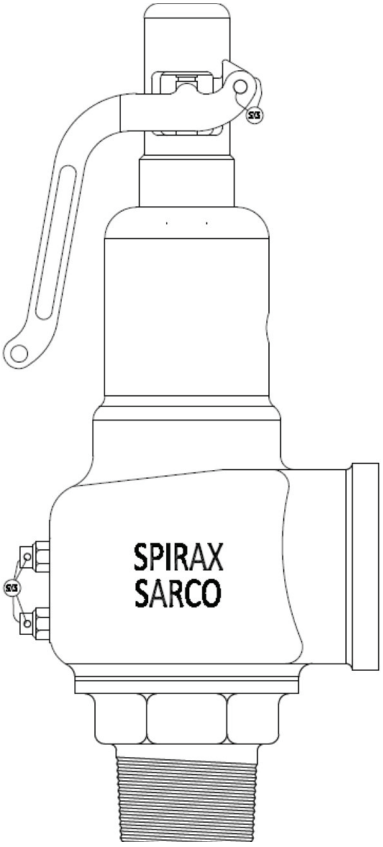
IM-P276-05
CTLS Issue 1

spirax sarco

SV568H
Safety Valve
Installation and Maintenance Instructions



1. Warranty

Spirax Sarco warrants, subject to the conditions described below, to repair and replace without charge, including labor costs, any components which fail within 1 year of product delivery to the customer. Such failure must have occurred because of defect in material or manufacturing and not as a result of product not being used in accordance with the instructions of this manual.

This warranty does not apply to products which require repair or replacement due to normal wear out or products that are subject to accident, misuse or improper maintenance.

Spirax Sarco only obligation with Warranty is to repair or replace any product that we consider defective. Spirax Sarco reserves the right to inspect the product in customer installations or request the return of the product with freight prepaid by the buyer.

Spirax Sarco may replace or repair any parts that are deemed defective without further responsibilities. All repairs or services executed by Spirax Sarco, which are not covered by this warranty, will be charged according to the current price list.

THIS IS THE ONLY SPIRAX SARCO WARRANTY TERM AND ONLY HEREBY SPIRAX SARCO EXPRESS. BUYER DISCLAIMS ALL OTHER WARRANTIES IMPLIED BY LAW, INCLUDING ANY MARKET WARRANTY FOR A PARTICULAR PURPOSE

2. General safety information

2.1 Access
Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

2.2 Lighting
Ensure adequate lighting, particularly where detailed or intricate work is required.

2.3 Hazardous liquids or gases in the pipe
Consider what is in the pipeline or what may have been in the pipeline at some previous time.
Consider; flammable materials, substances hazardous to health, extremes of temperature.

2.4 Hazardous environment around the product
Consider; explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

2.5 The system
Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk? Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

2.6 Pressure systems
Ensure that any pressure is isolated and safely vented to atmospheric pressure.
Consider double isolation (double block and bleed) and the locking or labeling of closed valves.
Do not assume that the system has depressurized even when the pressure gauge indicates zero.

2.7 Temperature
Allow time for temperature to normalize after isolation to avoid danger of burns.

2.8 Tools and consumables
Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

2.9 Protective clothing
Consider whether any protective clothing required by yourself and / or others in the vicinity to protect against the hazards of, for example, chemicals, high / low temperature, noise, falling objects, and dangers to eyes and face.

2.10 Permits to work
All work must be carried out or be supervised by a suitably competent person. Post 'warning notices' if necessary.

2.11 Electrical works
Before starting work study the wiring diagram and wiring instructions, and check any special requirements. Consider special emphasis on primary and phase source, local isolation of the major systems, fuse requirements, grounding, special cables, cable entries and electrical voltage selection.

2.12 Commissioning
After installation or maintenance, ensure that the system is working properly. Perform tests on all alarms and protective devices.

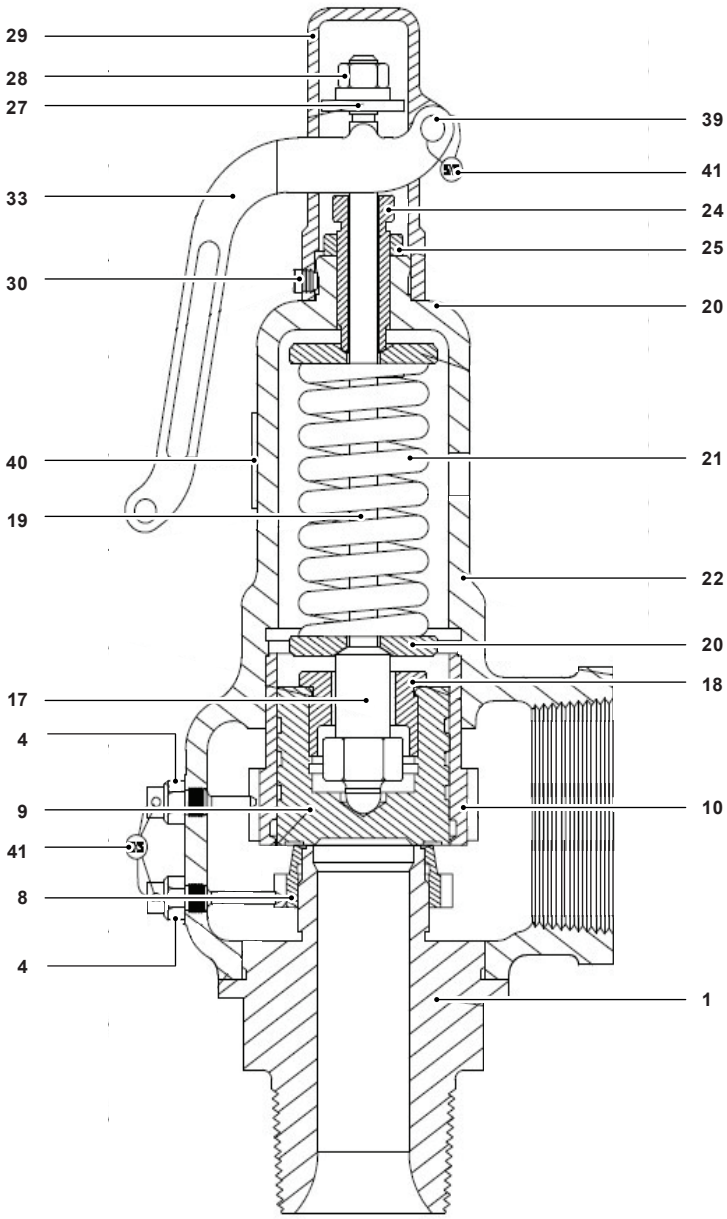
2.13 Storage
Equipment and materials shall be stored in a proper place and securely.

