TESUCO
TECHNICAL SUPPLIES COMPANY

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TECHNICAL INFORMATION SHEET ON SAFETY RELIEF VALVES (SRV)

General

AS 4289 states “A safety relief valve shall be provided for the low pressure side of the manifolds or control arrangements.

AS 5034 states “A pressure relief devise shall be provided for the low pressure side of all supply systems to protect connected equipment”.

Pressure relief devices must conform to the relevant requirements in AS 1271 for this type of valve.

(Small safety relief valves incorporated in a supply regulator will not suffice for this standard. They are only designed to relieve small, slow pressure build up where there is a minor seat failure or “creep”).

Design

Pressure relief devises (or SRV) must be designed to begin to open or crack at 1.1 times the working pressure and be fully open at 1.25 times the working pressure.

They must be sized so that they can vent all excess of the maximum flow of gas in the event of a catastrophic regulator failure so that connected equipment and piping downstream, does not increase above 1.25 times the working pressure.

The maximum flow of a regulator will vary dramatically from design to design depending on the flow path, the smallest orifice size and the type of valve seat.

There are a number of methods to establish the maximum flow in the event of a catastrophic regulator failure, but this should try to be attained from the regulator manufacturer.

If a safety relief valve is an integrated part of the regulator assembly to meet AS 5034, then the SRV will be matched to that regulator design.

Some samples of cracking and full flow pressures.

Regulator pressure kPa	SRV set pressure (1.1 times) kPa	SRV fully open pressure (1.25 times) kPa
275	300	344
300	330	375
400	440	500

Note: The set pressure is the cracking or weep pressure, this is very hard to observe without the right equipment as there will only be a slight loss of gas. More important is the fully open pressure and allowable downstream pressure.

Venting of SRV pressure.

Where pressure relief devices (or SRV) are located in non-naturally ventilated areas, they must be connected to vent piping that will not restrict the flow of gas.

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Pressure relief devices (SRV) for regulators to AS 5034.

The SRV must be matched to the maximum outlet pressure of the regulator and designed and sized related to maximum flow through the regulator is a failed state.

- Inlet pressure from the cylinder is 6,000 kPa (or 20,000 kPa for mixed gas or nitrogen)
- Regulator MWP is 400 kPa (This is flowing pressure, so in practice the pressure is higher)
- SRV set at 440 kPa

The SRV must be able to release the excess pressure (possible 20,000 kPa) without letting the downstream pressure (set at 400 kPa) exceed 500 kPa (1.25 times of regulator MWP).

Safety relief devices for beverage manifold supply systems to AS 5034

Due to the low bursting pressure of beer keg systems and to protect pressurized beverage storage containers, it is essential that each be protected by a pressure relief device fitted in the piping system immediately downstream of the regulator or as part of the low pressure side of the regulator.

For example, the MWP of the keg system for the purposes of the standard is 400 kPa. The safety relief must not open before 440 kPa and must vent all excess gas pressure so that the piping or keg downstream does not increase in pressure above 500 kPa (1.25 times the MWP).

It must be noted though that the SRV here are fitted to secondary regulators, which would have a maximum inlet pressure (allowable in the standard) of 2,400 kPa and in practice it is normally much lower. If the pipeline between the primary regulator and the secondary regulator in protected by a high volume SRV, then the failure of a secondary regulator will only expose the downstream pipeline servicing the kegs to this pressure. Therefore the SRV installed to protect the kegs must only be designed to relieve this pressure, within the requirements of the standard.

Example where the following criteria applies to the system:

- CO_2 Inlet pressure from the cylinder is 6,000 kPa
- Primary regulator MWP is 1,000 kPa (This is flowing pressure, so in practice the pressure is higher)
- Primary SRV set at 1,300 kPa
- Secondary regulator pressure set at 400 kPa
- SRV protecting the keg system set at 440 kPa:
- Maximum exposure to secondary regulator SRV - 1,300 kPa

The SRV must be able to release the excess pressure (1,300 kPa) without letting the downstream pressure (set at 400 kPa) exceed 500 kPa.

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Testing Pressure relief devices (SRV).

New or serviced pressure relief devices shall be assessed by a competent person prior to installation and assembly in the piping system to ensure that the device integrity has not changed during transport or storage. Valves must be assessed to meet Australian Standard AS 1271-3 for Class A. As part of a correctly specified system (including a suitable regulator to AS4267 or AS4840), the valve must fully conform to AS 5034 and AS 4289; most notably it has sufficient discharge at 125% of the set pressure.

Test procedure must be performed using AS 1271, 3.4.2 as a guide.
A suitable test rig must be used with a calibrated pressure gauge. A digital pressure gauge with high and low settings is preferable with accuracy of 0.5% of full scale reading.
Test Requirements:
For each test, record serial number and all details on a test report.
Test for set pressure.

- Operational Limit of + or – 3% on Crack pressure or 15kPa whichever is the highest.
- Raise the pressure slowly at a rate of 350 kPa / min.
- The presure at which the top pressure stops and the bottom pressure falls is the initial weep or crack pressure.
- Due to initial “stickiness”of the seat, the initial reading can be discarded. The second and third test is to be recorded.
- Remove lock nut and re-set if required.

Test for Re-seat pressure.

- Close valves and allow SRV seat to close, must be set at 15% of crack pressure.

A new test certificate to be issued including the serial number.
Test log of results is to be kept.

Maintenance of Pressure relief devices (SRV).

It is recommended on any gas equipment that has a soft seal, that they be refurbished or replaced every 5 years. The older the soft seal is in the SRV, the greater the “stickiness” of the valve as it is constantly under pressure from the spring onto the seat seal ring. Also open to degradation are the springs that can compress over time and lose tension. This would allow the valve to open prior to the set pressure.

Serviced or refurbished valves must tested as above.

Replacement valves must be fully tested prior to installation and have test certificates supplied.

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