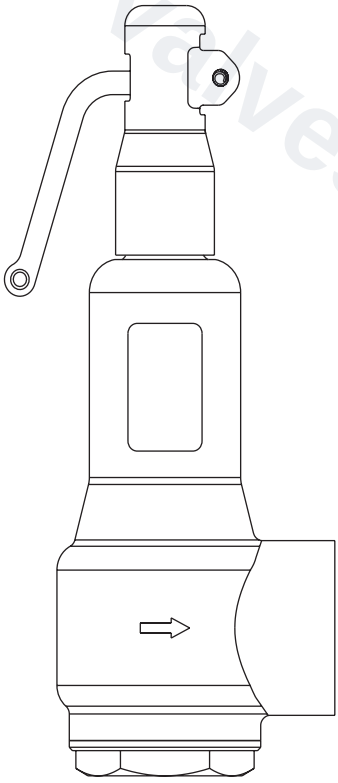
SV615
Safety Valve
Installation and Maintenance Instructions



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1. Safety information

Safe operation of the unit can only be guaranteed if it is properly installed, commissioned and maintained by a qualified person (see Section 1.11) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

1.1 Intended use

Referring to these Installation and Maintenance Instructions, Name-plate and Technical Information Sheet, check that the product is suitable for the intended use/application. The requirements of the EU Pressure Equipment Directive / UK Pressure Equipment (Safety) Regulations have been satisfied and, if applicable, the product accordingly bears the CE mark:

i) **The product has been specifically designed for use on the fluids specified in the Technical Information Sheets. (These fluids are in Group 2 of the above mentioned Pressure Equipment Directive). The product's use on other fluids may be possible but, if this is contemplated, Spirax Sarco should be contacted to confirm the suitability of the product for the application being considered.**

ii) **Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurance, ensure a safety device is included in the system to prevent such over-limit situations.**

iii) **Determine the correct installation situation and direction of fluid flow.**

iv) **Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.**

v) **Remove protective covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.**

1.2 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.

1.3 Lighting

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

1.4 Hazardous liquids or gases in the pipeline

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.

1.5 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.

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1.6 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.

1.7 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 labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.8 Temperature

Allow time for temperature to normalise after isolation to avoid danger of burns.

1.9 Tools and consumables

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

1.10 Protective clothing

Consider whether any protective clothing is 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.

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person.
Installation and operating personnel should be trained in the correct use of the product according to these instructions.
Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.
Post 'warning notices' if necessary.

1.12 Handling

Where the weight of the product exceeds 20 kg it is recommended that suitable lifting equipment is used to prevent personal injury.

1.13 Residual hazards

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of some products may reach temperatures in excess of 200 °C.
Many products are not self-draining. Take due care when dismantling or removing the product from an installation (refer to Section 11, 'Maintenance').

1.14 Freezing

Provision must be made to protect products which are not self-draining against frost damage if they are inoperative in environments where they may be exposed to temperatures below freezing point.

1.15 Safety information - Product specific

This product should not be dismantled without first releasing the compression on the control spring. The soft seal version of this valve (SV615AV and SV615BV) contains a Viton component. If the valve has been subjected to a temperature approaching 315 °C, the Viton material may have decomposed and formed hydroflouric acid. Avoid skin contact and inhalation of any dust or fumes as this acid causes deep burns and damage to the respiratory system.

1.16 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. However, if the valve is fitted with a Viton seal, special care must be taken to avoid potential health hazards associated with decomposition/burning of this item.

Viton:

- **Can be landfilled, when in compliance with National and Local regulations.**
- **Can be incinerated, but a scrubber must be used to remove Hydrogen Fluoride, which is evolved from the product and with compliance to National and Local regulations.**
- **Is insoluable in aquatic media.**

Please visit the Spirax Sarco product compliance web pages
https://www.spiraxsarco.com/product-compliance
for up to date information on any substances of concern that may be contained within this product. Where no additional information is provided on the Spirax Sarco product compliance web page, this product may be safely recycled and/or disposed providing due care is taken. Always check your local recycling and disposal regulations.

1.17 Returning products

Customers and stockists are reminded that under UK and EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and safety data sheets relating to any substances identified as hazardous.

