

# Building and plumbing newsflash number 429

## Water pressure reduction

### Purpose

To advise Water Service Providers (WSP) about implementing pressure reduction and leakage management programs to help maintain effective operation of fire suppression systems.

### Background

The Department of Infrastructure and Planning has administrative responsibility for the *Building Act 1975* (BA) and the *Plumbing and Drainage Act 2002*. Building and plumbing laws cover standards for fire safety, including fire safety installations such as sprinkler and hydrant systems. These systems are typically connected to WSP infrastructure where it is available.

The Department of Environment and Resource Management (DERM) has administrative responsibility for the legislative framework for the provision of water services. Local governments in South East Queensland are required under the Water Regulation 2002, schedule 10C, to achieve a collective saving of 60 mL per day of reticulated water by implementing a system of pressure and leakage management. While this regulation does not set a minimum service level (pressure) required to achieve the collective savings, it is now common place for WSPs to reduce reticulated water pressure in high pressure areas.

Pressure reduction or management is the process by which WSPs identify and reconfigure areas within their water supply network which are being subjected to excessively high pressures. This is intended to reduce pressures and therefore minimise water loss, power consumption, leakage, pipe bursts and the consequential impacts. WSPs aim to manage water pressure to a level commensurate with providing adequate customer service standards.

DERM guidelines recommend service levels should not fall below 250 kPa in commercial/industrial areas and 200 kPa in residential areas. In 2007, WSPs began implementing a pressure and leakage reduction program through reductions in mains water pressure using the DERM guideline. However, reticulated pressure of between 200–250 kPa does not satisfy the current requirements for fire safety systems without the provision of additional on-site infrastructure such as tanks and pumps. In new buildings where adequate pressures and flows are not available, owners are typically required to install water tanks and pumps to achieve required flow rates for fire systems and fire fighting purposes in order to comply with building legislation.

In existing buildings, owners may have relied upon higher WSP pressures at the time of approval and their building's sprinkler and/or hydrant systems may not perform adequately where reticulated pressures have since been reduced. For example, Queensland Fire and Rescue Service (QFRS) testing reveals that some fire systems have failed to perform in-line with required standards as a result of pressure reduction. For hydrants, the failure occurs when QFRS simulates fire fighting conditions and attempts to boost water supplies up to 700 kPa in-line with the hydrant system standard, AS 2419.

## Issues

Building owners and occupiers have an obligation to maintain the performance of essential services in their buildings at all times for the purposes of occupant safety.

### Fire services and Building Act compliance

AS 2118.1 covers the use of certain fire sprinkler systems and specifies the requirements for their installation and design. The standard also contains minimum requirements for water supply, pressure and flow of water to sprinkler systems and details the different types of sprinklers and their respective use in relation to the hazard classification. It sets requirements for the use of pumps and for piping used for sprinkler systems to achieve water pressure and flow requirements.

AS 2419.1 covers fire hydrant systems and sets minimum water supply pressures for hydrant designs based on water pressures and flows available to the premises from the source of supply. Where fire hydrants do not achieve the relevant criteria, additional systems must be installed to achieve the required pressure and flow rates.

Section 115 of the BA requires ongoing compliance with the building code provisions relevant to the building's approval.

### Operational impacts

Where WSPs reduce reticulated water pressures building safety and QFRS operations may be compromised. Also, where buildings have noncompliant fire services, there are additional costs associated with compliance due to the re-design and upgrade required for fire safety systems. In all cases, a new building and plumbing approval will be required to assess the proposed work for compliance, adding further to costs. Additional planning and development approvals may also be required in some cases.

Where system performance falls below design requirements in the building's development approval, on-site infrastructure, such as large water tanks and pumps may be required. This could be in the form of static storage, pump sets and/or the installation of larger fire mains. In this situation, owners may face difficulties in finding enough space on the premises to house the additional equipment. For example, where two fire-fighting attack hose lines are required on a fire hydrant both attack hose lines require enough water to last four hours in the event of a fire occurring. This means that to meet the requirements of the standard, an area capable of storing 288 cubic metres of water is required (600L/min x 60 x 4 hours x 2).

## Risks

The direct risks of pressure reduction include the potential for injury to occupants and fire fighters, loss of life, loss of contents, loss of the building and business disruption. Water pressure reduction programs may decrease performance of fire suppression and fire fighting systems. This may result in a building's fire sprinkler or hydrant system failing to meet the required operating water pressures and flows. Decreased performance should be identified during system maintenance testing, however it may go unnoticed for some time.

Reduced pressures may cause fire safety systems to operate less effectively and, in some cases, systems may not control or suppress a fire. Building fire safety systems must meet operating pressure and flows required at the time of approval in-line with development approvals and the *Fire and Rescue Service Act 1990* (see section 104D—ongoing requirement to maintain fire safety installations to a standard of safety and reliability). Reduced system performance may also limit the QFRSs ability to suppress or extinguish the fire and control fire spread.



## Recommendation

Key fire safety industry stakeholders advise that where average daily reticulated water pressures are maintained at 500 kPa, sprinkler and/or hydrant systems in approximately 80 per cent of existing buildings will still perform adequately. This is subject to site topography and building size and layout.

In designing implementation strategies, WSPs should consider the effect of pressure and flow reductions on the performance of fire safety systems. Where a WSP has implemented a pressure reduction program and **excess pressure is available**, average daily reticulated water pressures should not be reduced below 500 kPa in areas where buildings have sprinkler and/or hydrant systems. Building owners and occupiers should actively monitor the performance of their building's fire safety systems to ensure occupant safety is not compromised.

## Contact for further information

Department of Infrastructure and Planning

Building Codes Queensland Division

tel +61 7 3239 6369

[buildingcodes@dip.qld.gov.au](mailto:buildingcodes@dip.qld.gov.au)

**DISCLAIMER:** The information contained in this Newsflash is provided by the State of Queensland in good faith. The material is general in nature and before relying on the material in any important matter, users should carefully evaluate its accuracy, currency, completeness and relevance for their purpose. It is not intended as a substitute for consulting the relevant legislation or for obtaining appropriate professional advice relevant to your particular circumstances. The State of Queensland cannot accept responsibility or liability for any loss, damage, cost or expense you might incur as a result of the use of or reliance on information contained in this Newsflash. It is not intended to be, and should not be relied upon as the ultimate and/or complete source of information.