ASSESSMENT REPORT

The fire resistance performance of 78mm horizontal Speedpanel ceiling and supporting wall systems if tested in accordance with AS1530.4-2005

EWFA Report No:

34352100

Report Sponsor:

Speedpanel VIC Pty Ltd
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Testing. Advising. Assuring.

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CONTENTS

1 INTRODUCTION

This report presents an assessment of the fire resistance performance of 78mm horizontal Speedpanel ceiling and supporting wall systems if tested in accordance with AS1530.4-2005.

The tested prototypes described in Section 2 of this report, when subject to the proposed variations described in Section 3 and tested in accordance with the referenced test method described in Section 4. The conclusions of the report are summarised in Section 5.

The validity of this assessment is conditional on compliance with Sections 7, 8 and 9 of this report.

Summaries of the test data on which this assessment is based are provided in Appendix A together with a summary of the critical issues leading to the assessment conclusions including the main points of argument.

2 TESTED PROTOTYPES

This assessment is based on test report EWFA 2848400.1, EWFA 2848300.2, BWA 2286900.5, BWA 2257600, FAR 3754 and EWFA 2741700 tested in accordance with AS1530.4-2005 or AS1530.4-1997. The tests were sponsored by Speedpanel (VIC) Pty Ltd and Speedwall New Zealand Ltd respectively, and were undertaken by Exova Warringtonfire (Aus) Pty Ltd and BRANZ Limited respectively.

Refer to Appendix A for a detailed summary of the reference test data.

3 VARIATION TO TESTED PROTOTYPES

3.1 HORIZONTAL SPEEDPANEL CEILING ELEMENT

The proposed construction shall be horizontal orientated 78mm thick Speedpanel ceiling system as tested in EWFA 2848400.1 with consideration of the following variations:

- Modify the support detail and fix two layers of 16mm thick fire grade plasterboard directly to the underside or top side of Speedpanel. The fixing spacing shall be as per the maximum spacing of a previous tested or assessed plasterboard ceiling systems that achieves an FRL of 90/90/90 the maximum span of the ceiling shall be 3m and the ceiling shall be non-trafficable and support its own weight only.
- Modify the support detail and fixed a layer of corrugated steel sheeting to the top surface of the ceiling system. The maximum span of the ceiling shall be 3m and the ceiling shall be non-trafficable and support its own weight only.
- Include concrete wall, protected steel structure, 78mm vertical Speedpanel wall or 78mm horizontal Speedpanel wall as support options. Steel posts are installed for 78mm horizontal Speedpanel wall for lateral support at maximum 4500mm centres.
- Include bulkhead detail as shown in figures 6 to 9.

3.2 VERTICAL SPEEDPANEL SUPPORT ELEMENT

The proposed construction is made 78mm thick vertically orientated Speedpanel as tested in BWA2286900.5 with consideration given to the following variations:

- Walls shall be up to 6m high and the general arrangements are shown in figure 1 & 3.
- Walls shall be up to 4.5m high and the general arrangement is shown in figure 2.
- Walls shall be supported by concrete floor construction at the base of the wall.
- Head details shall be as shown in figures 28 and 29.
- Wall edge details shall be as shown in figures 30 to 35.
- Wall base details shall be as shown in figures 36 and 37.

3.3 HORIZONTAL SPEEDPANEL SUPPORT ELEMENT

The proposed construction is made 78mm thick horizontally orientated Speedpanel as tested in BWA 2257600 with consideration given to the following variations:

- Walls shall be up to 4.5m high and the general arrangements are shown in figures 4 & 5.
- Steel posts are installed for 78mm horizontal Speedpanel wall for lateral support at maximum 4500mm centres.
- Walls shall be supported by concrete floor construction at the base of the wall.
- Wall edge and junction details shall be as shown in figures 40 and 41.
- Wall base details shall be as shown in figures 42 and 43.

The proposed construction is summarised in Table 1 and Figures 1 to 45.

Table 1 – Schedule of Components

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td rowspan="3">1</td><td>Name</td><td>Speedpanel Panels – Ceiling System</td></tr>
<tr><td>Size</td><td>Nominal 285mm wide × nominal 78mm thick comprises of an aerated concrete core encased in a 0.4mm BMT galvanised steel skin.</td></tr>
<tr><td>Specification</td><td>Arranged horizontally and panel joints are fixed at 500mm centres with 10g × 16mm SDS.</td></tr>
<tr><td rowspan="3">2</td><td>Name</td><td>Perimeter Tracks</td></tr>
<tr><td>Size</td><td>85mm × 55mm × 1.26BMT galvanised steel C-track</td></tr>
<tr><td>Specification</td><td>used to cap ceiling panels at the end and fixed to panels on each side using 10g × 30mm SDS at 500mm centres</td></tr>
<tr><td rowspan="3">3</td><td>Name</td><td>Plasterboard Protection</td></tr>
<tr><td>Product</td><td>Two layers of 16mm thick fire grade plasterboard</td></tr>
<tr><td>Specification</td><td>
<table>
<tr><td>Location</td><td>Fixing & Spacing</td></tr>
<tr><td>Body of sheet 1st and 2nd layer</td><td>Fasten to each faming member at 25mm from sheet edges in two rows at 200mm max. centres</td></tr>
<tr><td>Butt joints 1st layer</td><td>Butt joint on framing and fasten at 40mm from sheet edges, 15mm from sheet ends and at 150mm max. centres</td></tr>
<tr><td>Butt joints 2nd layer</td><td>Butt joint within 50mm of centre line between framing and fix to 1st layer with laminating screws at 25mm from sheet edges, 40mm from sheet ends and at 200mm max. centres</td></tr>
<tr><td>Sheet Ends</td><td>Fasten at 40mm from sheet edges, 15mm min. from sheet ends and at 150mm max. centres</td></tr>
</table>
</td></tr>
</table>

