Válvulas Nacional

ValNac

Safety Valves

INSTRUCTION AND MAINTENANCE MANUAL

SAFETY VALVES
5500 SERIES

ISO 9001
BUREAU VERITAS
Certification

MA-55/03

OCTOBER 2026

VALVULAS NACIONAL, S. A. recommends reading this Instruction Manual carefully. It sets out the minimum precautions to be taken before installing safety valves to ensure correct operation.

VALVULAS NACIONAL, S. A. warrants its safety valves against manufacturing defects for 12 months from installation or a maximum of 18 months from delivery, whichever occurs first. It accepts no liability for malfunction caused by incorrect installation, storage and/or handling by the purchaser.

The warranty provided by VALVULAS NACIONAL, S. A. shall be void for any safety valve fitted with non-original spare parts and/or whose certification seal is missing or damaged.

Pay particular attention to all bold, boxed text. Its purpose is to prevent incorrect installation and, above all, to prevent injury to personnel handling safety valves.

VALVULAS NACIONAL, S. A. reserves the right to modify all or part of this manual without prior notice.

BASIC DEFINITIONS

(UNE-EN ISO 4126-1)

Safety valve: A valve which automatically discharges fluid, using only the energy generated by the fluid at its inlet, to prevent a predetermined safe pressure from being exceeded. It is designed to reclose and prevent further fluid flow once the system returns to its original operating conditions.

Pressure: The pressure unit normally used is the bar (1 bar = 10^5 Pa), expressed as gauge pressure (barg, relative to atmospheric pressure) or absolute pressure, as applicable.

Set pressure: The predetermined pressure at which the safety valve starts to open under operating conditions.

Maximum allowable pressure: The maximum pressure for which the equipment is designed, as specified by the manufacturer.

Overpressure: The pressure increase above the set pressure required for the safety valve to reach the maximum lift specified by the manufacturer, normally expressed as a percentage of the set pressure.

Reseating pressure: The inlet static pressure at which the disc re-establishes contact with the seat or the lift becomes zero.

Cold differential test pressure: The inlet static pressure at which the safety valve is adjusted to start opening on the test bench.
This test pressure includes corrections for operating conditions, such as back pressure and/or temperature.

Relieving pressure: The pressure used for sizing the safety valve, which is greater than or equal to the set pressure plus overpressure.

Built-up back pressure: The pressure at the outlet of a safety valve caused by fluid flowing through the valve and discharge system.

Superimposed back pressure: The pressure at the outlet of a safety valve when the device is about to operate.

Blowdown: The difference between the set pressure and the reseating pressure, normally expressed as a percentage of the set pressure. For pressures below 3 bar, this difference is expressed in bar.

Lift: The actual travel of the valve disc from the closed position.

Flow area: The minimum flow cross-sectional area between the body inlet and the seat, used to calculate the theoretical discharge capacity.

Flow diameter: The diameter corresponding to the flow area.

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1 - INTRODUCTION

This manual provides the information required for correct installation, operation and maintenance of VALVULAS NACIONAL Model 5500 safety valves.

2 - DESCRIPTION

Model 5500 safety valves have been designed, manufactured and tested in accordance with Pressure Equipment Directive 2014/68/EU, Category IV, and Directive 2014/34/EU (ATEX), Group II, Category 2.

Model 5500 safety valves are safety accessories designed to protect pressure equipment and vessels against excessive overpressure by controlled discharge of the contained fluid, whether gas, vapour, liquid or a mixture thereof.

For optimum performance, the valve internals are designed specifically for gas or liquid applications. Both versions provide rapid pop action.

Model 55G - Designed for gases and vapours.

Model 55L - Designed for liquids or liquid/gas mixtures.

The valves have a 90° angle configuration between the inlet and outlet connections. The flanged body has a large internal volume to minimise back pressure during discharge. Easily removable fixed full nozzle. Closed bonnet. Helical spring loading. The closure mechanism is carefully designed for efficient discharge of both gases and liquids. Accurate alignment of guided parts prevents rubbing and premature wear.

All safety valves are sized and manufactured for a specific application. To reuse an existing valve for another application, contact the Válvulas Nacional Technical Department for an assessment of the necessary adaptations.

3 - PRODUCT SAFETY SYSTEM AND LABELLING

Where necessary, this manual includes appropriate safety labels in rectangular blocks in the margins. Safety labels are vertical rectangles, as illustrated below, with three panels enclosed by a narrow border.

These panels convey four key messages:

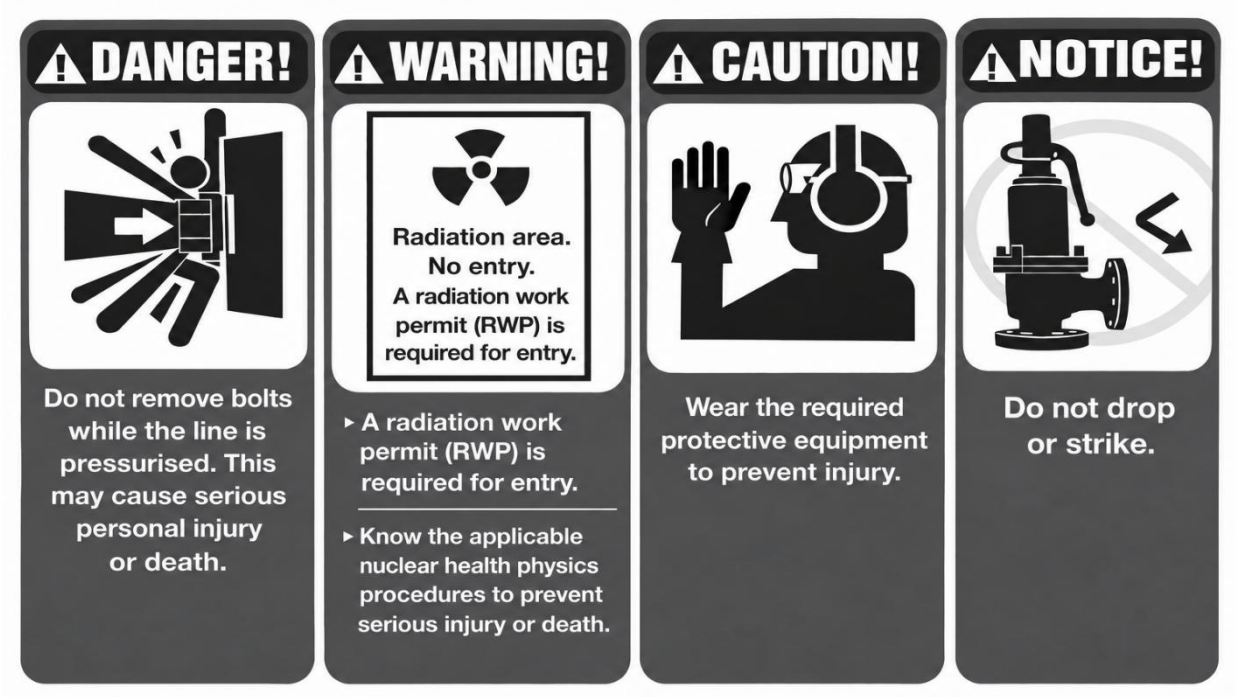
A. The severity of the hazard.
B. The nature of the hazard.
C. The consequences of personnel or product exposure to the hazard.
D. Instructions, where required, on how to mitigate the hazard.