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2. General product information

2.1 Description

The SV615 full lift, full nozzle safety valve is suitable for steam, air, inert industrial gas and non-hazardous liquid service.

Available types

Valves are available in sizes ranging from DN15 to DN50 and have a bronze body with female screwed connections and a stainless steel nozzle. There is also the option of a sanitary clamp inlet connection on the smaller sizes. All valves have a closed bonnet with either a lifting lever or closed cap (gas tight cap option). An optional soft seal disc is available in Nitrile (for air up to 120 °C), EPDM (for water) or Viton (for air up to 200 °C).

Standards and approvals

The SV615 complies with the requirements of EN ISO 4126:2004 and carries the CE mark indicating full compliance with the requirements of the EU Pressure Equipment Directive/UK Pressure Equipment (Safety) Regulations.

Seat tightness complies with ASME/API STD 527- Revision 2002.

Certification

A manufacturers' Typical Test Report is provided as standard for each valve which will include valve set and hydraulic test pressure. Also available on request is material certification in accordance with EN 10204 3.1.

2.2 Sizes and end connections

DN15, DN20, DN25, DN32, DN40 and DN50.

Inlet connections	Screwed BSP (BS 21 parallel) female
	Screwed NPT female
	1" Sanitary clamp compatible (DN15, DN20 and DN25 sizes only)
	BS 4825/ISO 2852/DIN 32676
Outlet connections	Screwed BSP (BS 21 parallel) or NPT female

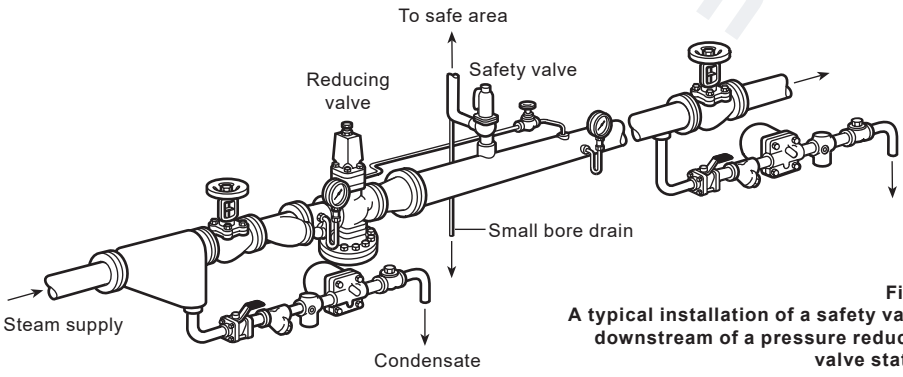

Fig. 1
A typical installation of a safety valve, downstream of a pressure reducing valve station

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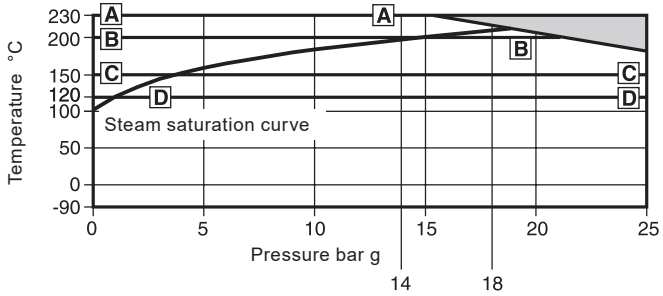
2.3 Pressure/temperature limits

Please contact Spirax Sarco, when so required, for relevant details regarding the maximum allowable limits that the shell can withstand.



The product **must not** be used in this region.

A - A Maximum operating temperature with metal seat.

A - B Maximum operating temperature with Viton seat.

A - C Maximum operating temperature with EPDM seat.

A - D Maximum operating temperature with Nitrile seat.