2.14 Disposal
Unless otherwise stated in the Installation and Maintenance Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken.

2.15 Additional information
Additional information and help is available worldwide at any Spirax Sarco service centre.

3. Materials

Part	Description
1	Body (Base)
8	Lower adjustment ring
4	Lower locking screw
5	Upper Locking Screw
9	Disc (Spare parts recommended for 2 years of operation)
10	Upper Adjustment Ring
17	Rod end (holes F /G / H and J)
18	Stem retainer
19	Stem
20	Spring support
21	Spring (Spare parts recommended for 2 years of operation)
22	Bonnet
24	Adjusting screw
25	Locking nut
27	Lever disc
28	Nut
29	Cap
30	Cap screw
33	Lever
39	Lever pin
40	Nameplate
41	Seal


29
28
27
33
30
40
19
17
4
9
41
8
4
39
41
24
25
20
21
22
20
18
10
1

3. Introduction

SV568H Valves meet the requirements of ASME Code Section VIII and XIII. These valves must not be used in equipment designed in accordance with ASME Section I.

Proper storage, handling, installation and testing of valves, ensuring performance is consistent with the product specifications.

This manual contains basic concepts of storage, installation, operation and maintenance of Safety Relief Valves SV568H, but does not replace the expertise and experience required for the execution of repair and maintenance of valves.

4. Terminology

4.1 Safety Valves
Automatic pressure relief device characterized by an instantaneous opening ("pop") upon reaching the set pressure. Used in service with compressible fluids (gases and vapors).

4.2 Relief Valves
Automatic pressure relief device characterized by a progressive opening proportional to the pressure increase above the set pressure opening. Used in service with incompressible fluids (liquids).

4.3 Safety relief valves
Automatic pressure relief device, suitable for working as a safety or relief valve, depending on the desired application.

4.4 Maximum Allowable Working Pressure (MAWP)
It is the maximum working pressure of a vessel, according to the design code, the strength of the materials used, the equipment dimensions and its operating parameters.

4.5 Operating Pressure
It is the pressure at which the vessel is subject to normal operating conditions. A reasonable margin must be established between the operating pressure and maximum allowable working.
For safe operation, the operating pressure must be at least 10% less than the MAWP, or 0.34 bar(g), whichever is greater.

4.6 Opening Pressure (Set Pressure)
This is the gauge pressure at which the valve is set to open.

4.7 Cold Differential Test Pressure
It is the pressure at which the valve is set to open on the test bench. This pressure includes corrections for service conditions (back pressure and / or temperature).

4.8 Relief pressure
It is the pressure at which the valve relieves the maximum capacity for which was dimensioned. It is equal to the opening pressure plus overpressure.

4.9 Overpressure
The pressure increase over the set pressure of the relieving device. Overpressure is expressed in pressure units or as a percentage of set pressure.

4.10 Accumulation
It is the increase in pressure above the MAWP of the vessel during discharge of the safety device, expressed as a percentage of that pressure. Overpressure is the same as accumulation only when the relieving device is set to open at the maximum allowable working pressure of the vessel.

4.11 Closing pressure
Is the pressure at which the Safety and Relief Valve closes, returning to its original position after the operational normality is restored, and is equal to the opening pressure minus the blowdown.

4.12 Blowdown
The difference between the set pressure and the closing pressure of a pressure relief valve, expressed as a percentage of the set pressure or in pressure units.

4.13 Lift
The actual travel of the disc from the closed position when a valve is relieving.

4.14 Relieving Capacity
It is the flow of a determined fluid that a valve is able to relieve in the operating conditions in which it was sized.

4.15 Coefficient of Discharge
It is the quotient of the actual capacity (measured in laboratory) divided by the theoretical capacity.

4.16 Back pressure

Is the pressure in the outlet connection of the Safety and / or Valve relief, it may be:

4.16.1 Superimposed back pressure

4.16.1.1 Constant

When there is no pressure variation on the discharge side of the valve at any operating condition, with the valve closed.

4.16.1.2 Variable

When there is variation in pressure on the discharge side of the valve prior to opening.

4.16.2 Build-up back pressure

The increase in pressure at the outlet of a pressure relief device that develops as a result of flow after the pressure relief device opens.

4.17 Simmer

The audible or visible escape of compressible fluid between the seat and disc of a pressure relief valve which may occur at an inlet static pressure below the set pressure prior to opening.

4.18 Chatter

Abnormal condition characterized by rapid openings and closings in succession, causing serious damage to the valve.