The top panel displays a signal word (DANGER, WARNING, CAUTION or NOTICE) indicating the severity of the hazard:

(1) **DANGER — Immediate hazards that WILL result in serious personal injury or death.**
(2) **WARNING — Hazards or unsafe practices that COULD result in serious personal injury or death.**
(3) **CAUTION — Hazards or unsafe practices that COULD result in minor personal injury.**

(4) **NOTICE — Hazards or unsafe practices that COULD result in product or property damage.**

The centre panel contains a pictogram identifying the hazard and the possible consequences of personnel or product exposure. For some personal hazards, the pictogram may illustrate preventive measures to mitigate or eliminate the hazard, such as wearing protective equipment.



The bottom panel may contain instructions on avoiding the hazard. For personal hazards, the message may describe the hazard and its consequences in greater detail, supplementing the pictogram.

4 - SAFETY ALERTS: READ – UNDERSTAND – APPLY

4.1 - DANGERS

I. **DANGER: High temperatures and pressures can cause injury. Ensure that the system is fully depressurised before repairing or removing valves.**
II. **DANGER: Do not stand in front of the valve outlet during discharge. KEEP CLEAR OF THE VALVE to avoid exposure to the fluid contained inside it.**
III. **DANGER: EXERCISE EXTREME CAUTION when inspecting a safety valve for leakage!**

4.2 - WARNINGS

I. **WARNING: Allow the system to cool to ambient temperature before cleaning, maintenance or repair. Hot components or fluids can cause serious injury or death.**
II. **WARNING: Always read and comply with the safety labels on all vessels. Do not remove or damage the vessel. Do not remove or damage vessel labels. Improper handling or misuse could cause serious injury or death.**
III. **WARNING: Never use pressurised fluids, gases or air to clean clothing or any part of the body. Never use any part of the body to check for leaks or discharge rates. Pressurised fluids, gases or air injected into or near the body can cause serious personal injury or death.**

IV. **WARNING: Never use pressurised fluids, gases or air to clean clothing or any part of the body. Never use any part of the body to check for leaks or discharge rates in pressurised areas. Pressurised fluids, gases or air injected into or near the body can cause serious injury or death.**

V. **WARNING: Do not allow anyone under the influence of toxic substances or narcotics to work on or near pressurised systems. Such workers endanger themselves and others and may cause serious personal injury or death.**

VI. **WARNING: Improper servicing or repair can cause product or property damage, serious personal injury or death.**

VII. **WARNING: These WARNINGS are as comprehensive as possible; however, it is impossible to anticipate every type of service or assess every potential hazard.**

VIII. **WARNING: Using unsuitable tools, or using suitable tools incorrectly, could cause personal injury or product or property damage.**

IX. **WARNING: This valve type is not designed for nuclear or radioactive applications.**

4.3 - CAUTIONS

I. **CAUTION: Observe all warnings in the service manual. Read the installation instructions before installing the valve(s).**

II. **CAUTION: Wear hearing protection when testing or operating valves.**

III. **CAUTION: Wear eye protection and suitable clothing.**

IV. **CAUTION: Wear respiratory protective equipment to protect against toxic media.**

Note: Refer any service enquiries not covered by this manual to Válvulas Nacional.

4.4 - PERSONNEL SAFETY PRECAUTIONS

Keep clear of the safety valve discharge.

Valve opening produces a sudden, very high noise level.
Leave sufficient clearance around the valve during installation to allow safe, easy access for disassembly and maintenance.

Always assume that the valve inlet and outlet are at the same temperature as the fluid.

The valve body drain opening is plugged at the factory before delivery. If the plug is removed on site for use, connect the opening to a safe location at a lower pressure than the system being drained.

If the fluid is toxic, flammable or otherwise hazardous, wear suitable protective clothing, including a gas mask, during valve disassembly. Clean all parts with suitable cleaning products before handling or machining them (replace all O-rings after cleaning).

To avoid hazards, perform disassembly, assembly and all maintenance operations in accordance with this manual. In particular, ensure that there is no pressure before removing the valve from the process and separating its components. These instructions contain various safety messages which must be read carefully to minimise the risk of personal injury and of following incorrect procedures that could damage the safety valve or leave it in an unsafe condition. These safety messages are not exhaustive.
Válvulas Nacional cannot know, evaluate or advise every customer on every conceivable method of carrying out work or on the potential hazards of each method. Válvulas Nacional has therefore not undertaken such an exhaustive assessment. Anyone using a procedure and/or tool not recommended by Válvulas Nacional, or departing from its recommendations, must be fully satisfied that the chosen method and/or tools do not endanger personnel or valve safety.

5 - HANDLING AND STORAGE

5.1 - HANDLING

1. **NOTICE: Flanged valves, whether crated or unpacked, must always be kept with the inlet flange facing downwards, in their normal installed position, to prevent misalignment or other damage to internal components.**

2. **NOTICE: Pressure relief valves, whether packed or unpacked, must never be subjected to sudden impacts. Take particular care during truck loading and unloading and when lifting the valve into its installed position.**







5.2 - STORAGE

Safety valves often remain on site for several months before installation.

Inadequate storage and protection may adversely affect their performance.

Handle safety valves carefully to prevent damage, particularly to the connections.

It is recommended that valves be kept in their original packaging and stored indoors in a dry environment until installation.

Store spare parts in their original packaging, under cover and in clean, dry conditions until use. O-rings and elastomeric components are supplied in polyethylene bags and must be stored in a dark place, such as a drawer or box.



6 - PRE-INSTALLATION AND INSTALLATION INSTRUCTIONS

6.1 - PRE-INSTALLATION AND INSTALLATION

CAUTION: After unpacking the valve and removing the protective devices, take particular care to prevent dirt or other foreign matter from entering the inlet or outlet connections.



Rough handling can damage the seating surfaces or misalign internal parts, causing leakage or malfunction. Handle the safety valve with care.

6.2 - INSTALLATION INSTRUCTIONS

Correct installation is essential for proper safety valve operation.

