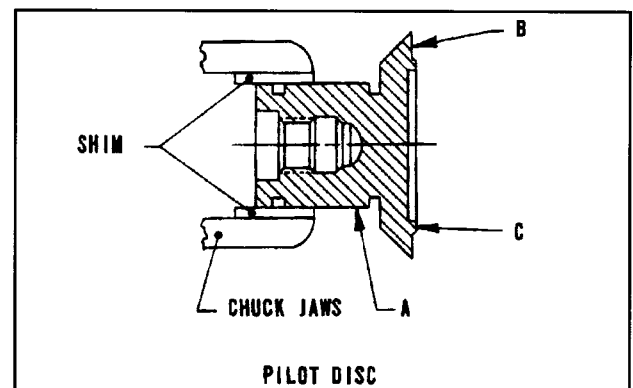


FIGURE 6A



PILOT DISC
FIGURE 6C

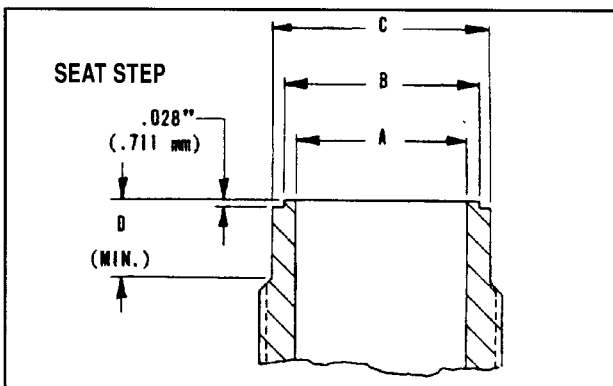
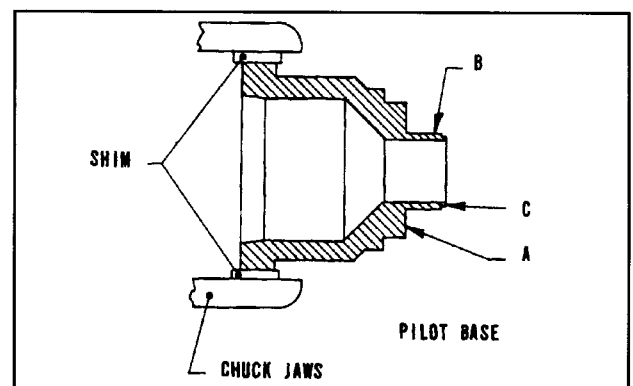


FIGURE 6B



PILOT BASE
FIGURE 6D

Consolidated® Safety Relief Valves Turbine Reheater Pilot Operated - Type 13900-3

X. Pilot Valve Seat Repairing and Lapping (continued)

11. When the seats cannot be repaired by lapping, they can be machined in accordance with the following instructions. Refer to Figures 6C and 6D.
 - a) Using a four-jaw chuck, align the disc or base by indicating at A & B. Runout as A or B cannot exceed .001 inches (.025 mm).
 - b) Take light cuts across Disc Seat "C", Figure 6C, to remove defects and restore 32 RMS finish. Dimensions E & F must be maintained and dimension .028 inches (.711 mm) must be reestablished. When "G" dimension, Figure 6A has been reduced to .025 inches (.635 mm), the disc should be replaced.
 - c) Take light cuts across Pilot Nozzle Seat "C", Figure 6D to remove defects and restore 32 RMS finish. Dimensions A, B & C must be maintained and the seat step dimension .028 inches (.711 mm) must be reestablished, Figure 6B. When "D" dimension is reduced below minimum specified, the base should be replaced.
 - d) Lap the seats. Refer to steps 1 through 10 of "Pilot Valve Seat Repairing and Lapping", which precedes step 11 above.

XI. Assembly of Pilot Valve

1. Before reassembly, all parts should be thoroughly cleaned and free from burrs.
2. Reassemble disc assembly as shown in Figure 6A.
3. Insure the pilot base flange (21) is installed on the pilot base (20). Place the pilot valve base (20) and flange (21) over the main valve bonnet studs (44) and secure with nuts (45).
4. Place a new pilot bonnet to base gasket (25) on base (20).
5. Put a small amount of lubricant* on the spindle (31) tip and lower spring washer (30) bearing surface of the spindle. Thread the disc on the spindle and assemble the spring (41) and spring washers (30) and (32) on the spindle.
6. Insert the disc, spindle, spring and spring washer assembly into the bonnet.
7. Install the adjusting ring (28) on the base (top of adjusting ring flush with seat).
8. Place a small amount of lubricant on the ball end of the compression screw (40).
9. Holding the bonnet and spindle (so that disc will not drop), install the bonnet assembly to the pilot base. Care should be taken to prevent the disc seat surface from rotating against base seat surface.
10. Insert the compression screw into the pilot bonnet and rotate clockwise until previously recorded measurement in disassembly procedure is obtained.
11. Reestablish the position of the adjusting ring as follows:
 - a) Using a pointed tool (Dresser Part No. 4215501), turn the adjusting ring to the right slowly, thus raising the ring until it touches the disc.
 - b) Then, counting the notches, turn the adjusting ring to the left, thereby lowering the ring, until the original position recorded in the disassembly procedure is obtained.
 - c) Insert adjusting ring pin and gasket. Tighten securely.
12. Remove pilot valve from main valve bonnet if main valve is to be disassembled.
13. Test pilot valve per instruction outlined under "Testing" before assembly onto main valve.

* **NOTE:** Lubricant should be "Twist" by Century Corp., or equivalent.

Consolidated® Safety Relief Valves

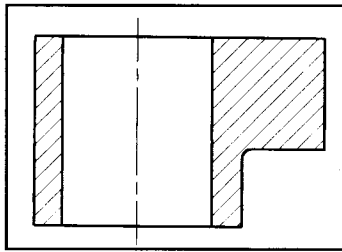
Turbine Reheater Pilot Operated - Type 13900-3

XII. Disassembly of Main Valve

Refer to Figure 4 for the following:

1. Remove bonnet stud nuts (23) from studs (22).
2. Using a sling through the three eyebolts (26), lift bonnet (19) vertically taking care not to bind bonnet against stud bolts.
3. Remove Gasket.
4. Remove the disc spring (56) and disc spring ring (57).
5. Fasten down guide (8) with two Guide Retainer Tools for disc removal, (Figure 7A), held in place with two stud nuts, 180° apart. (Dresser Part No. 4215301). This will hold the guide in place while the disc is removed.
6. Lift the disc vertically out of body.
7. Remove Guide Retainer Tools.
8. To remove the main guide (8), first remove the upper backing ring (9) from the guide. Using the tool shown in Figure 7B (Dresser Part No. 4128201), rotate extension rods until tips extend fully into the upper backing ring groove. Each end of the engaging tips should be equally spaced from the center of the lifting eye. The guide can now be lifted out of body.

