



**CROSBY** STYLE JQ 4 IN. PRESSURE RELIEF VALVE  
 INSTALLATION AND MAINTENANCE INSTRUCTIONS

Before installation, these instructions must be carefully read and understood.



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### 1 PRODUCT SAFETY SIGN AND LABEL SYSTEM

The following signal words and meanings are intended to explain the levels of risk associated with this product.

- **⚠ DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **⚠ WARNING** indicates a hazardous situation or unsafe practice which could result in death or serious injury.
- **⚠ CAUTION** used with the safety alert symbol, indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
- **⚠ ATTENTION** — Hazards or unsafe practices which COULD result in product or property damage.

#### Safety First

#### ⚠ WARNING

**Read and understand all instructions.** Failure to follow all instructions listed below, may result in system overpressure and/or serious personal injury or death.

To reduce the risk during installation:

- Comply with all information on the product, in this manual and in any local and national codes that apply to this product.
- Do not allow untrained personnel to work with this product.
- Use Emerson parts and work procedures specified in this manual.

#### Safety Precautions

Proper handling, storage, installation, maintenance and operation are essential to the safe and reliable functioning of any pressure relief product.

- Never subject valves to sharp impact loads. Rough handling (striking, bumping, dropping, etc.) may alter the pressure setting, deform valve parts and affect seat tightness and valve performance adversely. Striking a valve which is under pressure can cause premature actuation.
- When moving a valve, never use the lifting lever to lift the valve.
- Always lower the system pressure to the pressure level specified in the instruction before making any adjustment to the valve.
- Ear and eye protection should be used when working on a valve which has pressure.
- Wear safety gloves and accident prevention safety shoes when working with heavy components and component with sharp edges.
- Never stand in front of the discharge outlet of a pressure relief valve which is under pressure.
- Always stand to the side of and at a safe distance from the valve discharge and use extreme care when observing a valve for leakage.

The above precautions and suggestions are by no means exhaustive, and the user should always approach and use any pressure relief valve with great care. Emerson cannot be expected to know, evaluate, and advise customers of all the possible applications and

operating conditions for its products or of the possible hazardous consequences which may result from the misapplication or misuse of such products. Consequently, the improper handling, storage, installation, use or maintenance of any Emerson product by a non-Emerson employee may void any Emerson guarantees or warranties with respect to such product.

All personnel working with Emerson products should be trained adequately and thoroughly familiar with the contents of the appropriate instruction manual(s).

Operation, Installation and Safety Instructions are available at [Emerson.com/Final Control](http://Emerson.com/Final Control) or from your local Emerson regional sales office or representative. Any installation, maintenance, adjustment, repair, and testing performed on pressure relief valves should be done in accordance with the requirements of all applicable codes and standards under which those performing such work should maintain proper authorization through appropriate governing authorities. No repair, assembly and test work done by other than Emerson shall be covered by the warranty extended by Emerson to its customers. The user assumes full responsibility of work. In maintaining and repairing Emerson products the user should use only parts manufactured by Emerson. Call your nearest Emerson regional sales office or representative for a service engineer should you wish assistance with your field needs. Suitability of the material and product for the use contemplated by the buyer is the sole responsibility of the buyer. Also, storage, installation and proper use and application are the sole responsibility of the purchaser. Emerson disclaims any, and all liability arising out of the same.

# CROSBY STYLE JQ 4 IN. PRESSURE RELIEF VALVE

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### 2 INTRODUCTION

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#### 2.1 Purpose

The purpose of this manual is to provide a complete source of information and recommended instructions on the Style JQ Safety Valve.

#### 2.2 Scope

This manual provides a detailed physical and functional description of the Style JQ Safety Valve. Information is presented to enable properly trained personnel to inspect, test, maintain, disassemble, repair and reassemble the safety valve.

#### 2.3 Definitions

In this manual, the following meanings apply unless otherwise noted:

Abbreviation	Definition
cfm	cubic feet per minute (air)
CFR	Code of Federal Regulations
chlorine	dry chlorine (either gas or liquid)
DOL	U.S. Department of Labor
DOT	U.S. Department of Transportation
EPA	Environmental Protection Agency
OSHA	Occupational Safety and Health Administration (DOL)
psig	pounds per square inch gauge
psia	pounds per square inch absolute
Viton®	a registered trademark of E.I. du Pont de Nemours and Co.
TC	Transport Canada
USCG	United States Coast Guard

**The numbers in parentheses throughout this manual refer to items on Emerson Drawings, Tables 6.1 and 6.2 of this manual, or Institute Drawings 127, 128 and 132. Part numbers cited are those of Emerson. Shop numbers are Emerson identification numbers for complete valve assemblies.**

#### 2.4 Disclaimer

The user should be aware that changing technology or regulations may require a change in the recommendations herein. Appropriate steps should be taken to insure that the information is current when used. These recommendations should not be confused with federal, state, provincial, municipal or insurance requirements or with national safety codes.

#### 2.5 Approvals

##### 2.5.1 Valves

The USCG has approved various drawings of the Style JQ 4 in. valves for chlorine barges dating back to 1956. The most recent approval (June 16, 2023) was under Certificate No. 162.018/35/0.

The Style JQ 4 in. valves modified to meet ASME requirements have application in chlorine stationary storage service. They are available in both metal-to-metal and elastomeric seat seal designs.

#### 2.6 Revisions

Suggestions for revision should be directed to Emerson.

#### 2.7 Reproduction

The contents of this manual are not to be copied for publication, in whole or in part, without Institute permission.

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## INSTALLATION AND MAINTENANCE INSTRUCTIONS

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### 3 GENERAL INFORMATION

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#### 3.1 Functional Description

##### 3.1.1 Combination Pressure Relief Device

The Style JQ 4 in. Safety Valve is a hermetically sealed combination pressure relief device consisting of a breaking pin assembly in series with a conventional spring-loaded valve. The breaking pin assembly is installed as a complete unit into the base of the safety valve proper. The breaking pin assembly forms the gasket face for the flanged connection to the manway cover or an adaptor flange for connection to piping.

##### 3.1.2 Safety Valve Proper

The safety valve itself is a direct spring-loaded pressure relief valve with a metal-to-metal seat or elastomeric seat seals. During an over pressure event, the breaking pin and both diaphragms will fail and the valve will open fully, discharging chlorine until the pressure in the tank is reduced to a safe working level. At that time, the valve is designed to reseal and function as a pressure relief valve. Following an event, the device must be removed and reworked according to the procedures outlined in this manual.

##### 3.1.3 Breaking Pin Assembly

The Breaking Pin Housing (35) is protected by the Lower Diaphragm (37) which is supported by the Plunger Assembly (32), Yoke (30) and Breaking Pin (31). The pressure load on the Lower Diaphragm (37) is transmitted through the Plunger Assembly (32), to the Yoke (30) and thus to the Breaking Pin (31). The Breaking Pin (31) is a tensile loaded member designed to break at a predetermined pressure (either 300 psig or 375 psig) on a test stand at atmospheric pressure. The Breaking Pin (31) is held in place by two U-shaped Clips (34).

A positive seal is obtained between the Lower Diaphragm (30) and the Breaking Pin Housing (35) by creating a compressive load with the Spanner Nut (33) and its Follower (36).

#### 3.2 Valve Performance Data

##### 3.2.1 Style JQ 4 in. 300 Valve

- Capacity at 10% over pressure (330 psig): 15,242 cfm of free air (60°F, 14.7 psia)
- Breaking pressure of breaking pin: 300 psig ± 15 psig
- Start-to-discharge (set) pressure of safety valve proper: 300 psig ± 9 psig
- Vaportight pressure: 240 psig minimum

##### 3.2.2 Style JQ 4 in. 375 Valve

- Capacity at 10% overpressure (412.5 psig): 18,890 cfm of free air (60°F, 14.7 psia)
- Breaking pressure of breaking pin: 375 psig ± 15 psig
- Start-to-discharge (set) pressure of safety valve proper: 360 psig ± 10.8 psig
- Vaportight pressure: 300 psig minimum

#### 3.3 Identification and Records

It is suggested that owners who desire identification stamp their initials on the Base (17) of each valve and also on the side or bottom surface of the hexagon nut of the Housing (35). The Data Plate (20) on the valve should include:

- the name or identifying mark of the manufacturer
- manufacturer's design or type number
- set pressure, psi (or psi and kPa)
- official flow capacity, cfm air at standard conditions
- flow rating pressure, psi
- month and year of manufacture or test
- USCG Approval No. 162.018/35/0 on Style JQ 4 in. 300 valves for barge service

Records should be kept of all tests until the next retest. Refer to Section 5 for DOT regulations.