Remove the adhesive protective covers from the inlet and outlet flanges.

The valve may require inspection shortly after installation in the following cases:

- The valve has been installed incorrectly.
- The protected line contains contamination, such as scale or other debris.
- The valve is used for a service for which it was not designed.
- The valve has been handled incorrectly.

Before installation, check the nameplate to ensure that the valve is correct for the application. Check that the certification seal is intact; otherwise, the set pressure and seat tightness must be rechecked. Ensure that the valve is clean and that no dirt is visible inside the nozzle or body. Blow clean if necessary.

The piping, mating flanges and valve supports must be scrupulously clean. Ensure that no foreign matter, such as gasket particles, slag or dust, can become lodged between the disc and seat seating surfaces.

Tighten all bolts securing the valve to the vessel evenly in a cross pattern to prevent body distortion, preferably following ASME PCC-1 guidance.

Where discharge is piped to atmosphere, ensure that water, dirt and condensate cannot accumulate inside the valve body.

Support open-discharge piping so that forces generated during discharge are not carried by the valve neck.

Always install the valve vertically. The inlet piping from the equipment or system must be direct and as short as possible. The return connection to the vessel must be curved to prevent turbulence and facilitate removal of the discharged fluid.

The pressure loss between the vessel and valve must never exceed 3% of the set pressure while the valve is discharging at maximum capacity. Higher pressure losses may cause chattering.

Ensure that the inlet pipe diameter is at least equal to the valve inlet connection diameter.

The valve body is designed to withstand substantial mechanical loads; nevertheless, carefully design the discharge piping to avoid transmitting excessive stresses to the valve.

Provide sliding supports and avoid excessively long pipe runs attached directly to the valve outlet flange.

For gas, vapour or steam service, route the discharge piping upwards and provide suitable drainage. For liquid service, downward routing is recommended to prevent flooding of the valve body.

Never direct the outlets of valves in gas or vapour service towards areas where personnel could be endangered.

In gas or vapour systems, valve opening may generate noise exceeding the permissible exposure limits for personnel in the vicinity.

All safety valves have a drain opening at the bottom of the body. Where necessary, connect a pipe to this opening and route it to a safe collection vessel to prevent accumulation of water, corrosive liquids, contaminants or other substances that could damage the internals. See Figure 1.

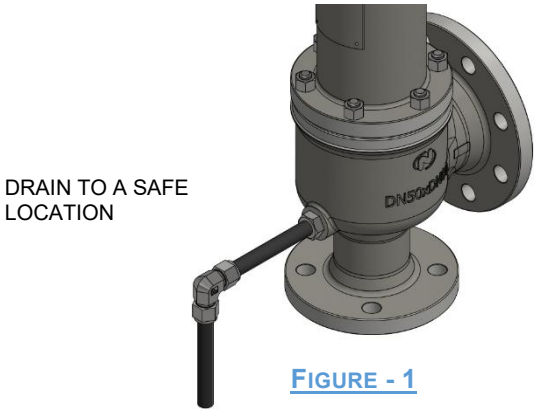


FIGURE - 1

When several safety valves discharge into a common header, the back pressure generated by one or more opening valves may impose back pressure on the others. This may increase their opening pressure by the amount of the generated back pressure. In such cases, balanced bellows valves are recommended to avoid back pressure effects.

For vessels containing saturated steam, install the valve on the steam side, as far from the liquid surface as possible.

Avoid installing safety valves where residues may accumulate.

Allow for valve removal and installation during maintenance by providing clear access around the valve.

Vibration in the piping or vessel on which the valve is installed may impair seat tightness and service life. Excessive fluid turbulence and inlet pressure pulsations can cause disc chattering against the seat (rapid opening and closing) during discharge, reducing tightness and service life.
Where vibration cannot be eliminated, increase the difference between set pressure and operating pressure by at least a further 10%.

For further installation recommendations, refer to API RP 520, “Design and Installation of Pressure-Relieving Systems in Refineries”.

6.3 - SYSTEM HYDROSTATIC TESTING

When hydrostatically testing a vessel or system, ensure that the safety valve will not be damaged.

Before an upstream test, if the valve was supplied with the test gag option, remove the cap plug (22) and fit the test gag locking screw (38) to disable the valve. Tighten the screw by hand only to avoid damaging internal parts. See Figure 2.

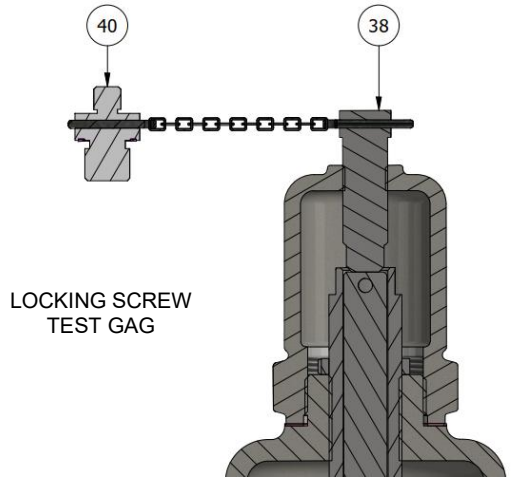


FIGURE - 2

Immediately after the hydrostatic test, remove the test gag and refit the plug. Otherwise, the safety valve will remain completely disabled and the system will be unprotected against overpressure.

For downstream hydrostatic testing, ensure that the pressure applied to the valve does not exceed its design limits. Where possible, remove the valve and perform the test with a blind flange fitted.

6.4 - SERVICE CONSIDERATIONS

For optimum performance, service pressure relief valves annually unless maintenance history indicates otherwise. Install them where access and removal for maintenance are straightforward.

6.5 - COMMISSIONING IN THE SYSTEM

Before commissioning, visually inspect and check the following:

- The nameplate shows the correct set pressure for the equipment to be protected.
- There are no blind flanges, closed valves or obstructions in the piping.
- The safety valves have been checked for set pressure and seat tightness.

7 - CHANGING SET PRESSURE AND BLOWDOWN

All valves manufactured and shipped by VALVULAS NACIONAL are carefully assembled, tested and certified before shipment.

Before installation, it is recommended that the valve be retested to ensure that transport and handling have not damaged the seating components or impaired seat tightness.

If the valve setting range is changed at the last moment for any reason, pay close attention to Section 5.1.

7.1 - CHANGING THE SET PRESSURE

When changing the set pressure of an existing valve, it is essential to use a correctly selected spring.

Contact VALVULAS NACIONAL to check or supply the spring and a new nameplate.

