Fire hydrant and sprinkler system commissioning and periodic maintenance procedure

1 July 2014

Contents

Abbreviations

The following abbreviations are included in this document:

AS	Australian Standard
BA	*Building Act 1975*
MP	Mandatory Part
QDC	Queensland Development Code
QFES	Queensland Fire and Emergency Services

Acknowledgements

Queensland Fire and Emergency Services (QFES)—*Guideline for conducting fire hydrant testing.*

1. Legislative background

This procedure is made under Queensland Development Code - Mandatory Part (MP) 6.1. It is unlawful not to follow this procedure.

The following legislation and subordinate legislation is applicable:

Building Act 1975 (BA):

- Section 74 applies to a building development approval for a building served by a special fire service. It provides that the person installing the system must provide QFES notice to inspect prior to finalising installation as well as after the installation, but prior to interior surface finishes being applied. The assessment manager must also be given a copy of the notices at the same time.

Building Regulation 2006:

- Section 39 sets out that the QFES may inspect the building work, or inspect or test the service to check the relevant aspects comply with the building development approval. It also outlines relevant timelines for inspections or advising of no inspection or testing; as well as relevant timelines regarding the outcome of the inspection or testing.
- Section 40 outlines what actions a building certifier can or must take in response to action under section 39.
- Section 41 sets out the consequences if a notice issued under Section 39(3) does not comply with Section 39(3).

Queensland Development Code:

- MP 6.1 outlines the commissioning, testing and maintenance requirements for fire safety installations including fire hydrants and sprinkler systems.

Sustainable Planning Regulation 2009:

- Schedule 7 sets out that the QFES is a referral agency for certain building work assessable against the BA and the jurisdiction for QFES.

- Schedule 8, outlines the referral jurisdiction of QFES which includes special fire services such as fire hydrants and sprinklers.

2. Six month transitional period to adopt AS 1851-2012

On 1 July 2014, amendments to MP 6.1 took effect to adopt the 2012 edition of Australian Standard 1851 - Routine service of fire protection systems and equipment (AS 1851 – 2012). A six month transition period will apply during which MP 6.1 will reference both the 2005 and 2012 editions of AS 1851. The transition period will apply from 1 July 2014 to 31 December 2014.

From 1 January 2015, only AS 1851-2012 will apply under MP 6.1.

3. Justification

The owner of a building is required to ensure that it complies with the building development approval. This includes special fire services such as fire hydrants and sprinklers systems that were required to be installed to meet the requirements of the relevant Building Code. Under the BA, the QFES has a role to play in assisting in the testing, inspection and monitoring of maintenance of fire hydrants and sprinklers. For example, a QFES officer may witness a test, which may occur during an inspection of all other systems.

Australian Standard (AS) 2419.1—Fire hydrant installations and AS 1851-2012 do not explain how the test should be performed. Therefore to ensure accuracy and consistency throughout the state, the procedure stated in Item 5 - *Most hydraulically disadvantaged hydrant* shall be conducted at all times when flow and pressure tests are carried out.

4. Hydrant testing equipment

The following hydrant testing equipment may be required for conducting flow and pressure tests. The equipment required will be dependent upon the fire hydrant system installed and whether the system is internal or external to the building.

Equipment

- Flow measuring device—one flow measuring device is used for every 10 litres per second requirement of the system. Therefore multiple devices may be required.
- Jet reaction diffusers
- Calibrated pressure gauge (NATA certified) per device used
- Various lengths of 65mm non-percolating hose class H
- Discharge test tanks
- Hydrant keys
- Various sized engineered orifice nozzles
- Pump appliance
- Multi stage hydrostatic test pump

- Suction hose/s
- Hose ramps
- Signage (Occupational Health and Safety)
- AS 2419.1 C2 Flow graph
- Two way radios with dedicated channel
- Multi stage pump appliance (for high rise structures)
- Portable relay pump (Internal boosters).

Note 1: For the purpose of this procedure, orifices are a type of flow measuring device.

Required system performance

The flow and pressure requirements will be determined utilising the appropriate AS 2419.1 or, if there was no Australian Standard in place at the time of installation, refer to MP 6.1.

5. Most hydraulically disadvantaged hydrant

A test at the most hydraulically disadvantaged hydrant will be conducted for all on-site fire hydrant systems servicing a building. The most hydraulically disadvantaged hydrant is generally:

- the fire hydrant farthest from the incoming water main, or on a boosted system, the farthest from the booster connection; and
- in a multi-level building, the fire hydrant at the highest level.

Note 2: This is particularly important when conducting a pump appliance test.

6. Procedure for hydrant/sprinkler testing

This maintenance procedure is designed for conducting flow and pressure tests only. It must be used in conjunction with the relevant Australian Standards and inspection checklists for achieving compliance when commissioning/testing a hydrant system.

6.1 Fire hydrant system—flow test: internal or external (onsite) system

10 litres per second systems

The test will consist of connecting a flow measuring device to the most hydraulically disadvantaged fire hydrant. The flow measuring device will then be opened to flow 10 litres per second (or, if using orifices, will be opened fully) with the residual pressure determined from the pressure gauge on the flowing hydrant.