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Body design conditions			PN25
Set pressure range	Maximum	½" to 1¼"	18 bar g
		1½" and 2"	14 bar g
	Minimum		0.3 bar g
Temperature	Metal seat	Minimum	-90 °C
		Maximum	+230 °C
	Nitrile seat *	Minimum	-30 °C
		Maximum	+120 °C
	EPDM seat *	Minimum	-50 °C
		Maximum	+150 °C
	Viton seat *	Minimum	-20 °C
		Maximum	+200 °C
Performance data	Overpressure	Steam	5%
		Gas	10%
		Liquid	10%
	Blowdown limits	Steam, gas	10%
		Liquids	20%
	Derated coefficient of discharge values	Steam, gas	0.71
		Liquid	0.52
Maximum permitted backpressure			10% of set pressure
Tested at a maximum inlet cold hydraulic test pressure of:			37.5 bar g

***** Note: Soft seal inserts are not suitable for use on steam applications.

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2.4 Dimensions/weights (approximate) in mm and kg

		Connection					Flow			
	Size	Inlet	Outlet	Lift	A	B	C*	D Ø	E Ø	Weight
Screwed BSPF x BSPF or NPTF x NPTF	DN15	½"	¾"	3	40	40	194	12	-	1.3
	DN20	¾"	1¼"	5	55	44	229	20	-	2.4
	DN25	1"	1½"	6	60	48	242	24	-	2.9
	DN32	1¼"	2"	7.25	70	58	279	29	-	4.2
	DN40	1½"	2½"	9.25	81	67	365	37	-	8.8
	DN50	2"	3"	11.50	96	80	420	46	-	13.0

* Applies to sealed cap and lever designs.

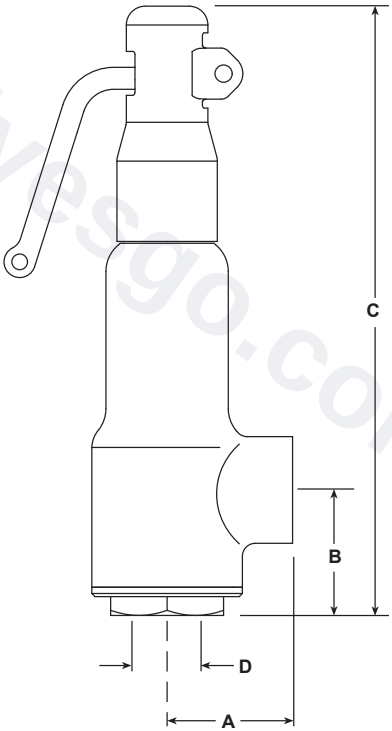

Fig. 2a Screwed version

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2.4 Dimensions/weights (approximate) in mm and kg (continued)

	Connection				Flow					
	Size	Inlet	Outlet	Lift	A	B	C*	D Ø	E Ø	Weight
Sanitary clamp	DN15	1"	¾"	3	40	55	209	12	50.5	1.4
	DN20	1"	1¼"	5	55	60	245	20	50.5	2.6
	DN25	1"	1½"	6	60	64	258	24	50.5	3.1

* Applies to sealed cap and lever designs.