FIGURE 7A
Guide Retainer Tool for Disc
Removal



CAUTION: DO NOT TILT OR FORCE.

9. Remove the lower backing ring (9) and "U" ring seal (13) from the grooves in the guide.
10. The seat bushing (2) is welded to the main base (1). The seat bushing should only be removed if it must be replaced.

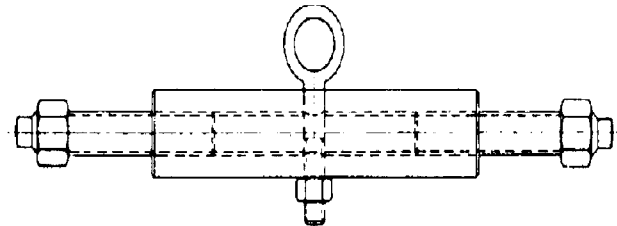


FIGURE 7B
GUIDE LIFTING FIXTURE AND INSTALLATION TOOL

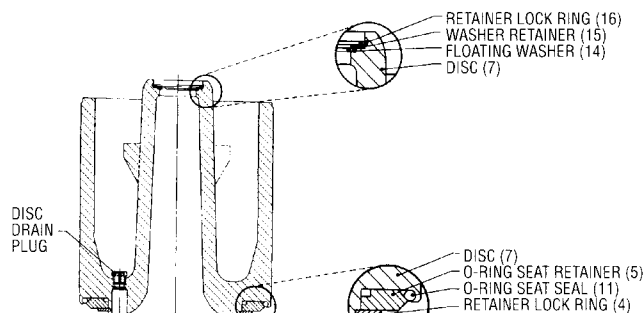


FIGURE 8
MAIN DISC

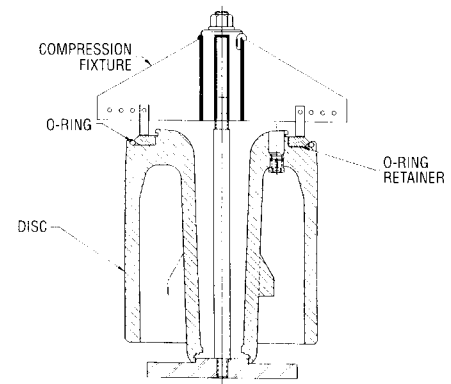


FIGURE 9
"O" RING RETAINER HOLD DOWN FIXTURE

Consolidated® Safety Relief Valves Turbine Reheater Pilot Operated - Type 13900-3

XIII. Main Valve Cleaning

13900 Series Safety Relief Valve internal parts may be cleaned with industrial solvents, cleaning solutions and wire brushes. If you are using cleaning solvents, take precautions to protect yourself from potential danger from breathing fumes, chemical burns, or explosion. See the solvent's Material Safety Data Sheet for safe handling recommendations and equipment.

It is not recommended to "sand blast" internal parts as it can reduce the dimensions of the parts. The base, bonnet and cap castings may be sand blasted with care not to erode internal and machined surfaces.

XIV. Repair of Main Valve Disc

1. When necessary to remove the floating washer (14), it is necessary to first remove the retainer lock ring (16). (refer to Figure 8). Truarc Pliers (Dresser Part No. 5153305) can be used to remove the lock ring (16). The other parts, washer retainer (15) and floating washer (14) can now be removed. Reassemble in reverse order.
2. Whenever main valve disc (7) is removed, the drilled drain plug (6) should be inspected and passages cleaned by the insertion of a wire of sufficient length.
3. To replace the O-ring seat seal (11), or remove the O-ring seat retainer (5); it is necessary to remove the retainer lock ring (4) (refer to Figure 8). Place the disc on the compression fixture, (Dresser Part No. 9336901), (refer to Figure 9), and compress the O-ring seat retainer. Remove the retainer lock ring with Truarc Pliers (Dresser Part No. 5153304).

CAUTION: EXTREME CARE SHOULD BE EXERCISED TO PREVENT THE LOCK RING FROM SLIPPING OFF THE PLIERS.

Remove the O-ring seat retainer and then O-ring seat seal. To reassemble the seat seal, clean all surfaces thoroughly, install a new O-ring lubricated lightly with silicone lubricant, replace O-ring seat retainer and then retainer lock ring. A slight compression on the seat retainer will be required to allow the retainer lock ring to seat properly in its groove.

XV. A. Repair of Main Valve Seat

If the seat bushing (2) seating surface must be repaired, the base assembly must be set up on an appropriate machine and the seat recut in accordance with the dimensions given in Figure 10.



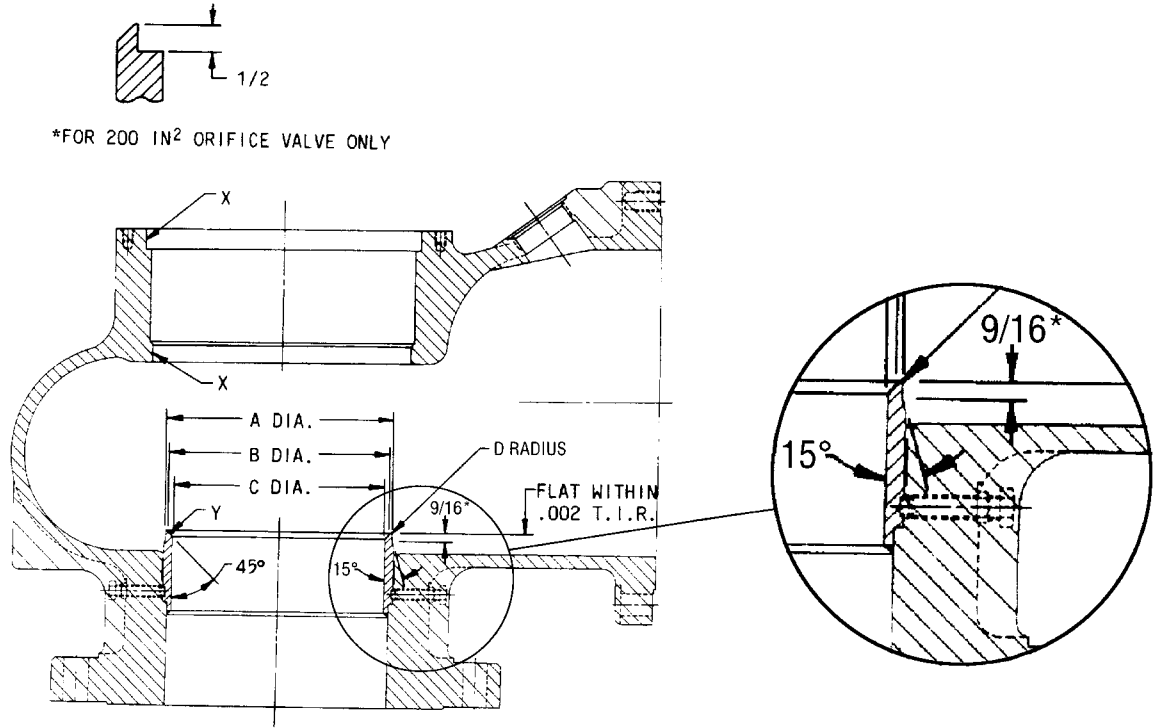
Consolidated® Safety Relief Valves Turbine Reheater Pilot Operated - Type 13900-3

XV. A. Repair of Main Valve Seat (continued)

When indicated at surfaces X and Y, run out should not be more than .004 inches (.102 mm). All recut surfaces should be finished to 63 rms.

