



STERIFLOW

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SSRV Series

Installation Recommendations for Steriflow Sanitary Safety Relief Valves

Warning: Warning: Steriflow Sanitary Safety Relief Valves must only be used, installed and repaired in accordance with these guidelines. Observe all applicable public and company codes and regulations. In the event of leakage or other malfunction, safely shut your system down; continued operation may cause system failure or a general hazard. Before removing any valve, disconnect, shut off, or bypass all pressurized fluid. Valves must be returned to Steriflow for service. Breaking the seal on any valve will void the warranty and the Certificate of Conformance for that valve.

Please read these instructions carefully!

Your Steriflow product will provide you with long, trouble-free service if it is correctly installed and maintained. Spending a few minutes now reading these instructions can save hours of trouble and downtime later.

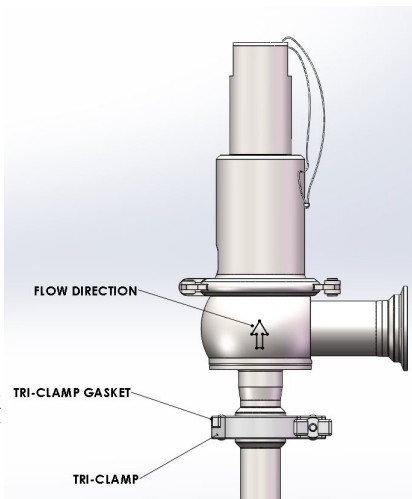
Preferred Installation

Proper installation is essential to ensure proper operation of safety relief valves. Proper consideration should be given to the following items before installation begins:

- Valves should be stored in their shipping cartons until installation
- Proper gasket selection for clamped connections according to the temperature and pressure of the process
- Proper clamp selection where applicable according to the temperature and pressure of the process
- Matching of pipe size and threads for threaded end valves
- The direction in which the outlet of the valve will face, especially if discharging to atmosphere

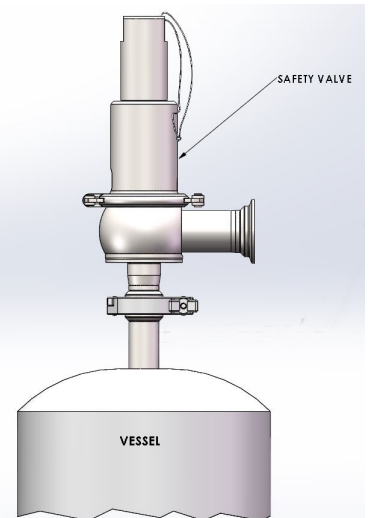
Additional recommendations provided in this document are based on API 520, Part II. Consult ASME BPE Part SD for recommendations to maintain aseptic conditions.

1. Gaskets should match the size and style of the clamped connection, i.e. 1" BPE tri-clamp ends should have gaskets sized for that connection that do not protrude into the flow path, and that are constructed of materials suitable for the process

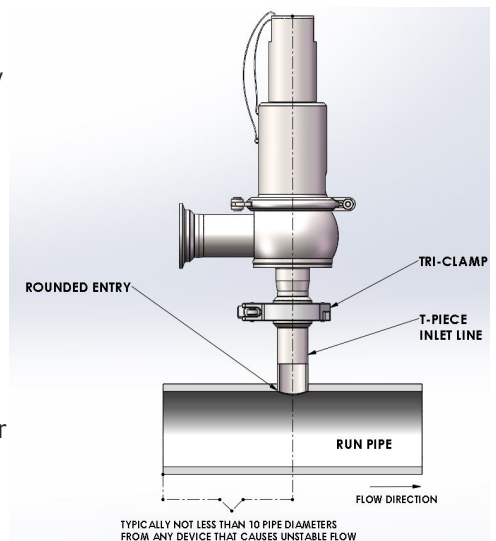


and the process temperature. The user is responsible for the proper selection of gasket size, style, and material of construction.

