



FSR 698

Fire Hazard Properties of Eco-Block Wall Systems

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Fire Hazard Properties of Eco-Block Wall Systems

1. CLIENT

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2. INTRODUCTION

This report gives BRANZ's assessment of the Fire Hazard Properties of ECO-Block wall systems, in accordance with the Building Code of Australia 2005, Part C1 Fire Resistance and Stability Clauses C1.10 Fire Hazard Properties (invoking specifications C1.10 and C1.10a), and Specification C1.1 Clause 2.4 Attachments not to impair fire-resistance.

2.1 Internal Linings

Clause C1.10 "deemed-to-satisfy" requirements are considered to comply with performance requirement CP4 which states:

"A material and an assembly must, to the degree necessary, resist the spread of fire to limit the generation of smoke and heat, and any toxic gases likely to be produced, appropriate to—

- (a) the evacuation time; and
- (b) the number, mobility and other characteristics of occupants; and
- (c) the function or use of the building; and
- (d) any active fire safety systems installed in the building."

Specification C1.10 uses the results of tests to AS 1530.3 to determine values for Spread of Flame Index and Smoke Developed Index. Specification C1.10a uses the results of tests to AS ISO 9705 or AS/NZS 3837 to give Group Numbers which relates to spread of fire. Smoke production is also measured.

For the purposes of this assessment to meet Clause C1.10 the wall needs to be enclosed on all sides and edges with a material complying with the appropriate Early Fire Hazard Indices or Group Number, and the lining remains in position so that it prevents ignition of the substrate and continues to screen it from access to free air for a period of not less than 10 minutes exposure to the conditions of the standard fire resistance test.

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2.2 External Linings

Specification C1.1 Clause 2.4 applies to the fire resistance requirements.

To meet C1.1 clause 2.4 the external cladding needs to be non-combustible or complies as follows:

(a) A combustible material may be used as a finish or lining to a wall or roof, or in a sign, sunscreen or blind, awning, or other attachment to a building element which has the required FRL if—

(i) the material is exempted under C1.10 or complies with the fire hazard properties prescribed in—(A) Clause 2 of Specification C1.10; or (B) Clause 2 and 3 of Specification C1.10a; and

(ii) it is not located near or directly above a required exit so as to make the exit unusable in a fire; and

(iii) it does not otherwise constitute an undue risk of fire spread via the facade of the building.

(b) The attachment of a facing or finish, or the installation of ducting or any other service, to a part of a building required to have an FRL must not impair the required FRL of that part.

The external cladding is considered to mean the final finished layer, not necessarily the polystyrene formwork.

For the purposes of this assessment the performance of the final outer cladding is considered.

3. DESCRIPTION OF ECO-BLOCK WALL

The ECO-Block wall system comprises polystyrene formers, into which concrete is poured, with plastic spacers forming flange surfaces in the outer face of the polystyrene. The internal surface of the wall is covered with plasterboard attached to the plastic flanges with screws at no greater than 200 centres around the perimeter of each sheet and 400 mm horizontally and vertically in the field. Joints in the plasterboard are taped and stopped in accordance with the lining manufacturer's specifications. The external cladding comprises a fibre cement board applied and finished in accordance with the lining manufacturer's specifications.

4. BACKGROUND

In Omega Point Laboratories (USA) report on project No. 15498-104229 dated 22 January 1999, an ECO-Block wall with 12.5 mm thick plasterboard linings was tested in accordance with UBC 26-3 Room Fire Test standard for interior of foam plastic systems. The test assembly comprised two Eco-Block walls and a plasterboard ceiling inside a 3.66 m long x 2.44 m high x 2.44 m wide fire test room. The heat source was a wooden crib at the junction of the two walls producing temperatures of 621°C above the crib, 300 mm below the ceiling, for 15 minutes. The plasterboard had not become detached during the test. After the test, areas of polystyrene foam had melted behind the plasterboard. The polystyrene foam blocks had not been filled with concrete.

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5. DISCUSSION

5.1 Internal Linings

The internal plasterboard linings are to be attached to the ECO-Block wall with screws and all joints stopped. This is considered to be a suitable means of attachment to prevent ignition of the core and to screen it from access to free air for a period of not less than 10 minutes, on condition that all joints are taped and filled as specified by the plasterboard manufacturer. The number of fixings is greater than would be used in a typical steel or timber framed drywall system and is therefore considered to be sufficient to protect the expanded polystyrene core.

The UBC 26-3 test uses a room similar size to the AS ISO 9705 test but with a different ignition source and test criteria. Notwithstanding the differences between the two tests the UBC 26-3 test demonstrated the ability of a plasterboard lining to prevent fire spread on the core. The lining used in this test was 12.5 mm thick standard plasterboard. It is considered that 10 mm standard plasterboard would perform similarly.

As for any wall system the internal lining must meet the BCA requirements for Fire Hazard Properties Clause C1.10 either by meeting the appropriate early Fire Hazard Indices or Group Number for the intended location in the building.

5.2 External Linings

The proposed external lining is to be fibre-reinforced cement board. Specification C1.1 Clause 2.4 requires the external cladding to be non-combustible. In Part C1 Fire resistance and Stability, Clause C1.12 fibre-reinforced cement board is deemed to be non-combustible therefore is suitable for use with ECO-Block walls. This is on condition that joints are finished in accordance with manufacturer's specifications.

6. CONCLUSION

It is considered that ECO-Block wall systems with a plasterboard lining on the internal surface and a fibre-cement cladding on the external surface meets the performance requirements of the Building Code of Australia 2005, CP4, and Part C1 Fire Resistance and Stability Clauses C1.10 Fire Hazard Properties (invoking specifications C1.10 and C1.10a), and Specification C1.1 Clause 2.4 Attachments not to impair fire-resistance on condition that:

- the internal plasterboard lining:
 - is not less than 10 mm thick
 - is attached at no greater than 200 mm centres at the perimeter of a sheet and 400 mm horizontally and vertically in the field, with screws not less than 25 mm long to the plastic flanges
 - is taped and filled in accordance with the lining manufacturer's specifications
 - complies with the Early Fire Hazard Indices or Group Number appropriate to the location and building class.

- the external fibre-reinforced cement lining is fixed at no greater than 200 mm centres at the perimeter of a sheet and 400 mm horizontally and vertically in the field, and finished in accordance with the lining manufacturer's specifications.:

7. LIMITATIONS

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The fire properties of the internal plasterboard lining must be separately verified for the intended application for compliance with BCA Specification C1.10 or C1.10a.

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