Consolidated®

INSTALLATION AND MAINTENANCE MANUAL

Rev. 4

Type 1900/P1, P2 & P3
Type 1900-30/P1 & P2
Type 1900/P1, P2 & P3-T
Type 1900-30/P1, P2 & P3-T

Type 1900/P Series

DRESSER
Flow Control

P.O. Box 1430
Alexandria, Louisiana 71309-1430 (USA)

CON-3
Revised 5/01

Product Safety Sign and Label System

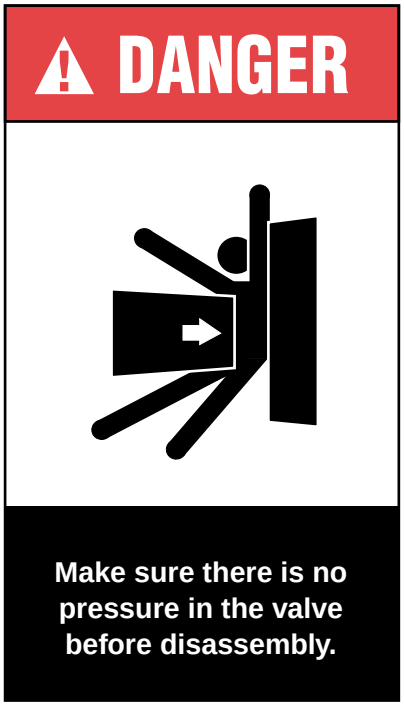
If and when required, appropriate safety labels have been included in the rectangular margin blocks throughout this manual. Safety labels are vertically oriented rectangles as shown in the representative examples (below), consisting of three panels encircled by a narrow border. The panels can contain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

- The level of hazard seriousness.
- The nature of the hazard.
- The consequence of human or product interaction with the hazard.
- The instructions, if necessary, on how to avoid the hazard.

ATTENTION
Hazards or unsafe practices which could result in product or property damage.

WARNING
Hazards or unsafe practices which could result in severe personal injury or death.

CAUTION
Hazards or unsafe practices which could result in minor personal injury.



DANGER
Immediate hazards which WILL result in severe personal injury or death.

The top panel of the format contains a signal word (DANGER, WARNING, CAUTION or ATTENTION) 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, then can be communicated by the pictorial.

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Valve Cross Sections and Nomenclature (with standard materials)

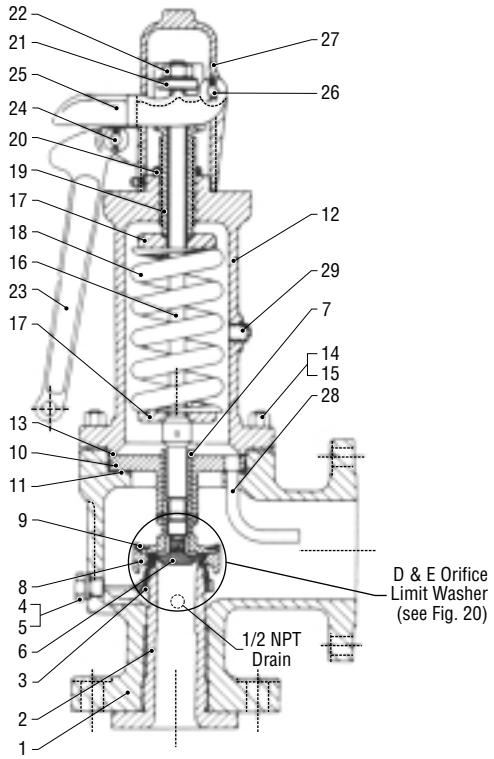


Figure 1
1900/P1 & P2

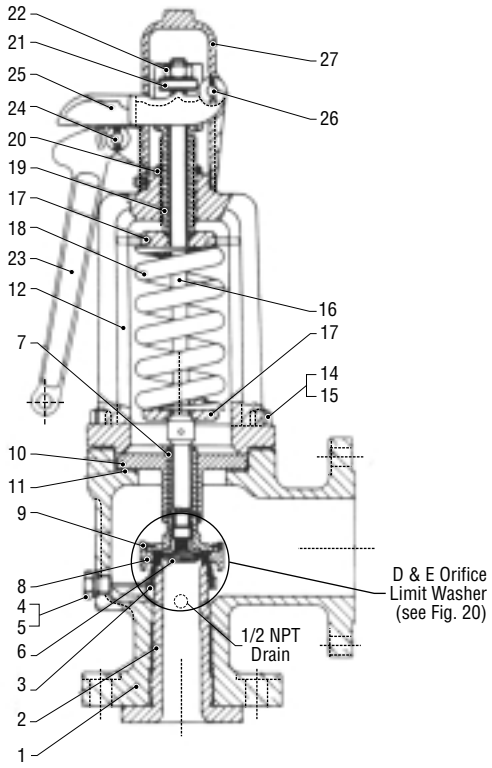


Figure 2
1900/P3

Ref. No.	Conventional Valve Nomenclature	Standard Material
1	Base: 1905-1918 1920 - 1928	SA216 WCC Carbon Steel SA217 WC6 Alloy Steel
2	Nozzle	316 Stainless Steel
3	Adjusting Ring	316 Stainless Steel
4	Adjusting Ring Pin	316 Stainless Steel
5	Adj. Ring Pin Gasket	316 SS (Non-Asbestos) Filled
6	Disc	616 Stainless Steel
7	Disc Holder	304 Stainless Steel
8	Holder Ring	410 Stainless Steel
9	Holder Ring Retainer	Carbon Steel (Nickel Plated)
10	Guide	Leaded Nickel Silver
11	Guide Gasket	Soft Iron
12	Bonnet/Yoke	SA216 WCC Carbon Steel
13	Bonnet Gasket	Soft Iron
14	Base Stud	B7 Alloy Steel
15	Stud Nut	2H Carbon Steel
16	Spindle	410 Stainless Steel

Ref. No.	Conventional Valve Nomenclature	Standard Material
17	Spring Washer	Carbon Steel
18	Spring: 1900D-T/P1 1900D-T/P2 1900D-T/P3	Carbon Steel (Phosphated) Tungsten Steel (Note 1) Carbon Steel
19	Adjusting Screw	416 Stainless Steel
20	Adjusting Screw Nut	416 Stainless Steel
21	Release Nut	Carbon Steel
22	Release Locknut	Carbon Steel
23	Drop Lever	Malleable Iron
24	Drop Lever Pin	Carbon Steel
25	Top Lever	Malleable Iron
26	Top Lever Pin	Carbon Steel
27	Plain Cap	Malleable Iron
28	Eductor Tube	304 Stainless Steel
29	Bonnet Plug	Carbon Steel
30	Limit Washer	304 Stainless Steel

Notes:

1. *Spring with wire size 1/4" and smaller may be supplied in Inconel®*
2. *See certified print for actual materials as standard materials are listed.*

Valve Cross Sections and Nomenclature (with standard materials)

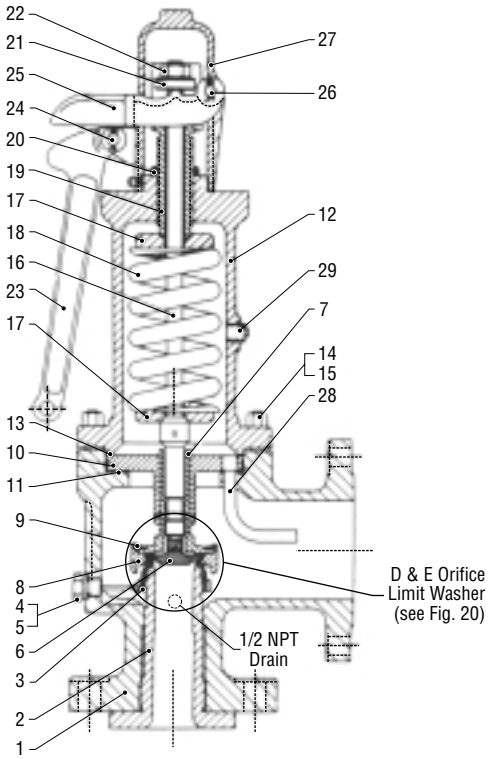


Figure 3
1900-30H thru T/P1 & P2

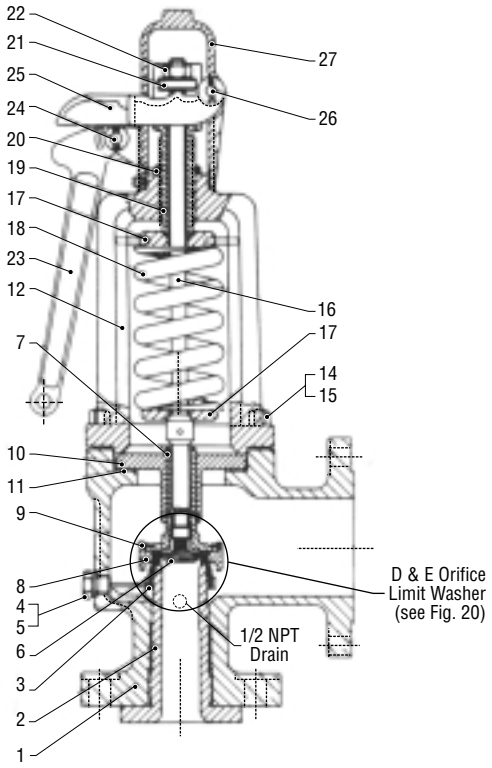


Figure 4
1900-30D thru G/P1 & P2

Ref. No.	Bellows Valve Nomenclature	Standard Material
1	Base: 1905-30, 1918-30 1920-30, 1928-30	SA216 WCC Carbon Steel SA217 WC6 Alloy Steel
2	Nozzle	316 Stainless Steel
3	Adjusting Ring	316 Stainless Steel
4	Adjusting Ring Pin	316 Stainless Steel
5	Adj. Ring Pin Gasket	316 SS (Non-Asbestos) Filled
6	Disc	616 Stainless Steel
7	Disc Holder	304 Stainless Steel
8	Holder Ring	410 Stainless Steel
9	Holder Ring Retainer	Carbon Steel (Nickel Plated)
10	Guide	Leaded Nickel Silver
11	Guide Gasket	Soft Iron
12	Bonnet	SA216 WCC Carbon Steel
13	Bonnet Gasket	Soft Iron
14	Base Stud	B7 Alloy Steel
15	Stud Nut	2H Carbon Steel
16	Spindle	410 Stainless Steel

Ref. No.	Bellows Valve Nomenclature	Standard Material
17	Spindle Retainer (Note 3)	Inconel®
18	Spring Washer	Carbon Steel
19	Spring: 1900-30D-T/P1 1900-30D-T/P2	Carbon Steel (Phosphated) Tungsten Steel (Note 1)
20	Adjusting Screw	416 Stainless Steel
21	Adjusting Screw Nut	416 Stainless Steel
22	Release Nut	Carbon Steel
23	Release Locknut	Carbon Steel
24	Drop Lever	Malleable Iron
25	Drop Lever Pin	Carbon Steel
26	Top Lever	Malleable Iron
27	Top Lever Pin	Carbon Steel
28	Plain Cap	Malleable Iron
29	Bellows	316 Stainless Steel
30	Bellows Gasket	Compressed Non-Asbestos
31	Limit Washer	304 Stainless Steel

Notes:

1. *Spring with wire size 1/4" and smaller may be supplied in Inconel®*
2. *See certified print for actual materials as standard materials are listed.*
3. *Applies to Fig. 4 only.*

i. Safety Notice

Proper installation and maintenance is essential to the safe and reliable operation of all valve products. The relevant procedures recommended by Dresser Flow Control (DFC), and described in this manual, are effective methods of performing the required tasks. Some of these procedures require the use of tools specifically designed for an intended purpose. These special tools should be used when, and as, recommended.

