This chapter of the AFS Designer must be read in conjunction with all chapters of the AFS Designer. Important legal statements on inside back cover.

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<th></th>
</tr>
</thead>
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</tr>
</tbody>
</table>
G | Performance

Disclaimer: This section of the AFS Designer is intended only by AFS to represent good building practice. This section is not intended in any way by AFS to represent all relevant information required on a project. It is the responsibility of those using AFS LOGICWALL®, including but not limited to builders, designers, consultants and engineers, to verify that AFS LOGICWALL® is suitable for use on a project. All diagram, plans and illustrations used in this section including any reinforcement shown are included for indicative and diagrammatic purposes only. It is the responsibility of those using AFS LOGICWALL® to ensure that reference is made to the structural engineer’s details for all diagrammatic and reinforcement requirements.

G1 Introduction

AFS LOGICWALL® is permanent formwork for reinforced concrete. Its material properties when concrete core filled deliver excellent performance characteristics – particularly for fire resistance and building acoustics.

AFS LOGICWALL® walls can satisfy BCA requirements for fire and acoustics in certain applications without additional treatment required. For thermal insulation AFS LOGICWALL® walls, in most cases, require the additional treatment of foam, foil board or wool insulation products to satisfy Section J of the BCA.

This section reviews each performance requirement in detail.

G2 Fire Resistance

Fire Resistance Levels (FRLs)

Fire rating requirements of the BCA are specified in terms of Fire Resistance Levels (FRL). The FRL specifies the performance, in minutes, of fire tested specimens for each of the following three design criteria when fire tested to the requirements of the Australian Standard AS1530 ‘Methods for Fire Tests on Building Materials, Components and Structures’ part 4 ‘Fire-Resistance Tests of Elements of Building Construction’:

- Structural Adequacy
- Integrity
- Insulation

A wall system under fire test that carries its load for 240 minutes and maintains its integrity and insulation for 240 minutes is given a FRL of 240/240/240, i.e. 240 minutes structural adequacy, 240 minutes integrity and 240 minutes insulation.

Systems constructed to the standard required for a particular FRL may be used to satisfy the requirements of lesser FRL.

CSIRO FRL Test

In March 2004 and again in November 2011, AFS LOGICWALL® wall panels were subjected to a Fire Resistance Test by the CSIRO in Sydney.

In 2004 an LW150 wall (150mm AFS LOGICWALL®), and in 2011 an LW120 (120mm AFS LOGICWALL®) were constructed replicating on-site conditions, i.e. subjected to a typical load, reinforced horizontally and vertically, electrical services installed in the wall and core filled with a concrete mix and method the same as would be adopted on site.

2004 Test Results (AFS150)

The following results were achieved (refer report No.FSV1038 by CSIRO):

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural adequacy</td>
<td>no failure at 240 minutes</td>
</tr>
<tr>
<td>Integrity</td>
<td>no failure at 240 minutes</td>
</tr>
<tr>
<td>Insulation</td>
<td>236 minutes</td>
</tr>
</tbody>
</table>

The following notes were also made by CSIRO:

Fire Resistance Level (FRL):

For the purpose of building regulations in Australia, the FRL of the test specimen was 240/240/180.

The fire resistance level of the specimen is applicable when the system is exposed to fire from either side, as the specimen was symmetrical.

For the purposes of AS 1530.4 the results of these fire tests may be used to directly assess fire hazard, but it should be noted that a single test method will not provide a full assessment of fire hazard under all fire conditions.
2011 Test Results (LW120)

Performance

Performance observed in respect of the following AS 1530.4 criteria:

- Structural adequacy: no failure at 241 minutes
- Integrity: no failure at 241 minutes
- Insulation: 190 minutes

The following notes were made by CSIRO:

For the purpose of building regulations in Australia, the FRL of the test specimen was 240/240/180.

The fire resistance level of the specimen is applicable when the system is exposed to fire from either direction.

For the purpose of AS 1530.4 the results of these fire tests may be used to directly asses fire hazard, but it should be recognised that a single test method will not provide a full assessment of fire hazard under all fire conditions.