Using a spring above its designed set pressure range may reduce disc lift and therefore discharge capacity, increasing overpressure in the protected equipment. Using a spring below its setting range may compromise its mechanical integrity and increase blowdown, making it more difficult for the valve to reclose after opening.

Before increasing the set pressure of an installed valve, verify that the new pressure is within its design pressure rating. Before reducing the set pressure, verify that discharge capacity at the new pressure is sufficient to protect the vessel.

Once certain that the spring is suitable for the new application, replace it as described in Section 6.

8 - MAINTENANCE

If the valve has operated with hazardous or contaminating fluids, decontaminate it before handling.

It is essential to follow the disassembly sequence below. Departing from this sequence may endanger personnel due to spring loading.

8.1 - DISASSEMBLY AND ASSEMBLY OF CONVENTIONAL VALVES

For assembly and disassembly, refer to the valve exploded views on page 18.

8.1.1 - DISASSEMBLY

First cut the certification seal. Unscrew the threaded cap anticlockwise.

For valves fitted with a lever cap, see Section 8.2 and Figures 5 and 6.

Before loosening the adjusting screw (11), record the distance between its top and the end of the spindle (9). This allows the screw to be returned to the same position during assembly.

Loosen the locknut (12), then release the spring (10) load by unscrewing and removing the adjusting screw (11).

Remove the bonnet (2) by unscrewing the nuts (24).

Never perform this operation unless you are completely certain that all spring load has been released.

Remove the spring (10) and spring washers (15).

Pull the spindle (9) to withdraw the assembly comprising the guide (8), disc holder (6) and disc (5). Unscrew the disc from the spindle to release the guide and disc holder/disc assembly. To remove the disc from its holder, remove the retaining ring (17).

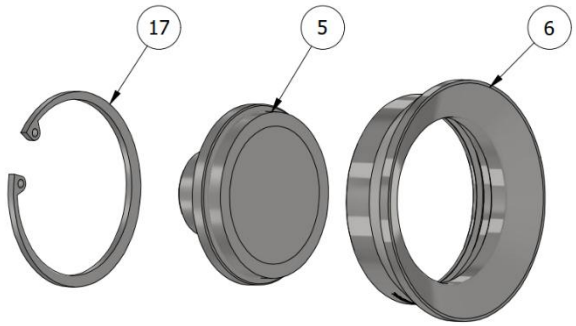


FIGURE - 3

8.1.2 - ASSEMBLY

Assemble the valve in the reverse order of disassembly.

Clean, inspect and recondition all parts, particularly sliding and rubbing surfaces.

During assembly, lubricate all threaded joints, the guide sliding surfaces and the spherical contact points that allow the internals to self-align. Refer to the application/temperature lubrication guide in ANNEX 1. See Figure 4.
NOT APPLICABLE FOR DEGREASED VALVES

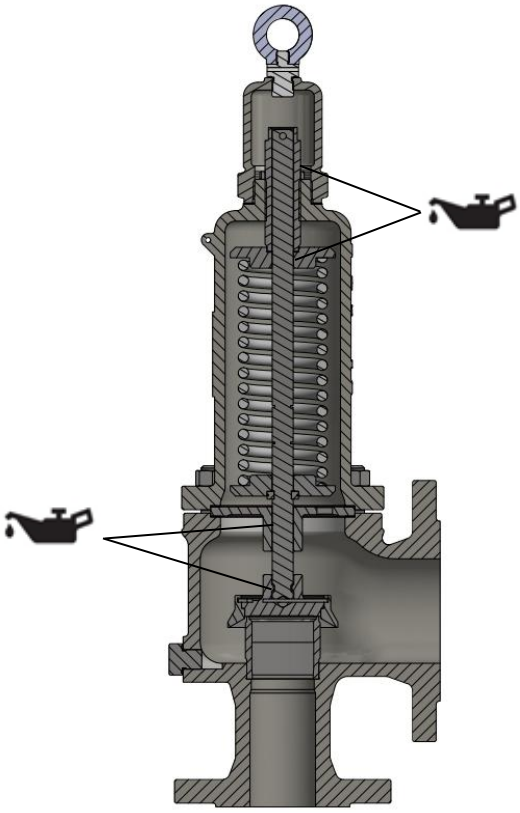


FIGURE - 4

Correct alignment of the internals is essential for proper valve operation.

Replace all gaskets with a complete new set. Reusing gaskets may cause abnormal operation, including leakage, communication between chambers or changes in opening lift.

To fit the disc into the holder, place the holder with its bell facing downwards, insert the disc and fit the retaining ring into its groove.

The seat and disc seating surfaces are lapped to a mirror finish. Assemble with extreme care to avoid impacts: even a very slight impact can leave marks and cause leakage, requiring disassembly and relapping.

Tighten the adjusting screw to the dimension recorded during disassembly. This avoids unnecessary pop tests and reduces the risk of marking the seating surfaces.

8.2 - DISASSEMBLY AND ASSEMBLY OF THE LEVER CAP

There are two cap types: open and packed. Each incorporates different components and therefore requires a different disassembly and assembly procedure.

8.2.1 - DISASSEMBLY

To remove the packed lever assembly, lower the lever (59) fully, unscrew the cap (51) and remove the assembly. See Figure 5.
Before unscrewing the nut (54), record distance “h” between the top nut and the end of the lever spindle (52). This ensures correct lever positioning during reassembly.