It is important to note that this manual contains various “safety messages” which should be carefully read in order to minimize the risk of personal injury, or the possibility that improper procedures will be followed which may damage the involved DFC product, or render it unsafe. It is also important to understand that these “safety messages” are not exhaustive. DFC cannot possibly know, evaluate, and advise any customer of all of the conceivable ways in which tasks might be performed, or of the possible hazardous consequences of each way. Consequently, DFC has not undertaken any such broad evaluation and, thus, anyone who uses a procedure and/or tool, which is not recommended by DFC, or deviates from DFC recommendations, must be thoroughly satisfied that neither personal safety, nor valve safety, will be jeopardized by the method and/or tools selected. If not so satisfied, contact DFC (at 318/640-2250) if there are any questions relative to tools/methods. Some of the products manufactured by DFC may be used in radioactive environments. Consequently, prior to starting any operation in a radioactive environment, the proper “health physics” procedures should be consulted and followed, if applicable.

The installation, operation and maintenance of valves and/or valve products may involve proximity to fluids at extremely high pressure and/or temperature. Consequently, every precaution should be taken to prevent injury to personnel during the performance of any procedure. These precautions should consist of, but are not limited to, ear drum protection, eye protection, and the use of protective clothing. (i.e., gloves, etc.) when personnel are in or around a valve work area. Due to the various circumstances and conditions in which these operations may be performed on DFC products, and the possible hazardous consequences of each way, DFC cannot possibly evaluate all conditions that might injure personnel or equipment. Nevertheless, DFC does offer certain safety precautions listed on this page for customer information only.

It is the responsibility of the purchaser or user of DFC valves/equipment to adequately train all personnel who will be working with the involved valves/equipment. Further, *prior* to working with the involved valves/equipment, personnel who are to perform such work should become thoroughly familiar with the contents of this manual. Accordingly, should additional copies of this manual be required, they can be purchased, at a minimal cost, by contacting DFC (in writing) at P.O. Box 1430, Alexandria, LA 71309-1430, or (telephonically) at 318/640-2250.

Interchangeability for T-Design

In 1988, a change was made in the design of the nozzle and base. The new design may be identified by a “T” suffix in the “Type” section of the nameplate. This change affects the interchangeability of the nozzle and base only. All other components of the previous design and the “T” design remain interchangeable.

ii. Safety Precautions

Follow all plant safety regulations, but *be sure* to observe the following:

- *Always* lower the working pressure before making any valve adjustment. This will avoid possible personal injury.
- Do *not* stand in front of the discharge side of a pressure relief valve when testing or operating.
- Hearing and eye protection should be used when testing or operating a valve.
- Wear protective clothing. Hot water can burn and superheated steam is *not* visible.
- When removing the pressure relief valve during disassembly, stand clear and/or wear protective clothing to prevent exposure to splatter of any corrosive process medium which may have been trapped inside the valve. Ensure the valve is isolated from system pressure *before* the valve is removed.

Safety Precautions (cont'd.)

• Before performing any machining on valve parts, consult DFC or its authorized representative. Deviation from critical dimensions can adversely affect valve performance.

• All valves require periodic inspection and tests by qualified persons to insure that the valves are in proper working condition and will function as designed by DFC. The owner/operator of the valves must be aware of usage conditions and must bear the responsibility for determining the appropriate frequency of examination of the valves.

iii. 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. Refer to Dresser's Standard Terms of Sale or specific contract details on warranty and limitation of remedy and liability.

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

Warranty Claims

Warranty claims must be made immediately upon discovery and in any event, within thirty (30) months of shipment of the applicable product (at F.O.B. shipping point), or within twenty-four (24) months from the date of installation, whichever is earlier. For all other details on warranty, limitation of remedy, liability of remedy and liability, please refer to Dresser's Standard Terms of Sale.

Incorrect Selection or Misapplication of Products

DFC cannot be responsible for customer's incorrect selection or misapplication of our products.

Unauthorized Repair Work

DFC 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.

Unauthorized Removal of Seals

All new valves and valves repaired in the field by Dresser Field Service are sealed to assure the customer of our guarantee against defective workmanship. Unauthorized removal and/or breakage of this seal will negate our warranty.

I. Introduction

A. Design Features

The Consolidated® 1900/P Series Steam Internals (conventional or bellows) pressure relief valve is a precision machined device and operates on the force balance principle.

Types 1900/P1 and P2 closed bonnet and P3 open yoke or slotted bonnet valves have been designed for steam service in accordance with ASME Code Section I and VIII. Both types come ready for application and should be handled carefully through receiving, handling, storage and installation.

Safety valves in organic fluid vaporizer service are totally enclosed and do not have a lifting lever.

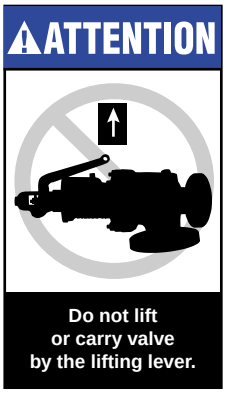
Reliable performance and easy maintenance procedures are characteristics of those valves when properly installed in applications suitable for their design.

Seat Tightness - Thermodisc™
When the valve closes, a Thermodisc™ seat compensates for temperature gradient around the seating surface.

High Nozzle Guide
Nozzle is guided in the base as close as possible to the nozzle seat.

Low Spindle Bearing
Valve has a low spindle bearing point, assuring proper alignment and load distribution at the seating surface. This prevents the disc from sliding across the seat on opening and closing.

Simple Blowdown Adjustment
Single blowdown ring design permits ease of adjustment. Proper blowdown can be attained by positioning the ring in accordance with adjusting ring position table shown on page 22.



Introduction (cont'd.)

B. Operating Principle

The Consolidated® 1900/P Series steam internals pressure relief valve is an automatic pressure actuated relieving device suitable for use either as a safety valve or safety relief valve depending on the application.

C. Handling, Storage and Pre-installation

1. Each valve should be carefully inspected after uncrating to be sure the valve has not been damaged during transit.

2. Flanged valves, either crated or skid-mounted, should always be kept with the inlet flange down, i.e. never laid on its side, to prevent misalignment and damage to internals.

3. 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.

4. Flange protectors and sealing plugs should not be removed until the valve is ready to be bolted into the installation, both inlet and outlet. Meticulous care should be exercised to prevent dirt and other foreign materials from entering the inlet and outlet ports before installation.

5. Valves, either crated or uncrated, should never be subjected to sharp impact. This would be most likely to occur while unloading or otherwise moving with a fork lift truck. While hoisting to the installation, care should be exercised to prevent bumping valve.

6. Uncrated valves should be moved or hoisted by wrapping chain or sling around discharge neck, then around upper bonnet structure in such manner as will ensure the valve is in vertical position during lift, i.e., not lifted in horizontal position.

Caution: Never lift the full weight of the valve by the lifting lever (if so equipped).

II. Installation

Consolidated® Pressure Relief Valves are checked, set and adjusted at the factory.

Piping (systems) is the responsibility of the user. One source of information is ANSI B31.1 Power Piping, Appendix II, "Non-mandatory Rules for the Design of Safety Valve Installations" in steam service.

Valves in organic fluid vaporizer service require a closed discharge piping system.

Piping should be as short as possible and in perfect alignment.

Pressure relief valves should be mounted to provide adequate access 360˚ around the valve plus overhead room to permit removal for testing and maintenance.

A pressure relief valve must never be installed in any position except the vertical position and preferably never on the outlet side of an elbow. No stop valve should be placed between the pressure vessel and its pressure relief valve except as permitted by applicable Codes. If a stop valve is located between the pressure vessel and a pressure relief valve, the stop valve shall have a minimum inside diameter equal to or greater than the nominal inside diameter of the pressure relief valve inlet.The inlet piping must be clean before installation.

The discharge piping size must never be less than the valve outlet size.