B. Replacement of Seat Bushing

Contact the factory for seat bushing replacement directions.



**FIGURE 10
MAIN VALVE SEAT BUSHING**

Orifice Size	DIMENSION CHART (INCHES)						
	A		B		C		D RADIUS
114	12.850	+0.000 -0.007	12.754	+0.000 -0.007	12.050	+0.010 -0.000	.029
143	14.350	+0.000 -0.007	14.254	+0.000 -0.007	13.500	+0.010 -0.000	.029
176	15.850	+0.000 -0.007	15.754	+0.000 -0.007	15.000	+0.010 -0.000	.029
200	16.850	+0.000 -0.007	16.754	+0.000 -0.007	16.000	+0.010 -0.000	.029
	DIMENSION CHART (MM)						
735	326.39	+0.000 -0.178	323.95	+0.000 -0.178	306.07	+0.254 -0.000	.737
923	364.49	+0.000 -0.178	362.05	+0.000 -0.178	342.90	+0.254 -0.000	.737
1136	402.59	+0.000 -0.178	400.15	+0.000 -0.178	381.00	+0.254 -0.000	.737
1290	427.99	+0.000 -0.178	425.55	+0.000 -0.178	406.40	+0.254 -0.000	.737

**FIGURE 10A
SEAT BUSHING DIMENSIONS**

Consolidated® Safety Relief Valves Turbine Reheater Pilot Operated - Type 13900-3

XVI. Assembly of Main Valve

Before installing any part in the valve it should be thoroughly cleaned and all the mating surfaces inside the valve body inspected and cleaned. All teflon seals, O-rings and back up rings should be replaced and lubricated lightly with silicone lubricant. All surfaces which will contact the "U" ring seals should also be lubricated.

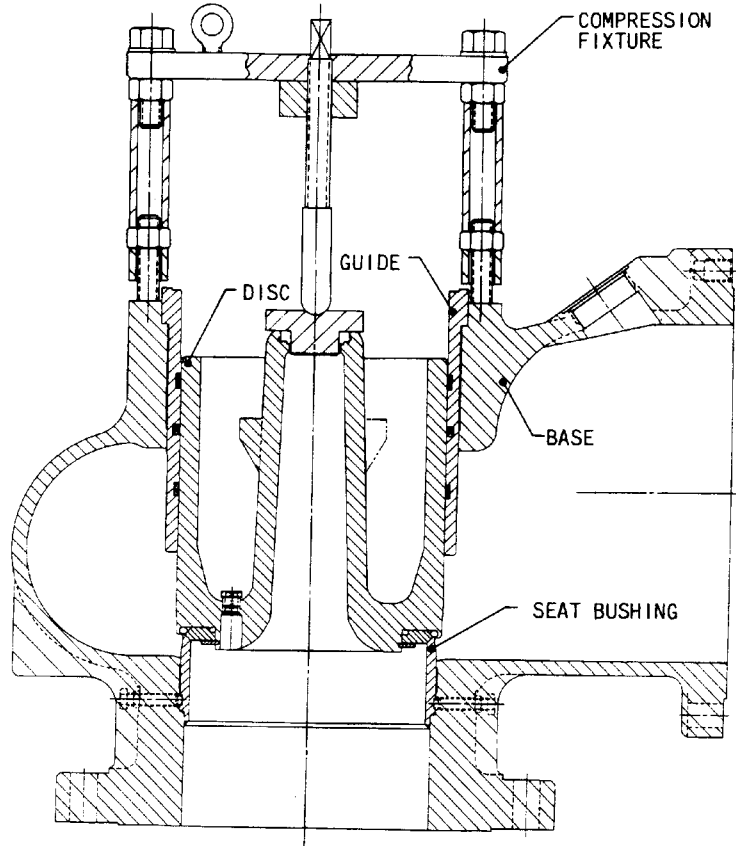


FIGURE 11

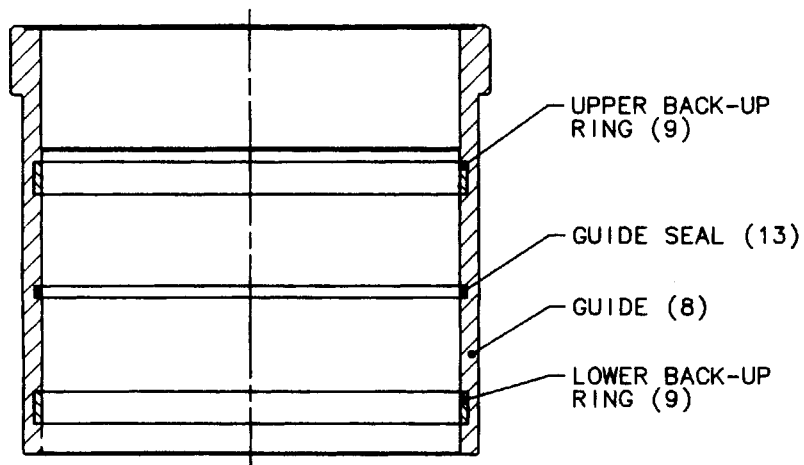


FIGURE 12
MAIN VALVE GUIDE

Consolidated® Safety Relief Valves

Turbine Reheater Pilot Operated - Type 13900-3

XVI. Assembly of Main Valve (continued)

1. Install both the lower backing ring (9), and "U" ring guide seal (13) in the guide (8) as indicated in Figure 12. (NOTE: Seal Orientation is the hollow side face upward.)

CAUTION: BACKING RINGS MUST BE HEATED TO APPROXIMATELY 130° TO PROPERLY SEAT IN BACKING RING GROOVE.

Lubricate the guide lightly with silicone. Install the guide assembly tool, Figure 7B, and lower the guide into the valve body until it seats solidly within the body. Remove the assembly tool. Install the upper backing ring (9).