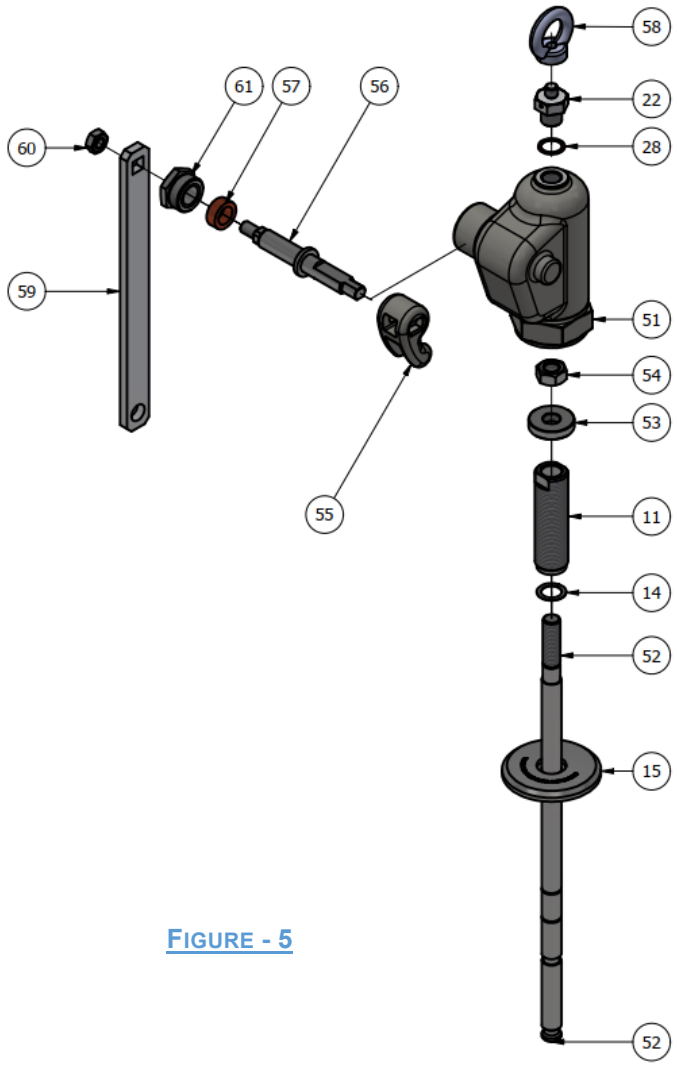


FIGURE - 5

11	ADJUSTING SCREW
14	THRUST WASHER
15	SPRING WASHER
22	TEST GAG PLUG
28	CAP GASKET
51	LEVER CAP
52	LEVER SPINDLE
53	FORK STOP
54	NUT
55	LEVER FORK
56	LEVER SHAFT
57	PACKING
58	LIFTING EYE
59	LEVER
60	NUT
61	PACKING GLAND

Loosen the nut (60) to release the lever (41) from the shaft (56). Remove the packing gland (61) and packing (57) from its housing. Pull out the shaft, bearing in mind that the fork (55) will become loose inside the cap.

To remove the open lever assembly, lower the lever (59) fully, unscrew the cap (51) and remove the assembly. See Figure 6.
Before unscrewing the nut (54), record distance "h" between the top nut and the end of the lever spindle (52). This ensures correct lever positioning during reassembly.

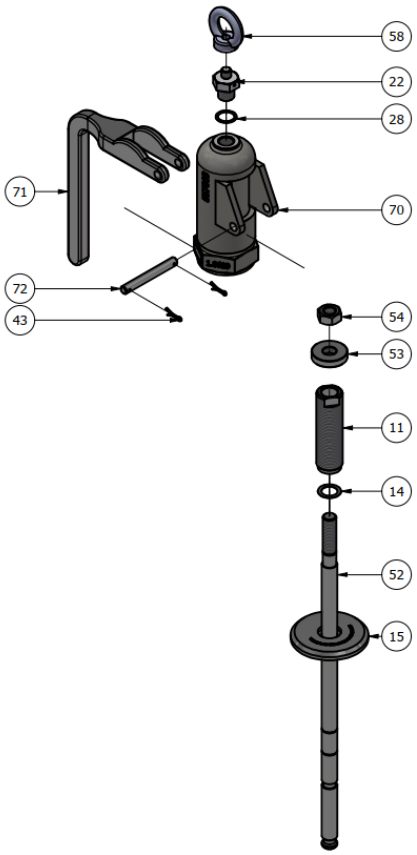


FIGURE - 6

11	ADJUSTING SCREW
14	THRUST WASHER
15	SPRING WASHER
22	TEST GAG PLUG
28	PLUG GASKET
43	SPLIT PIN
52	LEVER SPINDLE
53	FORK STOP
54	LOCKNUT
58	LIFTING EYE
70	LEVER CAP
71	OPEN CAP LEVER
72	OPEN CAP SHAFT

Remove one split pin (43) to withdraw the open cap shaft (72), releasing the open cap lever (71), then remove the lever.