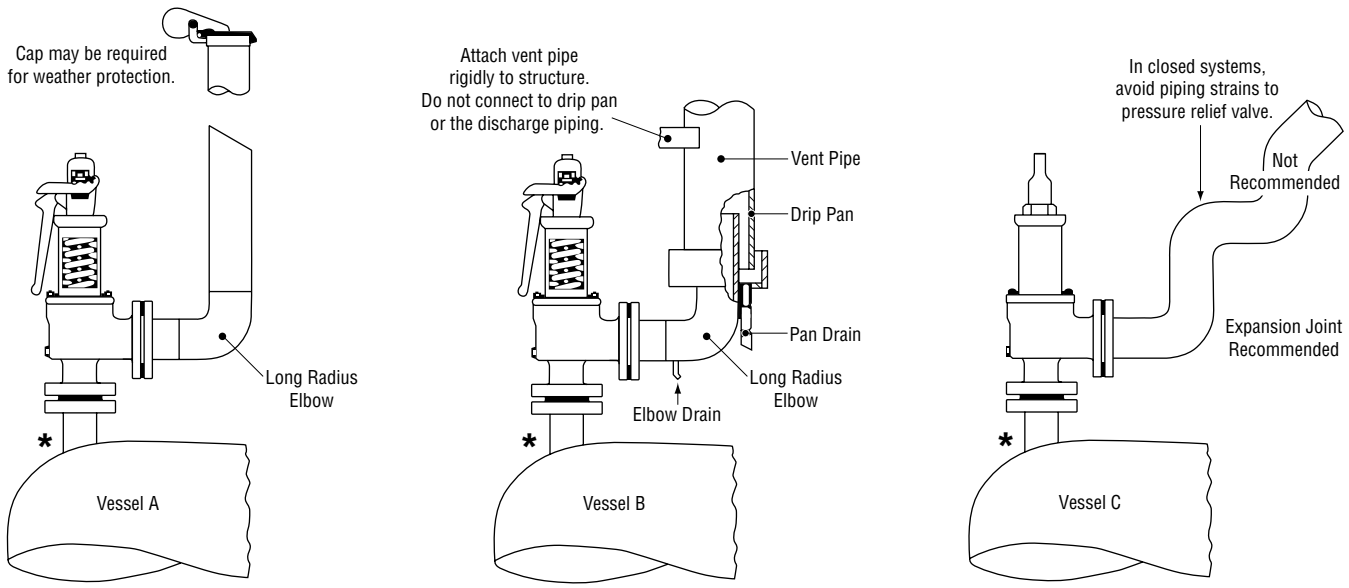
For conventional valves, Dresser recommends that the discharge piping be designed to limit the back pressure to 10% of the set pressure. Dresser recommends a bellows valve (see Consolidated® SRV-1 for applicable capacity factor).

When gags are used in conjunction with setting valves installed on the boiler, they should be installed after the boiler is at operating temperature.

When a valve is equipped with a lifting lever, the lever should be positioned to avoid accidental contact by other equipment or personnel, which might cause valve to lift accidentally.

Steam service valve body drain must be piped to a safe area. If left plugged, condensate will collect inside the valve body. If left open, hot water can escape and present a hazard to personnel near the valve. Preferably the drain connections (body, elbow and drip pan) should be piped separately - not main-folded - because of the tendency of small pipes to plug with rust.

When installing bellows valves, the bonnet vent plug must be removed and vented (piped) to a safe area.



* The pressure drop between the source of pressure in the protected equipment and the valve inlet should not exceed 3% of the valve set pressure.

Figure 5

IV. Terminology for Safety Valves
(paraphrased from PTC 25.3)

The basic definitions of pressure relief valves are given in ANSI B95.1, Terminology for Pressure Relief Devices; ASME PTC 25.3, Performance Test Code for Safety and Relief Valves; and API RP 520, Design and Installation of Pressure Relieving Systems in Refineries.

• **Accumulation**
See Overpressure

• **Back Pressure**
The pressure at the discharge side of the valve.

• **Superimposed Back Pressure:** the pressure in the discharge header before the valve opens

- Constant Superimposed: this type of back pressure remains essentially at a fixed value (constant) and exists (superimposed) continuously prior to and during the opening of the valve.

- Variable Superimposed: this type of back pressure varies or changes over a range from a minimum to a maximum, or vice versa. The actual back pressure at any specific time depends on conditions in the piping system to which the outlet of the valve is connected.

• **Built-up Back Pressure:** the pressure which develops at the valve outlet as a result of flow after the valve is opened.

• **Blowdown**
Blowdown is the difference between set pressure and resetting pressure. It is generally expressed as a percentage of set pressure.

• **Chatter**
Chatter is abnormal, rapid reciprocating motion of the movable parts of a safety valve in which the disc contacts the seat.

• **Closing pressure**
Closing pressure is the point at which the valve recloses.

• **Cold Differential Set Pressure (CDS)**
This is the test pressure at which the valve is adjusted to open on the test stand. This pressure includes the corrections for temperature and/or back pressure service conditions. Nameplate shows "cold set press" (see Figure 24).

• **Disc**
A disc is the pressure containing movable element of a valve which affects closure.

• **Flutter**
Flutter is abnormal, reciprocating motion of the movable parts of a valve in which the disc does not contact the seat.

Valve Terminology (cont'd.)

- **Leakage**

See "Seat Leakage".

- **Lift**

Lift is the disc rise when a valve is open.

- **Maximum Allowable Working Pressure (MAWP)**

The maximum pressure permissible in a vessel at the design temperature.

- **Nozzle**

A nozzle is the pressure-containing element which consists of the inlet flow passage (orifice) and includes the fixed portion of the seat.

- **Operating Pressure**

The normal pressure required to operate the vessel or system. A suitable margin must be provided between the operating and the valve set pressure.

- **Operating and Set Pressure-Differential**

Valves in process service will generally give best results if the operating pressure does not exceed 90% of the set pressure. On pump and compressor discharge lines, however, the differential required between the operating and set pressures may be greater because of pressure pulsations coming from a reciprocating piston. It is recommended that the valve be set as high above the operating pressure as possible.

- **Orifice**

The orifice is the minimum cross-sectional area of the controlling nozzle bore.

- **Overpressure**

Overpressure is any pressure in excess of the set pressure, usually expressed as a percentage of set pressure. For certification, accumulation is the percent of overpressure at which the valve is to be fully open as specified by the ASME Code.

- **Pressure Relief Valve**

A pressure relief valve is an automatic pressure relieving device actuated by upstream pressure. A pressure relief valve is designed to open to prevent a rise of system pressure above a specified value and to reclose after normal conditions have been restored.

A pressure relief valve is a two-chamber component having primary and secondary zones. Each chamber has different design criteria (i.e., pressure and temperature). The nozzle and disc are the primary members. The base and bonnet are the secondary members.

- **Rated Capacity**

The rated flow at an authorized percent accumulation permitted by the applicable Code. Rated capacity is generally expressed in pounds per hour (lbs/hr) or kg/h for vapors; standard cubic feet per minute (SCFM) or m^3/min for gases; and in gallons per minute (GPM) or L/min for liquids.

- **Relief Valve**

A pressure relief valve which opens in proportion to overpressure. A relief valve is used primarily for liquid service.

- **Reseating Pressure**

See closing pressure.

- **Safety Valve**

A pressure relief valve characterized by rapid full opening or pop action. It is used for gas or vapor service.

- **Safety Relief Valve**

A pressure relief valve which may be used as either a safety or relief valve, depending upon the application.

- **Seat**

The seat is the junction between the nozzle which is fixed and the disc which moves against the nozzle to obtain closure.

- **Seat Leakage**

Seat leakage test pressure is the specified inlet static pressure at which a quantitative seat leakage test is performed in accordance with a standard procedure.

- **Set Pressure**

Set pressure is the inlet pressure at which the valve has been adjusted to open under service conditions.

For gas and vapor service - when the valve pops.

For liquid service - when the valve begins to discharge a continuous stream.

- **Simmer**

Characterized by the audible/visual passage of a fluid across the seating surfaces just prior to opening. The difference between this start to open pressure and the set pressure is simmer.

For gas service valves, simmer is leakage just prior to opening.

For liquid service valves, simmer is the non-continuous flow (drops) just prior to becoming continuous.

- **Valve Trim**

Includes the disc and nozzle.

V. Maintenance

This manual provides plans for inspection and repair of Consolidated® 1900/P series steam internals pressure relief valves. The requirements of this manual are considered minimum and do not relieve the user of the responsibility of applicable codes, standards and guides, including all safety regulations having jurisdiction over the installation.

Preventative maintenance should be practiced. At regular intervals each valve should be removed, disassembled, inspected, refurbished and tested to the customer's requirements.

VI. Disassembly

Notes:

A. It's a good policy to keep parts together by valve serial number. Serial number and valve type number are stamped into the top edge of the outlet flange and on the valve nameplate.

B. For parts identification refer to Figures 1-4

The Consolidated® 1900/P series safety relief valve can be disassembled by following the procedure outlined below:

1. Remove cap (including lifting gear) and cap gasket.

2. Remove adjusting ring pin and gasket. If the existing blowdown is to be restored upon reassembly, the position of the adjusting ring with respect to the disc holder must be determined. Turn the adjusting ring counterclockwise, i.e., move notches on the adjusting ring from left to right. Record the number of notches passing the ring pin hole required for the ring to contact the disc holder. This information will be used in setting the ring upon reassembly of the valve.

3. Use dial caliper or depth micrometer to measure and record dimension A of Fig. 6 from the top of the spindle to the top of the adjusting screw. This will be used later for adjustment of the valve to near its original set pressure. Loosen the adjusting screw lock nut. Turn adjusting screw counter-clockwise to remove the spring load. When turning the adjusting screw use Vise-Grip® pliers to hold the spindle.

4. Remove the stud nuts and lift off the bonnet or yoke. Remove bonnet gasket.

5. Remove the spring and spring washers. The spring and spring washers should be kept together as a unit at all times.

6. All the upper internal parts can be removed as a unit by lifting out the spindle*. These parts should be removed by lifting straight up. On bellows valves care should be taken not to bend or distort the bellows or its flange. Care should be taken to ensure that disc and spindle assembly are fully engaged before removal.

7. Remove the spindle from the disc holder. In valves as shown in Fig. 1, 2 and 3, it is necessary to rotate the spindle counter-clockwise only, while pulling up. This engages the drop-out thread.

8. Remove guide from the disc holder.

9. On D and E valves, remove the limit washer and tag with the valve serial number. If bellows D or E, tilt the disc holder bellows assembly and slide out the limit washer.

The bellows is attached to the disc holder by right-hand threads. Apply a pin spanner wrench to the bellows ring and loosen bellows by turning counter-clockwise (Fig. 7). The bellows convolutions are very thin metal and care should be taken to protect them from damage at all times. Remove bellows gasket.

