RAPIDWALL PANEL SYSTEM
COMPLIANCE OPINION

For:	**HWL Building Company Pty Ltd**
Submitted:	**12th December 2007**
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Job :	**108907**
Revision:	**0**

1.0 EXECUTIVE SUMMARY

1.1 Introduction

- This report has been commissioned by HWL Building Company Pty Ltd (herein after referred to as 'the client').
- The 'Rapidwall' panel system is proposed to be used as both an external walling system and an internal walling system for single and double storey, detached class 1a buildings.
- The Rapidwall system is essentially a multi-component walling system which falls outside the scope of the 'Acceptable construction' provisions of BCA volume 2 and therefore must be addressed as an Alternative Solution.
- The format of the report has been designed to provide an in-depth explanation of the building regulation compliance regime and our assessment of the Rapidwall walling system with regard to Building Code of Australia compliance.

1.2 Scope of Report

The scope generally comprises:

- An introduction to the relevant legislative requirements applicable to the compliance procedure and Local Authority examination of 'Alternative Solutions' as they apply to the Building Code of Australia.
- An in-depth assessment of the Rapidwall system against the requirements of the Building Code of Australia to determine whether it achieves compliance.
- A compilation of evidence relied upon during our assessment.

1.3 Exclusions and Limitations

- This report does not include an assessment of the Rapidwall panel system in terms of it's compliance with BCA Volume 2 Part 3.12 (Energy Efficiency) other than the thermal insulation testing for the individual panel.
- This Compliance Assessment report only applies to the use of the Rapidwall system in it's proposed configuration as a single or double storey BCA Class 1a building.

- Product certifications relied upon in this assessment were assumed to be bona fide copies of original reports/documentation.
- This report pertains to the information supplied by HWL Building Company during the course of our assessment. Further modifications to the design (not resulting from the assessment by MBC) may invalidate our compliance assessment.
- The Statement of Compliance provided by MBC for the Rapidwall panel system will be based on the BCA in operation at the time of the assessment (BCA 2007). The client is advised that subsequent revisions to the BCA may impact on this report in terms of its legitimacy/validity.

1.4 Report conclusion

The Rapidwall panel system is considered to be an Alternative Solution and as such, is required to meet the relevant Performance Provisions of the BCA.

Having assessed all of the documentation provided in support of the Rapidwall panel system, we are of the opinion that the system meets the relevant Performance Requirements of the Building Code of Australia Volume 2 (2007) with respect to external walling systems (refer also to 'Exclusions and Limitations' with regard to report limitations).

2.0 LEGISLATIVE REQUIREMENTS

2.1 Applicable Legislation

In W.A. the legislative hierarchy is as follows:

Local Government (Miscellaneous Provisions) Act 1960

- The over-riding legislation applicable to the construction of new buildings within W.A.
- Allows Local Authority building surveyors to approve or refuse building licence applications.
- Contains Appeal Provisions whereby the aggrieved party (the person whose building licence application has been refused) may appeal to the State Administrative Tribunal against the Local Authority's decision.
- References the Building Regulations 1989.

Building Regulations 1989

- Called up by the Local Government (Misc Prov) Act 1960.
- References the Building Code of Australia.

Building Code of Australia

The Local Government (Miscellaneous Provisions) Act 1960 stipulates that a building licence is required for any new building work. The Building Regulations 1989 reference the requirement to comply with the version of the Building Code of Australia in force at the time.

2.2 The Building Code of Australia

2.2.1 – The current BCA in operation

The current version of the BCA applicable to class 1a buildings is BCA 2007 Volume 2 ('The Housing Provisions').

A Class 1a building is defined as:

A single dwelling being, a detached house or one of a group of two or more attached dwellings, each being a building, separated by a fire resisting wall, including a row house, terrace house, town house or villa.

This report applies to class 1a buildings as detached, single or double storey dwellings.

2.2.2 – Achieving compliance with the BCA

The Building Code is a performance based document which sets the minimum criteria that defines how buildings and building elements contained within them, must perform to meet the objectives and functional statements of the Code.

The Performance provisions of the Code are basically 'motherhood' type statements that encompass certain specified expectations that buildings or components are required to meet.

The applicable BCA clauses relating to the acceptance of Alternative Solutions are:

1.0.4 Compliance with the BCA:

A Building Solution will comply with the BCA if it satisfies the Performance Requirements.

1.0.5 Meeting the Performance Requirements

Compliance with the Performance Requirements can only be achieved by –

a) complying with the Deemed-to-Satisfy Provisions; or

b) formulating an Alternative Solution which –

i) complies with the Performance Requirements; or

ii) is shown to be at least equivalent to the Deemed-to-Satisfy Provisions; or

c) a combination of (a) and (b).