Likely Fire Performance of AFS LOGICWALL Systems

The likely fire performance of AFS LOGICWALL® systems LW162, LW200(D), LW262 (D), if tested in accordance with AS1530.4 -2005, is reported in the CSIRO report FCO-3084 (Refer Chapter L "Certification" to view the report)

Structural Considerations

AFS LOGICWALL® wall fire resistance can be based on the provided fire test results and calculations in accordance with clause 3 of BCA specification A2.3 or in accordance with AS3600. (Refer expert opinion by S Grubits and Associates dated 28 Jan, 2015).

Reinforced AFS LOGICWALL® walls may be designed to AS3600 Section 5.7 Fire Resistance Periods for Walls. When calculating structural capacity for a fire load the area of the exposed stud flange is to be excluded. Except for Axial and out of plane Wind Loads it is recommended that the AFS studs be ignored when calculating the fire rated structural capacity of walls.

Penetrations, Recesses and Chases

Penetrations through AFS LOGICWALL® walls to accommodate services, such as pipework, electrical cabling or ductwork must be protected, to prevent the spread of fire through the penetration, recess or chase.

This can be achieved with proprietary products, such as:

- Fire rated sealants;
- Fire collars and intumescent wraps
- Fire rated mortars;
- Fire rated pillows;
- Fire rated switch boxes.

Alternatively, the effect of penetrations, recesses and chases may not be significant and can be ignored, as set out in AS3600 Section 5.7.4 Recess for Services in walls.
Fig. G3.1 Fire-Resistance Test Report Certificate - 2004 Test (AFS150)

Certificate of Test

No. 1745

"Copyright CSIRO 2004 &
Copying or alteration of this report
without written authorisation from CSIRO is forbidden.

This is to certify that the element of construction described below was tested by the CSIRO Division of Manufacturing and Infrastructure Technology in accordance with Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4-1997 on behalf of:

Architectural Framing Systems Pty Ltd
29 Prime Drive
SEVEN HILLS NSW

A full description of the test specimen and the complete test results are detailed in the Division's sponsored investigation report numbered FSV 1058.

Product Name: Permanent formwork, load-bearing, reinforced concrete wall system

Description: The specimen comprised a reinforced concrete wall system of dimensions 2980-mm high x 3000-mm wide x 150-mm thick made up of 3 pre-fabricated permanent formwork panels filled with in situ concrete after assembly.

The formwork panels were fabricated from two 2980-mm high x 1200-mm wide x 6-mm thick fibre cement sheets bonded to 16 galvanised C-section metal studs of dimensions 136-mm x 35-mm x 0.6-mm using "AV Syntra" general purpose building glue. The studs were spaced at 100-mm centres and fixed together in a rigid frame. The studs had 90-mm diameter round holes spaced at 150-mm centres for a provision of horizontal reinforcing bars. The panels were fixed to a floor track (galvanised steel C-section) with provision for reinforcing starter bars from a completed floor slab. Succeeding panels were fitted together in a tongue and groove arrangement, and fixed with 9-18 x 20-mm fibrotoe clc/rb head screws at 600-mm centres. The wall was reinforced with N12 reinforcing bars at 450-mm centres, horizontally and vertically. Electrical services were installed in the cavity of the wall, that included two general power outlets and associated PVC conduits at 1200-mm centres. The panels were appropriately braced and 32 Mpa concrete 32.10-120 was pumped in through the top openings in 1500-mm layers and trowelled-off when completely filled. The specimen was subjected to an evenly distributed total load of 600 kN.

Details of panel construction are shown in drawing numbered 146-01 Issue B, dated 17 December 2003, by L.G.O.

The element of construction described above satisfied the following criteria for fire-resistance for the period stated:

<table>
<thead>
<tr>
<th>Structural Adequacy</th>
<th>Integrity</th>
<th>Insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>no failure at 240 applicable</td>
<td>no failure at 240 applicable</td>
<td>236 minutes</td>
</tr>
</tbody>
</table>

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of 240/240/180. The FRL is applicable for exposure to fire from either direction.

Testing Officer: Chris Wojcik
Date of Test: 25 February 2004

Issued on the 12th day of March 2004 without alterations or additions.