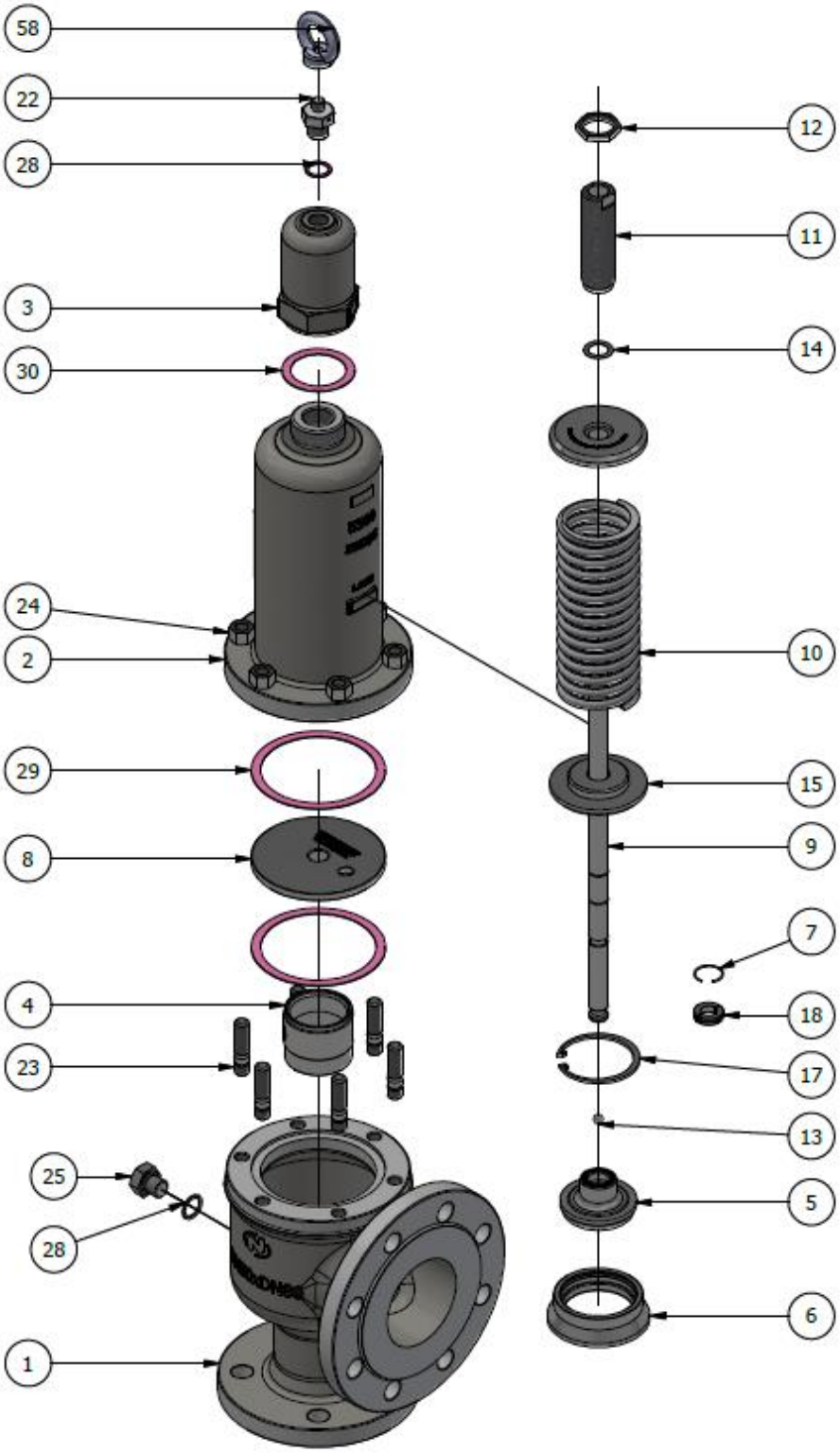
8.2.2 - ASSEMBLY

Packed lever cap: After inspecting, reconditioning and cleaning the parts, insert the lever fork (55) into the lever cap (51). Ensure that the cam faces upwards and insert the shaft (56) through the fork into its housing. Lightly lubricate the packing housing to facilitate insertion. Fit sufficient packing rings (57) so that, when tightened, the gland (61) does not bottom against the cap and the shaft is restrained laterally. After fitting the lever (59), some friction from the packing should be felt when operating it.

Open lever cap: After inspecting, reconditioning and cleaning the parts, insert the open cap lever (71) into the lever cap (70). Ensure that the fork stop (53) is above the lever (71). Insert the open cap shaft (72) into its housing and fit a split pin (43) at each end.

Refit the assembly to the valve in the reverse order of removal.
Never reuse packing rings: once compressed, they are unlikely to provide satisfactory tightness.

CONVENTIONAL SAFETY VALVES
MODEL 55



1	BODY
2	BONNET
3	CAP
4	SEAT
5	DISC
6	DISC HOLDER
7	CIRCLIP
8	GUIDE
9	SPINDLE
10	SPRING
11	ADJUSTING SCREW
12	LOCKNUT
13	BALL
14	THRUST WASHER
15	SPRING WASHER
17	RETAINING RING
18	SPLIT RING
22	TEST GAG PLUG
23	STUDS
24	NUTS
25	DRAIN PLUG
28	PLUG GASKET
29	GUIDE GASKET
30	CAP GASKET
58	LIFTING EYE

FIGURE - 7

8.3 - RECONDITIONING THE SEATING SURFACES

Safety valve seat tightness depends largely on the condition of the seating surfaces: the contact area between the seat (4) and disc (5).

If the safety valve leaks excessively and suitable equipment or experienced personnel are unavailable, return it to our facilities for a fully warranted overhaul and issue of the corresponding repair certificate.

8.3.1 - LAPPING THE SEATING SURFACES

Correct lapping of the seat and disc surfaces is essential to prevent leakage. Use suitable equipment and personnel with specific training for this operation.

If the seating surface is only slightly damaged, lapping alone will restore it to optimum condition.
If the seating surface is eroded or deeply marked by dirt, take the lightest possible facing cut on a lathe before lapping.

For manual lapping, use a special plate connected to a rotary drive that can be inserted telescopically into the valve body to reach the seat seating surface. Use the appropriate lapping cloths or compounds for the required finish. See Table 2.

Table - 2

GRIT	SIZE (μm)	FINISH TYPE	COMPOUND
400	15 ÷ 21	MEDIUM	SILICON CARBIDE SUSPENSION
800	7,5 ÷ 10,5	FINE	
1200	4 ÷ 6	MIRROR FINISH	DIAMOND POWDER SUSPENSION

In the standard procedure, reface the seating surfaces, then lap with a medium finishing compound. Once perfect flatness is achieved, use a separate lapping surface with a fine finishing compound. If the valve service requires greater tightness, finish with a diamond powder suspension to obtain a mirror-polished seating surface.

Lap the disc as follows:

Apply a thin layer of compound to the rotating lapping plate, selecting the grit for the required finish. Do not use the same surface for different finishes. Clean thoroughly after each lapping operation.

Place the part perfectly flat on the lapping surface. Apply light, even pressure and move it in a figure-of-eight pattern until the required finish is achieved. When using a lapping ring, use an oscillating motion.

When using a lapping ring, excessive compound may round the edges of the seat lip.

The essential conditions for successful lapping are:

A) A flat support surface for the lapping plate or ring.
B) A flat, polished lapping surface.
C) Clean lapping tools, workpiece and compound.
D) The correct compound grit for the required finish.
E) Smooth, even lapping motion, without vibration or sudden movement.
F) An operator properly trained in lapping techniques.

8.3.2 - MACHINING THE SEAT

Because the Model 55 seat is secured inside the body, machining the seat is not recommended. Incorrect parallelism or preparation of the seat surface may impair valve tightness.

8.3.3 - MACHINING THE DISC

To machine the seating surface, secure the disc in the lathe chuck without overtightening, to prevent distortion. Use a dial indicator to centre it, ensuring that the outside diameter and seating surface are aligned within 0.05 mm.

Machine the seating surface until all damage has been removed. Restore the lip to its original seating width.

Lap the seating area to a mirror finish in accordance with Section 8.3.1.

8.4 - TIGHTENING TORQUE FOR BODY/BONNET AND BONNET/CAP FASTENERS

The following table lists recommended nut tightening torques according to fastener material grade. B8M is used as the reference material because it has the lowest mechanical strength. The torques include an additional tightening allowance to ensure gasket tightness, taking account of spring preload in all possible configurations. The torque applies to each individual fastener.

TIGHTENING TORQUE (Nm) BODY/BONNET							
INLET	OUTLET	OUTLET CLASS	THREAD SIZE	NUMBER OF BOLTS	BOLT MATERIAL	GASKET MATERIAL	TIGHTENING TORQUE (Nm)
DN-20	DN-32	PN16	M8	4	B8M	Graph+316	12
DN-25	DN-40	PN16	M10	4	B8M	Graph+316	16
DN-32	DN-50	PN16	M10	4	B8M	Graph+316	20
DN-40	DN-65	PN16	M12	6	B8M	Graph+316	25
DN-50	DN-80	PN16	M12	6	B8M	Graph+316	30
DN-65	DN-100	PN16	M12	6	B8M	Graph+316	40
DN-80	DN-125	PN16	M14	8	B8M	Graph+316	50
DN-100	DN-150	PN16	M16	8	B8M	Graph+316	60
DN-125	DN-200	PN16	M18	8	B8M	Graph+316	65
DN-150	DN-250	PN16	M20	8	B8M	Graph+316	75

TIGHTENING TORQUE (Nm) DRAIN PLUG/CAP PLUG/TEST-GAG			
THREAD SIZE	BOLT MATERIAL	GASKET MATERIAL	TIGHTENING TORQUE (Nm)
⅜" G	B8M	Graph+316	25
½" G	B8M	Graph+316	45
¾" G	B8M	Graph+316	145

9 - SET PRESSURE ADJUSTMENT ON THE TEST BENCH

All testing and adjustment must be performed by personnel trained in safety valve operation and the associated test hazards.
Wear suitable eye and hearing protection whenever the valve is pressurised.
Never stand in front of the outlet flange while the valve is pressurised.