5. Storage and handling

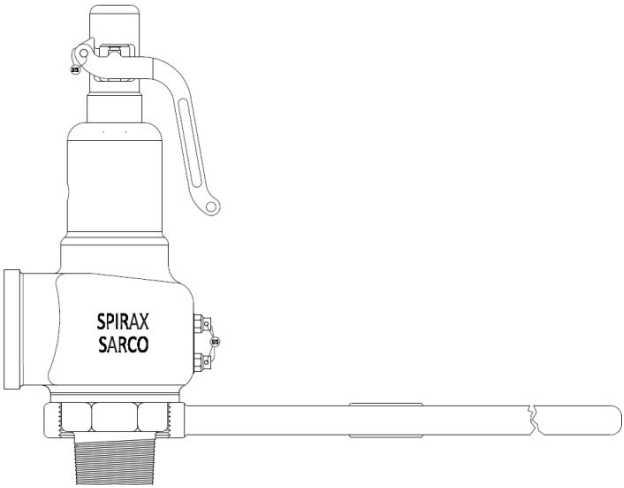
- The storage should always be done in the original packaging with valves standing in the upright position.
- Store the valves in covered, clean and dry environment. The protection of input and output connections prevents the entry of impurities inside the valve; remove them only at the moment of installation.
- When moving them, avoid vibrations, sudden shocks and heavy impacts, keeping them in an upright position, with the entry down.
- Never carry or move the valves using the test lever

6. Installation

6.1 General requirements

- It is recommended that the valves be inspected before installation for calibration and tightness. To do this, use a bench suitable for testing with vapour, compressed air or inert gas (See 7.6). Tests must be carried out by qualified professionals in the presence of an equipment inspector.
- Make sure that the equipment to be protected has undergone a purging process to remove all debris and particles, such as weld residue, pieces of gasket or any other solid materials. Please note that any impurities that get lodged between the sealing surfaces or even pass between them at high speed will cause grooves and marks that will cause the valves to leak.
- Safety Valves must be serviced periodically to ensure their satisfactory performance. To do this, they need to be installed in easily accessible areas. A working area must be provided around and above the valves so that the adjusting rings and the adjusting screw can be accessed. If two or more valves are installed in close proximity, the outlets must be parallel to provide protection for maintenance personnel and personnel working in the vicinity of the valves.
- Safety Valves must always be lifted in the vertical position, and can be lifted with a cable attached around the bonnet and outlet neck. Under no circumstances should the valve be lifted by the test lever.
- Safety valves must not be shocked or dropped during installation. If this happens, it must be inspected on a test bench to check the opening pressure and seal.
- Make sure that the threads of the fittings comply with the specifications of the pipework. Studs and nuts must be lubricated with an appropriate lubricant. In the case of threaded connections, when required by the thread construction standard, use sealants appropriate for the operating conditions.
- Valves with threaded connections must be installed using the body (1) as the location for the . Never use the bonnet (22) or its thread as the location for the spanner, as this will affect the opening pressure and performance of the valve (Figure 1).

Fig. 1



- Install discharge piping using the same procedures used in the valve installation.
- Prior to completing the installation, a visual check should be made to ensure that the valve lifting lever is free to operate.
- Valves with bellows should have the plastic cap removed from castle vent during installation.
- After installation, an inspection of the valve should be made to confirm that all adjustment components are properly locked and sealed, as required by ASME Section VIII UG126 (c) and Standard NR-13.
- Safety Relief Valves operating under the best possible conditions (with favorable operating cycles, relatively stable ambient temperatures and no dirt) provide the maximum level of security, tightness and reliability.

6.2 Inlet pipework

- Safety valves used in services with gases or vapours must be installed in the vessel, in the vapour/gas area above the level of any liquid contained, or in the piping connected to this area of the vessel to be protected (ASME code Section VIII, UG135(a)) (Figure 2).

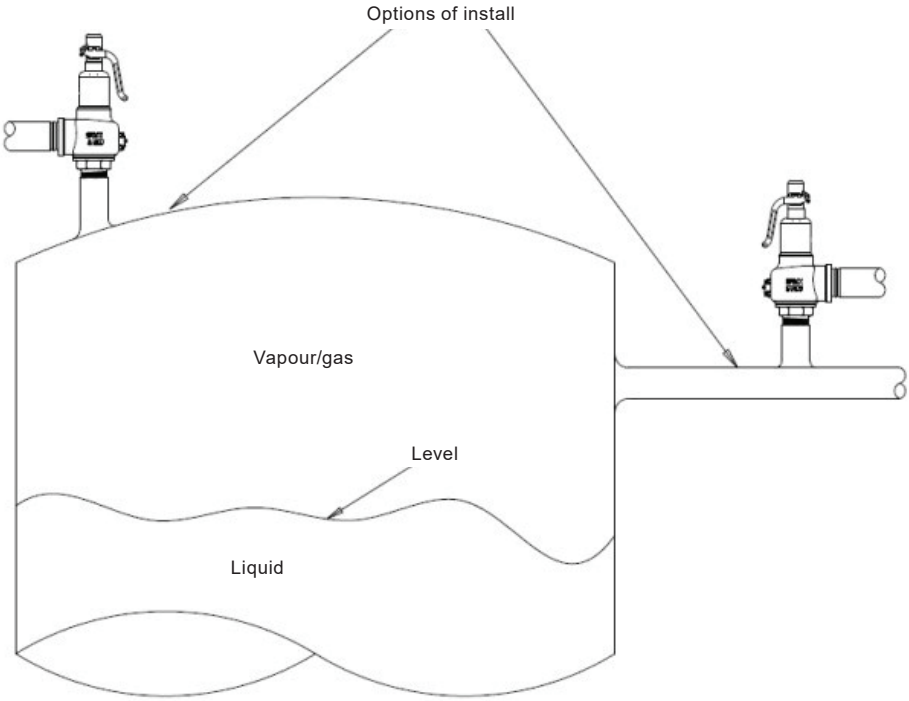


Fig. 2

- Safety valves must be installed in a vertical upright position (+/- 1º) in a pipe with a nominal diameter equal to or greater than the valve inlet diameter.
- The corners of the valve connection nozzles must be rounded with a radius greater than ¼ of the diameter of the opening.
- A shutoff valve may be installed between the Safety and Relief Valve and the protected equipment, provided they meet the recommendations of API RP 520 Part 2, of the ASME Code Section VIII UG135 (d) and of Appendix M of the same code.