Garry C. Collins
Manager, Fire Testing and Assessments

This laboratory is accredited (Accreditation No. 3032) by the National Association of Testing Authorities, Australia. The tests reported here have been performed in accordance with its terms of accreditation.

CSIRO Manufacturing & Infrastructure Technology
14 Julius Avenue, Riverside Corporate Park, North Ryde NSW 2113 AUSTRALIA
Telephone: 61 2 9490 5444 Facsimile: 61 2 9490 5565
This is to certify that the element of construction described below was tested by the CSIRO Division of Manufacturing and Infrastructure Technology in accordance with Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4-2005, Fire-resistance test of elements of construction on behalf of:

AFS Products Group Pty Ltd
22-24 Sommerville Circuit
EMU PLAINS NSW

A full description of the test specimen and the complete test results are detailed in the Division’s sponsored investigation report numbered FSV 1513.

PRODUCT NAME 120-mm thick, load-bearing AFS structural wall system.

DESCRIPTION: The specimen comprised a reinforced concrete wall system 3000-mm high x 3000-mm wide x 120-mm thick made up of three pre-fabricated permanent formwork panels core-filled with concrete after assembly. The pre-fabricated permanent formwork panels, 1200-mm wide x 3000-mm high, comprised two 6-mm thick fibre cement sheets (CSR Waterblock Technology) bonded to the perforated steel stud assembly using AFS Structural Adhesive. The studs, nominally 2900-mm long x 108-mm wide x 35-mm high, with perforations shown in drawing numbered AFS-CSIR-23-11-11, dated 23 November 2011, by Peter Ellsmore & Associates Pty Ltd., were equally spaced over the width of the panel at nominally 140-mm centres. The wall was reinforced with N12 reinforcing bars at 400-mm centres vertically and 600-mm centres horizontally. The panels were appropriately braced and 32 Mpa 120-mm slump concrete was pumped in through the top openings in 1500-mm high layers, and trowelled off when completely filled. A total load of 700 kN was applied to the specimen for the duration of the test.

The element of construction described above satisfied the following criteria for fire-resistance for the period stated:

- Structural adequacy: no failure at 241 minutes
- Integrity: no failure at 241 minutes
- Insulation: 190 minutes

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of 240/240/180. The FRL is applicable for exposure to fire from either direction.

This certificate is provided for general information only and does not comply with the regulatory requirements for evidence of compliance.

Testing Officer: Chris Wojcik Date of Test: 23 November 2011
Issued on the 5th day of December 2011 without alterations or additions.

Garry E Collins
Manager, Fire Testing and Assessments

CSIRO Materials Science and Engineering
14 Julius Avenue, Riverside Corporate Park, North Ryde NSW 2113 AUSTRALIA
Telephone: 61 2 9490 5444 Facsimile:61 2 9490 5555

This document is issued in accordance with NATA’s accreditation requirements.
Building Acoustics relates to the control of noise in buildings including the minimization of noise transmission from one space to another and the control of noise levels within a space.

The Acoustic terms used in this section are explained as follows:

Rw
An Rw value is a laboratory measurement to determine the effectiveness of a system as a noise insulator.

Ctr
A Ctr is an adjustment factor to account for low frequency noise.

Ctr was originally a correction factor for traffic noise, however it is also useful for representing noise sources such as home entertainment systems, home cinema, rock music, distant jet aircraft and low speed rail traffic. It reflects the perceived sound reduction through an element subjected to these typical urban noises.

Ctr is a negative number so Rw + Ctr will be less than Rw. It is not a constant and varies from system to system.

Dnt,w
A Dnt,w is a field measurement that is more indicative of the actual sound insulation of a system. The laboratory rating and field rating differ as the field measurements usually have sound transmission paths other than the one through the wall itself (flanking) and may have different room absorption, wall areas and room volumes that are constant in a laboratory.

A field measurement is more useful as it reflects clearly the acoustic performance commensurate with normal building practice. A laboratory is useful as it shows the maximum performance from the panel but it may not accurately reflect how the panel will perform in a building.

BCA Compliance
The BCA provides basically four avenues of compliance for a wall or floor system.