#### 3.4 Alterations

##### WARNING

*No alterations to these valves for chlorine barge service may be made beyond what is allowed in this manual without the consent of Emerson and the USCG for the Style JQ 4 in. 300.*

### 4 INSTALLATION

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#### 4.1 Care in Handling

Pressure relief valves must be handled carefully and never subjected to sharp impact loads. They should not be struck, bumped or dropped. Rough handling may alter the pressure setting, deform valve parts and affect valve performance adversely. When it is necessary to use a hoist, the chain or sling should be placed around the valve body in a manner that will ensure that the valve is in a vertical position to facilitate installation. The valve should never be lifted or handled using the lifting lever inlet and outlet protectors should remain in place until the valve is ready to be installed on the system.

#### 4.2 Inspection

Pressure relief valves should be inspected visually before they are installed to ensure that no damage has occurred during shipment or while in storage. All protective material, sealing plugs and any extraneous material inside the valve body or nozzle must be removed. The valve nameplate and other identifying tags should be checked to ensure that the particular valve is being installed at the location for which it was intended. The valve seals protecting the spring setting should be intact. If seals are not intact, the valve should be inspected, tested and seals installed properly before use.

#### 4.3 Inlet Piping

Pressure relief valves should be mounted vertically in an upright position. Installing a pressure relief valve in other than this recommended position might affect its operation adversely. A valve should never be installed on a fitting having a smaller inside diameter than the inlet connection of the valve. Inlet piping must be designed to withstand the total resultant forces due to the valve discharging at the maximum accumulated pressure and the expected piping loads. The magnitudes of the bending moment exerted on the inlet piping will depend on the configuration. Many valves are damaged when first placed in service because of failure to clean the connections properly when installed. Both the valve inlet and the vessel and/or line on which the valve is mounted must be cleaned thoroughly of all foreign material. The inlet connection bolts or studs should be drawn down evenly to avoid straining the valve body with possible distortion of the base.

### 5 PERTINENT REGULATIONS

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#### 5.1 DOT Regulations

When the Style JQ 4 in. 300 Safety Valve is used on chlorine barges in the U.S., the regulations of the USCG-DOT should be consulted. The concerned reader should see Section (13.2).

#### 5.2 TC Regulations

Regulations similar to those in the U.S. are promulgated by the Canadian Coast Guard of the TC. There are some differences and the concerned reader should consult the appropriate TC regulations (13.3).

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### 6 PARTS, TOOLS AND SUPPLIES

The safety valve is manufactured by Emerson consists of Safety Valve Proper and Breaking Pin Assembly. Tables 6.1.A and 6.1.B indicate standard materials of construction. Alternate materials may be available; contact Emerson.

#### 6.1 Safety Valve Proper

Refer to Table 6.1.A for the safety valve proper. All parts are interchangeable within a shop assembly number regardless of the year of manufacture.

##### 6.1.1 The Cap (1) and Upper Diaphragm (2)

The Cap (1) seals the Upper Diaphragm (2) to the Casing (8). The Upper Diaphragm (2) protects the upper portion of the valve from external contamination. The data plate is attached to the Casing (8). Be sure to use the data plate with the correct set pressure and shop number (3.3).

##### 6.1.2 Spring (5)

There are two different springs. Be sure to assemble the valve with the correct Spring (5). Refer to Emerson Spring Selector Procedure SS-5703.

#### Crosby Standard Corrosion Resistant Coating

**Spring** is the standard spring for the 300 psig valve (stamped X00367).

**Yellow Spring** is the standard spring for the 375 psig valve (stamped 704).

##### 6.1.3 Disc Bushing (10A) and Disc (10B)

The Disc Bushing (10A) and Disc (10B) are furnished as a subassembly. To change out the metallic seat valve for elastomeric seat design, refer to Section 12.2.

##### 6.1.4 Spiral Pin (10C)

A Spiral Pin (10C) is used only in the elastomeric seat valve.

##### 6.1.5 Collar (10D)

A Collar (10D) is used in the elastomeric seat valve.

##### 6.1.6 Nozzle (13)

The Nozzle (13) used in the metallic seat valve is designed for use with a Nozzle Gasket (14). The Nozzle Gasket (14) in early versions of the Style JQ 4 in. 300 valve was antimony lead. The current gasket material is compressed asbestos (Fed Spec HH-P46E). The Nozzle (13) used in the elastomeric seat valve is designed for use with the O-ring (10E) (Size 5-046, Viton® A material).

**TABLE 6.1 PARTS FOR STYLE JQ 4 IN. VALVE**

Description				
Breaking Pin Setting (PSI)	300	375	300	375
Spring Setting of Valve (PSI)	300	360	300	360
Seat Design	Metallic		Elastomeric	
Crosby JQ Valve Drawings	H-38572-F	H-38572-F	H-86008	H-86008

**TABLE 6.1.A SAFETY VALVE PROPER**

Shop Assembly No. (Emerson)							
Item	Description	Ref. No.	Material	Part No.			
1	Cap	6.1.1	Ductile iron	63690	63690	63690	63690
2	Upper diaphragm	6.1.1	3% Antimony lead	63691	63691	63691	63691
3	Adjusting bolt	- - - -	Monel®-cast	63692	63692	63692	63692
4	Lock nut	- - - -	Monel®-cast	63693	63693	63693	63693
5	Spring	6.1.2	Carbon steel (CAD, plated)	X00367C	71561	X00367C	71561
6A	Spindle	- - - -	Steel	SA38579	SA38579	SA38579	SA38579
6B	Spindle ball	- - - -	SST	17944	17944	17944	17944
7	Disc guide	- - - -	Cast steel	63695	63695	63695	63695
8	Casing	- - - -	6 in. Seamless steel pipe, schedule 40	63696	63696	63696	63696
9	Top spring washer	- - - -	Steel (CAD, plated)	63697	63697	63697	63697
10A	Disc	6.1.3	K-Monel® (Bushings - KR steel)	SA38588	SA38588	SA49877	SA49877
10B	Bushing	6.1.3	SST-440C	36333	36333	36333	36333
10C	Spiral pin	6.1.4	SST	- - - -	- - - -	75745	75745
10D	Collar	6.1.5	Monel®	- - - -	- - - -	82554	82554
10E	O-ring	- - - -	Viton®	- - - -	- - - -	75746	75746
11	Adjusting ring	- - - -	Monel®	63699	63699	63699	63699
12	Lock pin	- - - -	Monel®	66807	66807	66807	66807
13	Nozzle	6.1.6	K-monel	63701	63701	82566	82566
14	Nozzle O-ring, Nozzle Gasket	6.1.6	Viton®, asbestos (HH-46PE)	68754	68754	80482	80482
15	Base gasket	- - - -	3% Antimony lead	63703	63703	63703	63703
16	Safety mech. Gasket	- - - -	3 % Antimony lead	63704	63704	63704	63704
17	Base	- - - -	Cast steel	63705	63705	63705	63705
18	Lockscrew (2 required)	- - - -	Alloy steel	63706	63706	63706	63706
19	Bottom spring washer	- - - -	Steel	63707	63707	63707	63707
20	Nameplate	- - - -	Sheet brass	67130	71531	67130	71531
21	Locking strip	- - - -	SST	74926	74926	74926	74926
22	Seal and wire	6.1.1	Lead-SST	73906	73906	73906	73906

**TABLE 6.1.B BREAKING PIN ASSEMBLY**

Shop Assembly No. (Emerson)							
Item	Description	Ref. No.	Material	Part No.			
30	Yoke (assembly with 32 and 35)	6.2.1	Steel bar	67367	67367	67367	67367
31	Breaking pin alternate 1	6.2.2	ARMCO iron rod	67132	71562	67132	71562
31	Breaking pin alternate 2	6.2.2	American brass- bronze, no. 286*	84808	102227	84808	102227
32	Plunger with columns	- - - -	Steel	67368	67368	67368	67368
33	Spanner nut	- - - -	Monel®	67369	67369	67369	67369
34	Breaking pin clip (2 required)	- - - -	Piano wire	67370	67370	67370	67370
35	Housing (assembly with 30 and 32)	- - - -	Cast steel	67371	67371	67371	67371
36	Follower	- - - -	Monel®	67372	67372	67372	67372
37	Lower diaphragm	- - - -	3 % Antimony lead	67133	67133	67133	67133
38	Vacuum grill	- - - -	Monel®	67373	67373	67373	67373

Viton® is a mark owned by E.I. du Pont de Nemours and Co.