9.1 - GASES AND VAPOURS

If a test bench is unavailable, set pressure testing may be performed using a vessel pressurised with air or nitrogen, preferably with sufficient cushioning volume to prevent seating surface damage when the valve pops.

Preferably connect the valve directly to the vessel through an isolation valve. The connecting pipe must have an internal diameter of at least 8 mm.

The test may be performed in either of two ways:

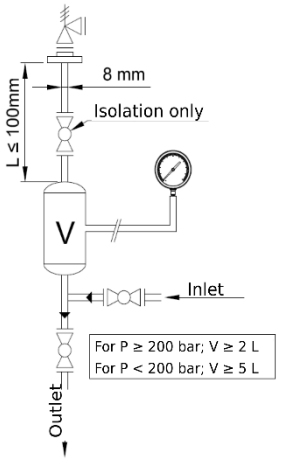
A) Increase the valve inlet pressure until continuous fluid leakage is detected as a hissing or unexpected rushing sound.

B) Increase the valve inlet pressure until the valve pops. To obtain this action.

If performed correctly, both methods give practically identical results.

Test (B) requires a larger vessel to prevent seating surface damage and greater care in securing the valve.

ILLUSTRATIVE SCHEMATIC



Thoroughly blow clean all test bench connections and piping before fitting the valve, to remove dirt that could settle on and damage the seating surfaces.

9.2 - LIQUIDS

Set pressure testing of liquid-service valves (55LC) is performed with clean water at ambient temperature.

An accumulator vessel is normally unnecessary, but an air/water pulsation dampener is essential when using a reciprocating pump.

The set pressure is identified when a continuous, fully vertical stream of water flows from the valve outlet flange.

9.3 - TEMPERATURE AND BACK PRESSURE CORRECTION

For conventional valves intended to operate above 100 °C and/or with back pressure other than atmospheric pressure, apply temperature and/or back pressure corrections when adjusting the set pressure on a test bench at ambient temperature and atmospheric outlet pressure.

Apply the correction factor in Table 3 to the set pressure of valves intended for fluid temperatures above 100 °C.

Table - 3

OPERATING TEMPERATURE	SET PRESSURE INCREASE
UP TO 100 °C	0 %
101 °C TO 250 °C	2 %
251 °C TO 500 °C	3 %
ABOVE 500 °C	5 %

Apply the temperature correction factor above even if the set pressure has already been corrected for discharge back pressure.

The pressure at which the valve is tested on the bench, known as the cold differential test pressure (CDTP), is the inlet pressure at which the valve opens on the test bench at ambient temperature and atmospheric outlet pressure.

To calculate the cold differential test pressure accurately, take account of the required process opening pressure, the increase for temperatures above 100 °C and any back pressure other than atmospheric pressure.

Example of calculating cold differential test pressure with back pressure and temperature corrections:

DATA: Conventional valve, set pressure 20 bar, process temperature 260 °C, constant back pressure 1 bar, steam service.

Cold differential test pressure adjustment:

20 bar – 1 bar = 19 bar.

The temperature correction table requires a 3% correction factor because the temperature is between 251 °C and 500 °C:

3% of 19 bar = 0.57 bar (rounded to 0.6 bar).

The cold differential test pressure to be set on the bench is therefore:

19 bar + 0.6 bar = 19.6 bar.

If the valve opens below or above the set pressure, adjust the spring as follows:

A) Remove the cap (3), or (39) if the valve has a lever.
B) Loosen the locknut (13) to release the adjusting screw (11). Turn it clockwise to increase the opening pressure or anticlockwise to decrease it.
C) Once the required set pressure is achieved, tighten the locknut and refit the cap.

Set pressure adjustment tolerances are ±0.15 bar for pressures up to and including 4.8 bar, and ±3% for pressures above 4.8 bar.

Never adjust the set pressure while the valve is pressurised. Rotation may damage the seat and disc seating surfaces.

10 - SEAT TIGHTNESS TESTING

For both gas/vapour and liquid-service valves, perform seat tightness testing after setting the pressure, using the same test fluid.

For valves set above 3.5 bar, the inlet pressure for seat tightness testing is 90% of the set pressure. For valves set at or below 3.5 bar, the test pressure is 0.35 bar below the set pressure.

Take particular care during this test. The pressure is close to the opening pressure and unexpected valve opening may endanger the operator.

10.1 - SEAT TIGHTNESS TESTING WITH AIR

Figure 8 shows the test method for valves intended for gas or vapour service.

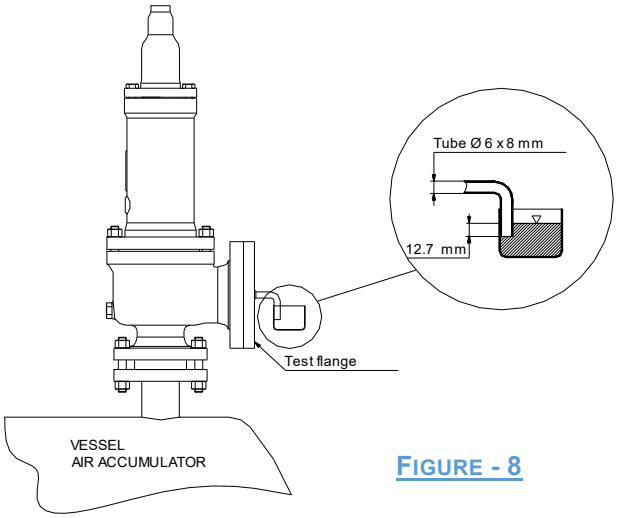


FIGURE - 8

Blank off the valve outlet with a flange whose only outlet is a tube with a 6 mm internal diameter and 1 mm wall thickness, bent through 90°, with its end immersed 12.7 mm below the water surface in a container.

Set the seat tightness test pressure as described in Section 8. Maintain it for 1 minute for valves DN 50 (2 in.) or smaller, 2 minutes for DN 80 and DN 100 (3 and 4 in.), and 5 minutes for DN 150 (6 in.) or larger. Then count the bubbles produced over 1 minute. The test is acceptable if the limits in Table 4, as recommended by API RP 527, are not exceeded.