10. Remove disc holder retainer ring using inside snap ring pliers (see Fig. 22).

11. Separate disc holder, disc and holder ring.

12. Remove the adjusting ring from the nozzle by turning counter-clockwise and tag with valve serial number.

13. The nozzle should not be removed from the base unless necessary due to damage.

** In instances where valves are fouled with foreign materials and/or heavy products, disassembly may be eased if these parts are given a prior soaking in a suitable solvent.*

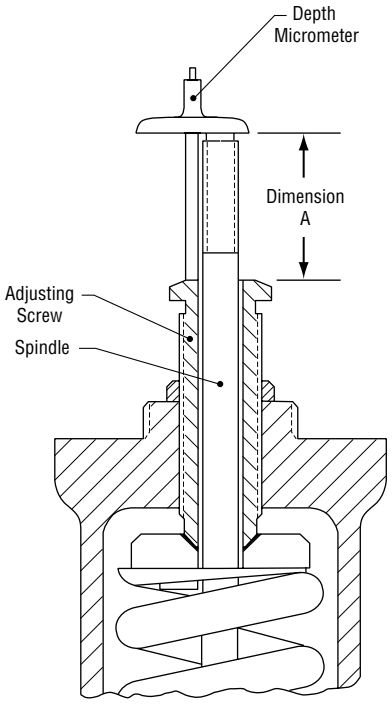


Figure 6

VII. Inspection

Now all parts should be cleaned. First remove grease and sealants, then remove rust and scale. Inspect the internal parts to ensure they are not damaged by galling. Look especially at the rubbing surfaces of the guide and disc holder.

Inspect the spindle to ensure concentricity. Over-gagging is one of the common causes of bent spindles.

Inspect the spring and washer assembly for excess clearance (greater than 1/32") and inspect the bearing surfaces for galling.

1. Between the upper spring washer and the adjusting screw
2. The lower spring washer and the spindle shoulder
3. Spring - look for corrosion pits. Replace the spring if severe corrosion or pitting is present. If the spring has been in service a long time, measure the free length of the spring. Contact Dresser and give this dimension, the spring number, and the valve set pressure to obtain their recommendations.

On all disc holders, inspect the bearing surface between the spindle pocket of the disc holder.

Inspect all bearing parts for concentricity, apply a very thin layer of Clover 3A grinding compound to the actual bearing surfaces, and grind together to determine if smooth, uninterrupted contact is made. If grinding does not restore the original condition or very close to it, then the parts should be replaced. Spherical surfaces should have a 63 RMS or better surface finish and their radius must be continuous. Each corresponding bearing surface should be conical and smooth with a 63 RMS or better surface finish. All traces of lapping compound must be carefully and totally removed prior to reassembly.

A surface finish comparator is required to obtain these readings. See Maintenance Tools and Supplies on page 23.

The bellows (if present) should be visually inspected and perhaps reassembled to the disc holder with a good gasket, filled with water, and allowed to set for an hour or two to show any leakage. At conclusion, if a successful test, then dump the water and remove the gasket and allow the bellows to dry out. (Make sure bellows is dry when valve is reassembled).

If conventional valve with eductor tube, push a wire through the tube to check for plugging.

Nozzle - The nozzle seating surface must be inspected for nicks, cuts or grooves. Minor steam cuts can be lapped out. See dimensions under Section VIII, "Repair".

Thermodisc™ - If surface defects cannot be lapped out, the disc must be replaced. If after lapping, "A" in Fig. 9 is less than " A Min.", replace the disc.

Adjusting Ring - The adjusting ring must have undamaged threads. Both surfaces "A" and "B" must be undamaged. See Fig. 10.

Adjusting Ring Pin - Pin must be inspected to ensure that it is long enough to keep the Adjusting Ring from turning yet without touching the bottom of the notch (see Fig. 10).

Gasket Surfaces - All gasket surfaces should be inspected for cleanliness and be without radial scratches. Be sure all pieces of the old gasket have been completely removed.

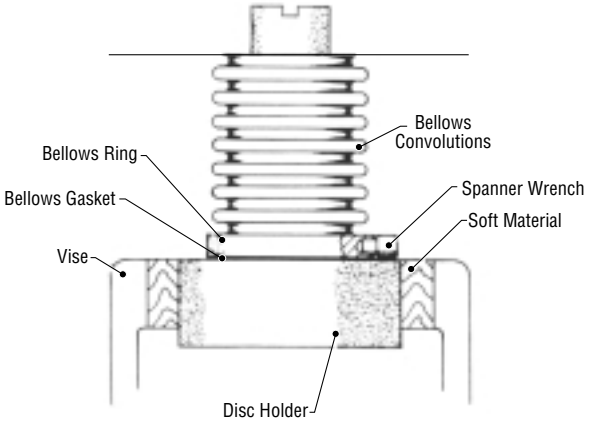


Figure 7

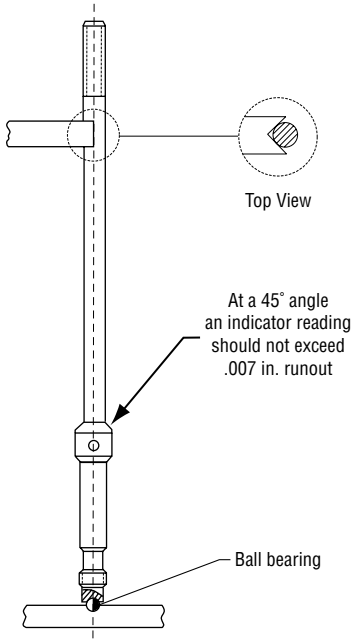


Figure 8

VIII. Repair

A. Machining of Nozzle Seat

All damaged parts, as determined by inspection, must be replaced with the exception of the valve nozzle, which may be machined as follows:

The nozzle seat should be machined with the nozzle assembled in the base whenever possible. If it should be necessary to remove the nozzle from the base, use the methods shown in Fig. 11 or 12.

Use a hex wrench or pipe wrench as appropriate on nozzle flange to remove nozzle from base, or use a three-jaw chuck welded vertically to a stand bolted to the floor (see Fig. 12).

Lathe set-up for machining of nozzle: grip the inlet flange of the valve in a four-jaw independent chuck (see Fig. 13).

True up the work so that the top of the nozzle at “C” and the base surface at "B” run true within .001 in. on indicator.

If the nozzle has been removed, grip the nozzle in a four-jaw independent chuck using a piece of soft material such as copper or fiber between the jaws and the nozzle as shown at “A” (Fig. 14).

True up the nozzle so that the surfaces marked “B”, “C” and “D” run true within .001 in. on indicator.

Thermodisc™: because of the critical shape of the disc, Dresser recommends against any machining of the disc. However, careful lapping may be done so long as dimensions in Fig. 9 are maintained.

Orifice	A Min.
D thru M	.003
N thru T	.005

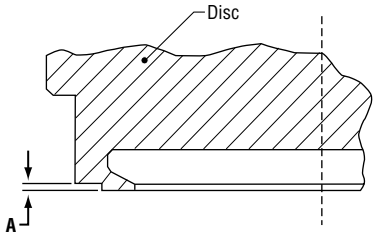


Figure 9

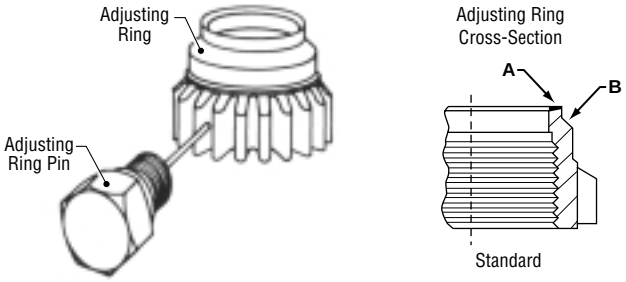


Figure 10

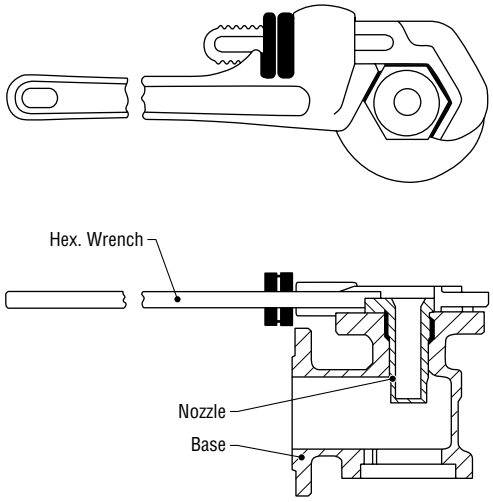


Figure 11

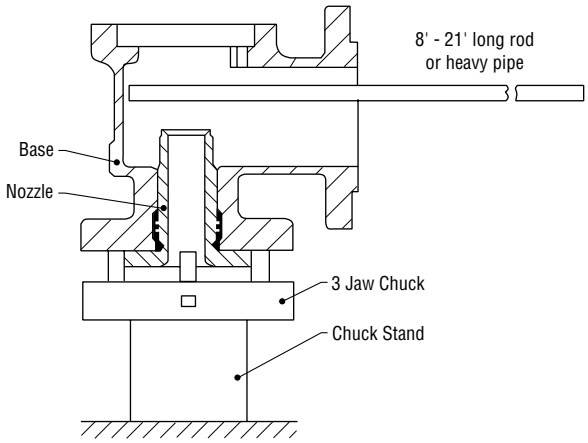


Figure 12

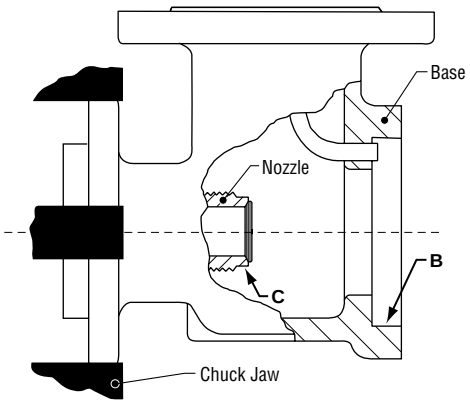


Figure 13

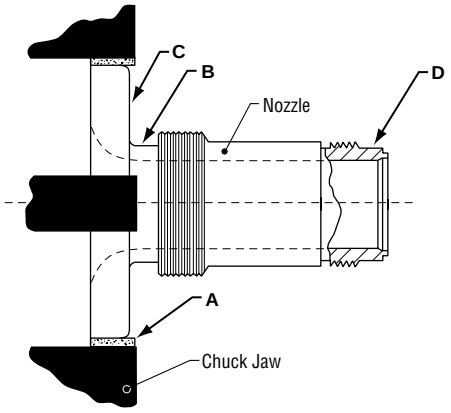
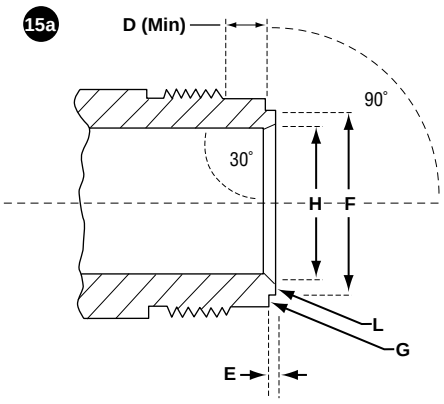