1.0.8 Alternative Solutions

a) An Alternative Solution must be assessed according to one or more of the Assessment Methods.

b) An Alternative Solution will only comply with the BCA if the Assessment Methods used to determine compliance with the Performance Requirements have been satisfied.

c) The Performance Requirements relevant to an Alternative Solution must be determined in accordance with 1.0.10

1.0.9 Assessment Methods

The following Assessment Methods, or any combination of them, can be used to determine that a Building Solution complies with the Performance Requirements:

a) Evidence to support that the use of a material, form of construction or design meets a Performance Requirement or a Deemed-to-Satisfy Provision as described in 1.2.2.

b) Verification Methods such as –

i) the Verification Methods in the BCA; or

ii) such other Verification Methods as the appropriate authority accepts for determining compliance with the Performance Requirements.

c) Comparison with the Deemed-to-Satisfy Provisions.

d) Expert Judgement

1.0.10 Relevant Performance Requirements:

The following method must be used to determine the Performance Requirement or Performance Requirements relevant to an Alternative Solution:

a) Identify the relevant Deemed-to-Satisfy Provision of Section 3 that is to be the subject of the Alternative Solution.

b) Identify the Performance Requirements from Section 2 that are relevant to the identified Deemed-to-Satisfy Provisions.

c) Identify Performance Requirements from other parts of Section 2 that are relevant to any aspects of the Alternative Solution proposed or that are affected by the application of the Deemed-to-Satisfy Provisions, that are the subject of the Alternative Solution.

The DTS provisions in BCA Volume 2 are also called the 'Acceptable Construction' section of the Code. Essentially if the building and components comply with these provisions they are deemed acceptable and therefore comply with the Code. There are some limitations applicable to this section, generally relating to climatic variations within Australia.

An 'Alternative Solution' allows users to introduce flexibility into the building design process, which may result in cost savings without compromising safety. Alternative solutions can be applied in situations where the prescriptive provisions are not adaptive enough to suit every design of building. An alternative solution must be shown to meet the Performance Provisions of the Code.

3.0 ALTERNATIVE SOLUTION – 'RAPIDWALL' WALLING SYSTEM

3.1 Applicable Deemed-to-satisfy clauses

The pertinent DtS clauses are contained within Section 3 of BCA Volume 2 'Acceptable Construction', and these are:

- Part 3.7.1: Fire Separation
  - **3.7.1.5 Construction of external walls**

  (a) External walls required to be fire-resisting must extend to the underside of a non-combustible roof covering or non-combustible eaves lining and must—

  (i) have an FRL of not less than 60/60/60 when tested from the outside; or

  (ii) be of masonry-veneer construction in which the external masonry veneer is not less than 90 mm thick; or

  (iii) be of masonry construction not less than 90 mm thick.

- Part 3.12.1 Energy Efficiency – Building Fabric
  - **3.12.1.4 External walls**

  (a) Each part of an external wall must satisfy one of the options in Table 3.12.1.3, except for—

(i) in climate zones 1, 2 and 3 south of latitude 20° south, an external wall facing the south orientation sector, as described in Figure 3.12.2.1; and

(ii) opaque non-glazed openings such as doors (including garage doors), vents, penetrations, shutters and the like; and

(iii) glazing; and

(iv) a storey of a building complying with (b) or (c).

(b) In climate zones 1 and 2, the requirements of (a) do not apply to the storey of a building provided—

(i) the external walls achieve a surface density of not less than 220 kg/m²; and

(ii) the external surface of the external walls achieves a solar absorptance of not more than 0.45; and

(iii) the external glazing complies with 3.12.2.1 with the applicable value for CSHGC in Table 3.12.2.1 reduced by—

(A) 15%, when the external walls are shaded with a verandah, balcony, eaves, carport or the like which projects at a minimum angle of 15 degrees in accordance with Figure 3.12.1.2; and

(B) 25%, when the external walls are not shaded in accordance with (A) but the floor is concrete slab-on-ground and there is another storey above; and

(iv) the habitable rooms contain ceiling fans.

(c) In climate zones 4, 6, 7 and 8, where the minimum Total R-Value specified in Table 3.12.1.3 cannot be achieved by any part of an external wall of a storey, the deficit may be compensated by the performance of the glazing in that storey, provided the sum of the conductance of the external walls and of the glazing in that storey is not more than the maximum required, where—

(i) the design conductance is calculated—

(A) for the external walls, by dividing their areas by their Total R-Values; and

(B) for the glazing, by multiplying its area by its Total U-Value; and

(ii) the required maximum conductance is calculated—

(A) for the external walls, by dividing their areas by their required minimum Total R-Values; and

(B) for the glazing, in accordance with 3.12.2.1(a)(i).