  If installed, the shutoff valve must be full bore and have a nominal diameter equal or greater than the Safety and Relief Valve inlet diameter.

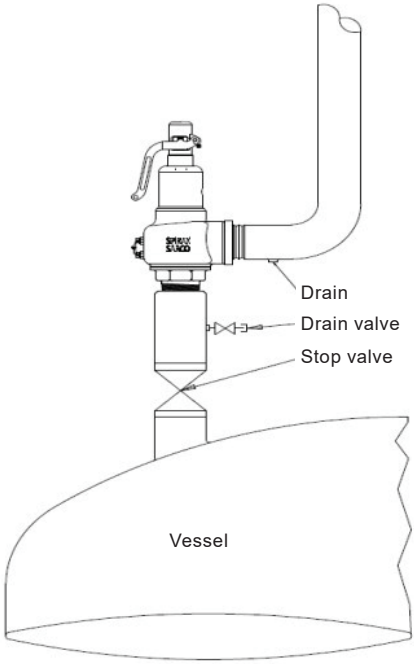


Fig. 3

- The inlet of a safety valve should not be positioned at the end of a horizontal pipe in which there is normally no flow. Foreign materials or liquids can accumulate, which can become trapped and interfere with the valve's operation or cause it to be serviced more frequently.
- Excessive pressure loss at the inlet of the safety valve will cause extremely rapid opening and closing of the valve, which is known as “chattering”. Chattering may result in lowered capacity as well as damage to the seating surface of the valve. Severe chattering can cause damage to other parts of the valve. Pressure drop from the protected equipment to the Safety and Relief Valve shall not exceed 3% of set pressure when the valve is relieving the maximum flow rate for which it was sized.
- To reduce the effects of excessive turbulence at the entrance of Safety Relief Valves, the following recommendations should be observed.
- Safety valves should be installed at least eight to ten pipe diameters downstream from any bend in a steam line. This distance should be increased when the valve is installed on the horizontal section of a header which is preceded by an upward section.
- Safety valves should not be installed closer than eight to ten pipe diameters either upstream or downstream from a diverging, or a converging, “Y”.
- Safety valves should never be installed, in a steam line, in a position directly opposite to a branch line.

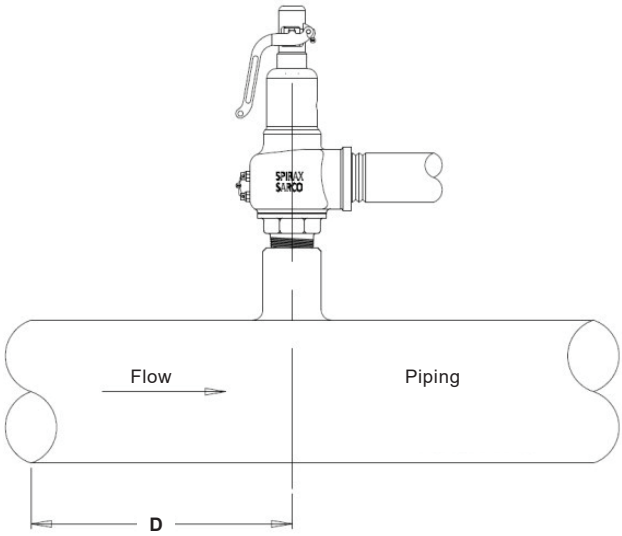


Fig. 4

- The effects of vibration and reaction force resulting from the valve discharge on all valve and discharge pipe components must be taken into account when designing the system.
- Excessive vibration in line produces changes in the Safety and Relief Valve set pressure, it also may cause leakage in the valve. Ways to eliminate this problem before installation should be studied.
- ASME Section VIII code requires that the design of the inlet connection consider the stress conditions that occur due to reaction forces during valve operation, external loads, vibration and loads resulting from thermal expansion of the discharge pipe.
- The calculation of reaction force during valve relief is responsibility of the designer of the vessel and / or piping. Spirax Sarco can provide this information only as technical assistance and does not assume any responsibility for its application.
- External loads resulting from support systems and poorly designed piping may be the cause of excessive stresses and distortion in the valve and inlet pipe. The accumulation of stress may cause the valve to malfunction or leak.
- Vibrations in the inlet piping systems may cause leaks, premature wear of certain parts of the valve and / or pipe failure by fatigue. The high frequency vibrations cause more damage to the tightness of Safety and Relief Valves than low frequency. This effect can be minimized, allowing a greater difference between the operating pressure of the system and the opening pressure of the valve, especially under conditions of high frequency.