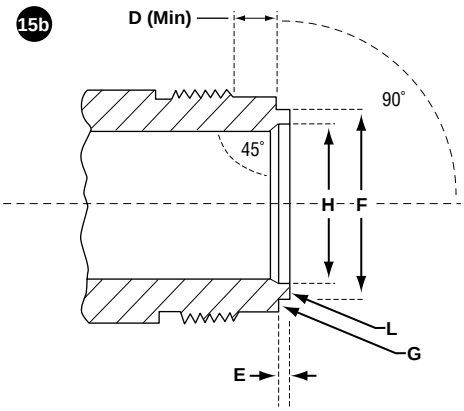
Figure 14

Figure 15
Nozzle Seat Dimensions

D thru G Orifices



H thru T Orifices



Orifice	English Dimension (inch)				Metric Dimension (mm)			
	D Min	E	F	H	D Min	E	F	H
D, E, F	5/16	.025	.945	.830	8.0	0.635	24.003	21.082
G	5/16	.025	1.085	.955	8.0	0.635	27.559	24.257
H	1/4	.025	1.255	1.125	6.4	0.635	31.877	28.575
J	3/8	.025	1.565	1.430	9.5	0.635	39.751	36.322
K	7/16	.025	1.885	1.710	11.1	0.635	47.879	43.434
L	7/16	.025	2.310	2.135	11.1	0.635	58.674	54.229
M	7/16	.025	2.605	2.400	11.1	0.635	66.167	60.960
N	1/2	.025	2.835	2.630	12.7	0.635	72.009	68.802
P	5/8	.025	3.420	3.185	15.9	0.635	86.868	80.899
Q	7/8	.025	4.425	4.180	22.2	0.635	112.395	106.172
R	1	.025	5.245	4.960	25.4	0.635	133.223	125.984
T	3/4	.025	6.328	6.043	19.1	0.635	160.731	153.492

Repair (cont'd.)

B. Lapping

Lapping is required to obtain the surface finish necessary for proper seating. Prior to lapping, Lap Ring must be reconditioned to ensure proper results.

Reconditioning of Ring Laps
Lap Rings are reconditioned by lapping them on a flat lapping plate. The lapping should be done with figure-eight motions as indicated in Fig.16. To obtain the best results, the Lap Rings must be reconditioned before each use.

Always run outer edge of lap beyond edge of plate to even wear.

Lapping Plate*: The lapping plate is used for reconditioning Lap Rings. One 11 inch diameter cast iron plate is required for the entire range of valve sizes.

Lap Rings*: Laps are flat cast iron rings.

Lapping Compound*: Lapping compound is used as the cutting medium in lapping valve seats.

General Lapping Comments
Seat lapping is an art and comes with practice and experience. To obtain the best results, the Lap Rings must be reconditioned before each use.

At first the parts will slide easily; however, as the seat becomes smooth and flat, the lap will drag noticeably. Clean the seat periodically for examination. When the seat is fully lapped, it will have a uniform dull light grey appearance. At this point, clean and apply 1000 grit and lap to a mirror finish. When lapping has been completed, any lines appearing as cross scratches can be removed by rotating the lap which has been wiped clean of compound - on the seat faces - about its own axis. With practice a quarter turn on #4/0 emery polishing paper accomplishes the same result. Clean with alcohol or other suitable cleaner.

A Surface Finish Comparator is used to determine surface finish number (microinch). For full details on surface finish numbers refer to ANSI B46.1 and/or Machinery's Handbook.

In many cases a 1000 grit lap may be adequate. Both nozzle and disc seat surfaces must be 8 RMS finish or better.

Typical Seat Lapping Recommendations

Seat Finish RMS	Repair Oper.	Grit
over 250	machine	-
over 125 - 250	grinding	320
over 16 - 125	grinding	500
16 and under	lapping	1000

**See "Maintenance Tools and Supplies"on page 24*

Nozzle Lapping
When using the Lap Ring uniformly, coat the lap with a small amount of lapping compound. Keep the lap squarely on the nozzle seat and avoid any tendency to rock the lap, which will result in rounding of the seat. Keep a firm grip on the lap to prevent the possibility of dropping it and damaging the seat. Use an oscillating motion while applying very light force and if possible occasionally rotate the nozzle. (Do not turn the lap in just one direction.)

Thermodisc™ Disc Lapping
Uniformly coat the disc with a small amount of lapping compound and place it on the Lap Ring. The operation is basically the same as the nozzle except that the disc must be moved on the Lap Ring. The operation is basically the same as the nozzle except that the disc must be moved on the Lap Ring.

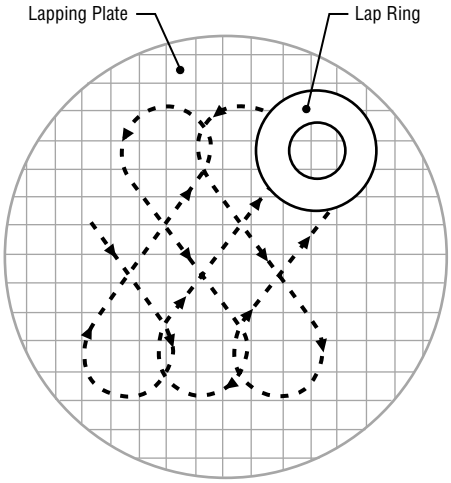


Figure 16

IX. Reassembly

Notes:

A. Check all gaskets used during reassembly. Undamaged solid metal gaskets (not pitted or creased) can be reused. All soft gaskets must be replaced. Before placing the (flat) gaskets, apply a light uniform coating of lubricant to the surface to be gasketed; then coat the top of the gasket with lubricant.

B. Before reassembling the valve, all parts should be cleaned. Special attention should be given to guiding surfaces, bearing surfaces, flange faces, retainer recesses and grooves.

C. If grinding in of bearing parts is required, use Clover® Grade 3A (see Section VII, "Inspection"), and be sure to remove all grinding compounds and thoroughly clean both surfaces and rinse with alcohol or other suitable cleaner.

Reassembly (cont'd.)

D. On D and E valves, be sure to measure the required lift before final assembly. See page 19 for instructions.

E. The final step before final assembly is lubrication. Apply lubricants sparingly, but be sure that each bearing surface is lightly by uniformly covered. For lubricant see "Maintenance Tools and Supplies" on page 22.

Reassemble valve as follows:

1. If the nozzle was removed, apply lubricant to the nozzle threads before reinstalling the nozzle into the base, then tighten.

2. Reinstall the adjusting ring to the nozzle. Make sure the ring is low enough on the nozzle to allow sufficient clearance between the disc holder and the adjusting ring so that the disc will seat on the nozzle and not on the ring.

3. a) On D and E valves, if the nozzle does not require any machining, the same limit washer (tagged during disassembly) may be used again. However, lift should be checked and verified correct as described on page 17.

b) if D or E valve nozzle was remachined, measure the required lift before final assembly. See page 17.

4. Assemble disc, holder ring and disc holder. Use care to avoid seat damage during assembly. Insert retainer ring beveled side upwards in groove using proper inside snap ring pliers. See Fig. 22.

5. On bellows valves (see Fig. 7), place a new bellows gasket on the disc holder. Thread the bellows down to the gasket finger tight on the disc holder. Using a pin spanner wrench or special cable type wrench, turn the bellows ring down until a pressure tight seal is obtained.

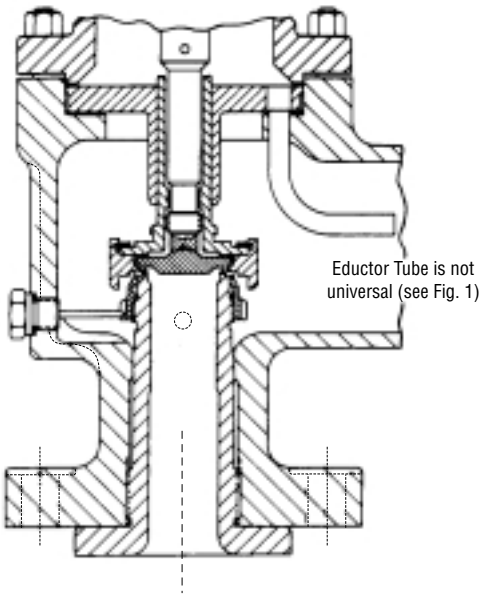


Figure 17

6. On D and E restricted lift valves, install the limit washer.

7. Place the guide over the disc holder. DO NOT DROP. If bellows is present, the weight of the guide will slightly compress the bellows.

8. Apply lubricant sparingly to the inside conical end of the spindle.

9. a) For all conventional and H thru T bellows valves, place spindle in disc holder assembly, thread in all the way, and be sure spindle feels "free".

b) For bellows D thru G valves, a ring type retainer is used. Place the spindle retainer ring on the spindle below the enlargement prior to installing the spindle into the disc holder assembly, and snap the ring into the internal groove at the top of the disc holder (Fig. 4) using an awl.

10. Place proper guide gasket in the base. If conventional valve, use metal gasket and if bellows valve, use soft (non-asbestos) gasket.

11. Install the spindle/disc holder assembly and guide by gently lowering into the valve base. Take care to align the hole(s) in the guide over the extended end of the eductor tube(s).

Note: Bellows valves do not have an eductor tube.

12. Apply a small quantity of lubricant to the spring washer bearing surface of the spindle. Place the spring assembly on the spindle.

13. Place bonnet gasket in the base prior to installing the bonnet. Uniformly tighten the bonnet stud nuts using the pattern shown in Fig.18.

