



# NPRF ADVISORY NOTE

Issued 22 August 2011

## PRESSURE CONTROL VALVES

### PURPOSE

The purpose of this Advisory Note is to provide technical information to the plumbing industry on the terminology and use of pressure control valves used in water services installed in accordance with AS/NZS 3500:2003. The majority of these valves are used where the pressure supplied from the property service exceeds 500 kPa and when an authorised pressure regulating device is required.

### BACKGROUND

In installations downstream of the water meter, AS/NZS 3500.1:2003, Clause 3.3.4 states that water at any outlet other than a fire service outlet within a building shall not exceed 500 kPa. This maximum pressure requirement is essentially required because pressures above 500 kPa can cause significant property damage, excessive noise in the system and reduce the life of appliances taps and fittings. Where the delivery from the water authority exceeds the maximum pressure of 500 kPa, break tanks, pressure ratio or pressure reducing valves must be installed to maintain the desired pressure within a building's water system. These installation examples in this advisory note represent an acceptable plumbing solution in accordance with the Plumbing Code of Australia subject to acceptance by the authority having jurisdiction.

### Importance of Pressure Reduction

- Protect piping components and fixtures.
- Water conservation.
- Plumbing Code of Australia performance requirements.
- Maximum pressure within a building at any outlet other than a fire service outlet shall not exceed 500 kPa - Deemed-to-Satisfy Requirements (AS/NZS 3500.1).
- Critical pressure management must include a pressure relief valve downstream.

### What is Thermal Expansion?

A backflow preventer or check valve installed in a water supply line causes a closed system. A closed system can create excessive pressures in the hot water lines when the thermally expanded water has no means of escape. The pressure build-up occurs as the heated water expands in volume. If the utilised pressure regulator has a by-pass feature, some pressure could be dissipated back to the network utility provider's water main. If inlet pressures are greater than or equal to 1,034 kPa, the temperature/pressure relief valve will discharge before the integral bypass will operate. Trapped pressure can lead to serious plumbing problems.

### Pressure Reducing Valves vs. Pressure Limiting Valves

#### Pressure Reducing Valves Features

- Adjustable.
- Diaphragm design.
- More accurate with varying inlet pressures.
- No creep on down-stream.
- Serviceable.

## Pressure Limiting Valves Features

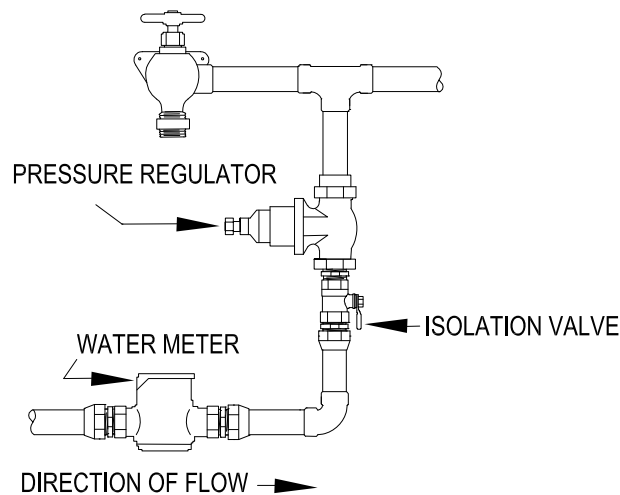
- Non-adjustable.
- Piston design.
- Less accurate with varying inlet pressures.
- Greater tendency to creep on down-stream under no-flow condition (as much as 30%).
- Non-serviceable.

## Plumbing Solutions - Types of Installations

- Single regulator.
- Multiple regulator installations – two regulators in a series.
- Parallel installations – multiple regulators in parallel.

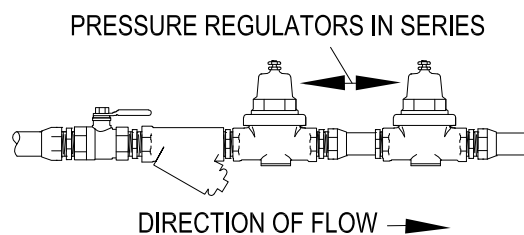
### Single Regulator Installation

Most commonly installed on residential and commercial applications. This installation requires that the regulator handle all demand flows from zero to full capacity.



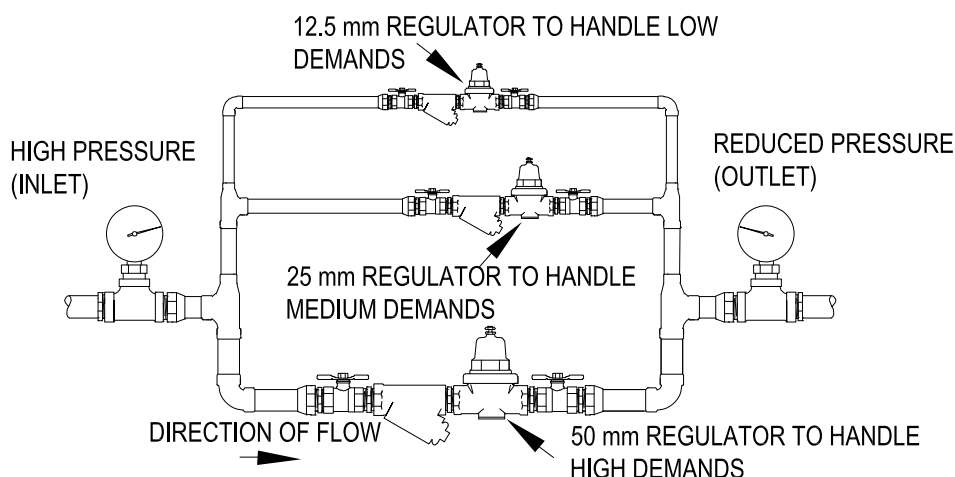
### Multiple Regulator Installations in Series

Used in special situations where a wide variance between the inlet pressure and the desired reduced pressure exists. Excessive pressure reduction is generally considered when the reduction is more than 4 to 1 ratio (i.e. 1,400 kPa to 350 kPa).



## Parallel Installations

Used for systems with low to high flow demand. Consists of a group of parallel regulators, all receiving water from a common source. After flowing through the chain of valves, water enters a common service line of sufficient size to service the system at the reduced pressure. Low flow is serviced by smaller PRV and as demand in the system increases, the larger valves come into service.



## Appropriate Method for Selecting the Proper Valve and Size

- Calculate flow required for the application in Litres per Second (L/s).
- Estimate delivery pressure of the water in Kilopascal (kPa).
- Determine the maximum allowable difference between flowing pressure and static pressure or the “Fall-off”. “Fall-off” is not the same as pressure drop!
- Apply this information to appropriate flow charts to determine the type and size valve that best suits the installation needs.

## Other Methods

When using other methods the following should be taken into consideration:

- Over sizing the valve keeps the valve plunger from opening fully causing excessive wear.
- Under sizing the valve causes high velocity, a noisy valve and premature wear of the internal components.
- Pipe sizing does not refer to actual capacities and demands of the system, but rather on existing plumbing.

## CONCLUSION

When selecting valves for controlling pressures in water services, consideration should be given to matching the particular operation required to the characteristics of valves available. Valves should then be installed and tested to manufactures instructions and relevant Australian Standards.

For further information contact [www.plumbingregulators.org](http://www.plumbingregulators.org) or your state or territory plumbing regulator

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