Item	Description	
4	**Name**	**Fixing to Surround**
	Specification	• Minimum 5mm mild steel Dynabolt with at least 40mm embedment for connection to concrete structure at maximum 400mm centres and additional fixing in accordance with project engineer's specification. • 10 gauge × 30mm SDS screws fixed into Speedpanel walls at 250mm centres. • Mechanical all steel fixing to manufacture's specification into structural steel at maximum 400mm centres.
5	**Name**	**Plasterboard Strip**
	Product	Two layers of 16mm thick × 120mm wide fire grade plasterboard
	Installation	Fixed to the end support of Speedpanel ceiling. Plasterboard strips shall be fixed to Speedpanel panels by using 12 gauge × 45mm bugle head, fine thread, self-drilling screws at 250mm centres in two rows.
6	**Name**	**End Support Option – Speedpanel Wall**
	Specification	Max. 6m high vertically or horizontally orientated 78mm thick Speedpanel wall and the horizontal orientated Speedpanel wall is supported by steel posts at maximum 4500mm centres.
7	**Name**	**Steel Angle**
	Size	50mm × 50mm × 1.2 BMT galvanised steel angle
	Specification	Fixed to support construction with masonry anchors (Item 4) and fixed to Speedpanel panels with 12 gauge x 30mm long SDS screws at 500 centres.
8	**Name**	**Fire Rated Sealant**
	Product	Cavco "Premium-Flex Fyreseal" Acrylic Sealant or Hilti Firestop Flexible sealant CP 606
	Specification	Applied to the interface between all tracks and panels. Applied to interface between end wall and ceiling system Applied to seal all gaps between top tracks and panels, between flashing and panels, between plasterboard strip and panels and between angle and panels at wall head.
9	**Name**	**End Support - Concrete Slab**
	Material	Concrete floor
10	**Name**	**End Support – Protected Steel Structure Beam**
	Specification	Steel structure beam shall be protected with vermiculite spray that has been tested or assessed to maintain an FRL of 120/120/120.
11	**Name**	**Corrugated Steel Roof Sheeting**
	Material	0.55mm thick steel
	Installation	Fixed at middle of each Speedpanel panel at nominal 250mm centres by using 10g × 16mm SDS.
12	**Name**	**End Support – Concrete Wall**
	Material	Concrete wall
13	**Name**	**Fixing**
	Material	14-10 ×120mm Hex Head, Coarse thread screws.
	Installation	Fixed the panels to steel posts at every panel join.

Item	Description	
14	**Name**	**Flashing**
	Material	0.7mm BMT × 130mm wide galvanised steel flashing
	Installation	Screw fixed into steel angle and panel at head track at 250mm centres on one side or both sides depending on designs. Fixing details as per test EWFA 2741700.1.
15	**Name**	**Plasterboard Strip**
	Material	One layer of 13mm fire grade plasterboard 120mm wide
	Installation	Fixed on one side of the steel angle depending on designs. Refer to figures 25 and 35. The plasterboard strip fixed to Speedpanel by using 6g × 40mm Bugle head, Fine Thread, Self-drilling screws in two rows and staggered at 200mm centres.
16	**Name**	**Steel Angle**
	Size	50mm × 50mm × min. 3mm thick
	Installation	Fixed to support construction with masonry anchors (Item 4) and fixed to Speedpanel panels with 12 gauge x 30mm long SDS screws at 500 centres.
17	**Name**	**Tek Screw**
	Size	14-20 gauge × 115mm
	Installation	Fully penetrated through steel angle (item 16) and the Speedpanel wall panel with C-track and penetrate then into the steel angle (item 16) on the other side. Screws shall be installed at nominally 250mm centres at each panel joint location.
18	**Name**	**Plasterboard Strip**
	Material	Two layers of 16mm fire grade plasterboard 120mm wide
	Installation	Fixed on one side of steel angle, secured with fixings through steel angle and C-track into Speedpanel wall panel.in two rows and staggered at 200mm centres
19	**Name**	**Corner Flashing**
	Size	0.7BMT × 160mm × 160mm steel flashing
	Installation	Capped on the outside of bulkhead corner incorporated by two vertical 78mm thick Speedpanel wall sections and fixed to Speedpanel panels by using 10 gauge × 30mm SDS fixing screws at 250mm centres.