Monel® is a mark owned by Special Metals Corporation.

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### 6.2 Breaking Pin Assembly

Refer to Table 6.1.B for the breaking pin assembly. This assembly includes a Plunger Assembly (32) which backs up a Lower Diaphragm (37). The Plunger Assembly is held in position by a Breaking Pin (31) which is placed in tension when pressure in the tank acts against the lead diaphragm.

#### 6.2.1 Yoke (30), Plunger with Columns (32) and Breaking Pin Housing (35)

These items are factory assembled parts. All parts are interchangeable between the 300 lbs and the 375 lbs valves.

#### 6.2.2 Breaking Pin (31)

Breaking Pins (31) are manufactured with a 3/8 in. diameter. An unpainted breaking pin is used on the 300 psig valve. A yellow breaking pin is used on the 375 psig valve. The Breaking Pin has an accurately machined neck which at a temperature of 70°F (21.2°C) is designed to break at 300 psig ± 15 psig or at 375 psig ± 15 psig. The manufacture of breaking pins is a specialized and carefully controlled procedure. They are factory-tested by breaking one pin in each lot of fifteen to verify the accuracy of the manufacture.

#### 6.2.3 Lubrication

Only halogenated Fluorocarbon (FKM) lubricants identified as being completely inert in liquid and gaseous chlorine may be used.

### 6.3 Installation Parts

#### (Customer Supplied Parts)

##### 6.3.1 Studs

Studs must be in accordance with Drawing 102 (13.1.3).

##### 6.3.2 Gaskets

For information on gaskets used when mounting the valve to the vessel, refer to Pamphlet 95 (13.1.2) Gaskets for Chlorine Service, Edition 6, January 2021 can be purchased at following web address: <https://www.chlorineinstitute.org/products/pamphlet-95>

### 6.4 Tools and Test Equipment

All of the special tools or parts needed to test the Style JQ 4 in. valves are listed in Table 6.2.

### 6.5 Test Equipment

#### 6.5.1 Test Pressure Gauge

Pressure gauges must be recalibrated at least once every six months and have 600 psig range, 5 psig graduations and ± 1/2% or better accuracy. Other instruments with comparable readability and accuracy to the above may be used.

#### 6.5.2 Gas Pressure Control

##### ⚠ WARNING

Failure to follow these instructions can cause damage to the valve and potentially personal injury from an over pressure event.

To test the Breaking Pin (31), it is necessary to raise the pressure very slowly. A pressure regulator suitable for the cylinder pressures involved and equipped with a cylinder pressure gauge (usually 0 to 3000 psig) should be used. The regulator output should not be capable of supplying pressure in excess of 500 psig. The use of a small needle valve following the pressure reducing valve will improve the control of the test pressure.

#### 6.5.3 Gas Supply

A convenient supply of dry air or nitrogen in a cylinder can be used for testing the safety valve proper. Helium should be used to leak test the breaking pin assembly.

### 7.2 Safety Precautions

##### ⚠ CAUTION

Failure to follow these instructions can cause damage to the valve and potentially personal injury. Always wear proper PPE.

The following safety precautions are to supplement existing facility procedures and any specific precautions in this manual. These precautions must be understood and applied during disassembly, repair and testing of the safety valve.

- The working area must be properly vented when disassembling and cleaning the valve.
- Chlorine vapor may be trapped within the safety valve between the valve seats and the upper and lower diaphragms.
- Chlorinated residues could be present. Appropriate handling procedures should be developed.

### 7.3 Removal of Valve from Tank

##### ⚠ WARNING

Tank pressure must be released before removing the valve from the container. Failure to do so could result in personal injury.

Take proper precautions when removing the valve from the tank. Remove the valve gasket from the manway cover, being careful not to score the groove. Inspect the groove and arrange for any necessary maintenance. Protect the safety valve housing within the breaking pin assembly when removed from the tank and during transportation to the maintenance area.

### 7.4 Visual Inspection

A visual inspection of the safety valve should be made after the valve is removed from the tank and prior to disassembly. Note the general appearance of the valve:

- Note any indication of corrosion.
- Inspect the Lower Diaphragm (37) for failure.
- Inspect the Upper Diaphragm (2) for bulging.
- Check the gasket surface where the Breaking Pin Housing (35) bolts to the manway cover. Corrosion/erosion or physical damage should be noted.
- Check the valve identification tag.
- Consider tagging the valve indicating unusual appearance or conditions (e.g. need for decontamination).

TABLE 6.2 PARTS AND TOOLS - TEST EQUIPMENT

Item	Description	Material	Part No.	Drawing Ref. 13.1
40	Adapter flange	Steel	101047	127
43	Filler	Steel	101048	127
44	Gasket (drawing 102, item 8)	(See Drawing)	- - - -	102
46	Test diaphragm	Steel	101050	127
47	Test bonnet	Steel	SA-58511	127
48	Lower diaphragm spanner	Steel	101051	128
49	Lower diaphragm holding fixture	Steel	101052	128
53	Angle valve wrench	(See Drawing)	100864	128
54	Housing wrench (6 - 5/16 in. box)	Steel	101053	128
55	Adjusting bolt and nozzle spanner	Steel	101054	128
56	Strap wrench (18 in. long, strap 2 - 14 in. wide)	Steel	101055	- - - -
60	Wrench bar 1 in. diameter x 36 in.	Steel	101057	- - - -



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### 7.5 Removal of Breaking Pin Assembly from Safety Valve Proper

#### ⚠ CAUTION

Failure to follow these instructions may result in improper function of the valve.  
Always wear proper PPE.

Being careful not to damage the gasket surface of the Breaking Pin Housing (35), fasten the flat sides in a vise and remove the wire seal. With a strap wrench, remove the safety valve proper from the breaking pin assembly. Note the presence of corrosion or residue on the upper portion of the breaking pin assembly or the chamber of the Base (17). This indicates possible Lower Diaphragm (37) failure.

### 8 RECONDITIONING AND TESTING OF METALLIC SEAT VALVES

#### 8.1 Disassembly of Safety Valve for Initial Inspection

##### ⚠ CAUTION

Failure to follow these instructions may result in improper function of the valve.  
Always wear proper PPE.

The valve should be carefully dismantled in accordance with instructions in this manual. Valve parts should be thoroughly cleaned after disassembly per Section 12.1.

##### 8.1.1 Removal of Cap (1) and Casing (8)

Unscrew the Cap (1) and the Casing (8) from the Base (17). Do not support the valve upside down on the Spindle (6).

##### 8.1.2 Initial Inspection

If the visual examination of the safety valve does not show any evidence of dirt, corrosion, or moisture, proceed to test as outlined in Sections 8.6 and 8.7.

#### 8.2 DISASSEMBLY OF SAFETY VALVE PROPER

##### ⚠ CAUTION

Failure to follow these instructions may result in improper function of the valve.  
Always wear proper PPE.

If the valve is contaminated or does not pass the vaportight requirements, it must be disassembled as follows.

##### 8.2.1 Remove Adjusting Bolt (3)

Loosen the Lock Nut (4) on the Adjusting Bolt (3). The Lock Nut (4) may be left on the Adjusting Bolt (3) to approximate the spring setting after reassembly if so desired. Remove the Adjusting Bolt (3) with a strap wrench or special tool. If the Disc Guide (7) is loose on the Base (17), it should be held in place during this operation to avoid distorting the small lock screws. A strap wrench has proven effective if this is necessary.

##### 8.2.2 Remove Spring (5) and Disc (10A)

Lift out the Spring (5), the top Spring Washer (9), the Spindle (6) and the Bottom Spring Washer (19). Remove the Disc (10A) by lifting it out carefully with fingers. Be very careful not to mar the seating surfaces; minute damage will cause the valve to leak.

##### 8.2.3 Remove Disc Guide (7)

First, loosen the two Lock Screws (18) with a hex wrench. Next, turn the Disc Guide (7) counterclockwise until it is free from the Base (17).

#### 8.3 Disassembly/Inspection of Seating Surfaces

##### ⚠ CAUTION

Failure to follow these instructions may result in improper function of the valve.  
Always wear proper PPE.

Remove the Lock Pin (12) and then the Adjusting Ring (11) from the Nozzle (13). Next, unscrew the Nozzle (13) from the Base (17). Be careful not to mar either seating surface. Even the most minute scratch will cause the valve to leak.