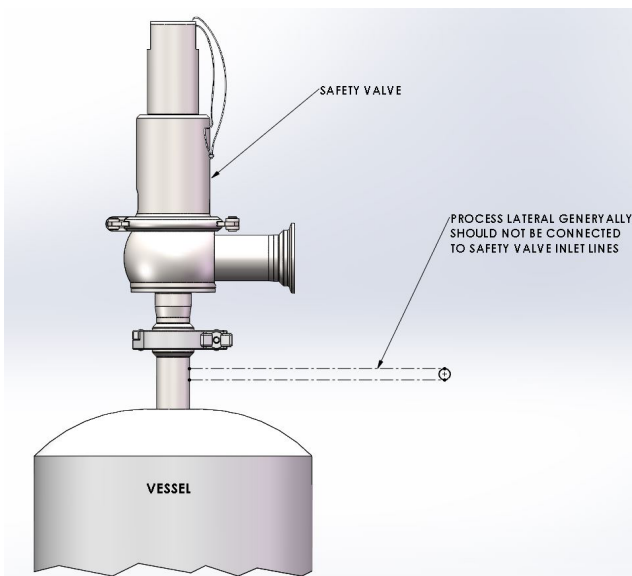
2. The pressure connection to the process must be connected to the inlet of valve according to the flow arrow or inlet marking on the valve body. Additionally, illustrations in this manual may be used as guidance. The direction of the outlet should be carefully considered if the valve will be discharging to atmosphere.
3. Safety Relief Valves should be placed as close as possible to the protected equipment to minimize pressure losses flowing to the safety relief valve. If protecting a vessel the valve should be mounted on top the vessel itself, unless pressure fluctuations may cause a momentary opening of the valve because they are of a magnitude close to the valve's set pressure. (1)



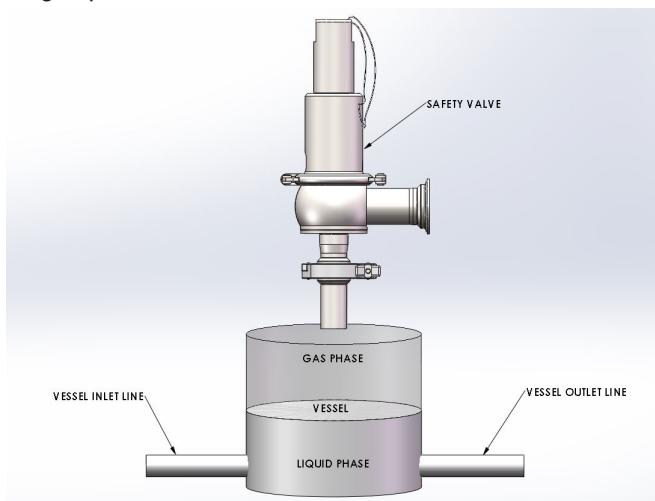
4. Safety Relief Valves should not be installed in locations where unstable flow patterns may exist. Branch connection to the valve itself should have rounded, smooth corners for maximum flow (2).



5. Safety Relief Valves should not be mounted within 10 pipe diameters (3) of any valve or other device that can alter flow rates. More detailed guidance on recommended distances to other valve equipment can be found in API 520, Part II.
6. The proposed location for installation should be evaluated for proximity to orifice plates and flow nozzles should be considered as they are known to adversely affect safety valve performance. Other fittings such as tees and elbows can create turbulence that can impact safety relief valve performance(4).
7. Process laterals should generally not be connected to the inlet lines of safety relief valves. Exceptions should be analyzed carefully to ensure that the allowable pressure loss at the inlet of the safety relief valve is not exceeded under simultaneous conditions of rated flow through the safety valve and maximum possible flow through the process lateral (5).



8. If a vessel is partially filled with a liquid covered by gas, the safety relief valve should be located at the gas phase.



9. Although ASME Sect VIII, Div 1, Appendix M11 permits horizontal installation given certain considerations, **Steriflow does not recommend horizontal installations without prior factory approval.** Also see API 520, Part II – Installation, 9.4 – Mounting Position for additional information on this subject.
10. Safety relief valves may be shipped and stored in the horizontal position.
11. Protective end covers should remain in place until just before installation.
12. Impurities and debris from system fabrication must be removed before safety relief valves are installed. Valve damage from debris and impurities could require complete re-furbishing by the manufacturer.
13. No excess static, dynamic, or thermal stresses should be imparted by the valve mounting arrangement. These stresses could lead to distortion of the valve body or seat that can cause leaking. The following measures should be observed:
 - a. Installation that permits expansion without causing stress in the piping
 - b. Attach or support piping in a way that does not transmit stress
14. Do not place insulation around spring housing of Steriflow safety relief valves to prevent inadvertent heating of the spring. If spring heating in the installation is unavoidable, consult manufacturer.
15. All safety valves should be visually inspected before installation. All protective materials and end caps should be completely removed. API 520 Part II recommends that the inlet surface be cleaned since foreign materials clinging to the inside of the nozzle will be blown across the seats when the safety valve is operated. Some of these materials may damage the seats or get trapped between the seats in such a way that they cause leakage. Valves should be tested before installation to confirm their set pressure.
16. For system pressure checks that are often conducted before commissioning, the safety relief valve should be removed, and the mounting flange capped with a suitable blanking plate, gasket, and clamp. For threaded end models, the valve should be removed, and a pipe plug or cap of suitable rating used to close the pipe.