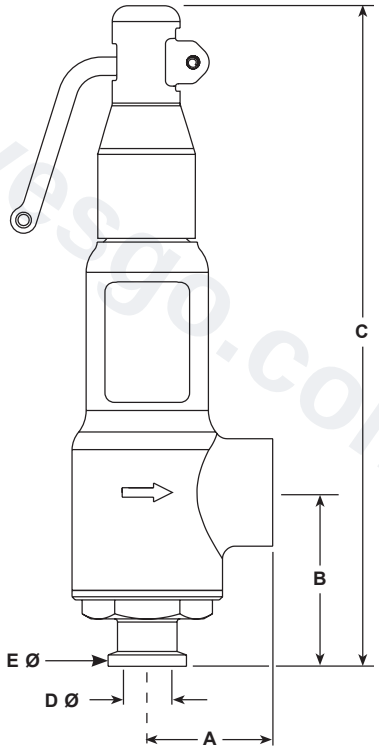

Fig. 2b Sanitary clamp version

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2.5 Materials

No.	Part		Material	
1	Body		Bronze	BS EN 1982 CC491KM
2	Nozzle	DN15 and DN20	Stainless steel	BS 970 431 S29
		DN25 to DN50	Stainless steel	BS 3146 Pt2 Gr. ANC2
		Sanitary connection	Stainless steel	ASTM A276 316L
3	Disc		Stainless steel	ASTM A276 316L
4	Lever housing		Bronze	BS EN 1982 CC491KM
5	Spring		Chrome-vanadium alloy steel	BS 2803 735 A50 HS
6	Stem guide		Brass	BS 2872 CZ 121
7	Spring end plate		Brass	BS EN 12165 - CW617N
8	Stem		Stainless steel	BS 970 431 S29
9	Adjustment screw		Brass	BS 2874 CZ 121
10	Lever		Zinc plated SG iron	
11	Pivot pin		Stainless steel	AISI 304
12	Circlip		Stainless steel	BS 2056 316 S42
13	Adjuster lock-nut		Brass	BS 2872 CZ 121
14	Soft seal disc		Stainless steel/Nitrile	ASTM A276 316/bonded Nitrile 4490 (90 IRHD)
			Stainless steel/EPDM	ASTM A276 316/bonded EPDM 2064 (75 IRHD)
			Stainless steel/Viton	ASTM A276 316/bonded Viton F81 (85 IRHD)
15	Sealed cap		Bronze	BS EN 1982 CC491KM
16	Cap seal		Nitrile	BS 2874 CZ 121
17	Skirt		Brass	BS 2874 CZ 121
18	Grub screw		Steel	
19	Ball		Stainless steel	

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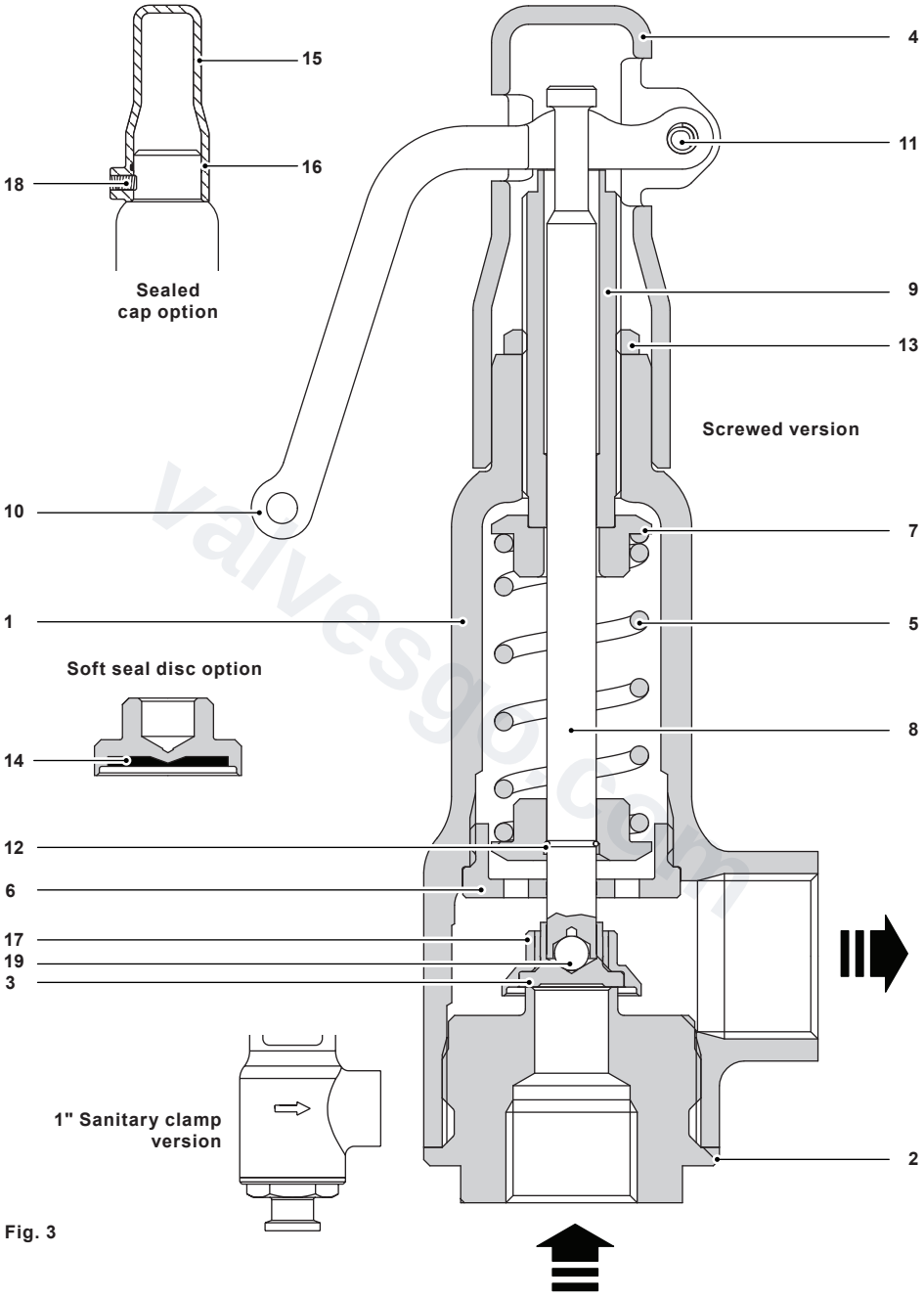