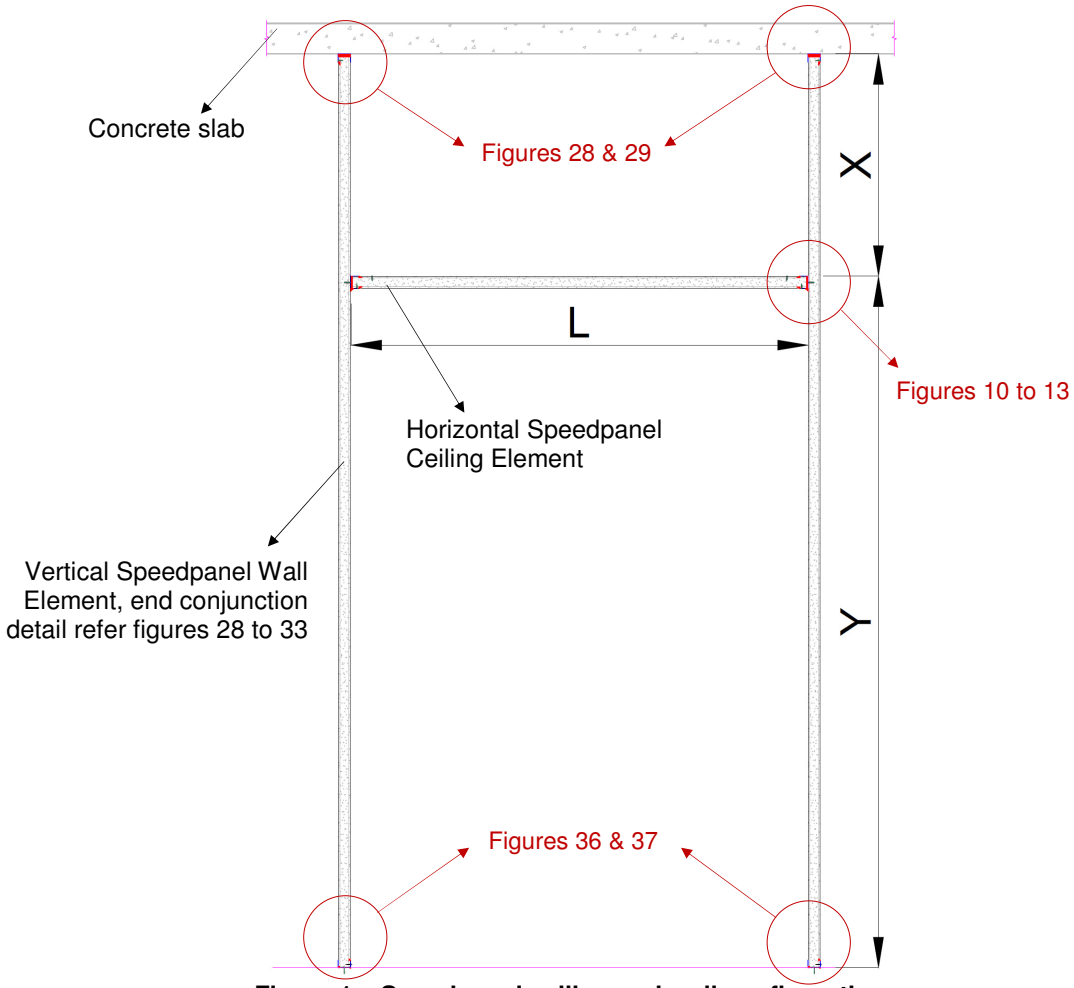


Figure 1 – Speedpanel ceiling and wall configuration

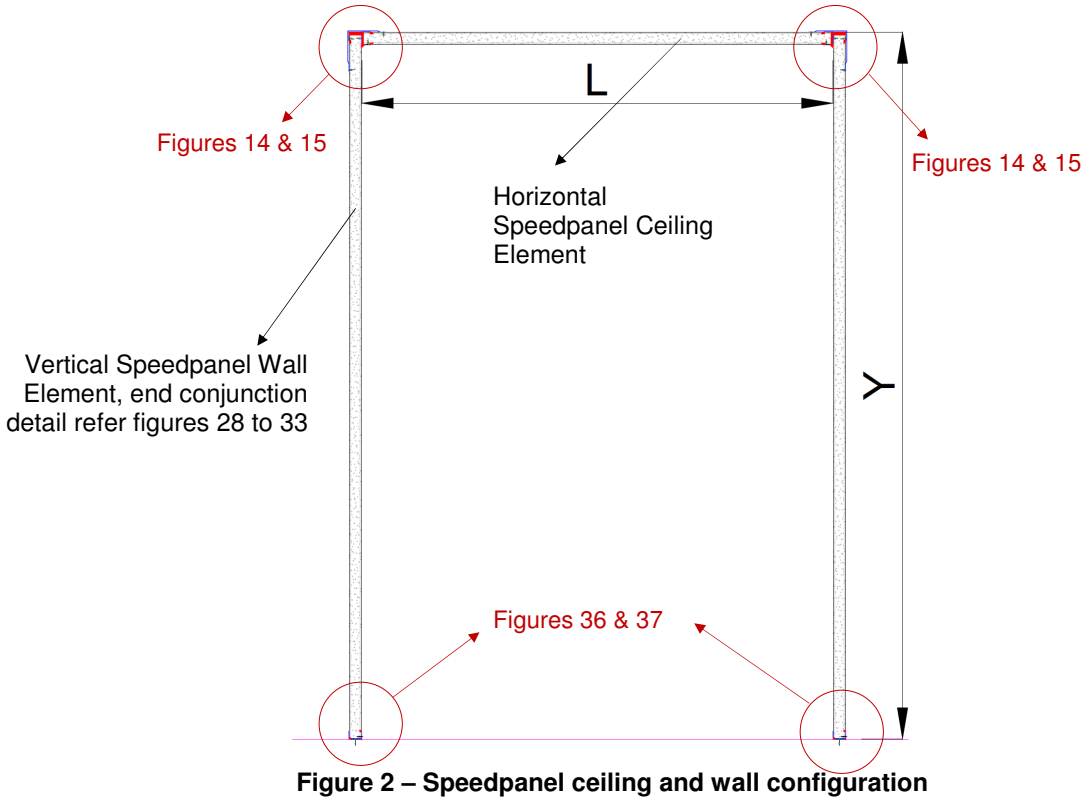


Figure 2 – Speedpanel ceiling and wall configuration

