

External Walls and PVC Permanent Formwork – Fire Compliance

After recent devastating fires associated with external walls in hi-rise buildings, authorities are understandably concerned with building fire safety and how external walls may best protect occupants from a fire.

Recent updates to Fire provisions in the Building Code of Australia (BCA) have ensured product suppliers and building professionals are proactive in designing load bearing external wall systems that protect life and property in the event of a fire.

Nick Gouskos, Senior Technical Engineer at AFS Systems states, “PVC permanent formwork external wall systems have multiple roles to play in fire safety, they must maintain structural stability to avoid any catastrophic collapse, they also need to avoid spread of fire, they must permit the safe evacuation of occupants from the building and maintain conditions required for fire-fighting purposes.”

For building classes 2 – 9, section C of BCA Volume 1 applies for fire compliance, for building classes 1 and 10, parts 2.3 and 3.7 of BCA Volume 2 apply and generally follows a simpler approach compared to Class 2 – 9 buildings. For the purposes of this article only Class 2 – 9 buildings will be addressed.

Fire resisting external walls including spandrels protecting vertically separated openings, are generally required on or near the boundary to the property or in close proximity to other buildings on the same property, in accordance with Clauses 2.6 & 3.3 and Specification C1.1 of BCA Volume 1.

For PVC permanent formwork external wall systems, CP1, CP2, CP3, CP4, CP7 and CP8 are the key BCA performance provisions for Fire compliance. A combination of Deemed to Satisfy and Performance Solutions may be presented to ensure compliance.

The key performance features for load bearing external walls include, Fire Resistant construction (including FRL up to 240/240/240), combustibility and spread of flame.

Separation & Resistance to Spread of Fire

Fire Resistant Construction requires FRLs as defined in Specification C1.1, the FRL of a wall system including penetrations is determined in accordance with AS 1530.4. PVC permanent formwork wall systems designed and constructed in accordance with AS 3600, provide similar or equal performance to in-situ or precast concrete walls with respect to FRLs.

Spandrels in external walls must protect vertically separated openings, Clause C2.6 of the BCA requires an FRL of 60/60/60 for spandrels in PVC permanent formwork load bearing external walls.

Additionally, the PVC permanent formwork external wall system must be proven to resist spread of fire over the wall to avoid flame spread to other parts of the building. Flame spread is the key factor when considering external wall types for use on a project, this has been identified as the main cause of property damage and loss of life when external walls are exposed to a fire source.

To demonstrate resistance to spread of fire on an external wall, a Fire Propagation test is required to be conducted in accordance with AS 5113. This test is a large scale fire test which provides a view on how external wall systems behave when exposed to a fire source. The AS 5113 fire test assesses the temperature rise over the wall during a fire event and also determines whether any spread of flame occurs..

PVC permanent formwork systems for load bearing external walls are required to be tested and assessed in accordance with the following fire testing standards:

- AS 1530.4: assesses the Fire Resistance Level (FRL) of the wall system up to 240/240/240
- Penetrations treatment for walls shall also be tested and assessed to comply with AS 1530.4.
- AS 5113: determines the temperature rise during a fire and whether any spread of flame occurs on the external walls

Over-Cladding & Wall Cavities

The final piece of fire compliance for PVC permanent formwork external load bearing walls is to assess whether the base wall system has been over-clad. In general, non-combustible over-cladding materials are to be used. Where the over-cladding forms a cavity between the cladding material and the PVC permanent formwork external wall, the cavity must be closed off at each floor level within the building, this will ensure any potential fire within a wall cavity will be stopped at the floor level above the source of fire.

For unclad PVC permanent formwork wall systems, the FRL and the results of a Fire Propagation Test on an External Wall must be assessed to ensure compliance is achieved with performance provisions CP1, CP2, CP3, CP4, CP7 & CP8 of BCA Volume 1.

AFS Rediwall®

AFS Rediwall® is a PVC permanent formwork wall system, for load bearing internal and external walls and is designed in accordance with AS 3600: Concrete Structures.

When tested to AS 1530.4 Rediwall® achieves FRLs up to 240/240/240. Rediwall has been tested to AS 5113, which has demonstrated flame spread does **not** occur on Rediwall external walls when exposed to a large fire source.

It has been determined that fire propagating via the Rediwall® PVC facing is unlikely and Rediwall® systems are not considered to increase the risk of fire spread via external walls. Additionally Rediwall® has been found to not adversely affect tenable conditions during occupant evacuation.

Penetration treatments for Rediwall® systems are considered compliant with AS 1530.4 when approved and compliant Fire stopping systems are used. Rediwall® has been tested and assessed with various types of penetrations and fire stopping systems and hence the overall system FRL is maintained.

Rediwall® systems therefore comply with Performance Requirements CP1, CP2, CP3, CP4, CP7 and CP8 of the BCA via Performance Solution compliance pathway.

Rediwall® system construction details including the CodeMark Certificate of Compliance are available on the AFS website. For system performance data and common construction details, AFS Specification Finder is a great resource for building professionals and is found on the AFS website homepage, www.afsformwork.com.au.

To ensure your load bearing external walls for your next project achieve the required Fire performance with minimal fuss, look no further than AFS Rediwall®.

To obtain further information on the compliance of AFS Rediwall® contact the AFS Technical Team on 1300 727 237.

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