Fig. 3

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2.6 How to select a SV615 safety valve

			SV615
Model type	SV615		
Configuration	A = Closed bonnet/easing lever		**A**
	B = Closed bonnet/sealed cap		
Seal material	S = Stainless steel		**N**
	N = Nitrile		
	E = EPDM		
	V = Viton		
Finish	P = Electroless nickel plated (ELPN)		
	Q = ELNP with stainless steel name-plate		
Size	DN15, DN20, DN25, DN32, DN40 and DN50		**DN15**
Connection (inlet x Outlet)	BSPF x BSPF		**BSPF x BSPF**
	NPTF x NPTF		
	Clamp x BSPF		

Selection example Please note if ELNP finish is required, add 'P'.

SV615	A	N		DN15	BSPF x BSPF

How to order example: 1 off Spirax Sarco SV615AN safety valve having DN15 screwed BSPF x BSPF connection, set at 6 bar g.

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3. Supply

Normally, the valve will be supplied set at the required pressure and sealed.
Setting of Spirax Sarco safety valves must only be carried out by authorised, competent persons. Spirax Sarco accepts no responsibility for valves which have been reset by unauthorised persons.

4. Handling

4.1 Valves should be transported in the upright position.

4.2 **Do not drop** and avoid sudden shocks or heavy impacts.

4.3 Always store in the suppliers packaging until required.

4.4 **Never** carry a safety valve by the lifting lever.

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5. Before fitting the valve

5.1 Ensure that the installation is correct (Figure 1).

5.2 Blow through the pipework to ensure that it is completely free of any foreign matter that may otherwise pass to the valve seat and cause damage, leading to seat leakage. Blowdown must be carried out before installing the safety valve.

5.3 Ensure that valve is set to the correct pressure, see 'Testing during use', Section 9.

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6. Installation

Note: Before actioning any installation observe the 'Safety information', Section 1.

CAUTION !

Take care if using liquid jointing compounds (particularly thread sealants such as 'Loctite' or 'Stag') that these don't contaminate internal seating faces.
In extreme cases, this type of contamination may cause these faces to stick together, causing a potentially dangerous overpressure situation.

6.1 The valve should always be mounted vertically upwards with its main axis vertical.

6.2 The valve should be fitted to the pipework or vessel by means of the shortest possible length of pipe or fitting.

6.3 There should be no intervening valve or fitting i.e. it should not be possible to isolate the safety valve (Figure 4).

6.4 The inlet pipe connection should not be smaller than the valve (see Figures 7 and 8).

6.5 Built up backpressure occurs as a result of a safety valve relieving into the discharge pipework.
To ensure adequate system protection and correct safety valve performance, Spirax Sarco recommend that this built up backpressure does not exceed 10% of the gauge set pressure. This value may be exceeded even when using short runs of pipework of the same nominal bore as the safety valve outlet**.**
It is the responsibility of the installer/owner to ensure that this requirement has been met by carefully considering the nominal bore and length of the discharge pipe, as well as the type and quantity of bends and pipe fittings to be installed.
Long radius bends and fittings are recommended.
Where there is any doubt as to the suitability of the discharge pipework system, please contact Spirax Sarco for further guidance.

