PVC Permanent Formwork – misconceptions and compliance

With recent media attention on the construction industry due to the use of non-compliant building products, the spotlight is clearly focussed on building compliance, increasing scrutiny on building professionals to ensure the solutions they're specifying, designing, and installing are compliant and will be accepted by building certifiers and building surveyors alike.

All external and internal wall systems must be compliant with relevant Performance Requirements of Volume 1 or 2 of the National Construction Code (NCC). Whether it is a Permanent formwork reinforced concrete wall system or precast concrete or conventional reinforced concrete wall systems, they all must comply with the same provisions of the NCC. For external walls this includes Structural adequacy (wind loads, self-support and/or load bearing), Weatherproofing and Thermal resistance, as well as Fire performance. Whilst internal walls require Structure adequacy and may also require Fire & Acoustic performance.

"There are many misconceptions surrounding permanent formwork systems, especially PVC based formwork systems", according to Nick Gouskos, Senior Technical Engineer at AFS Systems, a CSR Limited Company. "These mostly relate to the spread of fire and combustibility performance."

The reality for PVC formwork systems is that the PVC material used for most permanent formwork systems contain flame retardants within the composition of the PVC mix to improve its fire behaviour when exposed to fire where the PVC does not propagate fire spread and self-extinguishes when the fire source is removed.

"The other misconception is that when PVC is exposed to fire the smoke generated is excessive," Gouskos continues, "successful testing in accordance with AS5637.1 (AS/ISO 9705) and AS1530.3, has proven that the smoke developed when PVC permanent formwork wall systems are exposed to fire meet the Deem-to-Satisfy provisions of the NCC."

"PVC based formwork systems are some of the most rigorously tested products especially with respect to fire performance, enabling building professionals to confidently ensure compliance may be achieved."

For products that have achieved CodeMark certification, this compliance information is presented on the CodeMark certificate. For PVC permanent formwork systems you should be looking for compliance with the following pillars of the NCC:

- Structural
- Fire
- Weatherproofing
- Acoustics
- Thermal

Structural

The PVC formwork reinforced concrete wall systems (load bearing or non-load bearing) must be able to be designed, detailed and constructed in accordance with Concrete Structures Australian Standards, AS3600 with the required steel reinforcement being able to be accommodated within the PVC formwork panels without creating congestion to impede the appropriate flow and compaction of the concrete.

Fire

PVC formwork systems need to be successfully fire tested and assessed in accordance with a wide range of Fire Standards to be able to confirm performance when subject to fire. The various fire tests that should carried out include:

- AS5113: full scale fire test determines fire performance for external wall systems
- AS1530.3: fire tests confirms fire hazard properties for building elements such as the ignitability, flame propagation, heat and smoke release indices to determine applicable compliant wall applications within the NCC
- AS1530.4: large scale fire tests assesses the Fire Resistance Level (FRL) of the wall system.
- AS5637.1 (AS/ISO 9705): large scale room fire test determines the material Group Number and Smoke Growth Rate (SMOGRA) to determine compliant internal wall lining applications

Weather Proofing

External wall systems are subject to water penetration testing and weather tightness assessment by façade engineers to confirm compliance with the NCC (Volume 1) Weatherproofing Performance Requirement FP1.4.

Acoustics

The walling system is required to achieve certain level of acoustic performance under the NCC. Concrete mass within PVC formwork systems can provides excellent acoustic performance concrete wall thicknesses of as little as 150mm being able to achieve the airborne sound reduction targets of Volume 1 of the NCC.

Where wall systems require discontinuous construction, separate stud walls or resilient mounted furring channels may be used to further improve the impact sound rating requirements of the NCC.

Thermal

External walls require a thermal insulation rating which is determined by the elements of the wall and their respective thicknesses and R values. In general, all concrete walls including PVC permanent formwork walls, will require additional insulation. The mass of the walls can help with the thermal stability of the building and the technical manual for the wall system should provide recommendations for added insulation which is presented by climate zone. This enables the specifier to select suitable wall components.

AFS Rediwall®

AFS Rediwall® is a CodeMark Certified, PVC permanent formwork system for use in all building types in load bearing and non-load bearing reinforced concrete wall applications. The Rediwall® CodeMark Certificate confirms compliance to all the individual pillars of the BCA listed above.

For structural performance, the uniquely shaped web cut-outs allow Rediwall® to contain either a single layer of centrally located reinforcement or a double layer of reinforcement while maintaining the appropriate concrete cover as per AS3600 requirements and allowing concrete flow & compaction. The Ezy-FitTM Rediwall® corner allows for easy access to install & inspect the corners of walls where the greatest reinforcement congestion is expected.

A detailed Fire Engineering assessment of the Rediwall® system has been conducted in addition to comprehensive fire testing, which documents varied conditions and applications to provide fire engineered solutions to provide further supporting to project Fire Engineers & Certifiers. Rediwall® has been successfully tested and assessed to achieves an FRL up to 240/240/240, has a Group Number 1 classification for internal walls and passed AS5113 for no flame spread for external walls.

Rediwall® presents a weatherproof wall system compliant with NCC Volume 1, FP1.4 for external walls and lends itself to rainscreen or face sealed façade construction with any decorative cladding systems.

Rediwall® systems have been developed for acoustic performance with construction options to achieve the acoustic performance parameters for all classes of buildings. Where the Rediwall RW156 wall will achieve an acoustic rating of $R_w + C_{tr}$ of 50.

To ensure your wall system achieves the target thermal R values for all climate zones, AFS have developed numerous construction options for Rediwall®.

All Rediwall® system options are available on the AFS Specification Finder which is found on the AFS website homepage, www.afsformwork.com.au.

A CodeMark Certificate of Conformity provides evidence that a product has been assessed by an independent certifier, that the supply chain processes of that product can maintain compliance with the NCC and provides confidence in the quality and performance of the product.

To ensure your next project is certified and approved with minimal fuss, look no further than AFS Rediwall® for your load bearing and non-load bearing, external and internal wall applications.

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

ENDS