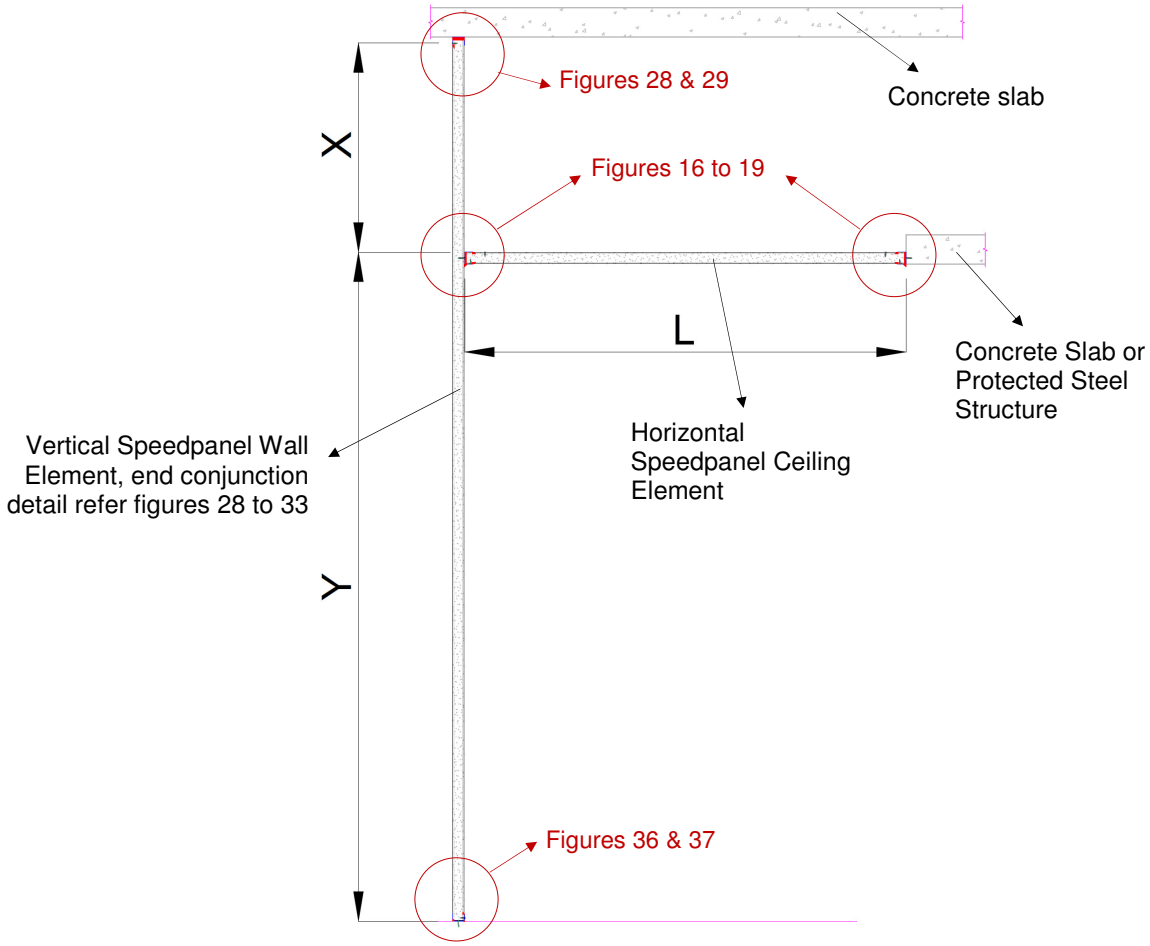


Figure 3 – Speedpanel ceiling and wall configuration

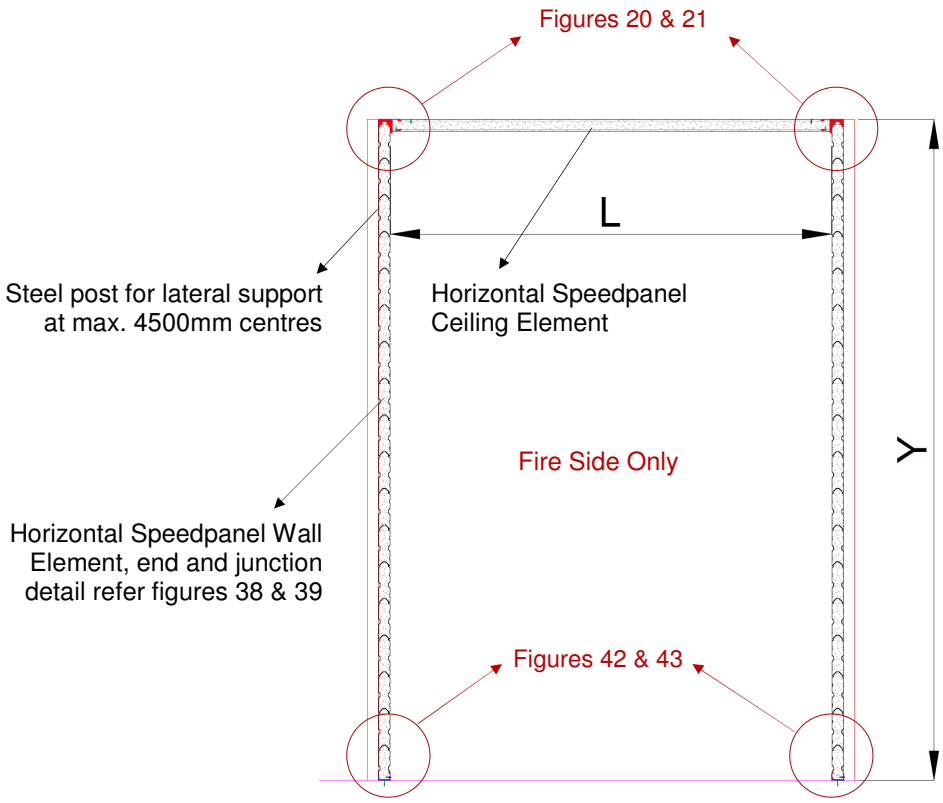


Figure 4 – Speedpanel ceiling and wall configuration