#### 8.4 Lapping Seating Surfaces

##### ⚠ CAUTION

Failure of the valve to pass the test for vaportightness indicates that lapping of one or both of the seating surfaces is required.

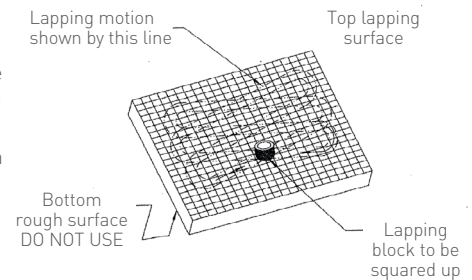
The instructions below are based on manual methods of lapping seats. A competent machinist or trained specialist should carry out the procedure.

##### 8.4.1 Lapping Equipment and Compounds

Seating surfaces on the Nozzle (13) and Disc (10A) are very important when reconditioning safety valves. The seats should be perfectly flat and free from surface scratches.

FIGURE 1

Use of reconditioner



##### 8.4.2 Lapping Block

Lapping blocks for Style JQ 4 in. valves are 2 5/8 in. in diameter and made of a special grade of annealed cast iron, perfectly flat on both sides. It is essential that the lapping block remain flat to produce a truly flat seating surface. In checking the lapping block and for restoring flatness after use, a lapping block reconditioner should be used.

##### 8.4.3 Lapping procedures Unless the seats have been damaged badly by dirt or scale, lapping the seating surfaces should restore them to their original condition. Never lap the disc insert against the nozzle. Lap each part separately against a cast-iron lapping block of the proper size. These blocks hold the lapping compound in their surface pores and must be recharged frequently. Lap the block against the seat. Never rotate the block continuously, but use an oscillating motion. Extreme care should be taken throughout to make certain that the seats are kept perfectly flat. If considerable lapping is required, spread a thin coat of medium coarse lapping compound on the block. After lapping with the medium coarse compound, lap again with a medium grade compound. Unless much lapping is called for, the first step can be omitted. Next, lap again using a fine grade compound. When all nicks and marks have disappeared, remove all the compound from the block and seat. Apply polish compound to another block and lap the seat.

Failure of the valve to pass the test for vaportightness indicates that lapping of one or both of the seating surfaces is required.

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As the lapping nears completion, only the compound left in the pores of the block should be present. This should give a very smooth finish. If scratches appear, the cause is probably dirty lapping compound. These scratches should be removed by using compound free from foreign material. Disc inserts should be lapped in the same way as nozzles. The disc insert must be removed from the holder before lapping. Before the disc insert is placed back in the holder all foreign material should be removed from both parts. The insert must be free when in the holder. If the disc insert is damaged too badly to be reconditioned by lapping, it should be replaced. Remachining the insert will change critical dimensions, affect the action of the valve and is not recommended.

### 8.4.4 Lapping Blocks

Lapping blocks are made of a special grade of annealed cast iron. There is a block for each orifice size. Each block has two perfectly flat working sides and it is essential that they retain this high degree of flatness to produce a truly flat seating surface on either the disc insert or the nozzle. Before a lapping block is used, it should be checked for flatness and reconditioned after use on a lapping plate. The block should be lapped in a figure eight motion, applying uniform pressure while rotating the lapping block against the plate as shown in Figure 2.

### 8.4.5 Lapping Compounds

Experience has proven that medium coarse, medium fine and polish lapping compounds will condition any damaged pressure relief valve seat properly except where the damage requires remachining. The following lapping compounds, or their commercial equivalents are suggested in Table 8.4.5.

### 8.5 Reassembly of Safety Valve Proper

#### ▲ CAUTION

Failure to follow these instructions may result in improper function of the valve. Always wear proper PPE.

During reassembly, lubricate all threads, ball joints and guiding surfaces (6.2.3).

#### 8.5.1 Reassembly of Nozzle (13) and Base (17)

To assemble the Nozzle (13) and the Base (17), use a new Nozzle Gasket (14) that is lightly lubricated on one side. Screw the Nozzle (13) into the Base (17) and tighten. The Adjusting Ring (11) should then be installed on the Nozzle (13); however, do not install the Lock Pin (12) at this time but turn the ring to its lowest position.

Be careful not to damage the seating surface of this assembly in any way or the valve will not pass final pressure test.

#### 8.5.2 Install Disc Guide (7)

Install the Disc Guide (7) by screwing it onto the Base (17). Next, install the Lock Screws (18) by using a hex wrench.

#### 8.5.3 Install Disc (10A), Spring (5), etc.

Hold the Disc (10A) and carefully lower it into position. Next, place the Spring (5), top Spring Washer (9), Bottom Spring Washer (19), and the Spindle Assembly (6) in position. Be sure to use the proper spring (6.1.2).

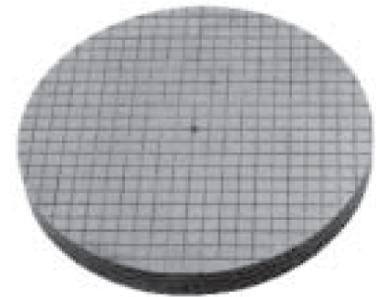
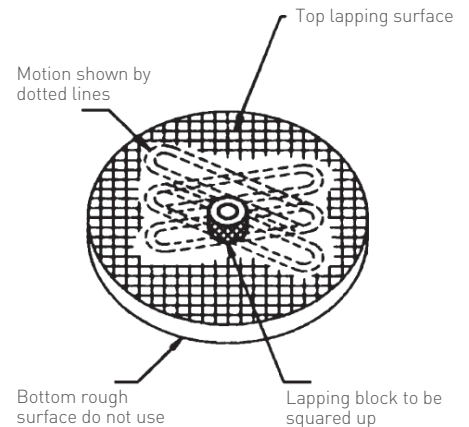
#### 8.5.4 Install Adjusting Bolt (3)

Screw the Adjusting Bolt (3) into the Disc Guide (7). After installing, the Lock Nut (4) should be tight against the Disc Guide (7).

#### 8.5.5 Set Adjusting Ring (11)

Raise the Adjusting Ring (11) by turning it with a rod or screwdriver until it touches the Disc (10A). Lower the Adjusting Ring (11) one notch for testing by turning with a rod or screwdriver. Twist a piece of 22-gauge copper wire around the groove in the Lock Pin. Holding the Lock Pin (12) with the wire, lower it into position and tighten with a screwdriver. Then, remove the wire. Alternatively, an expandable screwdriver can be used to install the Lock Pin (12).

FIGURE 2



LAPPING BLOCK RESURFACING PLATE



LAPPING BLOCK

TABLE 8.4.5 LAPPING COMPOUNDS

Abrasive	Grit Size	Average Micron Size	Description	U.S. Products Category Number
Silicon Carbide	320	31	Medium Coarse	No. 2F Crystolon
Silicon Carbide	400	22	Medium	No. 3F Crystolon
Silicon Carbide	600	16	Fine	No. A-600 Crystolon
Hard Alumina or Aluminum Oxide	900	9	Polish	No. 38-900-A
White Aluminum Oxide	1200	5	Polish	No. 38-1200-A



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### 8.6 Test for Start-to-Discharge (Set Pressure)

#### ▲ WARNING

Failure to follow these instructions can cause damage to the valve and potentially personal injury from an over pressure event.

A person should NEVER stand directly over or in front of or look directly into a relief valve when the tank or test stand is pressurized. The relief valve could suddenly "pop" open blowing gas, dirt and other debris into the person's face and eyes.

Mount the valve on the test stand (13.1.6). Be sure all parts are clean to prevent damage to valve seats. Place the Gasket (44) and the Filler (43) on the Adapter Flange (40) on the test stand (13.1.6). Bolt the safety valve proper to the Adapter Flange (40) above the Filler (43) and screen using a Safety Mechanism Washer (16).

Apply pressure slowly as the set pressure is approached to assure accurate determination of set pressure. If the set pressure is not within the limits shown in Section 3.2, reduce the pressure on the valve, loosen Lock Nut (4) and turn the Adjusting Bolt (3) clockwise to increase set pressure or counterclockwise to reduce set pressure; tighten Lock Nut (4). Then, retest the valve for the set pressure. Failure to reduce pressure before adjusting the valve can cause turning on the seating surfaces and damage to the lapped surfaces.