1. By measurements carried out by acoustic laboratory.
2. By reference to “deem to satisfy” systems contained within BCA.
3. By on site verification by acoustic testing of the completed installation.
4. By expert judgement.

AFS LOGICWALL® uses a combination of conditions 1, 3 and 4 above to demonstrate compliance and also relies upon acoustic tests carried out by approved acoustic laboratories.

The acoustic performance of the LW162 AFS LOGICWALL® (162mm thick) panel has been measured in an acoustic laboratory and is compared to a 150mm concrete panel which is a deemed to satisfy construction contained in Table 2 of the BCA. All acoustic measurements were made in the same acoustic laboratory. The AFS LOGICWALL® provides the same acoustic performance as the 150mm concrete panel.

Assessment of acoustic performance for differing thickness of the AFS LOGICWALL® panel is possible based on the laboratory measurements. For the AFS LOGICWALL® panel of 150mm and thicker the fibre cement facing sheets neither add nor detract from the acoustic performance. Whilst there are differences in the coincidence dip frequencies of the fibre cement face panel and the concrete infill, the concrete dominates and the acoustic performance is as if the wall is entirely of concrete.

In providing an assessment of the likely field performance, a range of performances are given. The results on site, even if best workmanship is carried out and the sound flanking paths have been well controlled, will vary. This is due in part to where the partition is located within the total apartment block and the nature and the mass of the terminating walls.
Laboratory and Field Performance

It is a requirement of the BCA for the majority of States and Territories of Australia that a wall separating sole occupancy units is required to have an $R_w + C_tr$ not less than 50 when measured in an acoustic laboratory.

There is however the verification clause that states that when the wall is installed in the actual dwelling that it shall achieve not less than a $D_{ntw} + C_tr$ of 45. In the end it is the field conditions that dominate as people do not live in acoustic laboratories. It is important that all the components in the chain of providing sound insulation have adequate performance and it is critically important to demonstrate in an acoustic laboratory that the chosen element has the potential performance.

In the case of the AFS 162 wall field sound insulation measurements had clearly shown that the results were consistently in the range of $D_{ntw} + C_tr$ of 49 – 47. This is a much better result than would have been predicted by the original CSIRO test TL463a carried out in July 2006.

Recent investigation has shown that the original test TL463 gave a poor performance for the AFS 162 wall particularly in the frequencies below 500 Hz. Further investigation also showed that a separately tested 150mm concrete wall gave the same results. It was also noted that the Highett Acoustic Laboratories also gave poor performance for the frequencies of 250 to 500 Hz for 75mm aerated autoclaved concrete panels when compared to other acoustic laboratories in Australia. The low performance for the AFS 162 panel, the 150mm precast panel and the 75mm aerated autoclaved concrete panels was attributable to the portal frame that was used to support the acoustic panel under test. This is not an unusual phenomenon and there are many papers covering this particular subject.

This has lead to an extensive investigation that is covered by an Evidence of Suitability document prepared by PKA Acoustic Consulting. The document is in a Part A and Part B configuration, the Part A provides the predicted results whilst Part B provides the supporting information. This document is available on our website.
### Fig. G3.2.1 Standard AFS LOGICWALL®

<table>
<thead>
<tr>
<th>Wall Type</th>
<th>RW</th>
<th>RW+CTR</th>
<th>DNTW</th>
<th>DNTW +CTR</th>
<th>Wall Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>LW120</td>
<td>50</td>
<td>47</td>
<td>49-45</td>
<td>46-42</td>
<td>External facades, service shafts*</td>
</tr>
<tr>
<td>LW150</td>
<td>54</td>
<td>50</td>
<td>53-49</td>
<td>49-45</td>
<td></td>
</tr>
<tr>
<td>LW162</td>
<td>56</td>
<td>50</td>
<td>54-50</td>
<td>49-45</td>
<td></td>
</tr>
<tr>
<td>LW200</td>
<td>58</td>
<td>53</td>
<td>57-53</td>
<td>52-48</td>
<td>Internal party walls (habitable to habitable), lift and stair shafts.</td>
</tr>
<tr>
<td>LW262</td>
<td>62</td>
<td>57</td>
<td>57-53</td>
<td>52-50</td>
<td></td>
</tr>
</tbody>
</table>

* Refer to G4 ‘Thermal Insulation for AFS LOGICWALL® thermal requirements.