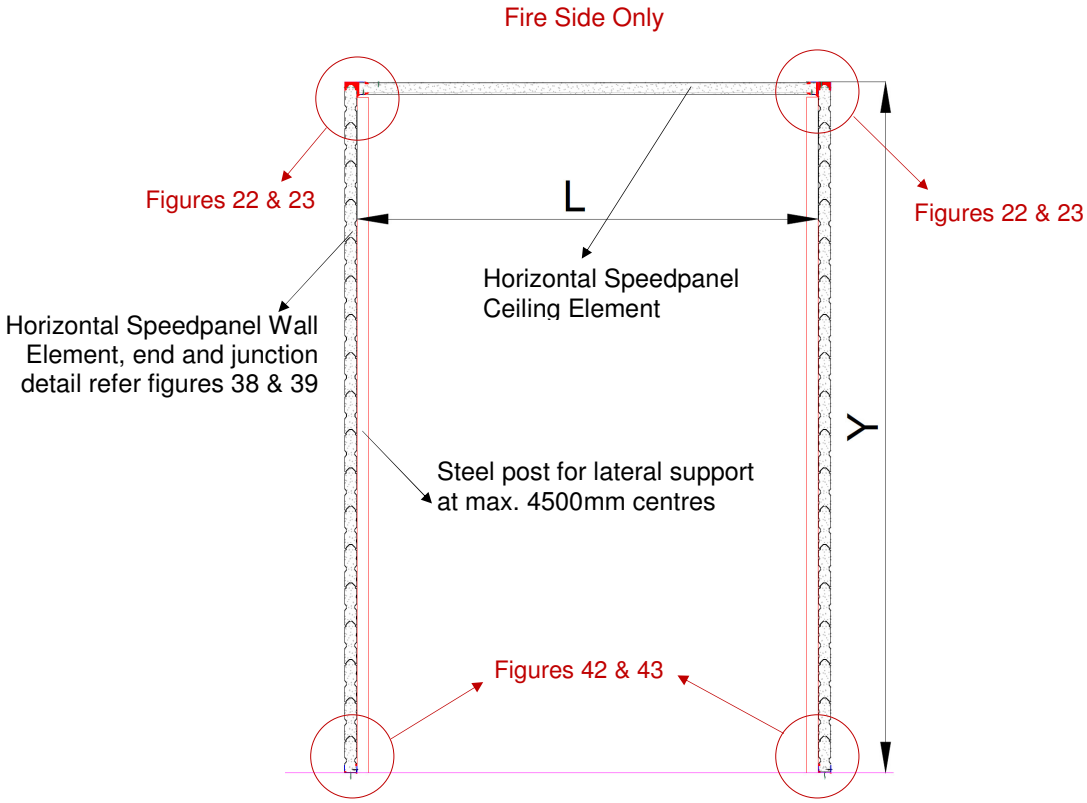


Figure 5 – Speedpanel ceiling and wall configuration

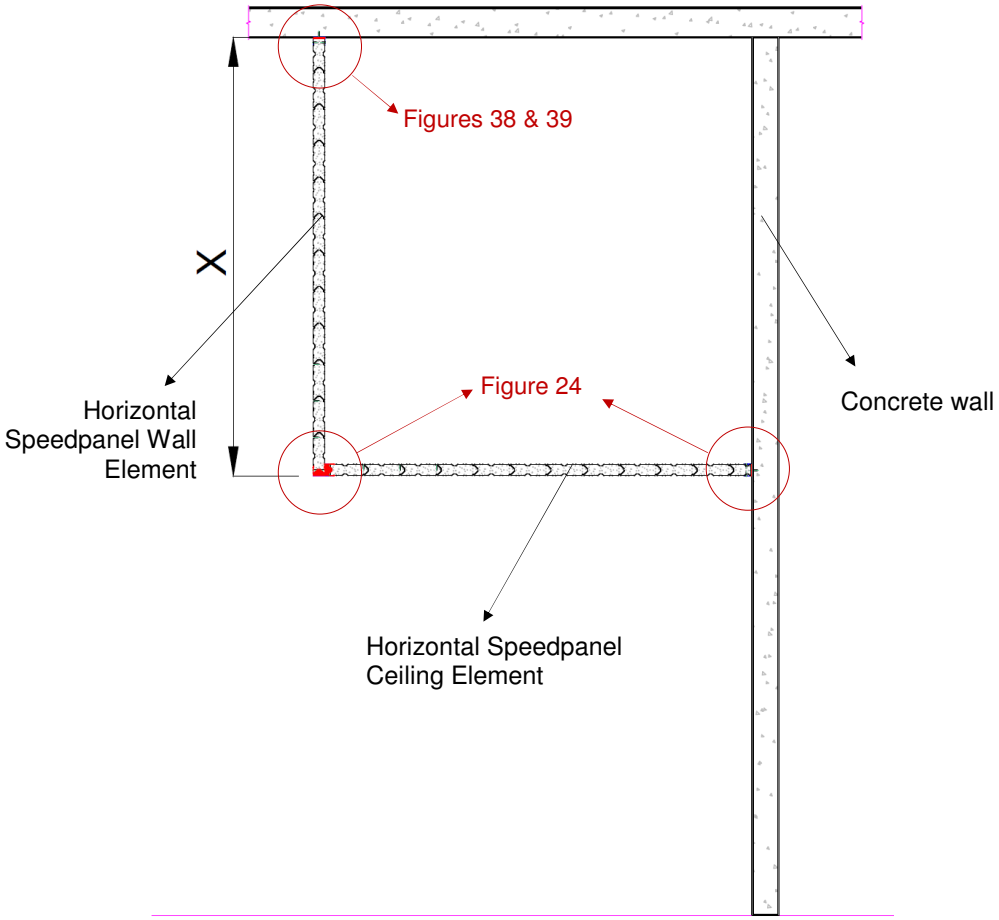


Figure 6 – Speedpanel Bulkhead Configuration (Section Elevation View)