Operating Notes

Vibration

“Most vibrations that occur in inlet line systems are random and complex. These vibrations may cause leakage at the seat of a safety valve, premature opening, or premature fatigue failure of certain valve parts, inlet and outlet, or both. Detrimental effects of vibrations on the safety relief valve should be avoided. This is possible by providing greater pressure differentials between the operating pressure and the set pressure.”(6)

Chatter and Flutter

Chattering and fluttering must be distinguished from a frequent opening of a safety valve. A frequent opening means that the safety valve goes through a complete operating cycle and discharges enough medium to lower the pressure in the protected equipment below the reseating pressure of the safety valve. The causes for frequent opening are: - oversized valve - small volume in the vessel (protected equipment) A frequent opening is, in general, not a safety issue – the safety valve is doing what it is supposed to do. In contrast to a frequent opening, the symptoms of a chattering or fluttering safety valve are safety issues! A chattering or fluttering safety valve does not discharge its full rated capacity and the pressure in the system may increase. If audible chatter is observed, safety valve inspection is suggested.

Lifting devices

Lifting devices are provided to overcome spring set pressure to allow the valve open at a lower pressure than the valve is set for in operation. The lifting device will allow the disc to lift and permit flow at 75% of set pressure. To operate the lift mechanism, turn the lift knob CCW, or pull the lever outward.

Insulation

If installation specifications call for the safety relief valve to be insulated, the insulation should not extend above the bonnet clamp to prevent heating the spring. In a case of increased operating temperature, it is permissible to set the safety valve at ambient temperature and correct the temperature influence by making use of a correction factor (consult factory for proper setting differential, CDTP).

Testing prior to plant start up

Before a plant is started up, a static pressure test is performed. For this test, all safety valves in the system must be prevented from opening. We recommend removing the valve and using a blind flange on the mounting location of the safety relief valve.

Notes:

- (1) API RP 520, Part II Sect 9.2
- (2) API RP 520 Part II Sect 9.3
- (3) API RP 520 Part II Sect 9.3.1
- (4) API RP 520 Part II Sect 9.3.2
- (5) API RP 520 Part II Sect 4.7
- (6) API RP 520 Part II, 5th Edition 2003, Sect. 4.1.2

Inspection Intervals

Based on many different operating conditions and different mediums, we suggest the following:

1. Determination of an initial inspection time interval: An initial interval of 24 months is suggested. If the safety valve opens frequently or the medium is corrosive the inspection time interval should be 12 months.
2. Inspection of safety valves after this period of time should include:
 - Set pressure repeat accuracy (this requirement is fulfilled if the set pressure corresponds to the test pressure with a tolerance of $\pm 3\%$)
 - Tightness test of the safety valve (this requirement is fulfilled if the tightness is tested according to API standard 527)
 - Testing ability to open (this requirement is fulfilled if the safety valve can be opened with the lifting device at an operating pressure $>75\%$ without the use of any additional tools).
3. Adapting the inspection time interval
The inspection time interval can be increased if the safety valve fulfills the requirements of the above mentioned tests. If not, the interval should be reduced to 12 months or less. In case the following inspection fulfills the requirements again the inspection interval can be lengthened by two months.

If the safety valve is leaking, the inspection should be performed immediately.

Statements in Codes and Standards

API Recommended Practice 576, Inspection of Pressure-Relieving Devices, Chapter 6.4:

“The inspection of pressure-relieving devices provides data that can be evaluated to determine a safe and economical frequency of scheduled inspections. This frequency varies widely with the various operating conditions and environments to which relief devices are subjected. Inspections may usually be less frequent when operation is satisfactory and more frequent when corrosion, fouling, and leakage problems occur. Historical records reflecting periodic test results and service experiences for each relief device are valuable guides for establishing safe and economical inspection frequencies. A definite time interval between inspections or tests should be established for every pressure-relieving device on operating equipment. Depending on operating experiences, this interval may vary from one installation to another. The time interval should be sufficiently firm to ensure that the inspection or test is made, but it should also be flexible enough to permit revision as justified by past test records.”

In API 510, the subsection on pressure-relieving devices establishes a maximum interval between device inspections or tests of 10 years. It also indicates that the intervals between pressure relief device testing or inspection should be determined by the performance of the devices in the particular service concerned.