6.6 Direct the outlet pipework to a safe point of discharge where there is no risk of injury to persons or damage to property in the event of the valve operating.

6.7 The outlet pipework should be adequately supported such that it does not place undue stress on the safety valve.

6.8 Where the outlet pipework is directed upwards a small bore drain should be provided at the lowest point (Figure 5). This drain should be taken to a place where any discharge will not create a hazard or inconvenience.

6.9 Each safety valve should have its own unrestricted discharge pipe.

6.10 Safety valves should not be lagged.

6.11 Safety valves can operate very suddenly and will be too hot to touch without protection when installed on steam systems.

6.12 Always use a wrench on the hexagon to secure the valve to the inlet pipe. Do not use pipe grips on the body. Do not use excessive leverage or force.

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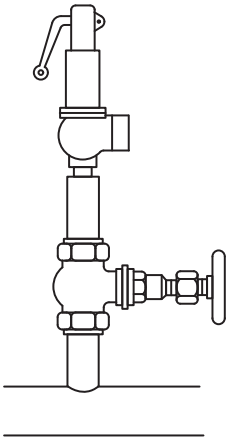
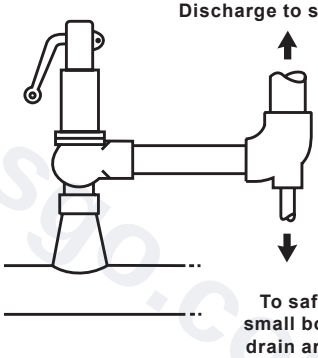
Fig. 4



Not drawn to scale

Fig. 5



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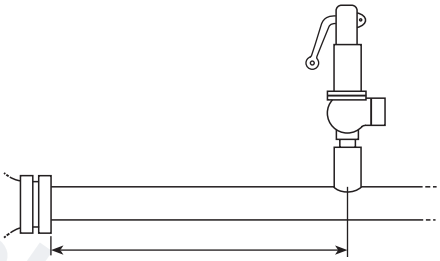
7. Damage prevention

Excessive pressure loss at the inlet of a safety valve when it operates will cause extremely rapid opening and closing of the valve, observed as chattering or hammering.
This may result in reduced capacity as well as damage to seating faces and the other parts of the valve. When normal pressure is restored it is possible that the valve will leak.

7.1 Solution

The safety valve should be fitted 8-10 pipe diameters downstream of any converging or diverging fittings or bends, see Figure 6.
Inlet branches should be as Figure 7 or 8.



8 - 10 pipe diameters downstream of converging 'Y' fittings or bends.

Fig. 6

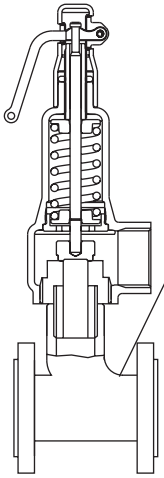


Fig. 7

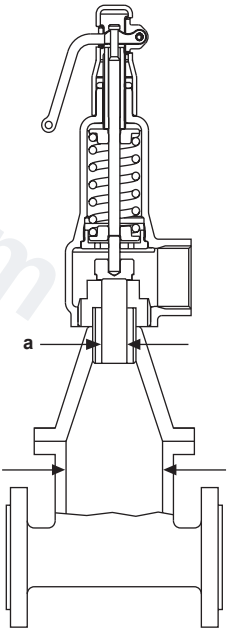


Fig. 8

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8. Commissioning

8.1 Once the valve has been fitted check that there are no leaks from either the inlet or the outlet connections.

8.2 Test the valve by raising the system pressure. Check that the valve operates at the correct set pressure.

8.3 Reduce the system pressure to the normal operating pressure and check that the safety valve reseats.

9. Testing during use

Note: Use suitable protection against excess heat and noise when testing safety valves.

It is recommended that the safety valve is tested for correct operation on a regular basis as part of a documented and controlled procedure, the frequency of testing is dependant on the application and system conditions and an appropriate test interval must be decided by the user or relevant insurance company.

Some valves are fitted with standard (open type) levers to enable testing for correct operation during use.

