

Water Saving Options Available When Testing Fire Safety Systems

1. SUMMARY

Significant amounts of water are used in routine maintenance of fire safety systems, but building owners can reduce this water consumption in several ways. Water saving methods can include sprinkler alarm testing with proprietary test devices and changes to the test water supply design – see sections 4 and 7 for more details.

AS1851-2005 is the Australian Standard for maintaining fire protection systems and equipment in buildings. Although there is currently no legislative requirement to use AS1851-2005, Victorian building owners, occupiers and service providers need to carefully consider how they will meet their statutory and public safety duties and responsibilities.

2. BACKGROUND

Hydrants, hose reels and sprinklers need regular maintenance to ensure complete reliability. Concerns have been raised by the community, government and the fire protection industry about the large amount of water used in testing, particularly with sprinkler systems.

3. REGULATORY REQUIREMENTS

3.1 Buildings constructed since July 1994

Part 5 of the Building Act 1993 (the Act) sets out requirements for occupying buildings and places of public entertainment. It specifically details when occupancy permits are required and the

form and effect of those permits. Part 5 also details the decision making responsibilities of the Relevant Building Surveyor (RBS). Most importantly, section 40 of the Act requires that a person must not occupy a building in contravention of the occupancy permit. This includes any conditions, such as maintenance requirements of the Building Regulation 2006 (the Regulations), to which occupation is subject. Substantial penalties may be applied if the Act is contravened.

3.2 Buildings constructed before July 1994

The Regulations also specify maintenance for existing buildings built prior to 1 July 1994. These items are defined as essential safety measures, similar to the requirements for buildings issued with occupancy permits on and after 1 July 1994.

The owner must ensure that all safety equipment, safety fittings and safety measures are maintained in a functional state.

4. WATER SAVING OPTIONS

Building owners can save on water consumption in several ways. The simplest and usually least costly method is a maintenance regime under AS1851-2005 – Maintenance of Fire Protection Systems and Equipment.

Design options are also worth considering, such as voluntary retrofitting over and above the minimum requirements of:

- AS2118 – Automatic Fire Sprinkler Systems
- AS 2941 – Fire Pump Sets
- AS2419 – Fire Hydrant Installations.

These options could also be looked at during the design stage of a new building.

Water saving methods for testing can include sprinkler alarm testing with proprietary test devices and changes to the test water supply design.

Options for test water supply could include:

- break tanks and return line
- pump recirculating tanks
- variable speed pumps
- remote annubar test facility
- recycled water supplies.

Saving water at the expense of safety system

5. AUSTRALIAN STANDARDS

5.1 Revisions to AS1851

AS1851 is the Australian Standard for maintaining fire protection systems and equipment in buildings.

After extensive industry and community consultation, AS1851 has been revised to incorporate the latest information available to the building industry and community.

Consideration has also been given to the interfaces between equipment for fire detection and firefighting.

Previous versions of AS1851 mandated weekly testing. AS1851-2005 introduced an option to test monthly instead, if:

- The main stop valve and subsidiary valves are
- Grade B status, monitored in accordance with AS2118.1.
- Water supply valves, except underground

key operated valves, are secured in the open position. The main stop valve is strapped and padlocked and all other valves are chained and padlocked.

- Control assemblies are located in a locked room, or enclosed in a locked cabinet or cage.
- Where required, systems incorporate an automatic installation jacking pump or retard chamber, whichever is appropriate.
- AS1851-2005 further states that weekly testing of compression ignition engine driven pump sets may be omitted in favour of monthly testing, where:
- they comply with AS2941-2002 and the engine starting batteries are replaced every two years, irrespective of condition or they do not comply with AS2941-2002, but are equipped with dual batteries, low voltage monitoring facilities and the engine starting batteries are replaced every two years, irrespective of condition.

5.2 Obligations under AS1851-2005

Currently, there is no mandatory requirement for the automatic use of AS1851-2005 in Victoria.

However, there may be a common law obligation. If AS1851-2005 is not immediately used, owners, occupiers and service providers should satisfy themselves that they have a sound reason for not adopting the latest standard.

6. ADOPTING AS1851-2005

6.1 Buildings constructed before 1 July 1994

Owners of these buildings can adopt the testing regime of AS1851-2005, without amendments to occupancy permits.

Owners must still maintain the essential safety measures outlined in Section 3, but the Regulations do not nominate specific frequency and standards for maintenance. The fire safety

system must be maintained to ensure the system operates in the way it was originally designed.

Owners who decide to use AS1851-2005 should clearly document that maintenance of fire safety systems is being undertaken in accordance with this standard.

There may be a requirement that retro fitting of the items as listed in Section 5.1 is needed for sprinkler systems to be tested monthly.

It is recommended that owners ask a suitably qualified person such as a building surveyor or engineer competent to assess their existing fire safety systems.

Currently, AS1851-2005 requires annual flow testing of hydrants and hose reels. There is no proposal to change this requirement. Water usage in the testing of these systems is considered minimal.