### 8.7 Test for Vapor Tightness

#### ▲ WARNING

Failure to follow these instructions can cause damage to the valve and potentially personal injury from an over pressure event.

A person should NEVER stand directly over or in front of or look directly into a relief valve when the tank or test stand is pressurized. The relief valve could suddenly "pop" open blowing gas, dirt and other debris into the person's face and eyes.

After setting the start-to-discharge pressure correctly, reduce the pressure to the required vaportight pressure (240 psig for a set pressure of 300 psig and 300 psig for a set pressure of 360 psig), screw the Casing (8) and the Cap (1) with Test Diaphragm (46) on the valve and hold for three minutes. Observe valve vaportightness as indicated by a soap solution over the  $\frac{1}{16}$  in. hole in the top of the Test Diaphragm (46). Remove the Cap (1) and the Casing (8) with the Test Diaphragm (46). If the valve is not vaportight at the minimum required pressure, dismantle and repair the valve (8.2 to 8.7). If vaportightness and set pressure meet the above requirements, remove the Lock Pin (12), lower the Adjusting Ring (11) two more notches, reinstall the Lock Pin (12) and record the test data as required by the local code.

### 8.7.1 Install Cap (1) and Casing (8)

Install a new Upper Diaphragm (2) and lubricate the threads on the casing (5.2.3). Tighten the Casing (8) with a strap wrench (with about one-foot leverage) or by inserting a bar through the handle on the Cap (1). Care must be taken not to damage the Upper Diaphragm (2). Too much leverage will cause the lead Base Washer (15) to flow. Be sure the proper data plate corresponding to the set pressure and shop number of the valve is applied.

## 9 RECONDITIONING AND TESTING OF ELASTOMERIC SEAT VALVES

### 9.1 Disassembly of Safety Valve for

#### Initial Inspection

#### ▲ CAUTION

Failure to follow these instructions may result in improper function of the valve. Always wear proper PPE.

The valve should be carefully dismantled in accordance with instructions in this manual. Valve parts should be thoroughly cleaned after disassembly per Section 12.1.

#### 9.1.1 Remove Cap (1) and Casing (8)

Remove the Cap (1) and the Casing (8) from the Base (17). Do not support the valve upside down on the Spindle (6).

### 9.2 Required O-ring (10E) Replacement

The seat seal O-ring (10E) of the elastomeric seat seal design valve must be replaced each time that the valve is tested and examined.

#### 9.2.1 Remove Adjusting Bolt (3)

Loosen the Lock Nut (4) with a pipe wrench on the Adjusting Bolt (3). The Lock Nut (4) may be left on the Adjusting Bolt (3) to approximate the spring setting after reassembly if so desired. Remove the Adjusting Bolt (3) with a strap wrench or suitable tool. If the Disc Guide (7) is loose on the Base (17), it should be held in place during this operation to avoid distorting the small lock screws. A strap wrench has been proven effective if this is necessary.

#### 9.2.2 Remove the Disc Assembly (10)

Lift out the Spring (5), the top Spring Washer (9), the Spindle (6) and the Bottom Spring Washer (19). Remove the Disc Assembly (10) by lifting it out carefully with fingers. Be very careful not to mar the Nozzle (13) surfaces; damage to the seat will cause the valve to leak.

#### 9.2.3 Teardown of Disc Assembly (10A-E)

To disassemble the Disc Collar (10D) and O-ring (10E) from the Disc Assembly (10A-E), the Spiral Pin (10C) must be driven out from a locked position. This operation may

conveniently be done using a  $\frac{1}{4}$  in. diameter drift pin having a long driving section. To facilitate removal, lubricate the pin with a good penetrant such as Neolube [colloidal graphite suspended in alcohol]. Then, remove the Disc Collar (10D) from Disc Assembly (10A-E). If difficulty is encountered in the disassembly of the Disc Collar (10D), carefully remove the Disc Collar (10D) by inserting a small pry bar (screwdriver) in the clearance slot provided between the Disc (10A) and the Disc Collar (10D).

#### 9.2.4 Inspection

If inspection at this point does not reveal corrosion or contamination, proceed to Section 9.3.4. If the valve is not clean, then continue with Section 9.2.5.

#### 9.2.5 Remove Disc Guide (7)

First, loosen the Lock Screws (18) with a hex wrench. Then, turn the Disc Guide (7) counterclockwise until it is free from the Base (17).

#### 9.2.6 Remove the Nozzle (13)

Remove the Lock Pin (12) and then the Adjusting Ring (11) from the Nozzle (13). Next, unscrew the Nozzle (13) from the Base (17). Be careful not to mar the seating surface. Damage to the seating surface will cause the valve to leak. Remove the O-ring (14) and discard.

### 9.3 Reassembly of the Safety Valve Proper

#### 9.3.1 Install Nozzle (13)

Prior to assembly of the Nozzle (13) and the Nozzle O-ring (14) to the Base (17), clean the parts and coat the guiding, sealing and threaded surfaces with a thin film of nonreactive lubricant. Place the O-ring (14) in the O-ring groove of the Nozzle (13). Next, thread the Nozzle (13) to the Base (17); make sure the O-ring (14) is retained fully within the confines of the groove. Apply sufficient torque to ensure that the Nozzle (13) will not move and that metal-to-metal contact is made between the Nozzle (13) and Base (17).

Screw the Adjusting Ring (11) on the Nozzle (13). Do not install the Lock Pin (12) at this time.

#### 9.3.2 Examination

After assembly, examine the Nozzle (13) metal seating surface. There must be no impairment of the flat surface or the small radius on the outer periphery of the Nozzle (13) which might tear or score the O-ring (10E) or affect the proper setting or sealing of the nozzle seat with the O-ring (10E) in the Disc Assembly (10A-E). It is not necessary to lap the metal Nozzle (13) seating surface. However, it is important that this surface be carefully protected to insure against any damage due to handling.

# CROSBY STYLE JQ 4 IN. PRESSURE RELIEF VALVE

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### 9.3.3 Install Disc Guide (7)

Install the Disc Guide (7) by screwing it onto the Base (17). Next, install the Lock Screw (18) by using a hex wrench.

### 9.3.4 Reassembly of Disc Assembly (10A-E)

Carefully clean all parts of the subassembly Disc Assembly (10A-E). Lightly lubricate the guiding surfaces on the Disc (10A) and the outside diameter of the Spiral Pin (10C) and O-ring (10E) (6.2.3). Assemble the O-ring (10E) to the Disc Collar (10D); then, install both on the Disc (10A) taking care to insure that the holes in the Disc Collar (10D) for the Spiral Pin (10C) line-up with the holes in the Disc (10A).

#### NOTE

- It is most important that the O-ring (10E) is not allowed to roll or twist during this assembly operation. The parting line of the O-ring (10E) should never be visible on the seating contact surface.
- After assembly, the protrusion of the O-ring (10E) should present a uniform appearance relative to a cross section around the entire periphery of the seating surface.
- The metal seat contact surface should be carefully examined to insure against any objectionable discontinuity which might contribute to improper metal-to-metal contact with the Nozzle (13) or tearing or scoring of the O-ring (10E).

### 9.3.5 Install Disc Assembly (10A-E) and Spring (5)

Hold the Disc Assembly (10A-E) and carefully lower it into position. Next, place the Spring (5), top Spring Washer (9), bottom Spring Washer (19), Spindle (6) in position. *Be sure to use the proper spring (6.1.2).*

### 9.3.6 Install Adjusting Bolt (3)

Screw the Adjusting Bolt (3) into the Disc Guide (7). Avoid distorting the small Lock Screws (18). After installing, the Lock Nut (4) should be tight against the Disc Guide (7).

### 9.3.7 Setting Adjusting Ring (11)

Raise the Adjusting Ring (11) by turning it with a rod or screwdriver until it touches the Collar (10D). Lower the Adjusting Ring (11) one notch for testing by turning with a rod or screwdriver. Twist a piece of 22-gauge copper wire around the groove in the Lock Pin (12). Holding the Lock Pin (12) with the wire, lower it into position and tighten with a screwdriver. Then, remove the wire. Alternately an expandable screwdriver can be used to install the Lock Pin (12).

### 9.4 Test for Start-To-Discharge (Set Pressure)

#### ⚠ WARNING

*Failure to follow these instructions can cause damage to the valve and potentially personal injury from an over pressure event.*

*A person should NEVER stand directly over or in front of or look directly into a relief valve when the tank or test stand is pressurized. The relief valve could suddenly "pop" open blowing gas, dirt and other debris into the person's face and eyes.*

Mount the valve on the test stand. Be sure all parts are clean to prevent damage to valve seats. Place the Gasket (44) and the Filler (43) on the Adapter Flange (40) on the test stand. Bolt the safety valve proper to the Adapter Flange (40) above the Filler (43) using a Safety Mechanism Washer (16).