Do not operate the lever unless the system pressure is at least 85% of the safety valve set pressure.

Do not use any tool or mechanical device (e.g. length of pipe) on the lever.

Do not apply excessive force - **Hand operation only**.

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10. Guidelines for setting
(By authorised and competent persons only)

10.1 Choice of set pressure

A decision must be made regarding the pressure at which the safety valve should be set. The maximum set pressure, in accordance with BS 5500, is the safe working pressure of the plant it protects and the valve must achieve its rated capacity with an overpressure of no more than 10%.

The SV615 achieves its rated capacity at 5% overpressure on steam, 10% on air. If the valve is set too close to the operating pressure of the system the valve may operate prematurely. It will also fail to close satisfactorily when normal operating pressure is restored.

Figure 9 outlines the way a safety valve operates.

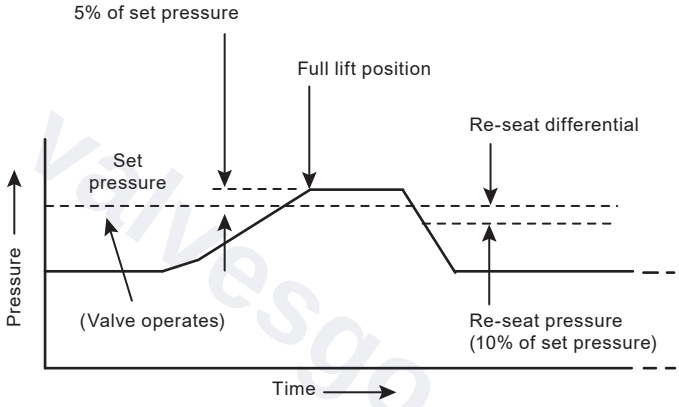

Fig. 9

It can be seen that the safety valve does not re-seat when the pressure falls to the safety valve set pressure. There must be adequate differential between the maximum system operating pressure and the safety valve set pressure if the valve is to re-seat.

The maximum system operating pressure is most likely to occur during no-load conditions. Figure 10 shows the range within which the valve must be set.

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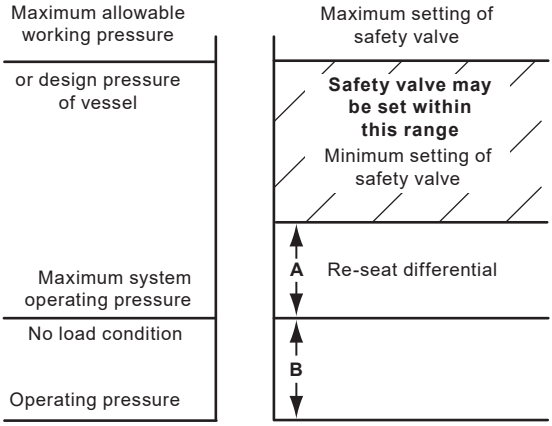

Fig. 10

Flowrate = Maximum rating of pressure reducing valve

A = 10% of safety valve set pressure, 0.3 bar minimum

B = Normal system pressure variation

Note: The operating pressure of a system will vary and it is important that the safety valve is set high enough to accommodate such fluctuations.

10.2 Setting the valve

Spirax Sarco cannot be held responsible for unauthorised alteration of the set pressure.

Although not mandatory, Spirax Sarco recommend that SV615 metal seated valves for steam service should be cold set on a test rig at 3% above the required set pressure. This does not apply if the valve is set on steam.

10.3 Valves supplied unset

Valves supplied unset to approved agents will include a set pressure tag to be stamped with the appropriate set pressure in bar after setting.

The tag should be permanently attached to the valve when using the locking wire and polypropylene seal. The back of the blue instruction label affixed to each unset valve will indicate the pressure range of the spring fitted.

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11. Maintenance

All safety valves should receive planned maintenance.

Note: Before actioning any maintenance work please read 'Safety information', Section 1.

It is recommended that Spirax Sarco safety valves are returned to your local Spirax Sarco agent for a thorough overhaul periodically (please read 'Returning products', Section 1.17).
The valve will be returned having been overhauled, tested re-set and sealed in accordance with industry standard procedures.

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