6.2 Buildings constructed between 1 July 1994 – 1 January 2005

Maintenance must occur as listed on the occupancy permit or maintenance determination. For an occupancy permit, section 40 of the Act applies (occupation of a building must be in accordance with the occupancy permit). This naturally includes complying with the conditions of maintenance. An owner must not alter the maintenance of an essential safety measure, without first going through the appropriate administrative process.

There is currently no legislative requirement to use AS1851-2005, but Victorian building owners, occupiers and service providers need to carefully consider their own individual situations in relation to their statutory and public safety duties and responsibilities.

Upon the application by an owner or agent of the owner a Municipal Building Surveyors (MBS)

may amend the maintenance conditions of an existing occupancy permit, under section 70 of the Act.

When reviewing an application, the MBS must consider occupant safety and whether the testing and maintenance requirements of AS1851-2005 are appropriate for the fire safety systems installed in the building.

The sprinkler system may need an upgrade, as

AS1851-2005 requires certain conditions to be met by the building's sprinkler system and pumps so that the outcome of monthly testing can be achieved.

6.3 Buildings designed after 1 January 2005

For buildings at design stage, sprinklers systems should adopt the criteria requirements of monthly testing, as identified in AS1851-2005. It is recommended that the RBS specifies the monthly testing regime allowed for in the standard, where those provisions have been included in the building.

7. OTHER DESIGN OPTIONS FOR WATER SAVING

The following are water saving options for owners and designers. These are not exhaustive and owners should consult with appropriately qualified persons, such as mechanical engineers, to discuss the most suitable option for each individual situation.

7.1 Sprinkler alarm testing

A recirculating pump proprietary test device does not consume water and importantly, retains the non-potable water within the system.

For proprietary devices to be considered, they must be able to fully test a component's functionality in the same way a current test is conducted or in a way that assures a similar level of reliability.

7.2 Fire system water testing

Water supply testing, at six-monthly and yearly periods, consumes more water than all of the sprinkler fire brigade alarm tests combined. This water is drawn directly from potable systems, making it possible to consider a broad range of water re-use possibilities.

Using fire pumps to boost pressure from the mains water supply can dramatically increase the amount of test water consumed. Monthly pump run testing and annual pump load testing are required, in addition to alarm testing and flow testing.

Although pumps are fitted with relief valves to protect pumps from overheating and damage when operating with little or no discharge, a much larger valve is required to limit the outlet pressure.

Excess pump pressure is controlled by a relief valve that dumps excess water to waste, bringing the pump back to system maximum pressure. Typically, this is about 25 per cent of the pump duty flow.

7.3 Pump recirculating tanks

Pump recirculating tanks have a number of benefits. With the tank filled as required and the town main water supply isolated, test water from both pump run and pump load tests is returned to the tank for contained reuse during the test period. After the test, the town main supply is reinstated.

The recirculating tank will need to be designed to cope with the maximum duty pump flow output and to prevent turbulence from return lines. As the pump is still relying on town main supply, in a retrofit situation existing pumps sets can remain. However, it does mean that the annual water supply test must be conducted without recycling.

7.4 Variable speed pumps

Variable speed pumps can achieve similar outcomes to recycling tanks. Excess pump pressure is regulated by adjusting the pump speed, rather than using a relief valve.

However, during the annual pump load test (which requires maximum duty flow), the pump speed cannot be reduced and test water will still be consumed.

AS2419 (public comment draft) now recognises variable speed pumps, permitted in NFPA 20 fire pump standard the USA for some time. When issuing a building permit for the upgrade work, owners will need to engage a building surveyor to assess the variable speed pump, as part of an alternative solution process.

7.5 Break tank and return lines

Almost all of the test water can be recycled, if the tank return lines are fitted to the pump pressure relief valves and flow test lines. Test water from both pump run and pump load tests is returned to the tank.

Annual flow testing can be undertaken as part of the annual pump load test. The size of the break must be designed to cope with the maximum pump' duty flow.

As break tanks rely on tank infill for the total volume of water, an annual flow test of town main supply to confirm tank infill capability is as an essential safety measure. This test water cannot be returned to the tank for reuse. However, annual flow testing can be performed as part of the annual pump load test and tank return lines can be retrofitted to the existing water tank supply.

7.6 Remote annubar test facility for sprinkler systems

AS2118-1999 requires that an annubar test facility is located at the sprinkler control valve assembly, which may be some distance from the

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water supply tank. Where long tank return lines are required, consider adding an annubar test facility remote from the sprinkler valves assembly immediately after the pump outlet – as permitted for non-sprinkler fire pump installation. Hydraulic reference point would also have to be added to the new location.

AS2118 – 2006 permits annubars to be located away from the sprinkler control valve and also mandates return lines wherever water supply tanks are fitted.

7.7 Recycled water supplies

There are a number of options that owners can explore to source water for recycling. This can be treated and made available for firefighting services.

These may include:

- storm water run-off collection
- shower and bathroom water (grey water)
- sewage effluent (black water).

8. BUILDING PERMIT REQUIREMENTS

Any building work that affects an essential safety measure – such as the equipment outlined in AS1851 2005, or other design options that owners may wish to incorporate – will require a building permit.

If you have a technical enquiry please email:

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1300 815 127

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