Apply pressure slowly as the set pressure is approached to assure accurate determination of set pressure. If the set pressure is not within the limits shown in Section 3.2, reduce the pressure on the valve, loosen the Lock Nut (4) and turn the Adjusting Bolt (3) clockwise to increase set pressure or counterclockwise to reduce set pressure; tighten Lock Nut (4). Then, retest the valve for the set pressure. Failure to reduce pressure before adjusting the valve can cause turning on the seating surfaces and damage to the O-ring (10E).

### 9.5 Test for Vapor Tightness

#### ⚠ WARNING

*Failure to follow these instructions can cause damage to the valve and potentially personal injury from an over pressure event.*

*A person should NEVER stand directly over or in front of or look directly into a relief valve when the tank or test stand is pressurized. The relief valve could suddenly "pop" open blowing gas, dirt and other debris into the person's face and eyes.*

After setting the start-to-discharge pressure correctly, reduce the pressure to the required vaportight pressure (240 psig for a set pressure of 300 psig and 300 psig for a set pressure of 360 psig), screw the Casing (8) and the Cap (1) with the Test Diaphragm (46) on the valve and hold for three minutes. Observe valve vaportightness as indicated by a soap solution over the  $\frac{1}{16}$  in. hole in the top of the Test Diaphragm (46). Remove the Cap (1) and the Casing (8) with the Test Diaphragm (46). If the valve is not vaportight at the minimum required pressure, dismantle and repair the valve (9.2 to 9.5). If vaportightness and set pressure meet the above requirements remove the Lock Pin (12), lower the Adjusting Ring (11) two more notches, reinstall the Lock Pin (12) and record the data as required by the local code.

### 9.5.1 Install Cap (1) and Casing (8)

Install a new Upper Diaphragm (2) and lubricate the threads on the casing (6.2.3). Tighten the Casing (8) with a strap wrench (with about one-foot leverage) or by increasing or inserting a bar through the handle on the Cap (1). Care must be taken not to damage the Upper Diaphragm (2). Too much leverage will cause the lead Base Washer (15) to flow. *Be sure the proper data plate corresponding to the set pressure and shop number of the valve is applied.*

## 10 RECONDITIONING AND TESTING OF BREAKING PIN ASSEMBLY

### 10.1 Disassembly of the Breaking Pin Assembly

#### 10.1.1 Remove Breaking Pin (31)

#### ⚠ CAUTION

*Failure to follow these instructions may result in improper function of the valve. Always wear proper PPE.*

Remove the Breaking Pin (31) prior to any other operation. Place the Housing (35) in a vice and remove the lower Clip (34). Carefully pull the Plunger Yoke (30) upward to extract the pin from the Housing (35). Do not use any force to remove the Breaking Pin (31). If the pin does not come out with only slight pressure, an application of penetrating oil may be helpful. If any force is used to extract the Breaking Pin (31), then the Breaking Pin (31) must be destroyed to ensure that it is never again installed.

#### ⚠ CAUTION

*Failure to follow these instructions may result in improper function of the valve. Always wear proper PPE.*

Remove the upper Clip (34) from the plunger Yoke (30). If this Clip (34) cannot be easily removed, the Yoke (30) should be held in a vice to avoid any damage to the Plunger Assembly (32). Carefully push the Breaking Pin (31) out of the Yoke (30). Do not use any excessive force to remove the Breaking Pin (31). If it is necessary to force or drive the Breaking Pin (31) out of the Yoke (30), then that Breaking Pin (31) must be destroyed to ensure that it is never again installed.

#### 10.1.2 Remove Spanner Nut (33)

Hold the Housing (35) in a vice and remove the Spanner Nut (33) by rotating it counterclockwise using the Spanner Nut Driver (48) and Holding Fixture (49).

# CROSBY STYLE JQ 4 IN. PRESSURE RELIEF VALVE

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### 10.1.3 Remove Vacuum Grill (38)

#### 10.1.4 Remove Follower (36)

If the Follower (36) does not fall out freely, push down on the Yoke (30) to free the Follower (36). In the event that the Diaphragm (37) has ruptured and the Follower (36) cannot be pushed out, place the Housing (35) in a vice and using a soft punch tap the Follower (36) lightly. Do not use a hard chisel or screwdriver to pry between the Follower (36) and the Housing (35). Care must be taken not to damage the Follower (36) or the seating surface of the Housing (35).

#### 10.1.5 Clean the Breaking Pin Assembly

The Breaking Pin Housing (35), Clips (34), Spanner Nut (33), Vacuum Grill (38) and Follower (36) should be cleaned per Section 12.1. During the cleaning operation, these parts must be protected to avoid damage to the seating surfaces, housing tongue and screw threads.

## 10.2 Inspection of Breaking Pin Assembly

### ▲ CAUTION

*Failure to follow these instructions may result in improper function of the valve.*

*Always wear proper PPE.*

#### 10.2.1 Cleaning Inspection

Examine the breaking pin assembly after cleaning. There must be no foreign material, corrosive deposits or residual chlorine on any of the parts. All the parts must be thoroughly dried and free from moisture.

#### 10.2.2 Gasket Seating Surface

Visually inspect the gasket seating surface on the bottom of the Breaking Pin Housing (35) where the valve is bolted to the manway cover. This gasket sealing surface must be clean and free from nicks, burrs and score marks. There must be no corrosion or erosion of the gasket sealing surface. The sealing groove must be clean and well defined.

#### 10.2.3 Plunger Assembly

Examine the condition of the Plunger. The Plunger assembly should move freely in the Housing (35). The total diametrical clearance between the plunger and the Housing (35) should not exceed 0.024 in., as measured with a wire feeler gauge. The Yoke (30) weld must not show any evidence of cracking or fracture. The Yoke (30) must be perpendicular to the bottom of the Plunger with Columns (32). To determine if the Yoke (30) and the Plunger with Columns (32) are perpendicular, visually check that the Yoke (30) is flush with the shoulder on the Plunger with Columns (32) (Figure 3). The holes for the Breaking Pin (31) and Clips (34) must be clean and free of burrs so the Breaking Pin (31) and Clips (34) fit freely.

Check the Plunger with Columns (32) position. With the Breaking Pin (31) installed, the lower surface of the Plunger with Columns (32) must be flush with the corresponding annular seating surface for the Lower Diaphragm (37) in the Housing (35). The maximum allowable deviation is flush to 0.012 in. recessed (Figure 3). Clearances in the clip/pin holes and grooves must not be such that the plunger can move beyond these limits using hand pressure. The surface of the plunger must be capable of supporting the Lower Diaphragm (37) without damaging it.

#### 10.2.4 Housing (35)

Inspect the diaphragm seating surface in the Housing (35). The diaphragm seating surface must be clean and free from nicks, burrs and score marks. There must not be excessive pitting or corrosion. The machine surface should have well-defined serrations (Figure 4). If the serrations are significantly worn or damaged, resurfacing should be considered.

Check the threads on the Housing (35) that accept the Spanner Nut (33) and threads that engage into the Base (17). There must be no visible deformation of the thread form and the threads must be clean and free from nicks and burrs.

If machining is required to restore the seating surface, the bottom of the Housing (35) surface must be machined so that the height of the seating surface is maintained at 0.312 in.  $\pm$  0.016 in.. The Housing (35) should be discarded if the distance from the base seat surface to the lower diaphragm seat surface is reduced below 1.234 in. (Figure 4).

#### 10.2.5 Breaking Pin (31) and Clips (34)

Inspect the Breaking Pin (31) and Clips (34) for any evidence of damage or corrosion. Breaking Pins (31) that are bent, corroded or otherwise damaged, must be destroyed. Clips (34) that are corroded or do not fit snugly should be discarded.

#### 10.2.6 Spanner Nut (33)

The circular surface on the Spanner Nut (33) that contacts the Follower (36) must be smooth and free from nicks and burrs. Any defect on this interface surface that cannot be removed by polishing is cause for scrapping the Spanner Nut (33). There must be no visible deformation of the thread form. Threads must be clean and free from nicks and burrs (Figure 5).