3.2 Applicable Performance Requirements

From Item 3.1 above, the following Performance Requirements are deemed to be applicable:

- **P2.1 – Structure**
- **P2.2.2 – Weatherproofing**

- **P2.2.3 - Dampness**
- **P2.3 – Fire Safety**
- **P2.4.6 – Sound insulation**
- **P2.6.1 – Energy Efficiency**

- **Performance Requirement P2.1 - Structure**

a) A building or structure, to the degree necessary, must—

- remain stable and not collapse; and
- prevent progressive collapse; and
- minimise local damage and loss of amenity through excessive deformation, vibration or degradation
- avoid causing damage to other properties;
- by resisting the actions to which it may reasonably be subjected.

b) The actions to be considered to satisfy (a) include but are not limited to—

- permanent actions (dead loads); and
- imposed actions (live loads arising from occupancy and use); and
- wind action; and
- earthquake action; and
- snow action; and
- liquid pressure action; and
- ground water action; and
- rainwater action (including ponding action); and
- earth pressure action; and
- differential movement; and
- time dependent effects (including creep and shrinkage); and
- thermal effects; and
- ground movement caused by—
- swelling, shrinkage or freezing of the subsoil; and
  (B) landslip or subsidence; and
  (C) siteworks associated with the building or structure; and
- construction activity actions.

The structural resistance of materials and forms of construction must be determined using five percentile characteristic material properties with appropriate allowance for—

- known construction activities; and

- type of material; and characteristics of the site; and
- the degree of accuracy inherent in the methods used to assess the structural behaviour; and
- action effects arising from the differential settlement of foundations, and from restrained dimensional changes due to temperature, moisture, shrinkage, creep and similar effects.

Glass installations that are at risk of being subjected to human impact must have glazing that—

- if broken on impact, will break in a way that is not likely to cause injury to people; andresists a reasonably foreseeable human impact without breaking; and
- is protected or marked in a way that will reduce the likelihood of human impact.

- **Performance Requirement P2.2.2 - Weatherproofing**

A roof and external wall (including openings around windows and doors) must prevent the penetration of water that could cause—

- unhealthy or dangerous conditions, or loss of amenity for occupants; and
- undue dampness or deterioration of building elements.

- **Performance Requirement P2.2.3 - Dampness**

Moisture from the ground must be prevented from causing—

- unhealthy or dangerous conditions, or loss of amenity for occupants; and
- undue dampness or deterioration of building elements.

- **Performance Requirement P2.3.1 – Protection from the spread of fire**

A Class 1 building must be protected from the spread of fire from—

- another building other than an associated Class 10 building; and
- the allotment boundary, other than a boundary adjoining a road or public space.

A Class 10a building must not significantly increase the risk of fire spread between Class 2 to 9 buildings.

- **Performance Requirement P2.4.6 – Sound insulation**

A building element which separates dwellings is to be constructed to prevent undue sound transmission between those dwellings.

- **Performance Requirement P2.6.1 - Building (Thermal insulation)**

A building must have, to the degree necessary, a level of thermal performance to facilitate the efficient use of energy for artificial heating and cooling appropriate to—

- the function and use of the building; and
- the internal environment; and
- the geographic location of the building; and
- the effects of nearby permanent features such as topography, structures and buildings; and
- solar radiation being—

  (i) utilised for heating; and

  (ii) controlled to minimise energy for cooling; and

  (f) the sealing of the building envelope against air leakage; and

  (g) the utilisation of air movement to assist cooling.

3.3 Assessment Methods

The following Assessment Methods have been used to determine that this particular Building Solution complies with the Performance Requirements:

- Evidence to support that the use of a material, form of construction or design meets a Performance Requirement or a Deemed-to-Satisfy Provision as described in 1.2.2. (evidence of suitability)
- Expert Judgement

4.0 EVIDENCE OF SUITABILITY

4.1 Evidence of suitability

Evidence to support that the use of a material, form of construction or design meets a Performance Requirement may be in the form of one or a combination of the following:

- A report issued by a Registered Testing Authority, showing that the material or form of construction has been submitted to the tests listed in the report, and setting out the results of those tests and any other relevant information that demonstrates its suitability for use in the building.
- A certificate confirming the Fire Resistance levels of the panel wall from a registered testing authority.
- A current Certificate of Conformity or a current Certificate of Accreditation
- A certificate from a professional engineer or other appropriately qualified person which—

  (A) certifies that a material, design or form of construction complies with the requirements of the Housing Provisions; and
  (B) sets out the basis on which it is given and the extent to which relevant specifications, rules, codes of practice or other publications have been relied upon.
- Detailed evidence of the fabrication process and construction method to prevent the ingress of dampness into the dwelling.
- A current certificate issued by a product certification body that has been accredited by the Joint Accreditation Scheme of Australia and New Zealand (JAS–ANZ).
- Certification of the Rapidwall panel for tested thermal performance in to be in accordance with AS/NZS 4859.1.
- Any other form of documentary evidence that correctly describes the properties and performance of the material or form of construction and adequately demonstrates its suitability for use in the building.

