

Snowy Technical Standards

SHL-MEC-117

Pressure relief valve bench testing

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1. Executive Summary

Pressure relief valves (PRVs) are a mechanical protection device designed to protect a system from over pressurising. Protection devices lie dormant for most of their life and are only required to operate during an emergency situation. The only way to determine if protective devices will work is to regularly test them to verify they are functioning as expected.

This standard sets out the requirements for PRV bench testing.

2. Scope

This standard applies to all PRVs protecting pressure vessels, pressure pipework and compressors across the business. It applies to the following systems:

- Air
- Carbon dioxide
- Diesel
- Gas (natural and LPG)
- Oil
- Water

This standard does not apply to:

- Hydro Turbine pressure relief valve. E.g Murray 1 turbine pressure relief valve.
- Transformer pressure relief devices
- 1 yearly easing lever operation of PRVs.

2.1. Applicable Standards

- AS1271 - Safety valves, other valves, liquid level gauges, and other fittings for boilers and unfired pressure vessels.
- AS3788 - Pressure equipment - In-service inspection.
- AS4343 - Pressure equipment - Hazard levels.

3. Definitions

Word and/or picture	Definition
Leakage test	A test done to ensure an effective seal on the seat in a closed position of the PRV
Pressure relief valve (PRV)	A type of mechanical protection device used to limit the pressure in a system from over pressurising.
Set Pressure	The PRV manufacturer will state their specific definition of set pressure. Generally it is the pressure at which the valve under operating conditions commences to lift.
Reseating pressure	The value of the inlet static pressure of the PRV at which the disc re-establishes contact with the seat and then stops relieving pressure

4. Technical Requirements

Routine testing of PRVs is implemented in Snowy's maintenance management system. The purpose of this standard is to specify the technical requirements of routine tests.

Within Snowy Hydro, the nominal testing frequency of PRVs is 4 years. PRVs can either be tested or replaced every 4 years.

PRV test intervals can be extended beyond 4 years and may be extended to the same interval as the internal inspection interval of the associated pressure equipment. Intervals cannot be extended if the PRV has only been replaced and never tested. Previous test results of the particular valve or valve model in the operating context are required.

PRVs can be tested in NATA approved facilities, locally or in service, based on the below table. If PRVs are to be tested locally or in service, test procedures shall be developed and reviewed by engineering (either regional or central).

Generally, air PRVs should not be tested in service or locally as it is likely that reseat pressure cannot be measured effectively, they will not reseat at the correct pressure and require adjustment or overhaul.

Results/certificates are to show results prior to and after any adjustment/cleaning. The results/certificate will include the PRV serial number.

If set pressure result is >110% of specified set pressure, the pressure relief valve shall be inspected/investigated to understand the cause.

System/ Requirement	External Facility*	Tested locally	Tested in service	Set Pressure	Reseat Pressure	Leakage test
Air compressor	Either suitable		x	✓	✓	✓
Air vessel and air pipe	✓	X	X	✓	✓	✓
Carbon dioxide	✓	X	X	✓	✓	✓
Diesel	✓	X	X	✓	✓	✓
Gas	✓	X	X	✓	✓	✓
Oil immersed	Either suitable			✓	Optional	✓
Water	Either suitable			✓	✓	✓

*A facility with a bench pressure test stand with NATA certified pressure gauges

- **Set pressure** : successfully tested 3 times. Results as per AS1271 3.4.2(a) +/- 3% or +/- 0.015 MPa, whichever is greater. Or standard relevant to valve if more applicable.
- **Reseat pressure** : successfully tested 3 times. Results as per AS1271 or standard relevant to valve if more applicable.
- **Leakage test** : as per AS1271 2.6.3, API 527 or standard relevant to valve if more applicable. Generally 90% of set pressure.

5. Storage and shelf life

PRVs should be stored in accordance with the manufacturer's instructions. If no instructions are provided, then the following should be followed:

- Between 5-50 °C
- In a sealed bag or container.
- All ports to be plugged, blanked or capped.
- In a non corrosive environment.

If stored in accordance with the above instructions, a PRV may be stored for up to 4 years before installation.

If stored in accordance with the above instructions, once installed, it can be in service for it's nominal test frequency.

If the PRV has been in storage for longer than this duration, it must be retested prior to installation in accordance with the technical requirements, section 4.

6. Installation and commissioning

Prior to installation, it must be checked that the operating pressures on the PRV tag/nameplate are correct for the system it is protecting. PRVs that do not have a nameplate/tag, shall not be installed.

When installing the PRV, it is not a requirement to manually lift the lifting lever to test the functionality.

When installing the PRV, it is not a requirement to pressurise the system to operate the pressure relief valve at the set pressure.

7. References

This standard was updated whilst reviewing [information from the National Board of Boiler and Pressure Vessel Inspectors from the USA](#)