

Internal Walls and PVC Permanent Formwork – Fire Compliance

Building Regulatory Authorities around the world have been introducing new fire safety measures to strengthen fire regulations and compliance protocols in Building Codes. Australia is no different with numerous amendments to the Fire provisions of the Building Code of Australia (BCA) being introduced in recent years.

With the evolving landscape of fire regulations for buildings, it's never been a more important time for building professionals to focus on fire compliance in their projects. In this article, we focus on how PVC permanent formwork wall systems for load bearing internal walls address fire compliance.

Internal walls may include fire resisting walls between building classes and fire compartments, fire exit walls, fire control room walls plus service shafts and lift shafts in class 2 – 9 buildings. This may also extend to Fire resisting walls and separating walls in adjoined class 1 buildings.

For building classes 2 – 9, part C of BCA Volume 1 applies for fire compliance with each of the above listed issues for consideration being addressed. For building classes 1 and 10, parts 2.3 and 3.7 of BCA Volume 2 apply and generally follow a simpler approach when compared to Class 2 – 9 buildings.

For the purposes of this discussion Class 2 – 9 buildings will only be addressed. For PVC permanent formwork wall systems, the key BCA performance provisions for compliance are CP1, CP2, CP3, CP4, CP7 and CP8. A combination of Deemed to Satisfy and Performance Solutions may be presented to ensure compliance with these provisions.

Nick Gouskos, Senior Technical Engineer at AFS Systems states, “For internal walls there are numerous factors to consider which can impact the fire requirements of the wall, these include the internal lining materials, whether the wall is load bearing or not, the intended use of the building and the Type of construction required.”

Fire Resistance Level (FRL)

The most common first step for a load bearing, internal fire resisting wall is to determine the FRL required for the Type of construction and application. C1.9(c) of the BCA requires internal load bearing walls to meet Specification C1.1.

Gouskos explains, “The biggest misconception that we hear with PVC Permanent Formwork Systems being used for internal walls, is that the PVC Permanent Formwork wall is not a concrete wall. This is completely inaccurate as PVC Formwork wall systems are designed to AS 3600, which is the Australian Standards for Concrete Structures and therefore these wall systems are deemed to be concrete walls”

Specification C1.1 requires load bearing internal walls to be constructed from concrete or masonry or fire protected timber. As PVC permanent formwork systems are designed to AS 3600, they are inherently a concrete wall and therefore meets the Specification C1.1 requirement of being constructed from concrete.

In addition to this, Specification C1.1 details the required FRL's for all wall types, the FRL provides three performance categories in minutes of fire resistance; the first is Structure (Load Bearing), the second is Integrity and the third is Insulation.

For a wall requiring FRL 90/60/30 this means the wall (when exposed to fire) will still be able to support the load acting on the wall for 90 minutes, the integrity of the wall will be maintained to

prevent passage of hot gasses or smoke through the wall for 60 minutes and the wall is insulated to maintain a temperature below specified limits on the un-exposed side for 30 minutes.

The FRL of a complete wall system, including penetrations is determined in accordance with AS 1530.4. A full-scale fire test is usually required, however if sufficient prior testing has been conducted, an assessment report may be suitable. PVC permanent formwork wall systems when designed and constructed in accordance with AS 3600, provide similar or equal performance to reinforced concrete walls with respect to FRLs. All penetrations considered part of the wall system are therefore required to comply with AS 1530.4 when installed in PVC permanent formwork wall systems.

Internal Linings

The next step in determining fire compliance is to assess the internal linings of the walls with respect to the Fire Hazard Properties as defined in C1.10 of BCA Volume 1. Specification C1.10 require wall linings to be of Group 1, 2 or 3 depending on the location within the building. Note that a material with Group number 1 can be used for all building classes and all wall applications. The Group number and the smoke growth rate index (SMOGR_{RC}) is determined by testing in accordance with AS ISO 9705 / AS 5637.1.

A common approach in determining compliance for a PVC permanent formwork wall system will be to determine whether the PVC material is considered to increase the risk of fire spread and whether the PVC material will adversely impact the tenable conditions during occupant evacuation of the building. The material group number and SMOGR_{RC} are key elements to consider for internal load bearing walls.

PVC permanent formwork systems for load bearing internal walls are required to be tested and assessed in accordance with the following 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 compliant with AS 1530.4.
In summary, the whole wall system must achieve performance equal to or greater than that required by Specification C1.1.
- AS ISO 9705/ AS 5637.1: determines the material group number and Smoke Growth Rate index (SMOGR_{RC}) must comply with Specification C1.10.

For internal load bearing wall applications, all PVC formwork systems designed in accordance with AS 3600 and tested compliant with the above standards are considered Deemed to Satisfy solutions.

AFS Rediwall®

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

A detailed Fire Engineering assessment of the Rediwall® system has been conducted in addition to comprehensive fire testing, Rediwall® can achieve FRLs up to 240/240/240 and has a Group 1 classification.

Penetration treatments for all Rediwall® systems in Fire Rated wall systems have been tested and assessed for compliance with AS 1530.4. Rediwall® systems are considered compliant with AS 1530.4 when approved and compliant Fire stopping systems are used. All Fire stopping and penetration treatments must have existing testing or assessment for installation in concrete walls.

Rediwall® is therefore a Deemed to Satisfy solution for all load bearing internal wall applications.

All 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 internal 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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