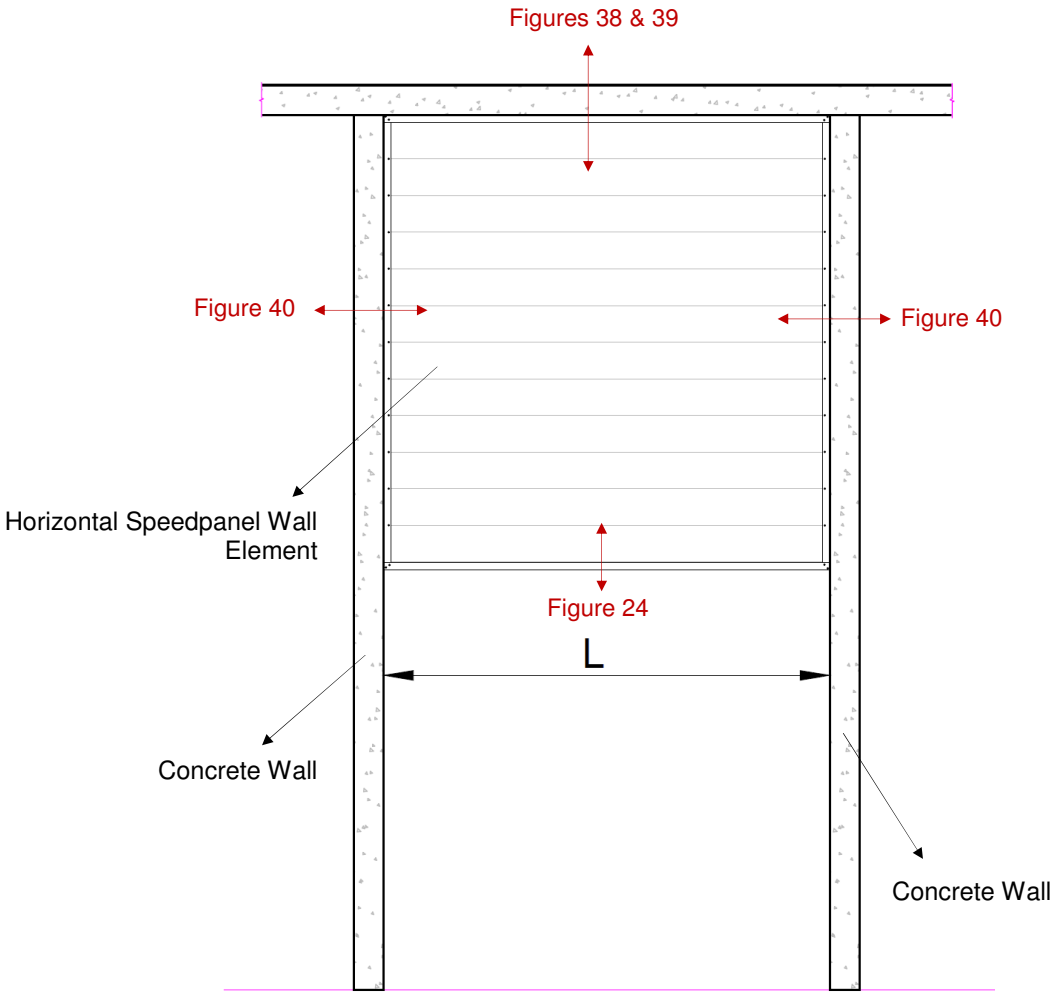


Figure 7 – Speedpanel Bulkhead Configuration (Front View)

