



Fire and Emergency Services (FES) Commissioner's  
Operational Requirement Guideline (ORG)

**Issued:** April 2020

**Authorised:** Superintendent Built Environment Branch

## **ORG 7: Sprinkler Systems**

### **1. Intent**

A sprinkler system should be installed throughout a building to prevent a fire developing to a size where occupants are unable to evacuate, and firefighters are unable to safely contain and extinguish the fire.

### **2. Operational Requirement**

The FES Commissioner requires the following in place:

- i. a fully compliant sprinkler system in accordance with the National Construction Code (NCC) E1.5 and the relevant Australian standards (subject to the fuel load quantity and fuel arrangement) throughout the entire building, including balconies and canopies,
- ii. sprinklers should not be omitted by using performance based approaches relying on management practices to limit fuel loads or firefighters to extinguish the fire, unless agreed to by DFES,
- iii. for hotel and apartment buildings greater than three storeys and less than 25m in height, where sprinkler systems are required by the NCC, any proposed FPAA101D sprinkler system should have the following installed:
  - a. 'wet' hydrant riser, and
  - b. compliant (AS 2419.1) feed hydrant and booster assembly on site.
- iv. A firefighter will still require a hydrant, therefore, sprinklers do not replace a fire hydrant system.

Consultation with the DFES Built Environment Branch is required for any deviations from the above or if clarification is required.

### **3. Reason**

A fully compliant and maintained sprinkler system helps prevent the uncontrolled spread of fire and allows occupants additional time to escape and for firefighters to safely enter a building to extinguish the fire and conduct search and rescue operations. A sprinkler system will generally not extinguish a fire.

To recognise the occupant characteristics and building complexities, the NCC mandates AS 2118 sprinklers in all buildings greater than 25m in height and when certain conditions are met in other occupancy types such as aged care, hospitals, large shopping centres and storage buildings. The NCC also mandates the installation of sprinkler systems in hotels and apartments greater than three storeys and less than 25m in height. For these buildings only, however, there is the option of installing either an FPAA101H or FPAA101D in lieu of an AS 2118 sprinkler system.

To compensate for the cost of sprinkler installation in these lower height types of hotels and apartments, the NCC deemed to satisfy provisions allow certain concessions, including reductions in system maintenance, reductions in hydrant system requirements and reduction to fire resistance levels in fire compartments. Table 1 provides a comparison of some of the significant requirements and operating specifications of the differing sprinkler system options. Further detail is also provided in DFES technical notes.

Fire Safety Measure	Sprinkler System Provided				
	AS2118.1	AS2118.4	AS2118.6	FPAA101H	FPAA101D
Number of Storeys	Any	Up to 4	Any	Up to 7 <sup>1</sup>	Up to 7 <sup>1</sup>
Max. no of sprinklers Operating in Class 2/3 Area	4	Up to 4	4	2	2
Min no. of sprinklers operating – Other Classifications	6	6	AS2118.1 Performance	AS2118.1 Performance	3 <sup>2</sup>
Design area of operation in Residential Classification	126 m <sup>2</sup>	96 m <sup>2</sup>	126 m <sup>2</sup>	48 m <sup>2</sup>	48 m <sup>2</sup>
Minimum Design Flow for sprinklers	4.8 L/s	Not less than 3.3 L/s	Hydrant + 4.8 L/s	20 L/s (assuming 2 x hydrants)	2.2 L/s
Pump(s) and Tanks for Sprinklers	Dedicated		From hydrant supply	From hydrant supply	From drinking water supply
Minimum duration of Water Supply for Sprinklers	½ Hour <sup>34</sup>	½ Hour	½ Hour <sup>34</sup>	From 4 Hour Hydrant Water	½ Hour
Sprinkler Booster	Yes			Yes <sup>4</sup>	No
Expected Reliability / Effectiveness of Sprinklers	90-95%			91% <sup>9</sup>	88% <sup>9</sup>
Direct Brigade Alarm and Building Wide Alarm on activation	Yes			No	No
Hydrant System	AS2419.1 Hydrant System <sup>6</sup>	AS2419.1 Hydrant System <sup>6</sup>	AS2419.1 Hydrant System	AS2419.1 Hydrant System	Dry riser and no onsite hydrant (can be a street hydrant 60m away)
Minimum Hydrant Flow Rate	10 L/s			10 L/s	6 L/s <sup>7</sup>
Duration of Water Supply for Hydrants	4 Hours		4 Hours <sup>8</sup>	4 Hours	<b>Town's main only (unless pumps and tanks required)</b>

Notes:

- Reference EFT consulting report [18].
- Carparks having ≤40 vehicles.
- Light hazard up to 6 sprinkler heads simultaneous.
- If containing carpark which requires protection (>40 vehicles) 1 hour storage required.
- Combined Sprinkler / hydrant booster.
- If no coverage from external hydrants.
- 6L/s when boosted by fire appliance.
- Combined water supply for sprinkler and hydrant systems.
- Estimated in ABCB 2018 Proposal for Change document / (EFT Report 2575).

Table 1. Sprinkler type comparison.

If a sprinkler system fails to operate effectively, the difficulty of performing firefighting operations is increased. Of the options available the FPAA101D system is the least preferred system of DFES as it does not have the following: (1) four sprinkler head operation (greater water flows available) (2) building wide alarm for occupants and

*This is a controlled document.*

notification to DFES when sprinklers activate (3) identification to firefighters of where the sprinklers have activated, (4) an established fire safety maintenance schedule and (5) a 'wet' hydrant system/riser.

In reaching the decision DFES has considered the following:

- i. the first arriving crew's standard operating procedure does not generally support the requirement to immediately boost a hydrant system,
- ii. the particular FPAA101D sprinkler specifications and the reliability analysis and estimate,
- iii. the other fire safety concessions, including the delay in having a suitable water supply (quantity, flows and pressure) available due to the 'dry' hydrant riser.

Therefore, to ensure the FES Commissioner's Operational Requirements are met and effective firefighting facilities remain available on site, DFES will request that a 'wet' hydrant riser is installed with the FPAA 101D sprinkler systems. The FPAA101D will also only be supported by DFES if proposed to be installed - strictly in accordance with the NCC deemed-to-satisfy requirements. Further information can be found in OR 6 and DFES technical notes.

#### **4. Risk Management**

DFES defines risk as: *'The threat that an event or activity adversely affects our ability to achieve business and operational objectives or the failure to exploit opportunities to maximise stakeholder value.'*

In the event of a building fire, there is a moderate risk that the provision of a poorly designed, maintained or installed automatic sprinkler system will:

- i. allow unnecessary spread of fire through additional fire compartments of a building,
- ii. present limitations on the ability of firefighters to access the location of the fire or trapped occupants,
- iii. inhibit the ability of occupants to access escape routes,
- iv. cause injury and death to occupants and/or firefighters.

The FES Commissioner's Operational Requirements are designed to help manage the risk.

#### **5. Resources**

Additional DFES sprinkler information for building owners, authorities having jurisdiction and fire safety practitioners is available in DFES technical notes and operational requirement documents:

<https://www.dfes.wa.gov.au/regulationandcompliance/buildingplanassessment/pages/publications.aspx>

#### **6. References**

AS 2118.1, 4 & 6 (1999 / 2017) Automatic Fire Sprinkler Systems, Standards Australia, Strathfield, NSW, Australia.

DFES Enterprise Risk Management Procedure (2018) Version1, Enterprise Risk.

National Construction Code Series (as amended) Volume One Building Code of Australia 'Class 2 to 9 Buildings', Australian Building Codes Board, ACT, Australia.

*This is a controlled document.*