2. Using slings on the Center Post of the disc (7), lower the disc into the guide. Using the assembly tool shown in Figure 7A, force the disc down onto the seat bushing. Remove the tool after the disc is firmly installed.
3. Install the disc spring ring (57) and spring (56) on the disc.
4. Install a new gasket (18) in the groove provided on the top of the guide.
5. Using slings through the eyebolts, lower the main bonnet (19) onto the base.
6. Install all stud nuts (23) and draw down bonnet evenly. Tighten securely all bonnet stud nuts. See Figure 14B for torque values.

Consolidated® Safety Relief Valves Turbine Reheater Pilot Operated - Type 13900-3

XVII. Assembly of Pilot and Main Valve

1. Before reassembly, all surfaces should be thoroughly cleaned and free from burrs.
2. Refer to Figure 4 for proper nomenclature.
3. Install the lower gasket (52) for sensing tube in main valve bonnet. NOTE: There are two gaskets used to seal this joint. One above and one below the sensing tube flange.
4. Install the sensing tube (17) in the main bonnet.
5. Install the second gasket (52) in the groove in sensing tube flange.
6. Install the pilot base (20) into the main valve bonnet. The outlet of the pilot should face the outlet of the main valve.
7. Install the pilot flange stud nuts (45) and torque down evenly. See Figure 14B for torquing values.

NOTE: Steps 8, 9, 10 and 11 required only when discharge tube is provided.

8. Install the fittings on the discharge tube. Also install O-rings (12) onto the discharge tube.
9. Insert the discharge tube (43B) into pilot valve outlet. Loosely tighten the pilot valve tube fitting (43A).
10. Loosely tighten the main valve boss tube fitting (43A).
11. Once alignment of tube is properly adjusted, tube fittings (43A) should be securely tightened.

XVIII. Testing

- A. Due to the large capacity of the main valve, it is impossible to adjust the pilot and main valve as an assembly unless on an actual installation. To obtain a valve setting on other than an actual installation, the pilot can be removed from the main valve and adjusted on a small test facility complying with the following requirements. Reference figures (15) and (16).
 1. The pressure source or test header must have a minimum capacity of six cubic feet (.170 m³). Header mounting flange should be a 4"-300# (101.6 mm - 20.4 bar) RF ASA flange.
 2. The test fixture indicated in Figure 15 should be equipped with a 4"-300# (101.6 mm - 20.4 bar) RF ASA flange on the lower end and have appropriate machining and drilling on the top end to match the pilot flange (Dresser Part No. 4130901).
 3. The test set up should be equipped with P₁ and P₂ pressure gauges as indicated in Figure 15. The P₁ gauge will sense inlet pressure and P₂ will sense pressure equivalent to that back of the main valve disc when the main valve is open.
- B. The following procedure should be used for testing the pilot.
 1. Install pilot valve with sensing unit. Lower flange and upper flange gasket on test fixture.
 2. Pressurize system and note pop pressure indicated by P₁ gauge. Adjust set pressure by loosening compression screw locknut and rotating compression screw clockwise (increase set point) or counterclockwise (decrease set point) until proper set pressure is established. Tighten compression screw locknut.



Consolidated® Safety Relief Valves Turbine Reheater Pilot Operated - Type 13900-3

XVIII. Testing (continued)

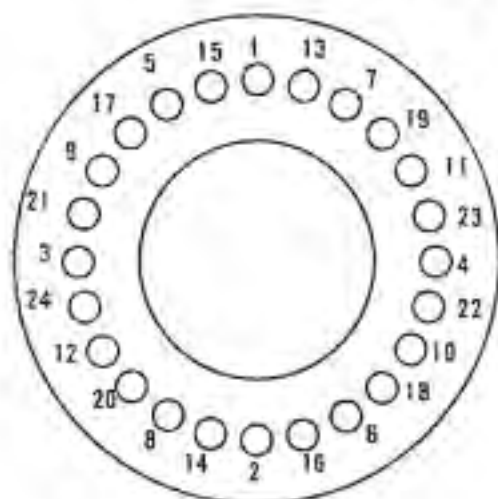


3. Adjust blowdown by removing adjusting ring pin and rotating adjusting ring clockwise (decrease blowdown) or counterclockwise (increase blowdown) until proper value is established. Blowdown is intentionally set for 10-12% of set pressure at factory before installing on main valve. Tighten adjusting ring pin.
4. Pop pilot five times to insure accurate settings noting P_2 pressure at each pop. P_2 pressure should drop to approximately 58% of P_1 .
5. Install lifting lever and cap on pilot. Bring system pressure up to just below the pilot set point and lift lever on pilot. Note that P_2 does drop to approximately the same value indicated in Step 4.
6. Check pilot for leakage. Bring the inlet pressure of the valve up to 94% of set pressure. Pass a cold rod across the outlet of the pilot. Any moisture occurring on the rod indicates valve leakage.
7. Test of main valve and pilot assembly:
 - A. Install pilot back on main valve.
 - B. Upon pressurizing the system, leakage around main valve joints is permissible for approximately one hour till the valve is uniformly heated.
 - C. Increase system pressure until pilot opens at set point. Continue to overpressure until main valve opens.
 - D. Check valve for leakage with system pressure at 90% of set.

CAUTION: DO NOT EXPOSE ANY PART OF THE HUMAN BODY TO THE DISCHARGE SIDE OF EITHER THE PILOT OR MAIN VALVE. WHEN TESTING FOR LEAKAGE, STAND 90° TO THE SIDE OF THE OUTLET DISCHARGE. IN THIS POSITION IT IS SAFE TO PASS A METAL ROD DOWNWARD ACROSS THE OUTLET.

- B. All external adjustments to the valve should be sealed in accordance with ASME Code Section VIII requirements.