6.3 Outlet pipework

- The discharge area of the outlet piping from a safety valve should not be less than the area of the outlet connection. Where more than one safety valve is connected to a common outlet pipe, the area of the pipe should not be less than the combined area of the outlet connections to the safety valves.
- All safety valve discharges should be piped so that the effluent is discharged clear from running boards or platforms. Ample provision for gravity drain should be made in the discharge pipe at, or near, each safety valve where water, or condensation, may collect. Each valve has an open gravity drain through the body, below the level of the valve seat, and this drain should be piped to a safe discharge area.
- A shut off valve may be installed at the outlet connection, provided it meets the recommendations of API RP 520 Part 2, of the ASME Code Section VIII UG135 (d) and of Appendix M of the same code. If installed, the shutoff valve must be full bore and have a nominal diameter equal or greater than the Safety and Relief Valve outlet diameter (Figure 05).

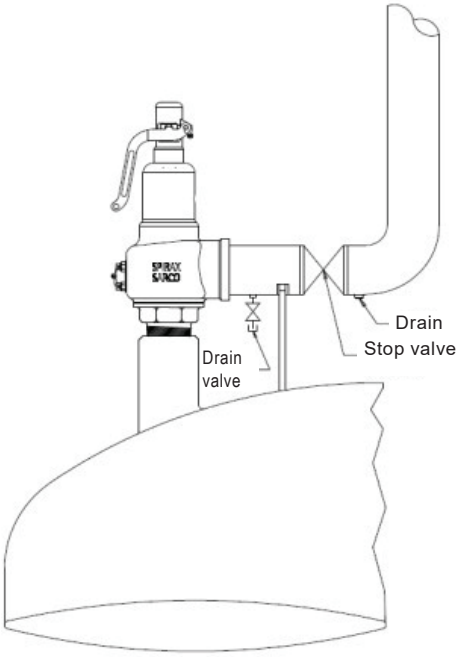


Fig. 5

- If a silencer is installed at the outlet of the valve, the area of the silencer shall be sufficient to prevent back pressure from interfering in the operation and in the valve relief capacity. The silencer or other necessary components shall be constructed so as not to allow the formation of corrosion deposits that may cause restrictions to process fluid passage.
- The discharge pipe must be installed so that no undue stress is imposed to the Safety and Relief Valve. Excessive stress may cause body distortions and leakage. To avoid them, the following recommendations should be observed:
- **1.** The discharge pipe should not be anchored to the valve. The maximum weight on the valve outlet should not exceed the weight of a short radius elbow with flange, plus a small vertical tube compatible with the valve connection
- **2.** It must be ensured that the thermal expansion of the brackets and piping system will not produce tensions on the valve. Spring Holders are recommended where needed.
- **3.** The discharge pipe should be designed to allow for expansion of the vessel as well as its own. This is especially recommended for long pipelines.
- The movement of the discharge pipe as a result of wind loads must be taken into account, as the continuous oscillation of the pipe introduces stresses into the valve, which can cause leaks.
- The discharge pipework must be designed to limit the total back pressure to a maximum of 10 per cent of the valve's opening pressure, or 2.1 barg, whichever is lower.

7. Maintenance and testing

SV568H valves model can be easily disassembled for inspection, maintenance or parts replacement.

- The period for maintenance of each valve shall meet at least the requirements of NR13 Standard for the protected equipment; the specific characteristics of the process and operating conditions shall also be considered.
- Before disassembling or removal of the valve for maintenance, make sure that the equipment or process line is depressurized.
- Safety and Relief Valves might be installed on vessels or equipment containing hazardous materials. Decontaminate and clean the valve before disassembly, following applicable recommendations for cleaning and decontamination of the vessel or equipment

7.1 Dismantling

7.1.1 Remove the lever pin (39) and remove the lever (33). Loosen the hood screw (30) and remove it.

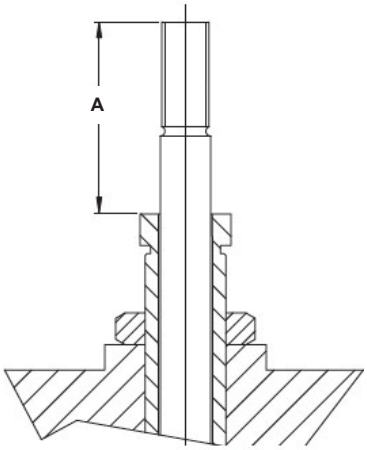


Fig. 6

7.1.2 Remove the lock nut (28) and the lever disc (27).

7.1.3 Make a note of dimension A, as shown in Figure 06. You will need this information to position the adjusting screw (24) when reassembling the valve.

7.1.4 Loosen the locking nut (25) and turn the adjusting screw (24) anti-clockwise. -time to fully decompress the spring (21)

7.1.5 Remove the upper and lower locking screws (5)(4). Remove the (22) by attaching the body (1) and turning the bonnet anti-clockwise.

7.1.6 Remove the spring and support assembly (21) (20).

7.1.7 Remove the stem (19) and disc (9) assembly by pulling the stem up vertically. Protect the sealing surface of the disc.

7.1.8 To remove the disc from the stem, secure the disc by protecting the outer diameter and remove the stem retainer (18) by turning it anti-clockwise, releasing the stem and stem terminal assembly (17).

7.1.9 Remove the upper adjusting ring (10) from the inside of the bonnet by turning it anti- clockwise.

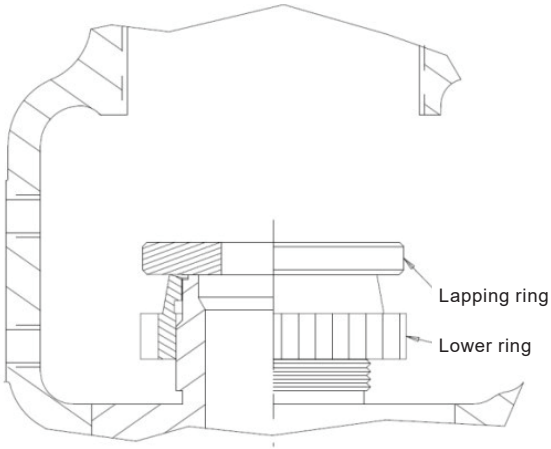


Fig. 7

7.1.10 Place a lapping ring on the sealing surface of the body (01), taking care not to alter the position of the lower ring.
Turn the lower adjustment ring anti-clockwise and count the number of notches until it comes into contact with the lapping ring (Figure 07). Make a note of this information as it will help you position the lower ring in the same position as before disassembly.