#### 10.2.7 Follower (36)

The smooth surface on the bottom of the Follower (36) that contacts the Lower Diaphragm (37) must be very flat and free from nicks and burrs. The angled surface that contacts the Spanner Nut (33) must be smooth and free from any mechanical damage. Any defect on either of these two surfaces is cause for scrapping the Follower (36) (Figure 6).

#### 10.2.8 Vacuum Grill (38)

The Vacuum Grill (38) must be nominally straight and free from nicks and burrs that could damage the Lower Diaphragm (37).

#### 10.2.9 Lower Diaphragm (37)

The Lower Diaphragm (37) shall not be reused. Inspect the new Lower Diaphragm (37) for surface imperfections such as nicks and scratches. Care should be used in handling or storing diaphragms to prevent nicks and scratches (Figure 7).

#### 10.2.10 Re-machining of Breaking Pin Assembly

If the inspection reveals a need to re-machine any parts they may be machined by properly trained personnel. When any imperfections cannot be removed without exceeding the critical dimensions, contained herein, the part must be scrapped.

# CROSBY STYLE JQ 4 IN. PRESSURE RELIEF VALVE

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FIGURE 3  
Plunger Assembly

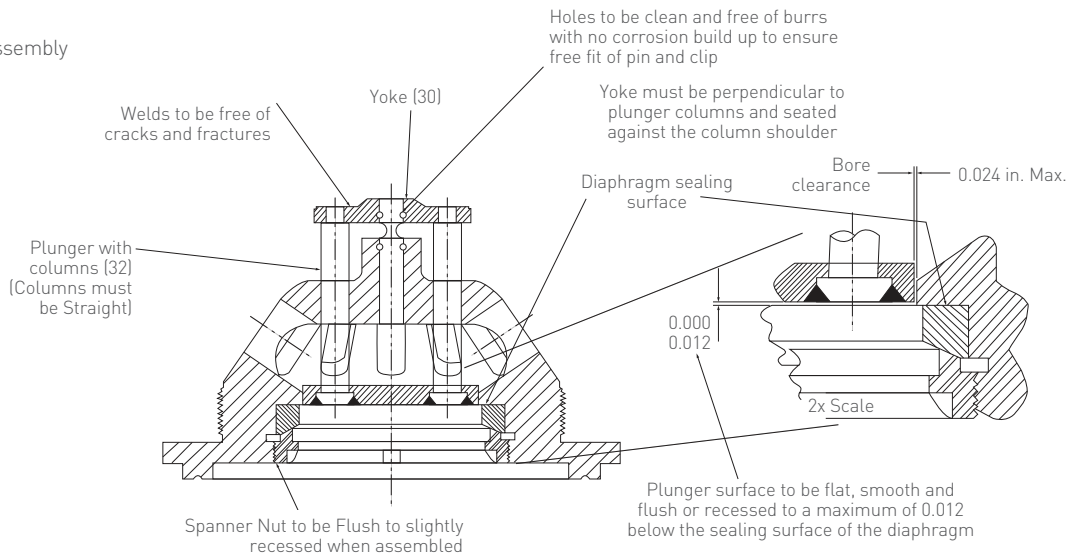


FIGURE 4  
Housing (35)

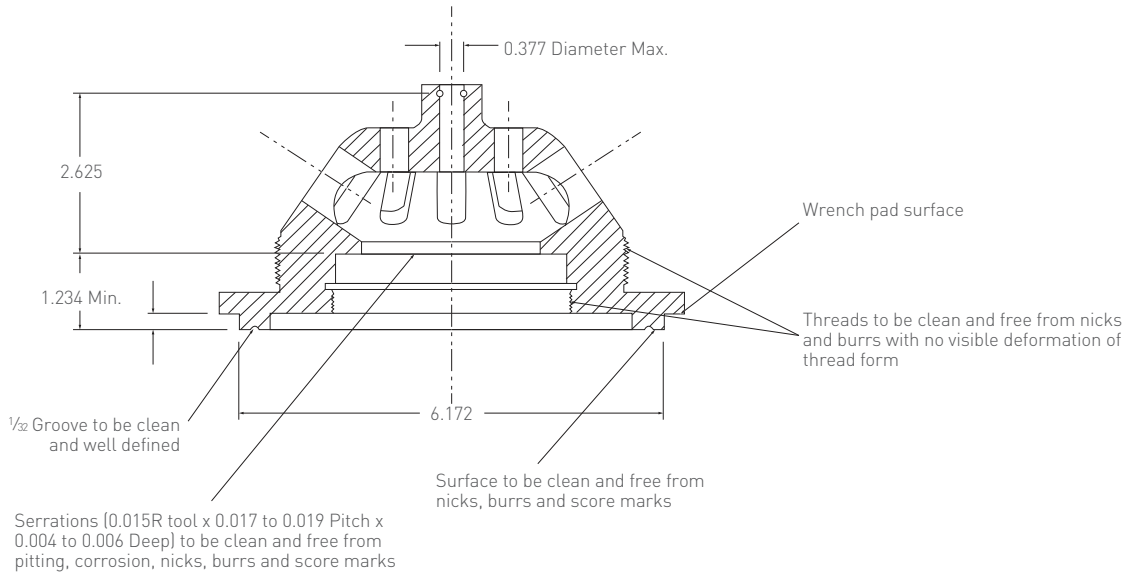


FIGURE 5  
Spanner Nut (33)

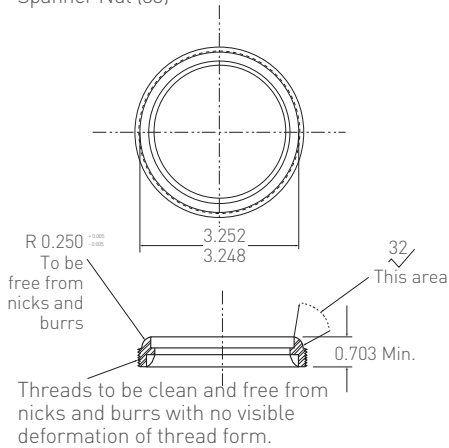


FIGURE 6  
Follower (36)

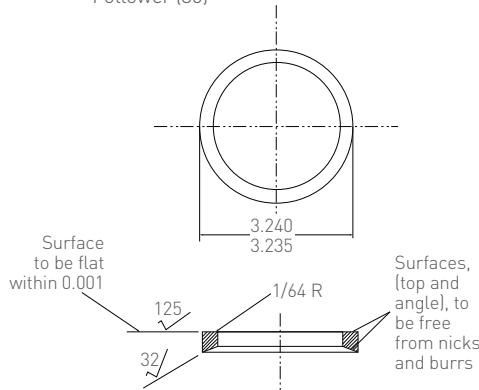
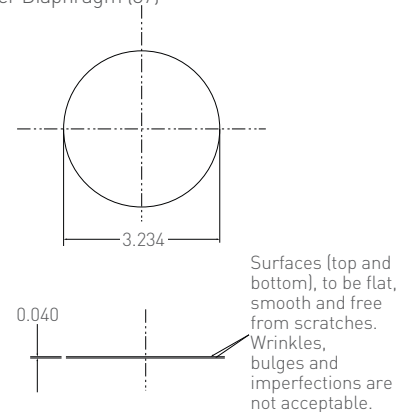


FIGURE 7  
Lower Diaphragm (37)



# CROSBY STYLE JQ 4 IN. PRESSURE RELIEF VALVE

## INSTALLATION AND MAINTENANCE INSTRUCTIONS

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### 10.3 Reassembly of the Breaking Pin Assembly

#### ⚠ CAUTION

Failure to follow these instructions may result in improper function of the valve.  
Always wear proper PPE.

#### 10.3.1 Install Breaking Pin (31)

Insert the Breaking Pin (31) into the Yoke (30) and fasten the upper Clip (34). Be careful to avoid any side strain on the notched portion of the Breaking Pin (31) when handling or assembling. Then, insert the lower half of the Breaking Pin (31) into the Housing (35) and fasten the lower Clip (34). Be sure to use the proper Breaking Pin (31) and Clips (34) (Section 6).

#### 10.3.2 Insert Lower Diaphragm (37)

Carefully insert the new Lower Diaphragm (37) into the Housing (35). The diaphragm must lay flat on the serrated surface and not ride up on the side of the Housing (35). No lubrication is allowed between the diaphragm and the serrated Housing (35) surface.

#### 10.3.3 Install Follower (36)

Lightly lubricate both sides of the Follower (36) (6.2.3). Place the Follower (36) into the Housing (35) with the smooth side down against the Lower Diaphragm (37).