4.2 To satisfy Performance Requirement P2.1 – Structure

Evidence to support that the Rapidwall system meets this specific Performance Requirement has been provided in Appendix A (refer to separate report) in the form of the following:

- Structural Engineer's Certification and design parameters for the Rapidwall system.

4.3 To satisfy Performance Requirement P2.2.2 – Weatherproofing

The Rapidwall panel system is provided with an externally applied finish in the form of either two coats of exterior quality, solvent based paint, or a texture render product (e.g. 'unitex' or similar) which provides a water resistant barrier. Refer also to the Rapidwall 'Construction Installation Specification' – Appendix B – Items 21 to 26.

4.4 To satisfy Performance Requirement P2.2.3 - Dampness

The Rapidwall panel system is used in conjunction with a concrete slab on ground. A compliant waterproofing membrane will be installed underneath the slab as is normal practise for damp-proofing membranes. Refer also to the Rapidwall 'Construction Installation Specification' – Appendix B – Items 10 and 11.

4.5 To satisfy Performance Requirement P2.3.1 – Protection from spread of fire

Evidence to support that the Rapidwall panel system meets this specific Performance Requirement has been provided in Appendix C in the form of the following:

- Product testing in accordance with AS 1530 - Fire-resistance test of elements of construction

4.6 To satisfy Performance Requirement P2.4.6 – Sound insulation

Evidence to support that the Rapidwall panel system meets this specific Performance Requirement has been provided in Appendix D in the form of the following:

- Acoustic opinion from Vipac Engineers regarding the expected performance of the Rapidwall panel in terms of resistance to impact sound transmission. Note that the opinion is applicable to class 2 and 3 dwellings, however the same figures may be applied to class 1a buildings in terms of the required sound insulation requirements. Note also that the typical wall configuration between dwellings is two leaves of Rapidwall.
- Acoustic test results for a single leaf of Rapidwall from Vipac Engineers.

4.7 To satisfy Performance Requirement P2.6.1 – Building (Thermal Insulation)

Evidence to support that the Rapidwall panel system meets this specific Performance Requirement has been provided in Appendix E in the form of the following:

- CSIRO report on the thermal transmission properties of Rapidwall showing that the R rating for a single wall panel insulated with Rockwool is 1.627. Note: each building utilising Rapidwall will require an individual energy efficiency assessment from an appropriately qualified person (e.g. ABSA approved assessor).

5.0 COMPLIANCE MATRIX

APPLICABLE BCA DTS CLAUSE	PERFORMANCE REQUIREMENT	EVIDENCE OF SUITABILITY
	P2.1 - Structure	A certificate from a professional engineer or other appropriately qualified person which— (A) certifies that a material, design or form of construction complies with the requirements of the Housing Provisions; and (B) sets out the basis on which it is given and the extent to which relevant specifications, rules, codes of practice or other publications have been relied upon.
	P2.2.2 - Weatherproofing	Adequate flashings to be provided around window and door openings in accordance with industry standard practise. Exterior quality paint finish (two coats), or texture rendered proprietary system to external face of the wall. Rapidwall 'Construction Installation Specification' provides further details on specific requirements for weatherproofing finishes.

	P2.2.3 - Dampness	Specification for the damp-proof course installed between the base of the wall and the ground floor slab. Rapidwall 'Construction Installation Specification' provides further details on specific requirements for dampproofing.
Clause 3.7.1.5 Construction of External Walls	**P2.3 – Fire Safety**	A certificate confirming the Fire Resistance levels of the panel wall from CSIRO
Clause 3.12.1 Building Fabric	**P2.6.1 – Building (Energy Efficiency)**	Test report data from CSIRO

6.0 CONCLUSION

The Rapidwall panel system is considered to be an Alternative Solution and as such, is required to meet the relevant Performance Provisions of the BCA.

Having assessed all of the documentation provided in support of the Rapidwall panel system, we are of the opinion that the system meets the relevant Performance Requirements of the Building Code of Australia Volume 2 (2007) - refer also to the report 'Exclusions and Limitations'.

End of Report.

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7.0 APPENDIX 'A'-

Refer to the attached report from Dare Sutton Clarke Pty Ltd.

8.0 APPENDIX B

9.0 APPENDIX C

10.0 APPENDIX D

11.0 APPENDIX E