7.1.11 Remove the lower adjusting ring from the body.

7.1.12 The valve is ready for cleaning and inspection.

7.2 Cleaning

The parts should be cleaned using sandpaper and a suitable solvent. During the cleaning process special attention must be take to the seating surfaces, guided surfaces and threads. Remove any encrustations from the bonnet (22) by scraping, wire brushing or if necessary, sand blast. It is not recommended to use sand blast for cleaning the internal parts of the valve.

7.3 Inspection

Carefully inspect each internal valve component, noting any defects such as cracks, corrosion, excessive wear or other mechanical defects. For the following parts some details must be observed:

7.3.1 Body (1)

Look for cuts, nicks or other damage on the seating surface. The threads of the blowdown ring and of fixation to the body must be in good condition without abrasions, tears or other damage. Verify if the nozzle has defects like cracks (w / dye penetrant) and/or severe corrosion.

After re-machining, if necessary, and lapping, check the G (Figure 08) dimension. If it is too badly damaged or the dimension G is less than the minimum indicated in Table 5, the nozzle should be replaced.

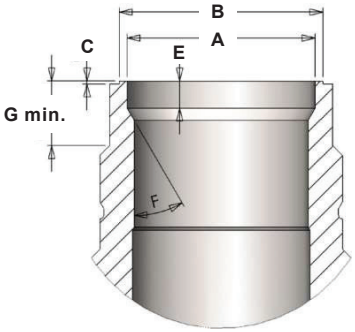


Fig. 8

Table 5

Metric units, mm						
Orifice	**G Min.**	**A + 0.10 + 0.00**	**B - 0.00 - 0.10**	**C + 0.10 - 0.00**	**E + 0.10 - 0.00**	**F + 1/2º**
D	6,0	12,0	13,4	0,6	1,2	30º
E	6,5	16,0	18,2	0,7	2,0	30º
F	5,0	20,7	23,3	0,7	3,0	30º
G	6,0	23,2	26,3	0,7	3,5	30º
H	8,5	28,6	31,7	0,7	4,0	30º
J	9,0	36,5	39,6	0,7	5,0	30º

7.3.2 (Figure 8) dimension. If it is too badly damaged or the dimension G is less than the minimum indicated in Table 5, the nozzle should be replaced.

Make sure that the outer diameter is not ovalised and that the surface is smooth with no marks or grooves. If there are any imperfections, these surfaces can be polished with suitable sandpaper. The thread of the stem retainer must be in good condition, with no abrasions, tears or other damage.

Check for cuts, marks or other damage to the sealing surface. Check the disc for defects such as cracks (for liquid penetrant) or severe corrosion. The disc can be reused if necessary until dimension A (Figure 9) is reduced to the minimum indicated in Table 6. Dimension B is entered to ensure that the disc is not machined beyond the limit.

Failure to observe this limit will result in a significant change in the flow configuration of the disc and upper ring assembly and will result in a significant increase in the "simmer" before the valve opens.

If the disc is badly damaged or the B dimension is less than the minimum indicated in Table 6, it must be replaced.

Fig. 9

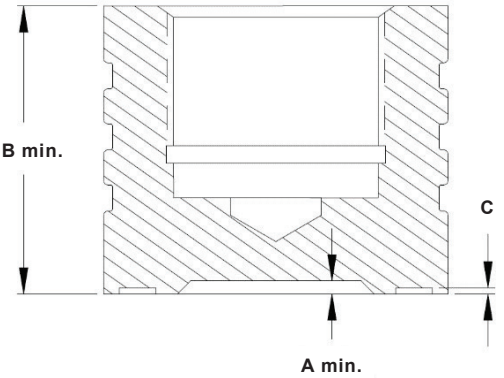


Table 6

Disc (Millimetres)			
Orifice	**A Min.**	**B Min.**	**C + 0,1 - 0,0**
D	0,9	15,7	0,7
E	1,0	20,4	0,7
F	1,1	27,4	0,7
G	1,2	32,4	0,7
H	1,2	34,4	0,7
J	1,2	41,4	0,7

7.3.3 Upper Adjusting Ring (10)

Make sure that the inner diameter of the ring is not ovalised and that the surface is smooth, with no marks or grooves.

If there are any imperfections, these surfaces can polished with appropriate sandpaper.

If it is badly damaged, the upper regulating ring should be replaced. In cases where the clearance between the inner diameter of the ring and the guided outer diameter of the disc is greater than the dimension given in Table 07, both the upper adjusting ring and the disc must be replaced.

Table 7

Diametral clearance (mm) Disc / Upper Adjustment Ring		
Guided Diameter		
Orifice	**Disc Nominal (mm)**	**Max.**
D	20,4	0,30
E	26,4	0,30
F	33,6	0,30
G	39,6	0,30
H	49,1	0,35
J	61,0	0,35

7.3.4 Bonnet (22)

Check the bonnet for defects such as cracks (for liquid penetrant) and/or severe corrosion. Inspect the condition of the threads of the outlet connection and body fixing for corrosion, tears, abrasions or other damage.