XIX. Torque Requirements



PROCEDURE

1. Refer to table for torque value for applicable round.
2. Torque each nut in sequence shown.
3. Repeat for each round.

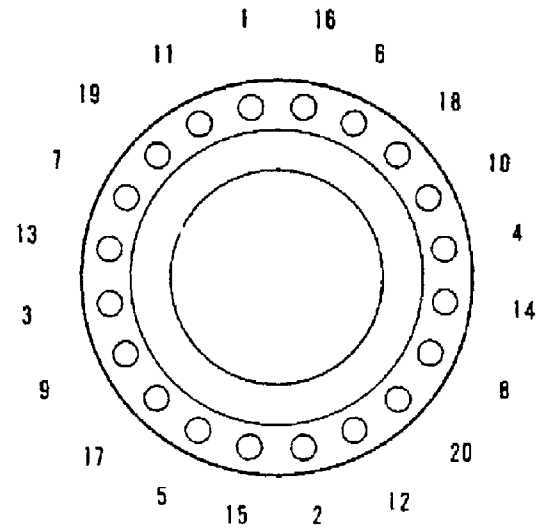
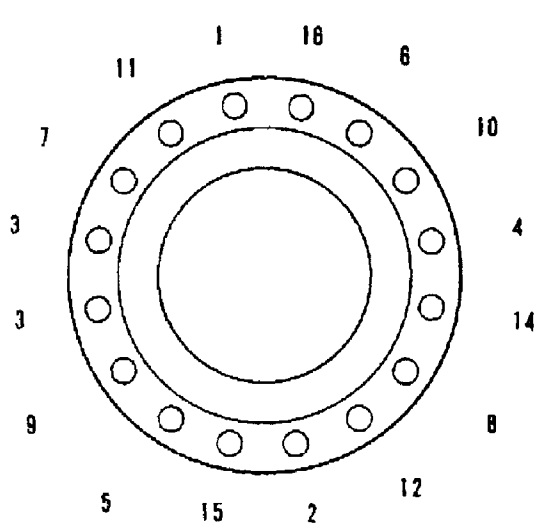
200 SQ. IN. 600 class FLANGE		1290 cm ² 600 class FLANGE
INLET NUTS		INLET NUTS
ROUND	TORQUE ft. lbs. ^{+15%} / _{-5%}	TORQUE nm ^{+15%} / _{-5%}
1	25	33.9
2	75	101.7
3	150	203.4
4	300	406.7
5	500	677.9
6	800	1084.6
7	1100	1491.4

114, 143 & 176 SQ. IN. 300 class FLANGE		735 cm ² 923 cm ² & 1136 cm ² 300 class FLANGE
INLET NUTS		INLET NUTS
ROUND	TORQUE ft. lbs. ^{+15%} / _{-5%}	TORQUE nm ^{+15%} / _{-5%}
1	25	33.9
2	75	101.7
3	150	203.4
4	300	406.7
5	500	677.9

* For 150 class inlets, use bolting torques for 1-1/8" diameter bolts and Figure 14A.

FIGURE 13
INLET NUTS TIGHTENING SEQUENCE

Consolidated® Safety Relief Valves Turbine Reheater Pilot Operated - Type 13900-3



1-1/8" DIAMETER BOLTS				
ROUND	TORQUE ft. lbs.	+10% -0%	TORQUE nm	+10% -0%
1	25		33.9	
2	75		101.7	
3	150		203.4	
4	355		481.3	

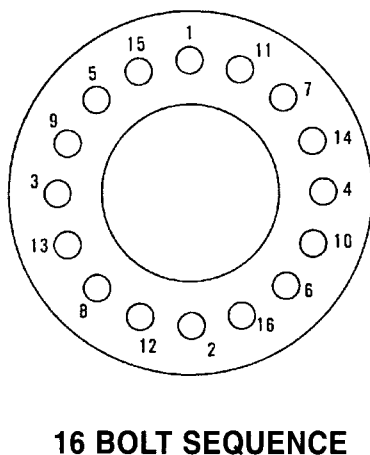
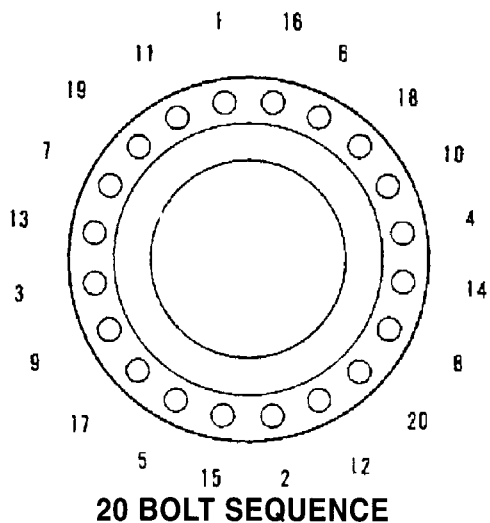
1-1/4" DIAMETER BOLTS				
ROUND	TORQUE ft. lbs.	+10% -0%	TORQUE nm	+10% -0%
1	25		33.9	
2	100		135.6	
3	300		406.7	
4	500		677.9	

**FIGURE 14A
OUTLET NUTS TORQUING SEQUENCE**

Consolidated® Safety Relief Valves

Turbine Reheater Pilot Operated - Type 13900-3

BONNET NUTS TIGHTENING SEQUENCE

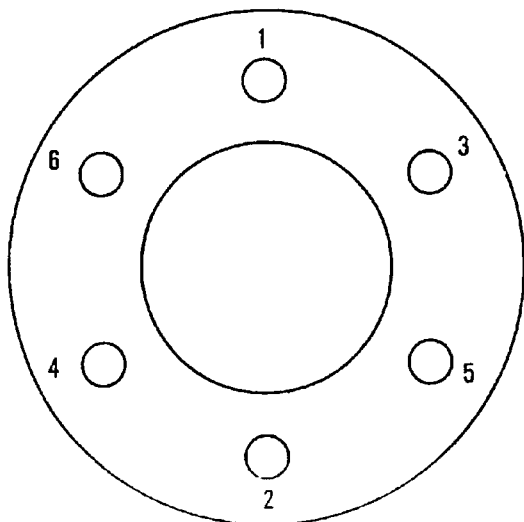


PROCEDURE

1. Refer to table for torque value for applicable round.
2. Torque each nut in sequence shown.
3. Repeat for each round.

BONNET NUTS								
ROUND	TORQUE IN ft. lbs. +10%-0%				TORQUE IN nm +10%-0%			
	5/8"	3/4"	1-1/8"	1-1/4"	15.8 mm	19.05 mm	28.57 mm	31.75 mm
1	15	25	95	125	20.3	33.9	128.8	169.5
2	30	50	185	250	40.7	67.8	250.8	338.9
3	60	100	375	525	81.3	135	508.4	711.8

PILOT FLANGE NUTS TIGHTENING SEQUENCE



PILOT FLANGE NUTS		
ROUND	TORQUE IN ft. lbs. +10%-0%	TORQUE IN nm +10%-0%
1	20	27.1
2	40	54.2
3	60	81.3
4	80	108.5
5	110	149.1

FIGURE 14B
TORQUING PROCEDURES

Consolidated® Safety Relief Valves **Turbine Reheater Pilot Operated - Type 13900-3**

XX. Inventory Philosophy

A. General Information

The importance of maintenance planning is the key to good plant operation. Part of that planning involves making sure that replacement parts needed to repair valves are available at the jobsite when required. Developing and implementing a standard valve maintenance plan will quickly pay for itself by eliminating costly downtime, unscheduled outages, etc.