### Consisting of stand alone AFS LOGICWALL® 120mm, 150mm, 162mm, 200mm and 262mm.

### Fig. G3.2.2 AFS LOGICWALL® with separate stud wall system providing impact isolation

<table>
<thead>
<tr>
<th>Wall Type</th>
<th>RW</th>
<th>RW+CTR</th>
<th>DNTW</th>
<th>DNTW +CTR</th>
<th>Wall Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>LW120</td>
<td>66</td>
<td>58</td>
<td>58-56</td>
<td>50-46</td>
<td></td>
</tr>
<tr>
<td>LW150</td>
<td>70</td>
<td>62</td>
<td>58-56</td>
<td>50-46</td>
<td></td>
</tr>
<tr>
<td>LW162</td>
<td>70</td>
<td>62</td>
<td>58-56</td>
<td>50-46</td>
<td>Internal party walls (habitable to wet area)</td>
</tr>
<tr>
<td>LW200</td>
<td>73</td>
<td>65</td>
<td>58-56</td>
<td>50-46</td>
<td></td>
</tr>
<tr>
<td>LW262</td>
<td>77</td>
<td>69</td>
<td>58-56</td>
<td>50-46</td>
<td></td>
</tr>
</tbody>
</table>

* Refer to G4 ‘Thermal Insulation for AFS LOGICWALL® thermal requirements.

### Consisting of a 64mm separate stud frame, timber or steel, separated at least 20mm from the AFS LOGICWALL®. The stud is sheeted with 9mm fibre cement sheeting, 13mm standard plasterboard or 10mm CSR Soundcheck. Included in the cavity is 50mm CSR Bradford glasswool partition batt or Tontine TSB4 polyester or Autex ASB4 polyester insulation batts.
**NOTES**

1. To achieve a discontinuous construction, a separate stud wall is required. To maintain the discontinuous construction the plumbing or other services must be run within the studs of the separate wall. There must be no direct connection between the plumbing services and the AFS LOGICWALL® wall other than at the perimeter.

2. The use of plasterboard lining to the face of the AFS LOGICWALL® walls can result in degradation of acoustic performance. This will particularly occur with the use of 10mm plasterboard. It is essential that there are no air gaps between the plasterboard and the face of the concrete panel as can be created by large dobs of wallboard adhesive. It is recommended that the wallboard adhesive be a combed screed application so that the plasterboard lining can be firmly pressed against the AFS LOGICWALL® panel.

**G4 Thermal Insulation**

A primary objective for a designer when planning a building is to design a building fabric – external elements such as ceilings, roofs and floors, which will deliver a cost effective, comfortable living or working environment for the inhabitants.

AFS LOGICWALL walls being a monolithic concrete barrier possess inherent features which greatly assist the designer in achieving the objective of thermal mass and air tightness.

1. **Energy Efficiency – BCA Section J**

   The BCA Volumes 1 and 2 contain thermal performance requirements in terms of minimum Total R for building fabric (the external ceilings, floors and walls) of new buildings in Australia.

   The total R-Value is the total thermal resistance of a building surface, including indoor and outdoor air film resistance.

   For Volume 1 (non-housing), the requirements are in Part J1, for Volume 2 (housing) the requirements are in Part 3.12.1, (Refer to www.abcb.gov.au)

2. **Thermal Insulation & Mass**

   The BCA recognizes the benefit of thermal capacity or mass, and so provides R concessions for heavyweight walls such as AFS LOGICWALL® walls.

   Heavy mass delays the transfer of outdoor temperature variations, improving indoor comfort. The concrete construction of AFS LOGICWALL® walls provides a significant thermal mass barrier to the external elements. If necessary additional insulation materials can be installed with AFS LOGICWALL® walls to achieve the higher R-values specified by the BCA. This in turn not only enhances occupant comfort, but also reduces heating/cooling costs and improves the acoustic performance of the wall against outside noise. Insulation materials should be installed with AFS LOGICWALL® walls so as to form a continuous thermal barrier.
3. Air Tightness & Condensation

Due to AFS LOGICWALL® walls being a uniform concrete monolithic mass, the air infiltration rate is practically zero eliminating the possibility of drafts and currents from outside. This contributes significantly to the thermal insulation of the building.