If it is badly damaged, the bonnet should be replaced.

7.3.5 Spring (21)

Inspect the spring for defects such as cracks (for liquid penetrant), severe corrosion and warping (parallelism and perpendicularism). When in doubt as to the proper performance of the spring, it is recommended to perform a load test in accordance ASME Code Section VIII UG-136 (a)(2).

The spring and its supports must be kept as a single assembly. Replace the spring if it shows heavy wear.

7.3.6 Rod (19)

Inspect for warping, corrosion and wear. If the rod is warped, it must be straightened before being reused, taking care not to damage the bearing surface of the disc holder and the threads.

7.4 Lapping

SV568H valves have their sealing surfaces (body and disc) lapped using a lapping machine, which guarantees the best sealing characteristics. For maintenance work, if you don't have a lapping machine, use a cast iron block or other perfectly flat surface (e.g. glass), using the conventional lapping method (Figure 10).

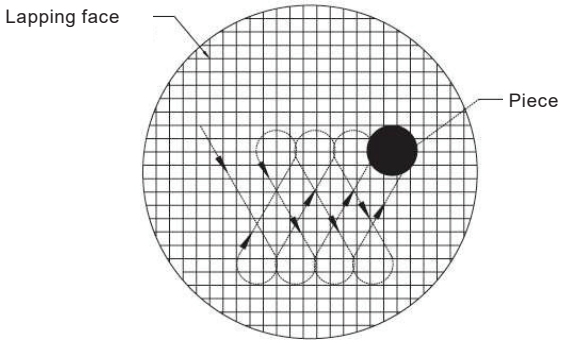


Fig. 10

We recommend the following diamond compounds for cutting:

Micron size	Lapping phase
20-40	Initial thinning
10-20	Quick thinning and pre-polishing
6-12	Fine polishing
3-6	Extra fine polishing

7.5 Assembly

SV568H Valves can be reassembled easily, without the need for special tools. Make sure that the internal parts are clean, especially the sealing surfaces and guided parts. Use a lubricant with anti-seize properties on all threads and bearing surfaces.

7.5.1 Fit the stem (19) and stem retainer (18) to the disc (9).

Attach the disc to a 3- or 4-jaw chuck and tighten the stem retainer by turning it clockwise. Check that the disc moves freely, resting on the spherical surface of the shank.

Be careful not to damage the outer diameter of the disc and the sealing surface during operation.

7.5.2 Fit the lower regulating ring (08) to the body (1). The adjusting ring must be positioned below the level of the seat, so that the disc rests on the body and not on the ring.

7.5.3 Install the disc, stem retainer and stem assembly by resting the disc on the body, taking care not to damage the sealing surfaces.

7.5.4 Install the spring assembly (21) and supports (20).

7.5.5 Fully screw the upper adjusting ring (10) onto the bonnet (22), turning it clockwise.

7.5.6 Fit the bonnet (22) to the body (01). Attach the body and tighten the bonnet by turning it clockwise. Use Table 9 to determine the required torque.

Table 9

Gauge		Orifice	Torque in Nm +10% -0%
In.	Exit		
½"	¾"	D	130
¾"	1"	E	150
1"	1¼"	F	190
1¼"	1½"	G	210
1½"	2"	H	280
2"	2½"	J	450

7.5.7 Screw the locking nut (25) onto the adjusting screw (24) and install the assembly in the bonnet. Compress the spring (21) by turning the adjusting screw clockwise until the original distance between the end of the rod and the top of the adjusting screw is reached. This procedure of compressing the spring will approximately restore the original setting pressure. The valve should still be set to the required pressure. When compressing the spring, hold the stem with pliers to prevent it from turning in the valve disc holder.

7.5.8 Position the upper adjustment ring (10) so that the lower face is at the same level as the disc face (9) (Figure 11).

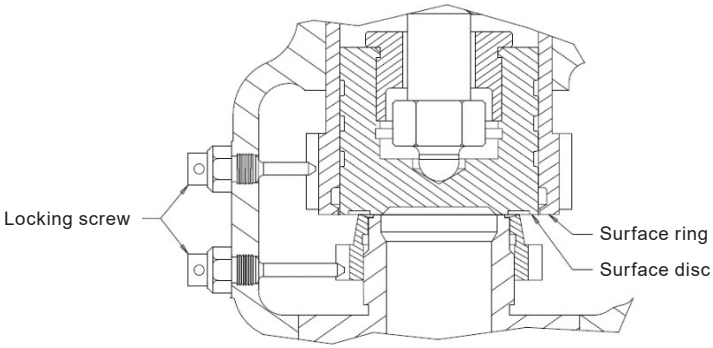


Fig. 11

7.5.9 Lock the ring with the locking screw (5). Check that the ring accepts a small movement. If it doesn't, the screw is too long. Remove it and grind the tip a little, keeping the original profile, then reinstall it.

7.5.10 Position the lower adjusting ring (8). If the original position is not known, refer to Table 10 to find out the number of notches to be lowered (move clockwise) from the contact of the adjusting ring with the disc. The number of notches to be lowered is also engraved on the valve body, below the locking screw (4). Lock the ring with the locking screw. Check that the ring accepts a small movement. If it doesn't, the screw is too long. Remove it and grind the tip a little, keeping the original profile, then reinstall it.

7.5.11 The valve is ready for final adjustment.

Table 10

Set pressure (barg)		No. of notches
Min.	**Max.**	
0,50	2,50	-2
2,55	7,50	-4
7,55	12,5	-5
12,6	15,0	-6
15,1	18,0	-7
19,1	20,7	-8

7.5.12 Although the valve can be adjusted in the service installation, it is recommended to adjust the valve and check the tightness of the seal on a test bench.