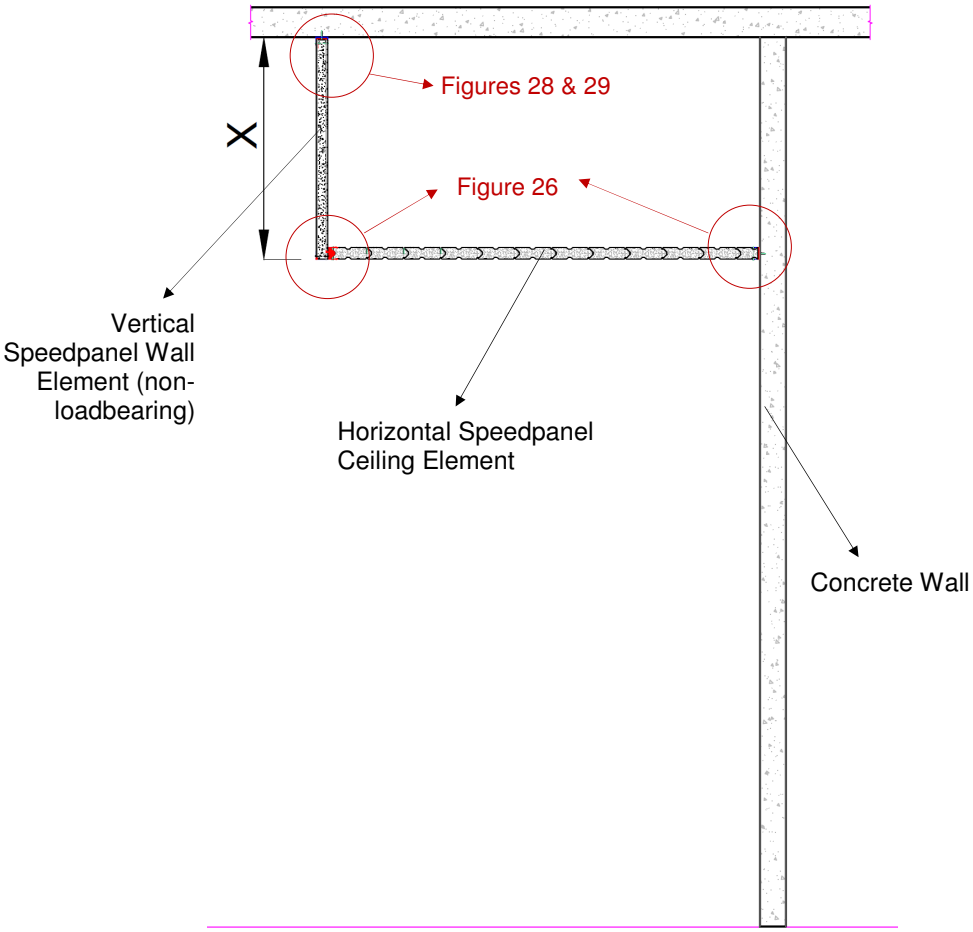


Figure 8 – Speedpanel Bulkhead Configuration (Section Elevation View)

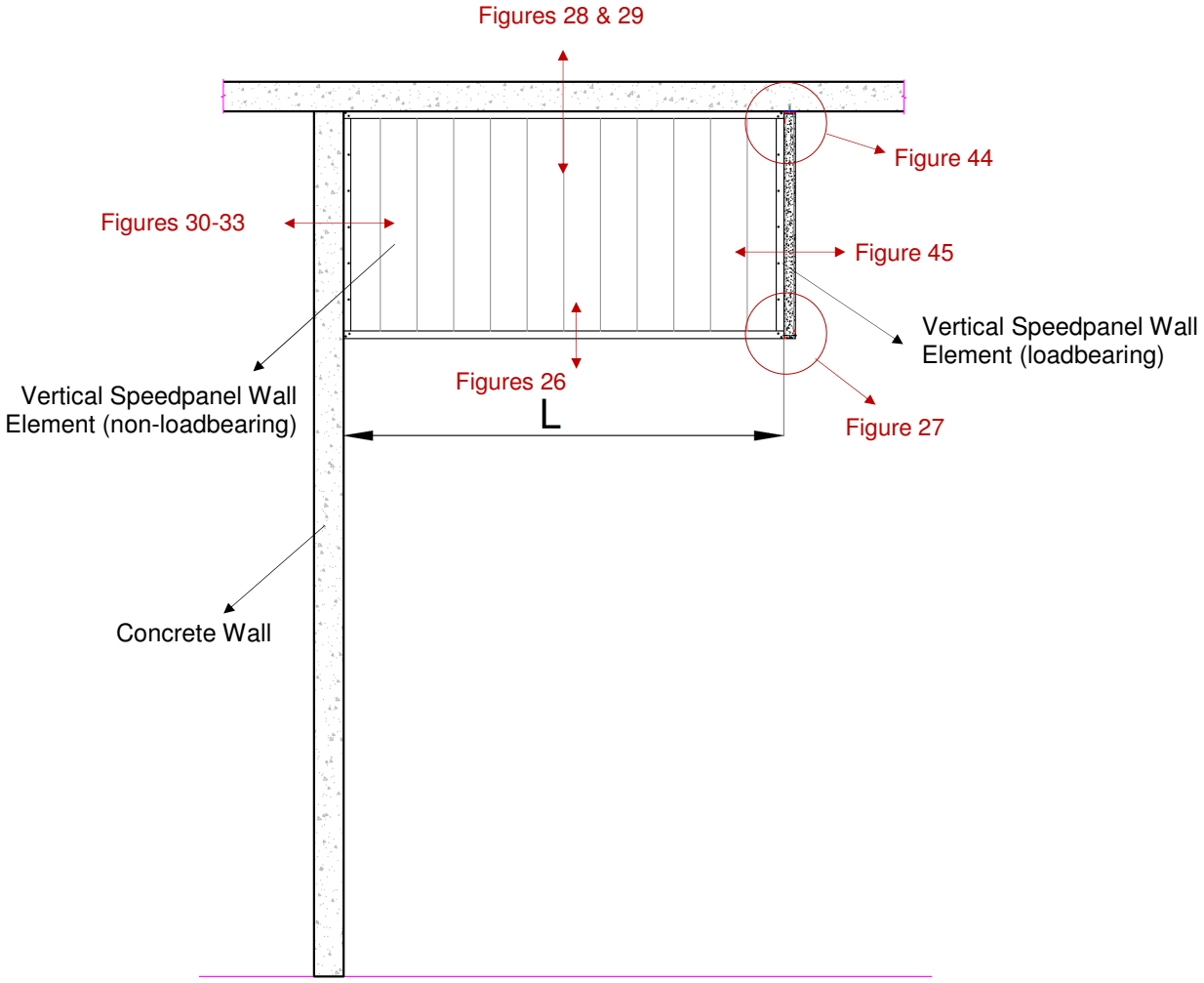


Figure 9 – Speedpanel Bulkhead Configuration (Front View)