Condensation is not uncommon in new buildings, apartments in particular. In fact, it is increased thermal insulation requirements that exacerbate condensation risk, so careful thermal design, vapour barrier placement and construction practices are essential to minimise condensation.

Housing stock in Australia has historically been quite deficient in preventing air leakage. Poor sealing and high-level open wall vents, meant water vapour from clothes dryers, showers and baths was carried from the building before condensing. With increased insulation and better techniques for preventing heat loss, buildings can no longer accommodate significant evaporation inside. The water vapour does not exit the dwelling as there are no air gaps for the air to carry it away, so it condenses on the coolest surface, typically the window glass. Although it may look excessive, it is an ‘operational’ issue rather than a building fault.

Activities such as failing to run fans while showering and while a room dries out, drying clothes inside without a dryer and exhaust fan operating, and appliances such as food steamers, kettles, urns and humidifiers, all contribute to water vapour and therefore potentially to condensation. The formation of condensation typically illustrates that the building is well sealed against draughts and well insulated.

Prevention of condensation can be achieved by the following common practices:-

- Running bathroom fans while showering and leaving them on for a time afterwards.
- Dry clothes outside, in a dryer with the laundry fan running or on a rack in the bathroom with the bathroom fan running, or in a communal drying facility.
- Avoid using humidifiers and other appliances which create steam/water vapour.
- If using steamers, urns or boiling water, ensure the rangehood is operating. (Rangehoods should exhaust to outside and must not be recycling type.)
- Leave windows ajar some of the time, particularly in bathrooms.
- Consider opening the outside doors and windows for a few minutes each day to ‘flush out’ humid air.

4. AFS LOGICWALL System Selection

The attached JMF Total R calculations show the various AFS LOGICWALL® wall systems can provide Total R performance to suit the different climate zones for different classes of buildings.

**Step 1.** From the following Climate Zone Map, determine the particular Climate Zone for the location. (For more detailed maps see [www.abcb.gov.au](http://www.abcb.gov.au))

**Step 2.** Determine the Class of the building.

**Step 3.** From the Climate Zone and Class of building determine the required Total R value for the wall from the Thermal Insulation Systems Options Table on page 133-135.
G4 Thermal Insulation continued

Fig. G4.1 Climate Zones (Map supplied by ABCB)
### G4 Thermal Insulation continued

**Fig. G4.2 Thermal System Options**

<table>
<thead>
<tr>
<th>AFS Product Code</th>
<th>Composition</th>
<th>Diagram</th>
<th>Total R-values</th>
<th>BCA Climate Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Summer</td>
<td>Winter</td>
</tr>
</tbody>
</table>
| LW120            | 6mm FC Sheet  
108mm concrete  
6mm FC Sheet  
20mm reflective air gap  
R0.15 generic antiglare bubble-foil insulation  
28mm reflective air gap  
10mm plasterboard | ![External Diagram](image1) | 1.79 | 2.0 | 1-7* |
|                  |             | ![Internal Diagram](image2) |             |               |
| LW120            | 6mm FC Sheet  
108mm concrete  
6mm FC Sheet  
20mm reflective air gap  
R0.14 generic antiglare bubble-foil insulation  
28mm reflective air gap  
10mm plasterboard | ![External Diagram](image3) | 1.82 | 2.04 | 1-7* |
|                  |             | ![Internal Diagram](image4) |             |               |
# G4 Thermal Insulation continued