B. Inventory Planning

The basic objectives in formulating a replacement parts plan are:

PROMPT AVAILABILITY
MINIMUM DOWNTIME
SENSIBLE COST
SOURCE CONTROL

Having parts immediately available from plant storeroom inventory is obviously the best way to accomplish those objectives. Since it is impractical to have every part that might be needed to accomplish a given repair in stock at all times, guidelines for establishing meaningful inventory levels are summarized in the table below:

PART CLASSIFICATION	REPLACEMENT FREQUENCY	PREDICTED AVAILABILITY*
CLASS I	MOST FREQUENT	70%
CLASS II	LESS FREQUENT BUT CRITICAL	85%
CLASS III	SELDOM REPLACED	95%
CLASS IV	HARDWARE	99%
CLASS V	PRACTICALLY NEVER REPLACED	100%

* Predicted availability means that percentage of time the user plant will have the right parts to make the proper repair on the product, (i.e. if CLASS I parts are stocked at the owners facility, the parts needed to repair valve in question will be immediately available in 70% of all instances).

C. Replacement Parts List

Consult the Recommended Spare Parts list (see Section XVIII of this manual) to determine the parts to be included in the inventory plan.

Select the desired parts and determine those required for proper maintenance of the valve population in the plant.

Consolidated® Safety Relief Valves
Turbine Reheater Pilot Operated - Type 13900-3

XX. Inventory Philosophy (continued)

D. Identification and Ordering Essentials

When ordering service parts, please furnish the following information to insure receiving the correct replacement parts:

1. Identify valve by the following nameplate data:
 - a. Size
 - b. Type
 - c. Temperature Class
 - d. Serial NumberExample:
16" 13906/114-2
S/N TC-56788

2. Specify parts required by:
 - a. Part Name
 - b. Part Number (if known)
 - c. Quantity

Consolidated® Safety Relief Valves
Turbine Reheater Pilot Operated - Type 13900-3

XXI. Recommended Spare Parts For Series 13900-3
Safety Relief Valve

Class	Part Name	Quantity Parts / Same Size, Type, Set Pressure & Temperature Class Valves in Service	Need Probability Coverage
I	Main Valve Seat Seal Guide Sliding Seal (1) Back-Up Ring (2) Bonnet Gasket (1) Sensing Tube Flange Gasket (2) Fitting Seal (2) Disc Retainer (1) Retainer Lock Ring (1) Pilot Valve Alternate A (See Note Below) Complete Spare Pilot Valve Alternate B (See Note Below) Disc Disc Retainer Ring Adj. Ring Pin Bonnet Gasket Adj. Ring Pin Gasket Seal Sealing Wire	 1/1 1/1 2/1 1/1 2/1 2/1 1/3 1/3 1/1 1/1 1/1 1/1 1/1 1/1 1/1 1/1	70%
II	Main Valve Floating Washer Floating Washer Retainer Floating Washer Retainer Lock Ring Pilot Valve (If Alternate B used for Class I) Guide Guide Pin Spindle Assembly Disc Holder Disc Collar	 1/3 1/3 1/3 1/6 1/6 1/6 1/6 1/6	85%
III	Main Valve Disc Spring Disc Spring Ring Pilot Valve (If Alternate B used for Class I) Base Adj. Ring Spring Spring Washer (Bottom) Spring Washer (Top) Compression Screw	 1/6 1/6 1/6 1/6 1/6 1/6 1/6 1/6	95%

NOTE: ALTERNATE A

If an auxiliary boiler is not available at the installation site for testing the pilot valve on steam at set pressure, it is recommended that spare pilot valves, which have been tested on steam be stocked in a 1/1 ratio.

ALTERNATE B

If an adequate auxiliary boiler is available, stocking replacement parts for the pilot valves are recommended as the most economical approach.

Consolidated® Safety Relief Valves
Turbine Reheater Pilot Operated - Type 13900-3

XX. Recommended Spare Parts For Series 13900-3
Safety Relief Valve (continued)

Class	Part Name	Quantity Parts / Same Size, Type, Set Pressure & Temperature Class Valves in Service	Need Probability Coverage
IV	<p>Main Valve Disc Drain Plug Base Studs 114 in² (16) 143 in² (20) 176 in² (20) 200 in² (20) Base Stud Nuts 114 in² (16) 143 in² (20) 176 in² (20) 200 in² (20) Eye Bolts (3) Eye Bolt Lock Nuts (3) Bonnet Stud Nuts (6) Main Bonnet Plug</p> <p>Pilot Valve (If Alternate B used for Class I Cap Lever Lever Pin Cap Lock Screw Release Nut Release Lock Nut Compression Screw Lock Nut</p>	<p>1/3 1 Set/6 1 Set/6 1 Set/6 1 Set/6 1/3 1/6 1/6 1/6 1/6 1/6 1/6 1/6</p>	99%
V	<p>Main Valve Base Disc Guide Bonnet Discharge Tube Assembly Nameplate Nameplate Screws Drain Plug</p> <p>Pilot Valve (If Alternate B used for Class I Sensing Tube Assembly Base Flange Bonnet Nameplate Nameplate Screws</p>	<p>None None None None None None None None None None None None None</p>	Not Applicable

NOTE: ALTERNATE A

If an auxiliary boiler is not available at the installation site for testing the pilot valve on steam at set pressure, it is recommended that spare pilot valves, which have been tested on steam be stocked in a 1/1 ratio.

ALTERNATE B

If an adequate auxiliary boiler is available, stocking replacement parts for the pilot valves are recommended as the most economical approach.

Consolidated® Safety Relief Valves Turbine Reheater Pilot Operated - Type 13900-3

