7 Consideration of Sprinklers

7.1 Assessment of Sprinkler Failure

Historically, a proportion of fires involving the external wall system originate internally in areas protected by an automatic extinguishing system, most of which are sprinkler systems[1]. Thus, where buildings are sprinklered, in evaluating effects on building occupants, fire brigade personnel, and impact to adjacent buildings (Key Requirements 1, 2, 5 and 6), QFES request an assessment of the sensitivity of impacts from external wall fires to sprinkler failures in the locations of fire origin.

7.2 Efficacy of Sprinklers Associated with External Wall Fires.

Sprinkler systems designed in accordance with AS2118.1 are based on the hazard classes of occupancy. Occupancy classifications for a sprinkler design are determined having regard to the expected heat release within a building compartment together with the fuel loading and burning characteristics of materials within that compartment (ref. AS2118.1 Section 2.2).

In AS2118.1 Section 3.1.1 (a), it is stated that sprinkler protection shall extend to bounding walls or other barriers designed to resist the spread of fire into the sprinkler-protected area and constructed in accordance with NCC. Sprinkler protection within the building is not specifically designed to provide protection from fire breaking through an opening from the outside, which may occur as a result of fire involving the external wall systems.

Thus, when considering lateral fire spread back into the building, the assessment should consider the efficacy of sprinkler protection elsewhere in the building taking account of knowledge of the installed sprinkler system, and the design and protection to openings on the external wall through which fire could spread to the levels above the floor of fire origin.

8 Evacuation

8.1 Staged and Horizontal Evacuation.

If there is a building requiring a long time for evacuation, the evacuation strategy must work in the event of possible external fire spread.

Vertical evacuation (using a stairway) is the preferred method to exit a building. However, vertical evacuation for very tall buildings and for some occupants within health care facilities, aged care facilities or childcare facilities is time consuming. Where this is the case, staged and/or horizontal evacuation is required. It is designed to enable occupants to move or be assisted in movement away from the area of danger to a place of safety in the building until vertical evacuation is available.

Fire spread via an external wall system has the potential to lead to fire spread to levels above the floor of fire origin prior to the designated FRL of the affected fire compartment on the level above. This may not only breach the designed vertical fire separation, but also if the fire affects two compartments above, (either side of a compartment wall abutting the perimeter of the building), the horizontal evacuation strategy in the level above may be threatened. Thus, where there is a risk of external fire spread via an external wall system, QFES seeks full details of the proposals; the demonstration of safety may include, but not be limited to, the following:

- a modified evacuation protocol endorsed by the Building Management, and an approved MIU describing how this is implemented considering fire safety systems, and staffing arrangement to manage the emergency.
- demonstration that the staffing requirements for horizontal egress are not impaired by the need to concurrently horizontally evacuate the levels above.
- where horizontal evacuation is part of the building fire safety strategy, and more than one compartment may be impaired by vertical fire spread, then there should be other compartments (smoke or fire) on that level sufficient to provide a place of safety.

[1] Fire Hazards of Exterior Wall Assemblies Containing Combustible Components, White and Delichatsios, ed Milke, Springer Briefs in Fire, Fire Protection Research Foundation, Springer 2015

- the FRL for the compartmentation (including the FRL for smoke compartment, if reliance is placed on these)
- the capability of the smoke zone pressurisation system to perform in relation to the number of compartments affect by fire for the duration of evacuation, taking account of the risk from external fire spread.
- modification to fire safety systems which may include changes to EWIS logic or zone pressurisation to be endorsed as achievable by an engineer accredited to approve such systems. An “in principle” endorsement should be submitted with the FER.

8.2 Protection at Ground Level Exits

Conditions at an external building exit should not impacted by fire, smoke and falling debris effects from an external wall fire.

Where combustible cladding surrounds the exit opening or is in locations above a ground level exit, the installation of an awning above the exit is often suggested as a solution to protecting people from the effects of falling cladding debris.

The following should be considered when designing awnings:

- the largest force from falling debris, taking account of the cladding size components and height of the cladding above the awning.
- the number of people potentially exposed to falling debris in proximity to the exit.
- use of non-combustible construction.

The awning design should be supported by a description of the fire safety philosophy relating to its use.

For example, if exits are available only at one side of a building or if there is a fire isolated stair extending the height of a tall building leading to an exit, and there is a risk of falling debris at the exit location, awnings would need to be designed to protect all persons envisioned to use those exits.

Alternatively, if exits are distributed at a number of locations around the building, and the occupants have the opportunity within the building to re-route from one exit location to another, then an awning may be designed to protect a smaller number of people, for example a warden to undertake a pre-egress surveillance to confirm the absence of a risk of falling debris.

Thus the fire engineering solution should include a demonstration of the robustness of the awning to withstand impact of falling debris and a philosophy of its use describing how occupants are protected from falling debris at a particular exit, supported by agreed procedures included in a Management in Use (MIU) document.

Other solutions to enable egress to a safe exit may be considered such as fully fire rated and structural rated passageways or spaces leading to a safe external location.

9 Relevant Information for QFES from a Comparative Assessment

QFES acknowledge the certifier’s prerogative to determine a nominated Assessment Method in accordance with NCC Section A2.2 (2) which includes a comparative assessment methodology to demonstrate suitability of the proposed performance solution.

QFES does not consider a comparison between the capacity of a DtS design to contain fire spread and that of an external wall system containing combustible material to provide information relevant to QFES operational considerations.

QFES evaluation of the submission proposals will be based on the determinations and outcomes of the calculated fire performance of the proposed performance solution to impact on Fire Brigade Intervention capacity.

Thus, where a performance solution proposal intends to pursue a comparative assessment, QFES will provide advice on the assessed deterministic outcomes of fire performance outputs associated with combustible cladding relating to the subject building, and not a hypothetical DtS building.