<table>
<thead>
<tr>
<th>AFS Product Code</th>
<th>Composition</th>
<th>Diagram</th>
<th>Total R-values</th>
<th>BCA Climate Zone</th>
</tr>
</thead>
</table>
| LW120 with 25mm PIR | 6mm FC Sheet  
108mm concrete  
6mm FC Sheet  
25mm PIR (24kg/m³)  
with bright RFL  
28mm reflective air gap  
10mm plasterboard | ![Diagram](image1) | Summer: 2.09  
Winter: 2.34 | 1-7* |
| LW150 with 10mm EPS | 6mm FC Sheet  
138mm concrete  
6mm FC Sheet  
10mm SL Class (13.5kg/m³)EPS with RFL  
28mm reflective air gap  
10mm plasterboard | ![Diagram](image2) | Summer: 1.25  
Winter: 1.40 | 1-7* |
| LW150 with 25mm EPS | 6mm FC Sheet  
138mm concrete  
6mm FC Sheet  
25mm SL Class (13.5kg/m³)EPS with RFL  
28mm reflective ~air gap  
10mm plasterboard | ![Diagram](image3) | Summer: 1.65  
Winter: 1.82 | 1-7* |
## G4 Thermal Insulation continued

<table>
<thead>
<tr>
<th>AFS Product Code</th>
<th>Composition</th>
<th>Diagram</th>
<th>Total R-values</th>
<th>BCA Climate Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>LW150</td>
<td>6mm FC Sheet 138mm concrete 6mm FC Sheet 28mm reflective air gap 10mm SL Class (13.5kg/m³) EPS with RFL 28mm reflective air gap 10mm plasterboard</td>
<td><img src="image1" alt="Diagram" /></td>
<td>Summer: 2.04  Winter: 2.32</td>
<td>1-7*</td>
</tr>
<tr>
<td>LW150</td>
<td>3.6mm external acrylic render 40mm rigid foam 6mm FC sheet 138mm concrete 6mm FC sheet</td>
<td><img src="image2" alt="Diagram" /></td>
<td>Summer: 1.97  Winter: 2.15</td>
<td>1-7*</td>
</tr>
</tbody>
</table>

* All AFS LOGICWALL® walls are suitable as external envelope walls for climate zones 1-7 as the AFS LOGICWALL® walls come under clause (b) of table J1.50 of the BCA (see fig. G4.3 on page G14) ("where the only space for insulation is provided by a furring channel, top hat section, batten or the like") which reduces required total R to 1.4 for climate zones 1 to 7.

AFS LOGICWALL® system ‘R’ values for other AFS LOGICWALL® compositions are in the certification section of this manual.
### BCA Vol 1, Class 2-9 Buildings - Summary

(Refer to Fig. G4.3 Walls - Minimum Total R for Each Climate Zone)

(a) Each part of an external wall that is part of the envelope, other than of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building, must satisfy one of the options in table J1.5a except for -

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

(ii) glazing; and

(iii) an earth retaining wall or earth-beam, in other than climate zone 8.

### Fig. G4.3 Options for each part of an External Wall that is part of an envelope

<table>
<thead>
<tr>
<th>Climate Zone</th>
<th>Options</th>
<th>Minimum Total R</th>
</tr>
</thead>
</table>
| 1, 2 & 3     | (a) (i) Achieve a minimum total R-Value of 3.3  
(ii) The minimum Total R-Value in (i) is reduced -  
(A) for a wall with a surface density of not less than 220kg/m², by 0.5; and  
(B) for a wall that is -  
(aa) facing the south orientation as described in Figure J2.3, by 0.5; or  
(bb) shaded with a projection shade angle in accordance with Figure J1.5 of -  
(AA) 15 degrees to not more than 45 degrees, by 0.5; or  
(BB) more than 45 degrees, by 1.0; and  
(C) if the outer surface solar absorptance value is not more than 0.6, by 0.5 | 3.3 |
|              | (b) Where the only space for insulation is provided by a furring channel, top hat section, batten or the like -  
(i) achieve a minimum total R-Value of 1.4; and  
(ii) satisfy a glazing energy index Option B of Table J2.4a | 1.4 |
| 4, 5 & 6     | (a) (i) Achieve a minimum total R-Value of 2.8  
(ii) The minimum Total R-Value in (i) is reduced -  
(A) for a wall with a surface density of not less than 220kg/m², by 0.5; and  
(B) for a wall that is -  
(aa) facing the south orientation as described in Figure J2.3, by 0.5; or  
(bb) shaded with a projection shade angle in accordance with Figure J1.5 of -  
(AA) 30 degrees to not more than 60 degrees, by 0.5; or  
(BB) more than 60 degrees, by 1.0. | 2.8 |
**G4  Thermal Insulation continued**