#### 10.3.4 Install Spanner Nut (33) and Vacuum Grill (38)

Lightly lubricate the threads of the Spanner Nut (33), the curved interface surface and the threads on the Housing (35) (6.2.3).

Insert the Vacuum Grill (38) with the notches resting on the Follower (36) and centered.

Thread the Spanner Nut (33) into the Housing (35). The Spanner Nut (33) must turn freely by hand pressure only until the Follower (36) contacts the Lower Diaphragm (37). Tighten the Spanner Nut (33) using the Spanner Nut Driver (48) and Holding Fixture (49). The Spanner Nut (33) must be very tight to compress lead into the sealing grooves. No wrinkling of the Lower Diaphragm (37) is permitted during this assembly. The Vacuum Grill (38) should not be tight against the Lower Diaphragm (37).

### 10.4 Test the Lower Diaphragm (37) for Leaks

#### ⚠ WARNING

Failure to follow these instructions can cause damage to the valve and potentially personal injury from an over pressure event.

*A person should NEVER stand directly over or in front of or look directly into a relief valve when the tank or test stand is pressurized. The relief valve could suddenly "pop" open blowing gas, dirt and other debris into the person's face and eyes.*

The Lower Diaphragm (37) must be absolutely gas tight. This test is very important because if gas leakage should occur, pressure will build up in the Breaking Pin Housing (35) increasing the pressure at which the Breaking Pin (31) will fracture.

Place the Gasket (44) and the breaking pin assembly on the Adapter Flange (40). Then, bolt the Test Bonnet (47) with bubble counter device to the Adapter Flange (40) using a Safety Mechanism Gasket (16).

- **Bubble Cap Tester Method**  
Fill the cup of the bubble counter until the tube opening is 0.5 in. below the surface of the water. Using helium, gradually apply pressure to 300 psig for the 375 psig Breaking Pin (31) or 240 psig for the 300 psig Breaking Pin (31). After the pressure is reached, observe the bubble counter for three minutes. There should be no bubbles observed during this period. Any leakage is cause for rework and retest.
- **Electronic Leak Tester Method**  
Secure the breaking pin assembly to the test plate. Apply 5 psig helium pressure to the test assembly, followed by air pressure to 300 psig for the 375 Breaking Pin (31) or 240 psig for the 300 Breaking Pin (31). Using an electronic leak tester with the probe inserted near the Lower Diaphragm (37) or hole in Test Bonnet (47), check for any leakage. Any leakage is cause for rework and retest.

# CROSBY STYLE JQ 4 IN. PRESSURE RELIEF VALVE

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### 11 REASSEMBLY OF SAFETY VALVE PROPER AND THE BREAKING PIN ASSEMBLY

#### 11.1 Installation of the Breaking Pin Assembly

##### **⚠ CAUTION**

*Failure to follow these instructions may result in improper function of the valve.*

*Always wear proper PPE.*

Check the safety valve proper and the breaking pin assembly to be sure that both are rated for service at 300 psig or 375 psig. Visually inspect the threads and gasket surfaces of both the Breaking Pin Housing (35) and the Valve Base (17). If necessary, carefully clean the threads and gasket sealing surfaces to remove any foreign materials. Lubricate one surface of a new Safety Mechanism Gasket (16) and the threads of both the Breaking Pin Housing (35) and Valve Base (17) (6.2.3). Screw the breaking pin assembly into the safety valve proper handtight using caution to assure proper thread engagement. Holding the breaking pin assembly on the flat surface, tighten the safety valve proper onto the Housing (35) using a hook shaped wrench or strap wrench. As a check against tampering prior to valve installation, insert a sealing wire through the handle on the Cap (1) and then through the Lock Strip (21) in the Base (17).

#### 11.2 Paint

After testing, mask the surface of the Breaking Pin Housing (35) and paint the exterior of the valve if necessary.

##### **⚠ CAUTION**

*Do not obliterate data plate.*

#### 11.3 Storage and Handling

Safety valves may be on location months before they are installed. These valves should be stored indoors in a location where dirt, moisture and other forms of contamination are at a minimum. It is best to leave safety valves stored in a dry place with protected covering on the gasket surface until they are to be installed.

Safety valves should be handled carefully. Rough handling may damage the Lower Diaphragm (37), gasket tongue, valve seats or the breaking pin assembly.

### 12 SPECIAL MAINTENANCE PROCEDURES

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#### 12.1 Cleaning

##### **⚠ CAUTION**

*Failure to follow these instructions may result in improper function of the valve.*

*Always wear proper PPE.*

Completely disassemble the safety valve proper and the breaking pin assembly. Place parts in a wire basket and clean by direct impingement of steam on the parts. Alternatively, cleaning parts in a pail with boiling water has been successful. Some parts have also been cleaned utilizing high pressure blasting with a water and aluminum oxide mixture. Heavily coated or corroded parts may require wire brushing, steel grit blasting of steel parts and glass bead blasting (or equivalent) of Monel parts. In all cases, seating surfaces should be protected to avoid damage. After cleaning, all parts should be dried and carefully inspected for suitability for continued use.

#### 12.2 Converting from Metallic Seat to Elastomeric Seat Design

The elastomeric seat valves are identical to the metallic seat valves except as noted in Table 6.1.A. Existing metallic seat valves may be altered as follows:

- Disassemble the safety valve proper per Section 8.2 and remove the Lock Pin (12), Adjusting Ring (11), Nozzle (13) and Nozzle Washer (14) from the Base (17); install the new Nozzle (13), O-ring (14), and the existing Adjusting Ring (11) per Section 9.3. Replace the Disc Guide (7) per Section 9.3.3, and install the new Disc Assembly (10A-E) per Section 9.3.4. Continue assembly per Sections 9.3.6 and 9.5.1.
- Valves changed over to O-ring seat design should carry identification Type 4 JQ valve, Shop No. 86006 for 4 in. JQ 300 valve or Shop No. 86007 for 4 in. JQ 375.



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### 13 REFERENCES

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#### 13.1 Institute Publications

- 13.1.1 *Chlorine Manual, ed. 5; Manual 1*; The Chlorine Institute: Washington, DC, 1986.
- 13.1.2 *Gaskets for Chlorine Service, ed. 1; Manual 95*; The Chlorine Institute: Washington, DC, 1992.
- 13.1.3 *Studs, Nuts and Gaskets for Chlorine Tank Manway Covers and Valves*, Drawing 102- 9; The Chlorine Institute: Washington, DC, 1993.
- 13.1.4 *Test Equipment for Chlorine Institute Standard Safety Valve, Type 4 JQ*, Drawing 127- 2; The Chlorine Institute: Washington, DC, 1995.
- 13.1.5 *Tools for Chlorine Institute Standard Safety Valve, Type 4 JQ*, Drawing 128-2; The Chlorine Institute: Washington, DC, 1995.
- 13.1.6 *Test Stand for Chlorine Institute Standard Safety Valve, Type 4 JQ*, Drawing 132-2; The Chlorine Institute: Washington, DC, 1995.
- 13.1.7 *Safety Valve for Chlorine Service -Metallic Seat Design, Styles 4 JQ 300 and 4 JQ 375*, Drawing H-38572-F; Crosby Valve and Gauge Company: Wrentham, MA, 1995.
- 13.1.8 *Safety Valve for Chlorine Service - Elastomeric Seat Seal Design, Styles 4 JQ 300 and 4 JQ 375*, Drawing H-86008; Emerson: Wrentham, MA, 1995.

#### 13.2 DOT Regulations

- 13.2.1 *Code of Federal Regulations. Title 46*. Office of the Federal Register National Archives and Records Administration. U.S. Government Printing Office: Washington, DC, [revised annually].
- 13.2.2 *Code of Federal Regulations. Title 33*. Office of the Federal Register National Archives and Records Administration. U.S. Government Printing Office: Washington, DC, [revised annually].

#### 13.3 TC REGULATIONS

- 13.3.1 *Guide to Canadian Transportation of Dangerous Goods Act and Regulations*, mini version; ICC International Compliance Center Ltd: Mississauga, Ontario, 1995.
- 13.3.2 *The Dangerous Chemicals and Noxious Liquid Substances Regulations*; The Canada Communications Group: Ottawa, Ontario, 1993.

#### 13.4 Standards

- 13.4.1 *Pressure Relief Devices*, ANSI/ ASME PTC 25; The American Society of Mechanical Engineers: New York, NY, 1994.

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