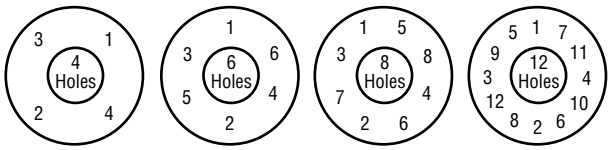


Figure 18

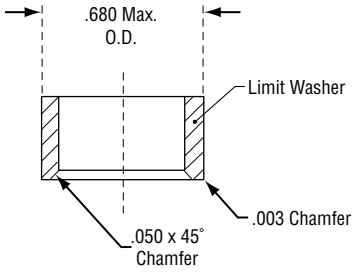


Figure 19

Reassembly (cont'd.)

14. With the adjusting screw lock nut assembled near the top of the adjusting screw, apply a small quantity of lubricant to the spherical end of the adjusting screw and also lubricate the threads. Thread the adjusting screw into the bonnet until it contacts the spring washer.

15. When compressing the spring, hold the spindle with Vise-Grip® pliers to prevent the spindle from turning in the disc holder. Turn the adjusting screw clockwise until the original distance between the end of the spindle and the top the adjusting screw is obtained. This method of compressing the spring will approximately re-establish the original set pressure. This is approximate - the valve must be reset for the required pressure.

16. Restore the adjusting ring to its original position with reference to the disc holder as recorded, and replace the adjusting ring pin using a new gasket. If the original position of the ring is not known, position the ring in accordance with Table 2.

Be sure the ring pin enters the notch in the ring but does not bind the ring. The ring should feel free after the pin has been installed. If necessary, cut the pin to the needed length or replace the pin (see Fig. 10).

17. The valve is now ready for setting and testing.

Checking Lift on D and E Valves

It is important to check the length of the lift restricting washer on all D and E "restricted lift" valves after servicing or replacement of parts. This is necessary to ensure the reliability of the nameplate capacity.

Notes:

A. The limit washer must be chamfered to clear disc holder fillet radius.

B. For bellows valves, the limit washer must also be chamfered on the lower O.D. as shown in Fig. 19.

C. Do not interchange internal parts or use a different base after parts have been custom fitted.

Use the following procedure to determine the correct limit washer length:

1. Use care to avoid seat damage. Assemble disc holder ring and disc holder by inserting the holder retainer ring, beveled side upward, in the groove using the proper inside snap ring pliers (see Fig. 22). Screw the bellows, if present, onto the disc holder using a new gasket.

2. Tilt the above assembly and slide the limit washer along the disc holder until it rests on the shoulder of the disc holder. Be sure the chamfered edge of the limit washer is down against the shoulder.

3. Install the guide before placing the spindle assembly into the disc holder assembly.

4. Install the guide gasket. Insert the assembly from Step 3 into the base.

5. Install bonnet gasket and bonnet, leaving out the spring assembly at this time.

6. Tighten nuts to compress gasket . Do not use impact wrench on bellows valves.

7. Place dial lift indicator on bonnet and over spindle, then zero indicator.

8. By inserting a wood dowel through the nozzle, push the disc up as far as it will go and measure the lift. Do not lift the spindle as this will result in a false reading.

9. Subtract the required lift of the valve from the measured lift to find the required limit washer length.

Note: The required lift is

- for a D orifice .086" (+.005 - .000)

- for an E orifice .139" (+.005 - .000)

10. Machine the limit washer to the required length. Chamfer the inside lower edge, deburr and polish as required.

11. Disassemble the valve, install the limit washer (with chamfer down), and reassemble valve as before. Measure the actual lift of the valve and compare it with the required lift of the valve as noted in Step 9.

12. a) If the actual lift is less than required, machine the lift washer the additional amount to obtain the required lift. (Machine chamfer and deburr before installation into valve.)

b) If the actual lift is greater than the required amount, obtain new limit washer and begin again with Step 9. (Machine chamfer and deburr before installation into valve.)

13. Disassemble valve and continue with next step of Reassembly on page 16.

X. Setting and Testing

Read and follow Safety Precautions on Page 6. For Valve Terminology see page 9.

Gauges used in valve setting must be kept calibrated in accordance with applicable codes and standards.

Test Medium

Steam Internals valves shall be tested on saturated steam as required by the ASME Code. The test medium must be clean. Before mounting the valve on the test stand, remove all dirt, etc. from the test receiver nozzle (valve inlet piping).

Set Pressure (Opening Pressure)

Set Pressure is dependent on spring tension which is controlled by an adjusting screw located on top of the valve. For accurate valve setting, pressure increases must be a slow but uniform rate, but rapid enough to cause the valve to open.

Setting and Testing (cont'd.)

Set Pressure Tolerance per ASME Codes

ASME Code Section I	
Set Pressure	**Tolerance**
15 to 70 psig	± 2 psig
71 to 300 psig	±3%
301 to 1000 psig	± 10 psig
Over 1000 psig	± 1%

ASME Code Section VIII	
Set Pressure	**Tolerance**
0 to 70 psig	± 2 psig
Over 70 psig	± 3%

A. Setting the Valve

Hold the spindle with Vise-Grip® pliers and set the valve to the required set pressure by turning the adjusting screw clockwise to increase the set pressure - counter-clockwise to decrease the set pressure - then lock the adjusting screw lock nut using two wrenches. Use one wrench to hold the adjusting screw from moving while using the other wrench to tighten the lock nut.

Open the valve only sufficient number of times to ensure that the valve opens three times in succession at the desired set pressure.

Simmer - If simmer causes erratic valve opening, refer to Table I, "Troubleshooting Guide".

B. Back Pressure Compensation

When testing with steam, no temperature compensation is required.

Conventional Valves - required to open against constant back pressure. The back pressure must be subtracted from the required set pressure to determine the test stand set pressure.

Bellows Valve - all Steam Internals bellows are balanced by design; therefore, they require no back pressure correction.

C. Blowdown (Reclosing Pressure)

The Steam Internals pressure relief valves are blowdown adjustable by design, but do not attempt to adjust blowdown on the stand so the test stand capacity may not be large enough to permit doing so.

Be sure to lower the working pressure before making any ring adjustment. This allows the spring force to keep the valve closed otherwise the valve may pop during adjustment.

If the cap has a sealing plug, then use the gag supplied fingertight to prevent "popping" during ring adjustment.

The adjusting ring may be moved to improve action during testing as the valve must operate smoothly without hang-up, and it must reclose. In general, raising the ring increases blowdown, and lowering the ring reduces blowdown.

To adjust blowdown:

1. Remove ring pin and gasket
2. Insert a small shank screwdriver through the ring pin hole and engage a slot in the ring (see Fig. 10).
3. To increase blowdown (lower reseating pressure), the adjusting ring must be raised by moving the notches counter-clockwise.
4. To decrease blowdown (raise reseating pressure), the adjusting ring must be lowered by moving the notches clockwise.

After testing, place the ring in its original position or if unknown, use Table 2 to relocate it. Be sure to remove the gag (if used) and replace the sealing plug and gasket after ring adjustment.

Section I valves, if possible, should have their blowdown adjusted on the installation. If the original setting is unknown, then use Table 2 on page 22 as a guide. Further adjustment may be necessary.

For Section VIII valves, set the ring in the original position or if unknown, use Table 2.

D. Seat Leakage

Seat Leakage is the escape of fluid with no valve lift.

Steam

Follow Safety Precautions on Page 6.

Test seat leakage at 90% of the set pressure or 5 psig, whichever is greater. The ASME Codes require that valves must be tight at operating pressures. After valve has been set at the required pressure and has reseated, yet before it reaches operating pressure, seat should be tested for leakage after the valve interior has dried. If there is no visual or audible leakage, then pass a polished metal rod (temp. of rod not to exceed 100˚F or 38˚C) slowly around the valve outlet and observe if moisture forms on the rod. If the rod remains dry, the valve is acceptable. If leakage is observed, the valve must be reworked.

E. Recommended Back Pressure Testing for Joint Leakage

After the valve has been set for the correct opening pressure, valves with closed bonnets and caps are recommended to be back pressure tested. Testing can be conducted by installing cap with gasket and applying air or nitrogen to the base drain connection or to the valve outlet. All other openings must be sealed.

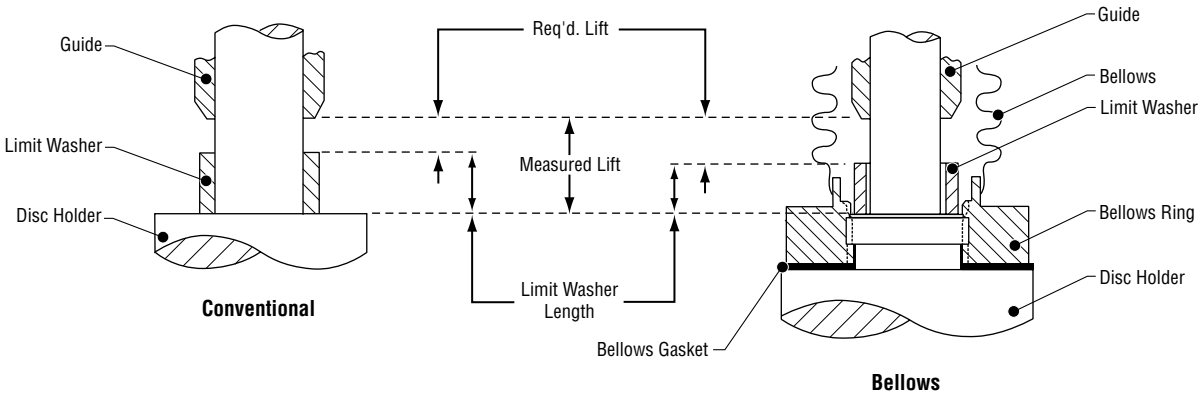


Figure 20

Setting and Testing (cont'd.)

Test pressure should be at least 10% of the valve set pressure or 30 psi, whichever is greater. Air nitrogen pressure would be held for 3 minutes before applying leak detector solution to all connections (joints).

On bellows valves, also install a clean pipe plug in the bonnet vent connection until it's just short of finger tight. The purpose is to obtain the smallest possible leak.

Examine the following for leakage during back pressure testing:

1. nozzle/base joint
2. adjusting ring pin seal
3. base/bonnet joint
4. bonnet/cap joint
5. If conventional valve, examine the "tight" bonnet vent plug.
6. If bellows valve, examine the "loose" bonnet vent plug.

Leakage is best detected by application of a commercial liquid leak detector, i.e. Snoop®. Use of soap or household detergent as a leak detector is not recommended as it may bridge small leaks.