**Fig. G4.3 Options for each part of an External Wall that is part of an envelope continued**

<table>
<thead>
<tr>
<th>Climate Zone</th>
<th>Options</th>
<th>Minimum Total R</th>
</tr>
</thead>
</table>
| 4, 5 & 6     | (b) Where the only space for insulation is provided by a furring channel, top hat section, batten or the like -  
               (i) achieve a minimum total R-Value of 1.4; and  
               (ii) satisfy a glazing energy index Option B of Table J2.4a | 1.4 |
| 7            | (a) Achieve a minimum total R-Value of 2.8 | 2.8 |
|              | (b) Where the only space for insulation is provided by a furring channel, top hat section, batten or the like -  
               (i) achieve a minimum total R-Value of 1.4; and  
               (ii) satisfy a glazing energy index Option B of Table J2.4a | 1.4 |
| 8            | (a) Achieve a minimum total R-Value of 3.8 | 3.8 |
|              | (b) Where the wall is an earth retaining wall or earth-beam, achieve a minimum Total R-Value of 2.0 | 2.0 |

**G5  Structural Durability Compliance AS3600 (2009)**

The LOGICWALL system is designed for the construction of both reinforced and non-reinforced concrete walls. Once constructed the formwork system does not contribute to the structural capacity of the wall which acts as a normal concrete structure. When used and constructed in accordance with AFS LOGICWALL manual instructions, the AFS LOGICWALL system comply with the durability requirements of AS3600 (2009). (Refer Chapter L - “Certification”, report #10655/01 by Mahaffey Associates and report #J0815172 by Professor Mark Bradford)

**G6  Weatherproofing**

AFS LOGICWALL® System will comply with the weatherproofing performance verification requirements as per Volume 1 and 2 of National Construction Code (NCC) 2016. Refer Chapter L – ‘Certification’ for weatherproofing verification report dated 21 NOVEMBER, 2018 by AECOM.

**G7  Non-combustibility**

In accordance with NCC vol.1 Clause C1.9 (e) (iv) , Fibre reinforced Cement sheeting may be used wherever a non-combustible material is required.

With reference to C1.9(d), the adhesive (equivalent to sealant) used to fix the fibre cement formwork sheet to the steel studs is deemed to be exempt form the non-combustibility requirements of C1.9 (a) and (b).
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Reasonable efforts have been made to ensure the accuracy of this publication; however, any information and data contained herein is subject to change without notice. To ensure the information you are using is correct, AFS recommends you review the latest technical information available on the AFS website www.afswall.com.au, or alternatively call 1300 727 237 to speak to a Technical Representative.

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DISCLAIMER

1. This technical manual named AFS Designer together with the design tables and associated information related to AFS LOGICWALL® has been prepared by AFS to assist design professionals using AFS LOGICWALL® including without limitation, developers, builders, engineers, architects or quantity surveyors with the design of structural walls.

2. It is the responsibility of the user to ensure that the use of this manual is appropriate and to exercise their own judgment when using this manual.

3. AFS does not accept any responsibility (whether for negligence or otherwise) for any consequence arising from the use or application of this manual.

4. The design and engineering of the structure of any building using AFS LOGICWALL® should only be undertaken by suitability qualified and experienced design professionals, engineers or consultants.

5. The full responsibility for the design, engineering and structural design, and certification of compliance with all relevant Australian Standards, National Construction Code (NCC) and any other statutory requirements at Local, State and Federal levels rests with the design professional, project engineer or project consultants including but not limited to the design engineer, acoustic consultant, energy efficiency consultant, fire engineer and any of their officers, employees, delegates, partners, agents and service providers of any nature.

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DEFINITIONS

The use of the terms ‘AFS LOGICWALL®’ and ‘AFS LOGICWALL® Walls’ throughout the AFS Designer are as follows:

AFS LOGICWALL®: Refers to AFS LOGICWALL® panels as permanent formwork prior to being installed & corefilled with concrete.

AFS LOGICWALL® Walls: Refers to AFS LOGICWALL® walls installed with concrete corefill incorporated.
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