The system must achieve the performance as detailed in the appropriate AS 2419.1.

Systems greater than 10 litres per second

For a system requiring a flow rate of 20 litres per second, the test will initially be set out as per the 10 litres per second test. An additional flow measuring device will also be required on the second most hydraulically disadvantaged hydrant and this will be flowed at 10 litres per second, with

measurements to be taken from the flowing hydrant. Should the system require 30 litres per second, the third most disadvantaged fire hydrant will require a flow measuring device opened to flow 10 litres per second. All three flow measuring devices are to run concurrently with measurements to be taken from each flowing hydrant.

Where the system requires a flow of 20 litres per second and there is only one fire hydrant on the system, the first flow measuring device should be set up as per the 10 litres per second test on one outlet. The second outlet should be connected with an additional flow measuring device with pressure to be taken at either flowing hydrant. Each flow measuring device can then be opened to flow with measurements recorded at a maximum of 10 litres per second.

The system must achieve the performance as detailed in the appropriate AS 2419.1.

Note 3: Test tanks may be required for internal hydrants, with one tank being required per hydrant operation.

Note 4: While street hydrants may be used to provide coverage in system design, most water agencies do not design their systems to cater for individual property firefighting flow and pressure requirements. AS2419.1 is not applicable to water agency street hydrants. If street hydrants are deemed sufficient for a particular property, it is the building owner/occupier's responsibility to have such hydrants maintained in accordance with AS1851-2012. Permission from water agencies must be gained before testing street hydrants.

Note 5: The procedures set out in section 6 do not apply where onsite pumps are installed. Please refer to the appropriate AS2419.1 for further information.

6.2 Fire hydrant system—hydrostatic test

Hydrostatic testing is to be carried out on commissioning a system, and for five yearly maintenance as required by AS 1851-2012.

Any volume loss detected is to be noted on Form 71 - 'Fire hydrant and sprinkler system commissioning' and Form 72 - 'Fire hydrant and sprinkler system periodic testing and maintenance'. These forms are available at the Department of Housing and Public Works website: www.hpw.qld.gov.au/forms-templates/approved-plumbers-and-drainers-forms.html. For combined systems, the sprinkler system must be isolated at each branch before the test is commenced. For multiple pressure zones, multiple tests are required.

6.3 Fire hydrant system—pump appliance test

Pump appliance testing is to be carried out on commissioning a system, and for five yearly maintenance as required by AS 1851-2012.

The pump appliance is to be connected to the hydrant booster with the required number of hose lines for the system. The required number of disadvantaged hydrant(s) must be connected with a flow measuring device/s, with a technician at each disadvantaged hydrant. On connection of all necessary equipment, the pump operator will gradually increase the pump outlet pressure until the technician at the most disadvantaged hydrant reaches the required pressure. At this time the pump operator is required to take the pressure on the pump compound, discharge and booster inlet pressure gauges. This test will determine the system boost pressure.

All performance outcomes are to be shown on Form 71 or Form 72, including allowable system pressure loss, making sure all allowable losses have been calculated. If there is more than one booster connection, this test is required on each booster connection. For example, if there are four pressure zones, four pump appliance tests are required.

Systems with a static storage water tank also require a suction test to ensure that the required flow rate and outlet pressure is achieved at the required number of most hydraulically disadvantaged hydrants. Refer to AS2419.1 for further information.

Note 6: Test tanks may be required for internal testing.

6.4 Fire sprinkler system commissioning and testing

Water pressure and flow test results when commissioning or maintaining sprinkler systems, shall be recorded on Form 71 and Form 72. Test results recorded on the these forms must comply with the testing requirements of the relevant deemed-to-satisfy provisions of the Australian Standards.

Sprinkler systems

- For systems installed to AS 2118.1, 2118.4 or 2118.6 the required pressure specification shall be noted on the form prior to undertaking the test.
- Running test: fire sprinkler system specifications are documented on the fire sprinkler system block plans outlining design requirements and required test points. Information shall be recorded stating the required flow rate in litres per second, available pressure in kilopascals and location of test points from which information was recorded. Test results will indicate the system's test performance and the tester shall indicate pass or fail in the required format on Form 71 or Form 72.
- This commissioning and maintenance procedure is designed for conducting the flow and pressure tests only. It must be used in conjunction with the relevant Australian Standards and their inspection checklists for achieving compliance and when commissioning or testing a sprinkler system.
- This section is to be used for sections 4.14 of AS2118.1-1999, 4 of AS2118.6-2012 and 2.2.3 (b) and (c) of AS2118.4-2012 as well as section 2 of AS1851-2012. Notes: (1) For AS2118.1 and AS2118.6 systems multiple testing points may be required. For buildings in which the test involves opening a valve to discharge a volume of water to achieve the accepted design flow, the system test points shall be recorded for each different system and locations.