7.6 Bench Test

7.6.1 The test bench must have an accumulator (lung).

7.6.2 The valve must be set to open at the opening pressure (AJ/F)(4,7) indicated on the valve nameplate (Figure 12).

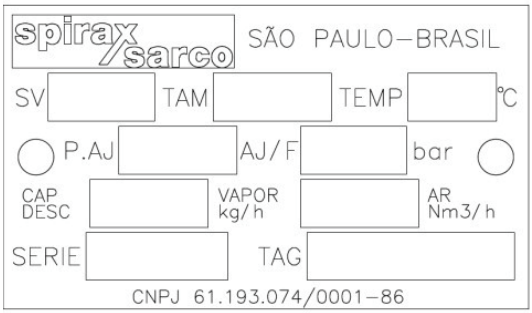


Fig. 12

7.6.3 With compressible fluids, the opening pressure is defined as the pressure at which the valve opens abruptly (POP) and not the pressure at which the leak starts (simmer).

7.6.4 The test procedure for Safety Valves on the bench must be in accordance with ASME code Sec. VIII (UG-136(d)(4) and API standard STD 527.

7.6.5 Before installing the valve on the test bench, remove all debris and particles, such as pieces gasket or any other solid materials, from the test bench and the valve inlet. Select the pressure gauge according to the valve's opening pressure, between 25% and 75% of the scale. Make sure the pressure gauge is calibrated and within its expiry date.

7.6.6 Install the valve on the test bench. If the valve opens below the desired pressure, the spring must be compressed. Hold the stem (19) to prevent it from turning on the disc and turn the adjusting screw (24) clockwise. If the valve does not open at the desired pressure, reduce the bench pressure by about 20 per cent and slowly reduce the spring compression by turning the adjusting screw anti-clockwise.

Continue adjusting until the valve opens to the desired pressure. Hold the stem while turning the adjusting screw. The valve stem must be centred with the adjusting screw. Friction of the stem against the sides of the adjusting screw can impair the valve's function.

7.6.7 If there is difficulty in presenting pop the valve (see 4.1), due to low volume available on the bench, the blowdown ring (08) can be lifted (turn anti-clockwise), until it touches the disc holder, and then lowered 2 to 3 notches. Depressurize the bench to make this adjustment. After testing reposition the ring.

7.6.8 Verify that the valve's opening pressure meets the requirements of ASME Section VIII (Table 11)

Table 11

Standard Construction	Set pressure	
	Pressure Opening (bar)	Tolerance (+/-)
ASME Sec.VIII	<= 4.8	0.13 bar
	> 4.8	3% *

*Percentage of opening pressure

7.6.9 Lock the lock nut (25) and repeat the test. At least two replicates of the same opening pressure must be obtained in order to make sure that the valve was adjusted correctly.

7.6.10 Check the seat tightness according to API STD 527 standard for the fluid used.

7.6.11 Install the lever disc (27) and lock it with the lock nut (28), install the hood (29) and the lever (33).

7.6.12 After adjustments and checks on the bench, the valve is ready to be installed and regulated under service conditions.

7.6.13 Once the adjustments and checks have been completed, the valve must be sealed (ASME code Section VIII UG-136(a)(7) and NR-13).

7.7 Blowdown adjusting (4.12)

7.7.1 The blowdown is adjusted through the blowdown ring (08).

7.7.2 To increase the blowdown (decrease closing pressure), the blowdown ring should be lifted, move the notches counter-clockwise through the lock screw (04) hole.

7.7.3 To decrease the blowdown (increase closing pressure), the blowdown ring should be lowered, move the notches clockwise through the lock screw (04) hole.

Note: Unless the test bench capacity is equal to or greater than the capacity of the valve, it is not possible to adjust the blowdown. If so, place the blowdown ring as shown in Table 07.

7.7.4 The valve will not schieve rated relieving capacity if the blowdown ring (08) is positioned too low.

7.8 Manual Valve Opening (Under Flow Condition)

Every safety valve that operates with water vapour or compressed air must have a manual override device (test lever) in accordance with ASME Section VIII UG-136(a)(3). To operate the test lever, the system pressure must be at least 75 per cent of the valve's opening pressure. Under flow conditions, the disc (09) must be lifted completely from its seat so that dirt, sediment and solid particles are not trapped on the sealing surfaces. To allow the valve to close under, release the lever completely.

7.9 Hydrostatic test

When hydrostatic tests are required after the Safety Valves have been installed, they must be removed and replaced with a blind plug or flange.
If it is not possible to remove them, test latches (GAG) should be used (Figure 13). It is common for Safety Valves to have problems caused by over-tightening the test lock (GAG). When it is necessary to use it, it should be tightened by hand, without tools, against the valve stem. This will be enough to prevent the valve from opening during hydrostatic testing.

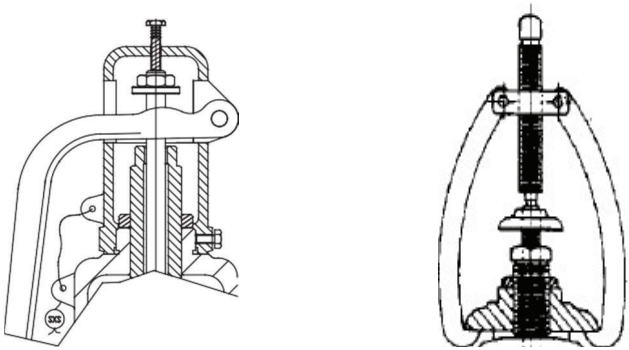


Fig. 13