XXII. Recommended Tooling & Equipment

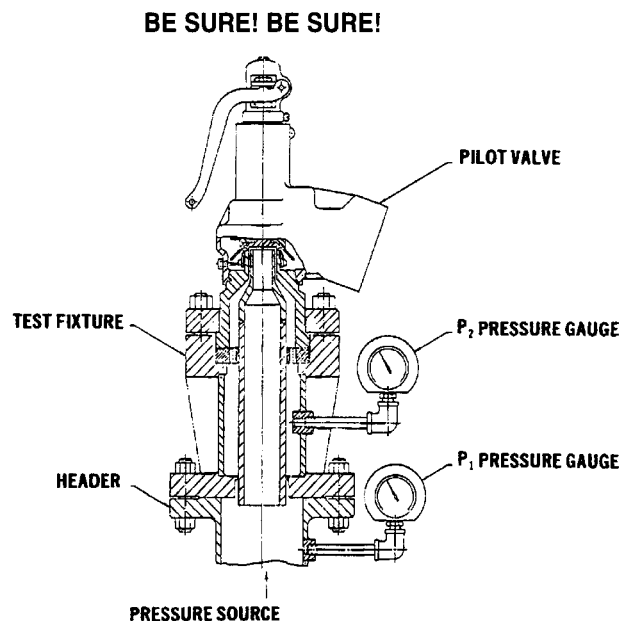
	ORIFICE cm ²	735	923	1136	1290
	ORIFICE in. ²	114"	143"	176"	200"
NO. REQ.	NAME OF PART	Part Number	Part Number	Part Number	Part Number
1	Guide Lifting Fixture	4128201	4128201	4128201	4128201
1	"O" Ring Retainer Fixture	9336901	9336901	9336901	9336901
1	Disc Installation Fixture	9337001	9337001	9336801	9336801
1	Pilot Valve Steam Test Fixture	4130901	4130901	4130901	4130901
1	Adjusting Ring Persuading Tool	4215501	4215501	4215501	4215501
2	Main Valve Guide Retainer Tool	4215301	4215301	4215301	4215301
1	Lubricant*	5153301	5153301	5153301	5153301
1	Truarc Pliers (Pilot Disc)	5153302	5153302	5153302	5153302
1	Truarc Pliers ("O" Ring Seat Seal)	5153304	5153304	5153304	5153304
1	Truarc Pliers (Floating Washer)	5153305	5153305	5153305	5153305
1	Kwik-Ak-Shun Grinding Compound	199-11	199-11	199-11	199-11
1	2-1/8 Seat Lap	1672806	1672806	1672806	1672806
1	1" Thinwall Hex Socket	5153303	5153303	5153303	5153303

*NOTE: Lubricant should be "Twist" by Century Corp. or equivalent.

YOUR SAFETY IS OUR BUSINESS!!!

DIVO has not authorized any company or any individual to manufacture replacement parts for its valve products.

When ordering replacement valve parts, please specify in your purchase order: "ALL PARTS MUST BE DOCUMENTED AS NEW AND SOURCED FROM DRESSER INDUSTRIAL VALVE OPERATION."



**FIGURE 15
PILOT TESTING FIXTURE**

Consolidated® Safety Relief Valves Turbine Reheater Pilot Operated - Type 13900-3

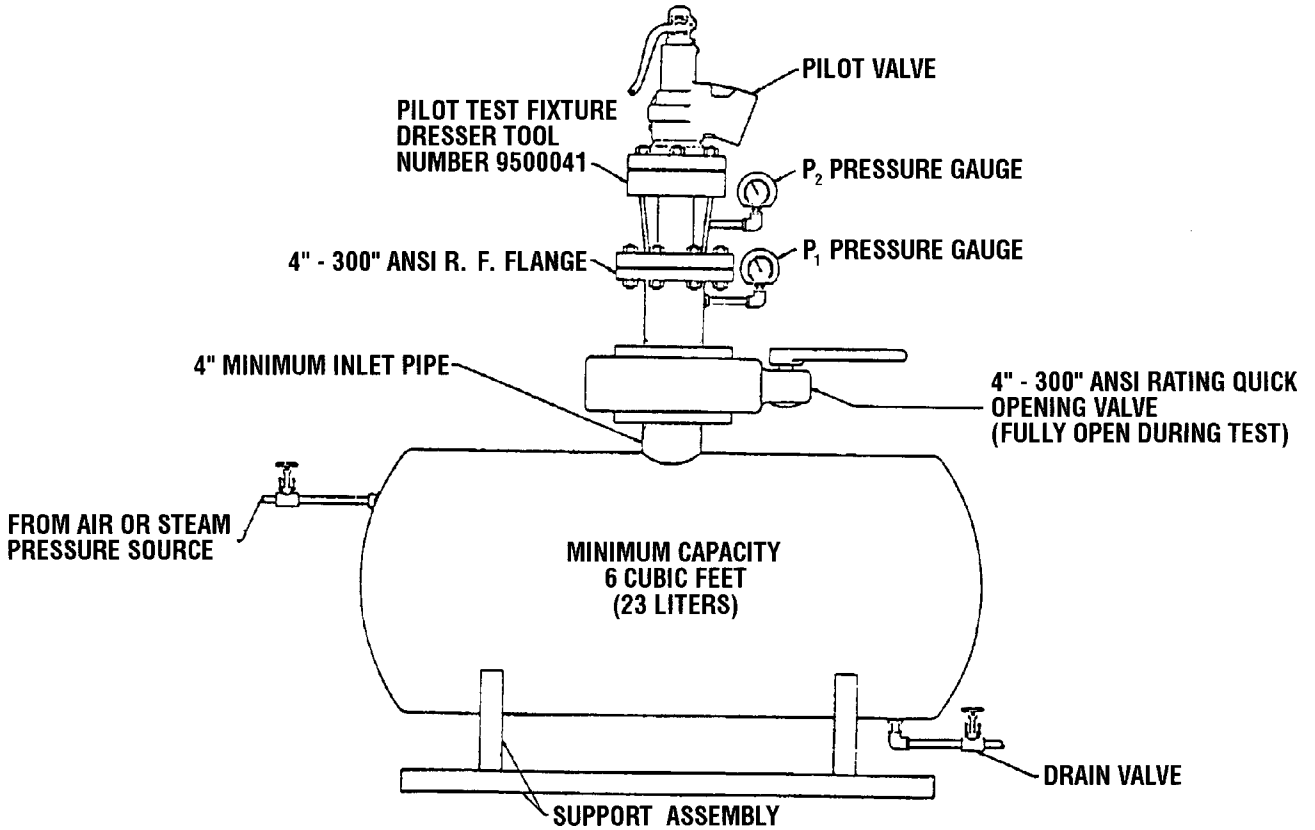


FIGURE 16
PILOT TEST FIXTURE AND TEST STAND

Consolidated® Safety Relief Valves Turbine Reheater Pilot Operated - Type 13900-3

XXIII. Manufacturer's Warranty Field Service, Training & Repair Program

A. Warranty Information

*WARRANTY STATEMENT - Dresser warrants that its products and work will meet all applicable specifications and other specific product and work requirements (including those of performance), if any, and will be free from defects in material and workmanship.

Defective and nonconforming items must be held for Dresser's inspection and returned to the original F.O.B. point upon request.

INCORRECT SELECTION OR MISAPPLICATION OF PRODUCTS - DVCD cannot be responsible for customer's incorrect selection or misapplication of our products.

UNAUTHORIZED REPAIR WORK - DVCD has not authorized any non-Dresser affiliated repair companies, contractors or individuals to perform warranty repair service on new products or field repaired products of its manufacture. therefore, customers, contracting such repair services from unauthorized sources must do so at their own risk.