Table - 4

VALVE SET PRESSURE IN barg AT 15.6 °C	ALLOWABLE LEAKAGE IN BUBBLES PER MINUTE	
	ORIFICES "C" TO "F"	ORIFICES "G" TO "T"
FROM 1 TO 69	40	20
UP TO 103	60	30
UP TO 130	80	40
UP TO 172	100	50
UP TO 207	100	60
UP TO 276	100	80
UP TO 385	100	100
UP TO 414	100	100

10.2 - SEAT TIGHTNESS TESTING WITH WATER

Before setting the seat tightness test pressure, fill the body with water. Once the level stabilises and water stops flowing from the outlet flange, set the test pressure as described in Section 8.
With the test pressure set, collect any water dripping from the outlet in a container for 1 minute. Leakage must not exceed 10 cm^3 per hour for each 25 mm of nominal valve diameter (API RP 527).

10.3 - EXCESSIVE LEAKAGE

If a correctly performed seat tightness test shows excessive leakage, disassemble the valve to check for dirt or foreign matter between the seat and disc and any resulting seating surface damage.

If leakage is caused by contamination from the test fluid, clean the seating surface with cellulose tissue or another non-abrasive material soaked in solvent. If the surface is marked, relap or recondition it as described in Section 6.4, according to the depth of the marks.

11 - TEST PRESSURE GAUGES

Measure pressure using periodically inspected and calibrated gauges with the corresponding calibration certificates, as specified in ANSI B40.1, Grade A.

Select the test gauge so that the test pressure lies between 25% and 75% of full scale. An error not exceeding 1% of the measurement range is acceptable.

12 - ATEX-MARKED VALVES

All safety valves supplied for installation in potentially explosive atmospheres comply with Directive 2014/34/EU (ATEX). They are classified as Group II, Category 2, and bear a nameplate with the following marking:

II 2G – Ex h IIC Tx G

For valves with temperatures above 450 °C, Tx is the maximum valve temperature and the designation Tx is omitted. Example at 475 °C:

II 2G – Ex h IIC 475ºC Gb

TX / (Ty)	*TEMPERATURE RANGE T (°C)*
	T>450º
T6 … T1	300º<T≤450º
T6 … T2	200º<T≤300º
T6 … T3	T≤200º

12.1 - SAFETY RECOMMENDATIONS

To prevent ignition hazards, observe the following recommendations:

a) Prevent dust from accumulating on the valve casing.
b) Keep the protective paint coating in perfect condition: rust subjected to impact or rubbing presents a high ignition risk.

c) Ensure that the valve remains electrically bonded to the system earth. Successive maintenance paint layers can form an insulating film that promotes static electricity accumulation. If not properly dissipated, this may produce discharges capable of ignition.

d) When installing or removing valves, do not use tools that may produce sparks during use or handling.

TROUBLESHOOTING TABLE		
FAULT	**POSSIBLE CAUSE**	**SOLUTION**
Excessive leakage	Dirt between the seat and disc.	Pop the valve once or twice and check. If leakage persists, disassemble and clean the internals.
	Marked or scratched seating surfaces.	Disassemble the valve and lap the seat and disc.
	Valve used with a fluid for which it was not designed.	Lap the seat and disc to a very fine finish (typical of valves designed for liquid service but used for gas service).
	Valve not installed vertically.	Correct the installation. Always install the valve vertically.
	Set pressure too close to operating pressure. Leakage may occur when operating pressure exceeds 90% of set pressure.	Increase the set pressure to obtain a minimum 10% differential. If this is not possible, modify the seating surfaces (Stellite hardfacing, extra-fine lapping, etc.).
Valve opens at a pressure other than its set pressure	Variable back pressure.	For conventional valves, check that the discharge header is at least the same size as the safety valve outlet and/or that there are no obstructions.
	Back pressure differs from the original specification.	Reset the valve to account for the actual back pressure (conventional valves).
	Adjusting screw locknut loose.	Retighten the locknut securely after resetting the valve.
	Misaligned valve internals.	Pop the valve two or three times to allow it to self-align.
Chattering (rapid, repeated opening and closing)	Excessive turbulence at the valve inlet.	Modify the valve installation.
	Oversized valve.	Recalculate and install the correct valve size.

NOTES

For valves with welded connections, the instructions in this document apply, with references to inlet or outlet flanges understood to mean inlet or outlet weld connections, respectively.

ANNEX 1

LUBRICATION CHART FOR SAFETY VALVE ASSEMBLY AND MAINTENANCE

LUBRICANT TYPE	
3	WEICON Anti-Seize (Nickel) High-Tech Assembly Paste or equivalent
4	MOLYKOTE® D-321 R Anti-Friction Coating (spray) or equivalent
5	WEICON PTFE Spray or equivalent
6	No lubrication (self-lubricating steel couplings or joints, or special anti-friction treatments).

LUBRICATION POINTS	
A	Joints tightened by rotation and all threaded parts, excluding the blowdown adjustment thread and screw heads.
B	Parts sliding against each other, e.g. the mating and sliding surfaces between the guide, spindle and guide pin, and spherical surfaces.

STANDARD SERVICE LUBRICATION CHART

Lubrication point	Set pressure	Operating temperature		Relieving temperature	LUBRICANT
	bar_g	T min [°C]	T max [°C]	T max [°C]	
A	All ranges				3
B	> 0.1	-180	≤ 450	≤ 450	4
			≤ 250	≤ 250	5
		< -180	All ranges	All ranges	6

CLEAN / OXYGEN SERVICE LUBRICATION CHART

Lubrication point	Set pressure	Operating temperature		Relieving temperature	LUBRICANT
	bar_g	T min [°C]	T max [°C]	T max [°C]	
A	All ranges				5
B	> 0.1	-180	≤ 250	≤ 250	5
		All other ranges			6

Application of lubricants.

Application of lubricating greases.

Lubrication of point A: Apply a thin, even layer of grease, preferably with a brush, covering the entire thread surface.

Application of dry-film lubricant spray.

Lubrication of point A: Degrease all threaded parts beforehand to prevent organic contamination (remove any other grease or oil). Once the surface is thoroughly degreased, apply the spray evenly and allow it to dry completely (5 min at room temperature) before assembling the parts.

Lubrication of point B: Thoroughly degrease all sliding parts as described above. After degreasing, follow the same procedure as for point *A*.





C/ Compositor Vivaldi, 2 - 8
Polígono Industrial Can Jardí
P.O. Box 123
08191 Rubí – Barcelona
Tel.: +34 936 995 200 / +34 936 995 150
Fax: 936 974 556
e-mail: comercial@valvulasnacional.com