Repair of leaking valve joints may be attempted by tightening the leaking joint while the valve is still on the stand. If this does not stop the leak, tear down and inspect the leaking joint(s), both metal surface and gasket.

If the valve internals have been disturbed, it is necessary to retest to this manual, otherwise repeat the back pressure tests as outlined above.

XI. Cap and Weather Shield Options

Steam Internals caps are supplied in accordance with customer order and/or the ASME Code. All caps for the same size valve are interchangeable and are available with or without gag.

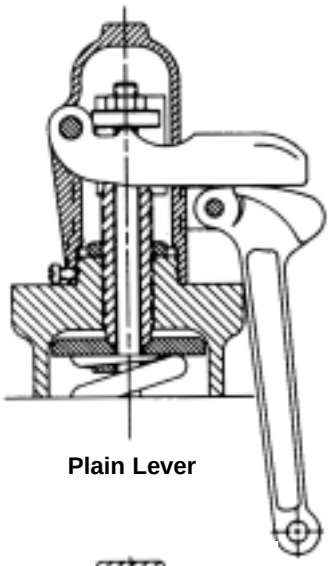
Manual Popping - on steam application after the valve has been in use, it may be necessary when permitted:

- to lift the disc from the valve seat periodically during operations to ensure that the disc is not frozen, etc. as a result of corrosion/boiler water deposits. Operating pressure under the disc should be approximately 75% of the set pressure when lifting in accordance with the ASME Code; otherwise, the lever assembly including spindle may be damaged.

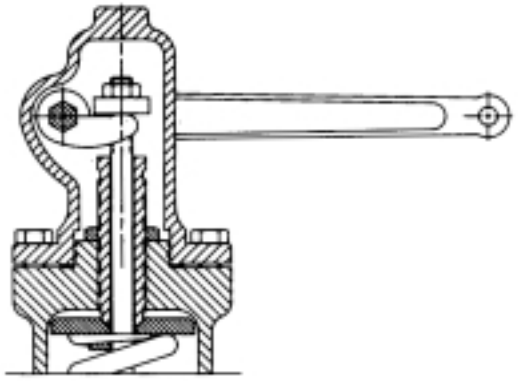
- to dislodge foreign particles which sometimes become trapped on the seating surface as the valve recloses. Prompt lifting of the lever, using system fluid pressure to clean the seat, should correct an otherwise leaking valve and save maintenance costs at a later date.

Refer to page 20 for more information.

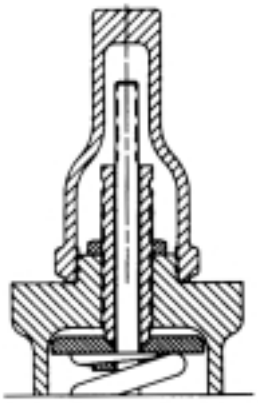
Cap and Weather Shield Options (cont'd.)



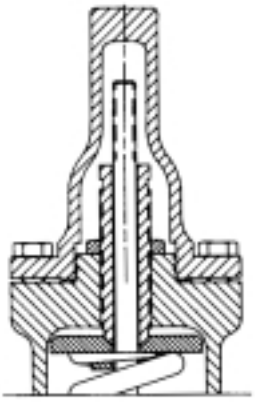
Plain Lever



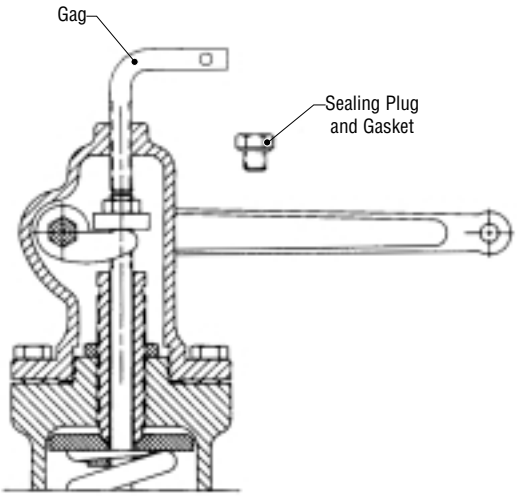
Packed Lever



Screwed Cap



Bolted Cap



Packed Lever with Gag

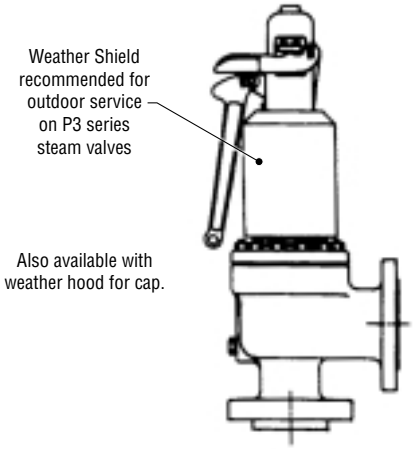


Figure 21

Cap and Weather Shield Options

XII. System Hydrostatic Testing

If the hydro pressure approaches set pressure, a test gag must be used to keep the valve closed. Apply gag finger-tight. DO NOT WRENCH TIGHTEN. Over gagging may bend the spindle and damage the disc thermo lip. After hydrostatic testing the gag *must* be removed and replaced by the sealing plug (gag replacement plug) furnished for this purpose. Test gags and sealing plugs are available from Dresser.

For hydro pressure exceeding 1.5 times the set pressure stamped on the name plate, Dresser recommends that the valve be removed and a blind flange be installed to avoid internal damage to the valve.

When a P3 series valve, yoke or open bonnet is used for outdoor service, Dresser recommends that a Weather Shield be used to protect against ice build-up and to help stabilize the spring temperature.

XIII. Troubleshooting Guide for Safety Relief Valves

Table I

Problem	Specific	Probable Cause	Corrective Action
Opening	*Simmer*	• Operating pressure to close to set pressure • Adjusting ring too low	• Increase differential • Raise ring
	Chatter	Flow starved • inlet pressure drop too large • built up back pressure • valve too large	 • See Fig. 5 • Check discharge piping • Check piping system
	Erratic Set	• Mechanical bind • Temperatures differential • Fatigued spring	• Check valve piping • Stabilize valve temperature • Replace Spring
Closing	*Long Blowdown*	• Adjusting ring too high • Hang-up	• Lower ring • See “Closing/Hang-up”
	Hang-up (does not fully close)	• Adjusting Ring too high • Pipe Loads • Misalignment of Parts • Mechanical binding • Corrosion	• Lower ring • See Fig. 5 • See Fig. 5, be sure valve is vertical and properly reassembled • Improper valve assembly • Improper material selection
Seat Leakage	*Simmer*	• See “Opening”	• See “Opening”
	Leakage	• Vibration • Piping loads •Operating pressure too close to set pressure •Solids trapped on seat • Mechanical binding • Improper assembly • Valve oversized	• Check piping system • See Fig. 5 • Increase differential • Lift lifting lever if equipped or inspect for seat damage • See “Closing/Hang-up” • Remove valve and inspect parts • Recheck piping system

Note: For Valve Terminology see pp. 8-9.

XIV. Adjusting Ring Settings

Table 2

Adjusting Ring Settings for Steam Service*
Metal-to-Metal Seats for Steam Internals

Adjusting Ring No. 1			Valve Orifice	Adjusting Ring No. 2		
Set Pressure 100 psig and below**	Set Pressure above 100 psig**	Total Notches		Total Notches	Set Pressure 100 psig and below**	Set Pressure above 100 psig**
2 notches	6 notches	24	D, E, F	24	2 notches	6 notches
2 notches	6 notches	30	G	30	2 notches	6 notches
1 notch	5 notches	24	H	30	2 notches	6 notches
2 notches	8 notches	30	J	30	2 notches	8 notches
8 notches	19 notches	32	K	32	8 notches	19 notches
10 notches	31 notches	40	L	40	10 notches	31 notches
9 notches	27 notches	36	M	40	10 notches	30 notches
10 notches	30 notches	40	N	40	10 notches	30 notches
15 notches	44 notches	42	P	40	14 notches	42 notches
17 notches	47 notches	48	Q	48	17 notches	47 notches
28 notches	36 notches	32	R	48	42 notches	64 notches
30 notches	38 notches	24	T	48	60 notches	76 notches

** To identify which ring, count number of notches on the ring and compare to total notches columns.*
*** Notches below disc holder*

XV. Maintenance Tools and Supplies

Lubricants - use on all metal-to-metal bearing surfaces, gasket surfaces, and all threaded parts for ease of maintenance. Nickel-Ease, a specialty lubricant, is available from Fel-Pro, Inc., Box C1103, Skokie, Illinois 60076.

Surface Finish Comparator - a pen type surface finish comparator is available from Miniature Precision Components, Inc.,100 Wisconsin St., Walworth, Wisconsin 53184.

The following special tools are required:

A. Pin Spanner Wrenches

For removal of Bellows from Disc Holder

Valve Orifice	Pin Spanner Wrench	Part No.
D thru G	3/4” radius - 7/32” Pin	4451801
H	7/8” radius - 15/64” Pin	4451802
J	1-1/8” radius - 17/64”Pin	4451803
K	1-1/4” radius - 9/32” Pin	4451804
L	1-3/8” radius - 19/64” Pin	4451805
M	1-5/8” radius - 21/64” Pin	4451806
N and P	1-7/8” radius - 23/64” Pin	4451807
Q	2-1/2” radius - 7/16” Pin	4451808
R	3” radius - 1/2” Pin	4451809
T	3-3/4” radius - 1/2” Pin	4451810

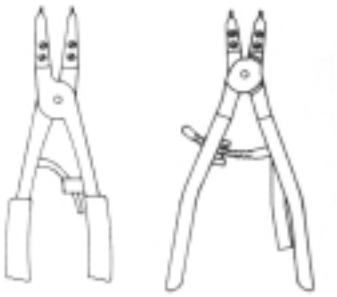
B. Inside Snap Ring Pliers

For removal of Holder Ring Retainer

Truarc® Pliers

Orifice	Model No.	Tip No.
D thru H	0700	0700-09
J and K	0700	0704-10
L and N	0700	0704-12
P and Q	0900	0900-12
R and T	1100	1100-15

Available from Waldes Kohinoor, Inc.
Long Island City, New York 11101



No. 0700 No. 0900 No. 1100

Figure 22

C. Lap Rings

For reconditioning nozzles and Thermodisc™ discs

Orifice	Inch	mm	Part No.
D thru J	1 3/4	4.5	1672805
K & L	2 5/8	66.7	1672807
M and N	3 13/16	96.8	1672808
P	4 3/16	106.4	167210
Q and R	5 1/2	139.7	167212
T	7	177.8	167213

D. Lap Plate

Part No. 0439002, for reconditioning all Lap Rings used for these valves.