**Refer to Dresser's Standard Terms of Sale for complete details on warranty and limitation of remedy and liability.*

B. Field Service

Utilities and Process Industries expect and demand service on a moment's notice. CONSOLIDATED Field Service can be depended upon for prompt response, even in extreme off-hour emergency situations.

DVCD maintains the largest and most competent field service staff in the industry. Service Engineers are located at strategic points throughout the United States to respond to customer's requirements for service. Each Service Engineer is factory trained and long experienced in servicing Safety Relief Valves. DVCD Service Engineers restore disc and nozzle critical dimensions which effect valve performance, and are capable of modernizing valves in the field.

It is highly recommended that the professional talents of a DVCD Field Service Engineer be employed to make final field adjustments during the initial setting of all CONSOLIDATED valves.

All Field Service Engineers' activities are coordinated from the Alexandria, Louisiana, Field Service Office. Upon receipt of a purchase order number authorizing the trip, the engineer is dispatched.

Contact: Field Service Supv., (318) 640-6055.

C. Factory Repair Facilities

The factory at Alexandria, Louisiana, maintains a complete CONSOLIDATED repair center. The Repair Department, in conjunction with the manufacturing facilities is equipped to perform specialized repairs and product modifications, e.g. but-weld, bushing replacements, code welding, pilot replacement, etc.

Contact: Customer Service - Valve Repair, (318) 640-6047.

For service please contact the appropriate sales office below.

Service Department

Location of Service Engineers

LOUISIANA, Alexandria	1
FLORIDA, Jacksonville	2
GEORGIA, Atlanta	3
ILLINOIS, Chicago	4
INDIANA, Crawfordsville	5
KENTUCKY, Maysville	6
NORTH CAROLINA, Charlotte	7
PENNSYLVANIA, Philadelphia	8
SOUTH CAROLINA, Charleston	9
TEXAS, Dallas	10
VIRGINIA, Richmond	11

THE DRESSER FIELD SERVICE ORGANIZATION IS UNEQUALED

For prompt field service, please call
Dresser Industrial Valve Operations Service Department, Alexandria, Louisiana.
Normal Working Hours - (318) 640-6055
After Hours, Weekends, Holidays - (318) 640-2250



Sales Office Locations

UNITED STATES

Dresser Industries, Inc., Valve & Controls Division
Industrial Valve Operation
La. Highway 3225 at U.S. Hwy. 167 North
P.O. Box 1430, Alexandria, Louisiana 71309-1430
Telephone (*) 1-318-640-2250, Telex 586423
Fax (*) 1-318-640-6222

Eastern Region

85 Bodwell Street, Avon, Massachusetts 02322
Telephone (*) 1-508-427-8959
Fax (*) 1-508-941-5409

Northern Region

3201 North Wolf Road, Franklin Park, Illinois 60131
Telephone (*) 1-847-451-3913
Fax (*) 1-847-451-3997

Southern Region

15112 Montales Road (77032), P.O. Box 60078
Houston, Texas 77205-0078
Telephone (*) 1-281-871-6600
Fax (*) 1-281-871-6608

Western Region

1040 South Yali Avenue, Montebello, California 90640
Telephone (*) 1-213-722-0497
Fax (*) 1-213-722-5347

Latin American Region

10556 N.W. 26th Street, Suite D-201, Miami, Florida 33172
Telephone (*) 1-305-470-2766
Fax (*) 1-305-470-2743

CANADA

Dresser Canada, Inc., Valve & Controls Division
5010 North Service Road
Burlington, Ontario, L7L 5R5 Canada
Telephone (*) 1-905-335-3529
Fax (*) 1-905-335-7828

Dresser Canada, Inc., Valve & Controls Division

3530 78th Avenue, Edmonton, Alberta, Canada, T6B 2X9
Telephone (*) 403-465-7882
Fax (*) 403-468-0934

CHINA

Dresser Valve & Controls China
Room 2101, Capital Mansion, #6 XinYuanNan Road
Chao Yang District, Beijing, China 100004
Telephone (*) 86-10-6465-4515
Fax (*) 86-10-6466-0195

EUROPE

Dresser U.K. Ltd., Valve & Controls Division
Industrial Valve Operation
Gillibrands Estate, Skelmersdale, Lancashire
WN8 9TU England
Telephone (*) 44-1895-52600, Telex (851) 627039
Fax (*) 44-1695-720175

Dresser Valve and Controls, Controls House
Riverside Way, Uxbridge, Middlesex, England UB8 2YF
Telephone (*) 44-1895-258181
Fax (*) 44-1895-234318

JAPAN

Dresser Japan, Ltd., Industrial Valve Operation
11F-KY Building, 1-8-11 Kiba-Shiragawa
Shiragawa-Ku, Tokyo 140 Japan
Telephone (*) 81-3-5462-8191
Fax (*) 81-3-5462-8195

KOREA

Dresser Korea, Inc.
#2107 Kuk Dong Building, 60-1, 3-Ka, Chongmu-ro
Chung-Ku, Seoul, Korea
Telephone (*) 82-2-274-0792
Fax (*) 82-2-274-0794

MEXICO

Masonelan Internacional S.A. de C.V.
Av. Henry Ford No. 114
Apartado Postal 572
54030 Tlalrepanita, Mexico
Telephone (*) 52-5-310-9883
Fax (*) 52-5-310-5584

SAUDI ARABIA

Dresser Al Rostaid Valve & Instrument Co., Ltd.
P.O. Box 10145, Jubail Industrial City 31961
Kingdom of Saudi Arabia
Telephone (*) 966-3-341-0278
Fax (*) 966-3-341-7624

SINGAPORE

Dresser Valve & Controls Far East
16, Tuas Ave 8, Singapore 639231
Telephone (*) 65-861-6100
Fax (*) 65-861-7172

SOUTH AFRICA

Dresser Limited, Valve & Controls Division
P.O. Box 2234, 16 Edendale Road, Eastleigh
Edenvalle 1610, Transvaal, Republic of South Africa
Telephone (*) 27-11-452-1550
Fax (*) 27-11-452-2903

UNITED ARAB EMIRATES

Dresser Valve & Controls Division
Units JAD1 & JAD2
P.O. Box 61302, Roundabout 6
Jebel Ali Free Trade Zone, United Arab Emirates
Telephone (*) 971-4-838752
Fax (*) 971-4-838038

VENEZUELA

Riese & CIA S.A.
Sabana Grande, Av. A, Lincoln Torre Domes
P.B. Of. 9-A, Caracas, Venezuela
Telephone (*) 58-2-793-8266
Fax (*) 58-2-794-0791

The appropriate International Access Code will need to precede the telephone/fax number if you are placing a call to a location outside of your country.

Industrial Valves

DRESSER

Dresser Industries, Inc.
Industrial Valve Operation
Alexandria, Louisiana 71309-1430 (USA)

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