E. Lapping Compounds

Brand	Grade	Grit	Lapping Function	Size Container	Part No.
Clover	1A	320	General	4 oz.	199-3
Clover	3A	500	Finishing	4 oz.	199-4
Kwik-Ak-Shun	-	1000	Polishing	1 lb. 2 oz.	199-11 199-12

XVI. Replacement Parts

A. Service Parts Inventory Planning

The basic objectives in formulating a service parts inventory philosophy is to provide prompt valve service capability, thus preventing maintenance outage time extensions. To accomplish this, it is necessary to have immediate availability of the proper inventory of service parts for optimum valve quantities. This can be achieved at a minimum of cost by defining the inventory on a frequency of need basis.

To assist towards this objective, Dresser recommends that the following guidelines be utilized to establish meaningful inventory levels.

1. Identify the total number of valves in service by size, type number, temperature class, and serial number.

2. Identify the frequency of replacement tendency of specific parts.

Class I - parts most frequently replaced

Class II - parts less frequently replaced, but critical in the event of an emergency requirement.

Class III - parts seldom replaced

Class IV - hardware (e.g. nuts, bolts, pins, cap components, etc.)

Class V - parts practically never requiring replacement

3. “Need probability coverage” is defined as the probable percent (%) of total, uninterrupted operational time which can be expected by stocking predetermined valve component classifications.

Determine “need probability coverage” which is compatible with a specific company’s operational objectives and service parts inventory investment philosophy. Then relate “need probability coverage” to parts classifications which will satisfy that need. Guidelines are as follows:

Parts Classification	Need Probability Coverage
Class I	70%
Class I and II	85%
Class I, II and III	95%
Class I, II, III and IV	99%

4. Consult recommended spare parts list by valve type to determine quantity of parts for valves to be covered by the inventory plan.

5. Select parts and specify quantities.

B. Ordering Essentials

When ordering replacement parts, the order should state:

1. Part name
2. Part number (if known)
3. Quantity
4. Valve size
5. Valve type number
6. Valve serial number
7. When ordering spring assemblies, also state valve set pressure and temperature.

Example of valve identification:

Type number: 3” 1910-30K/P2
Serial number: TD 07961

The correct part names can be obtained from Fig. 1 thru 4. Other information may be obtained from the name plate (see Fig. 23 and 24). If the nameplate has been lost or defaced, the serial number and valve type number can be found stamped into the edge of the outlet flange.

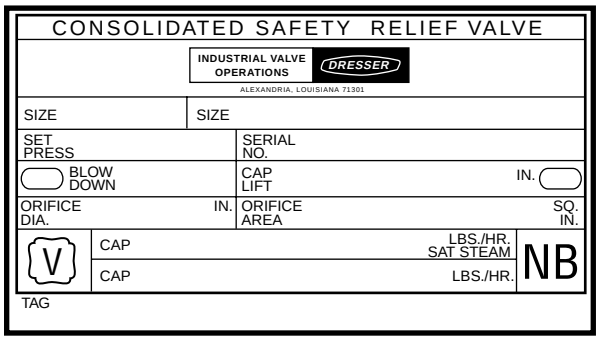


Figure 23
ASME Code Section I nameplate

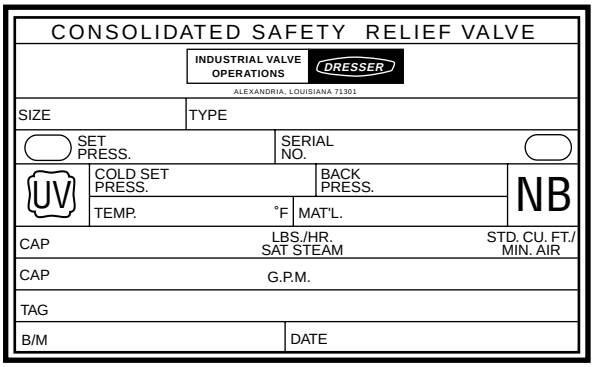


Figure 24
ASME Code Section VIII nameplate

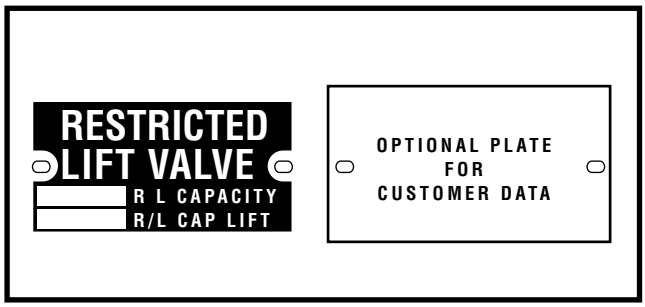


Figure 25

Your safety is our business!

Dresser Flow Control has authorized no company nor individual to manufacture replacement parts for our valve products.

When ordering replacement parts, please specify in your purchase order: "All parts must be documented as new and sourced from Dresser Flow Control".

Be sure! Be sure!

Replacement Parts (cont'd.)

C. Recommended Spare Parts

Steam Internal Design - Safety Relief Valves

1900 Conventional / P1, P2, & P3 • 1900-30 Bellows / P1 & P2

Class	Part Name	Interchangeability P1, P2, P3	C - Conventional B - Bellows	Qty. Parts/Same Valves in Service	Need Probability Coverage
Class I	Thermodisc™	P1, P2, P3	C & B	1/3	70%
	Nozzle	P1, P2, P3	C & B	1/10	
	Bellows	P1, P2	B	1/3	
	Adjusting Ring Pin	P1, P2, P3	C & B	1/3	
	Disc Holder Ring	P1, P2, P3	C & B	1/1	
	Disc Holder Retainer Ring	P1, P2, P3	C & B	1/5	
	Spindle Retainer	P1, P2	B	1/1	
	Gasket (Set)	-	-		
	(1) Cap Gasket	P1, P2	C & B	1/1	
	(1) Bonnet Gasket	P1, P2	C & B	1/1	
	(1) Guide Gasket	P1, P2, P3	C & B	1/1	
	(1) Adj. Ring Pin Gasket	P1, P2, P3	C & B	1/1	
	(1) Bellows Gasket	P1, P2	B	1/1	
Class II	Disc Holder	P1, P2, P3	C & B	1/6	85%
	Spindle	P1, P2, P3	C & B	1/6	
	Guide	P1, P2, P3	C & B	1/6	
	Studs, Base	P1, P2, P3	C & B	1 set/6	
	Nuts, Base Stud	P1, P2, P3	C & B	1 set/6	
Class III	Adjusting Ring	P1, P2, P3	C & B	1/10	95%
	Spring Assembly	-	-	-	
	(1) Spring *	P1, P2, P3	C & B	1/10	
	(1) Spring Washer (U)	P1, P2, P3	C & B	1/10	
	(1) Spring Washer (L)	P1, P2, P3	C & B	1/10	
	Adjusting Screw	P1, P2, P3	C & B	1/10	
Class IV	Adjusting Screw Lock Nut	P1, P2, P3	C & B	1/10	99%
	Cap (Select One):	-	-	-	
	Packet Lever Assembly	P1, P2	C & B	1/10	
	(1) Cap Assembly				
	(1) Release Nut				
	(1) Release Lock Nut				
	Plain Lever Assembly	P1, P2, P3	C & B	1/10	
	(1) Cap Assembly				
	(1) Release Nut				
	(1) Release Lock Nut				
	Limit Washer **	P1, P2, P3	C & B	1/10	

**If set pressure change is required, consult Dresser for the spring number.*

***Used only in the D & E orifices, machine per instructions on Page 13.*

XVII. Repair Department

Factory Repair Facilities

If downtime permits, it may be desirable to return the valves to the factory for repair or modernizing. The factory at Alexandria, Louisiana maintains a complete Consolidated® repair center. In addition to factory production parts stock, the repair center maintains its own service parts stock room. Most important, this enables return shipment of repaired valves within forty-eight hours after receipt of customer purchase order.

Contact: Repair Department
Product Repair Representative
(318) 640-6059
(318) 640-2250, Ext. 6059

Service Warranty

Factory repaired valves carry a warranty which covers workmanship and new parts installed during repair. This warranty is in effect for a period of one year from date of repair completion.

Dresser Product Repair by Unauthorized Sources

DFC has authorized no outside repair companies, contractors, nor individuals to perform warranty repair service on new products, field or factory repaired products of its manufacture. Therefore, customers contracting such repair services from unauthorized sources must do so at their own risk. Likewise, if any DFC product fails to perform within the scope of its design, we must be notified and given the opportunity to inspect and correct the product. We will accept no backcharges for unauthorized repair sources performing corrective repairs on our products.

XVIII. Safety Valve Maintenance Training

Rising costs of maintenance and repair in the utility and process industries indicate the need for trained maintenance personnel. Dresser Flow Control conducts service seminars that can help your maintenance and engineering personnel to reduce these costs.

Seminars, conducted either at your site or at our Alexandria, Louisiana manufacturing plant, provide participants with an introduction to the basics of preventative maintenance necessary to minimize downtime, reduce unplanned repairs and increase valve safety. While these seminars do not make “instant” experts, they do provide the participants with “hands-on” experience with Consolidated Valves. The seminar also includes valve terminology and nomenclature, component inspection, troubleshooting, and setting and testing with emphasis on the ASME Boiler and Pressure Vessel Code.

For further information, please contact the Product Training Manager by fax at (318) 640-6041, or by telephone at (318) 640-6054.

The Dresser Field Service Organization is unequaled

For prompt field service, please call Dresser Flow Control Service Department
in Alexandria, Louisiana • Normal working hours: (318) 640-6055
After hours, weekends, and holidays: (318) 640-2250

Service Department

Location of Service Engineers

THE DRESSER FIELD SERVICE ORGANIZATION IS UNEQUALED

For prompt field service, please call DresserFlow Control Service Department, Alexandria, Louisiana. • Normal Working Hours – (318) 640-6055
After Hours, Weekends, Holidays – (318) 640-2250

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