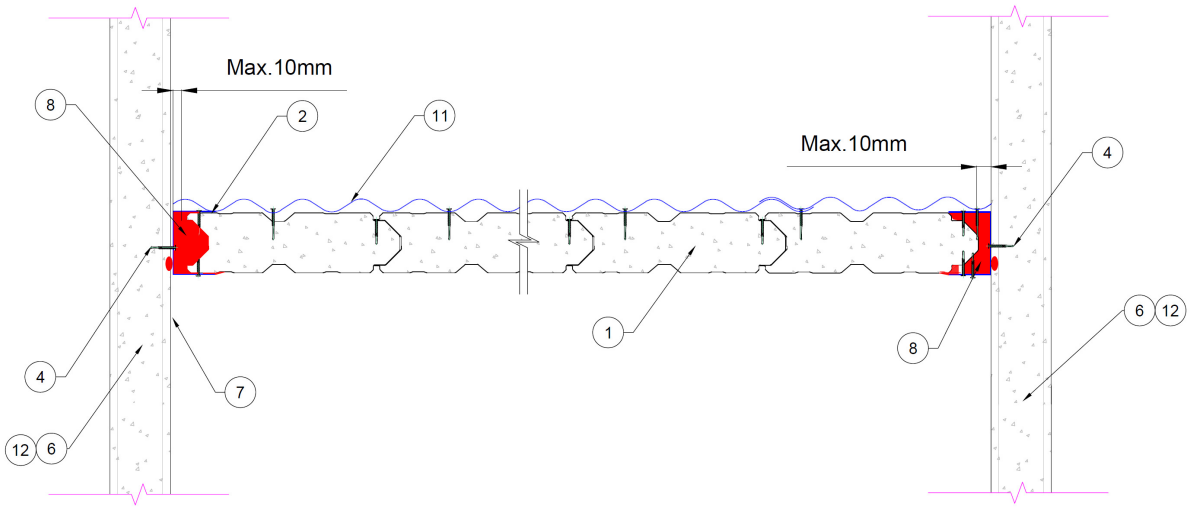


Figure 10 –Speedpanel ceiling protected with steel sheeting (Cross Section View)

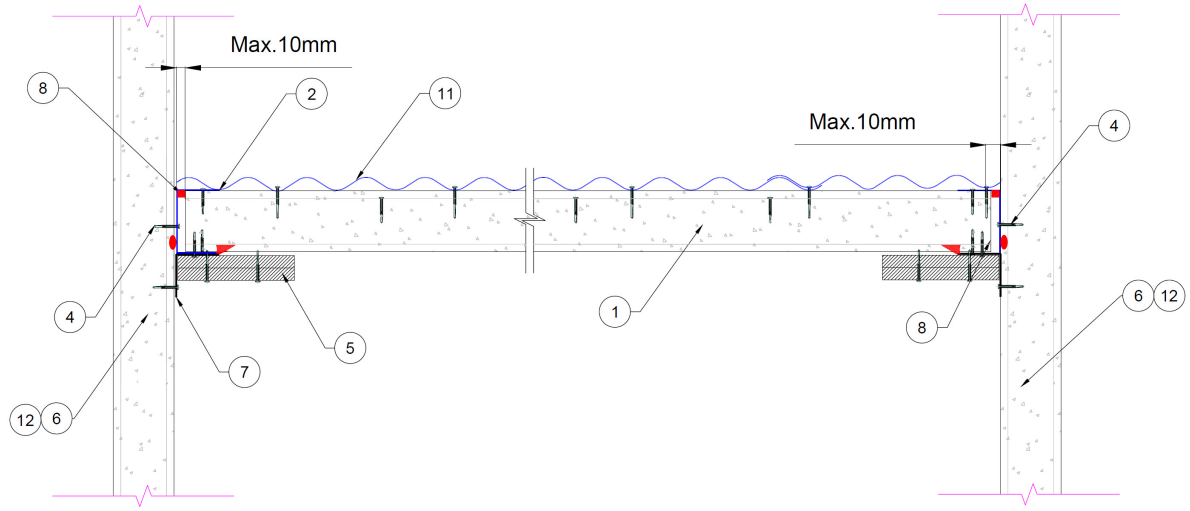


Figure 11 –Speedpanel ceiling protected with steel sheeting (Longitudinal Section View)

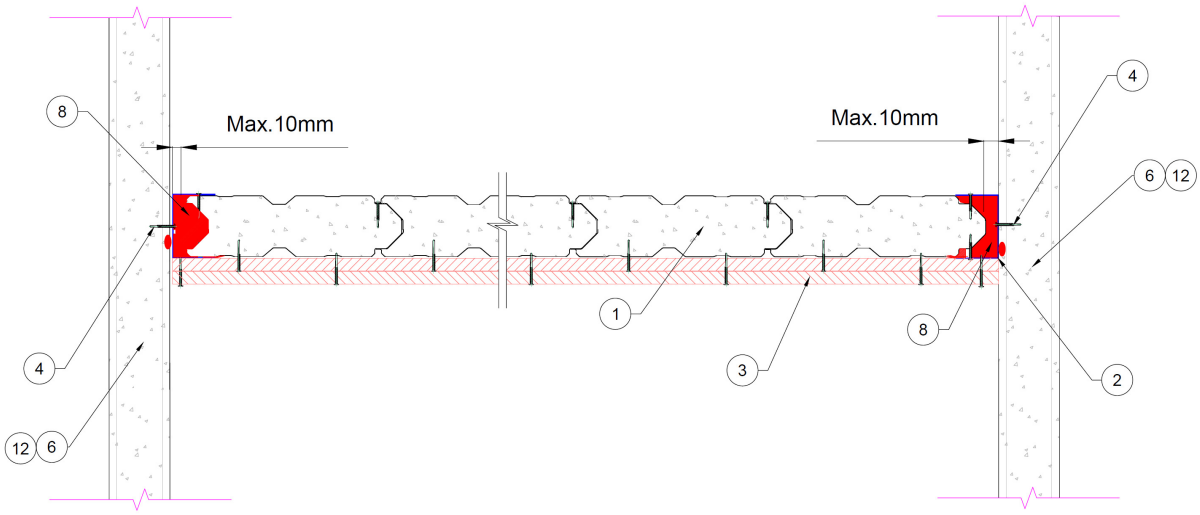


Figure 12 –Speedpanel ceiling protected with plasterboard linings (Cross Section View)

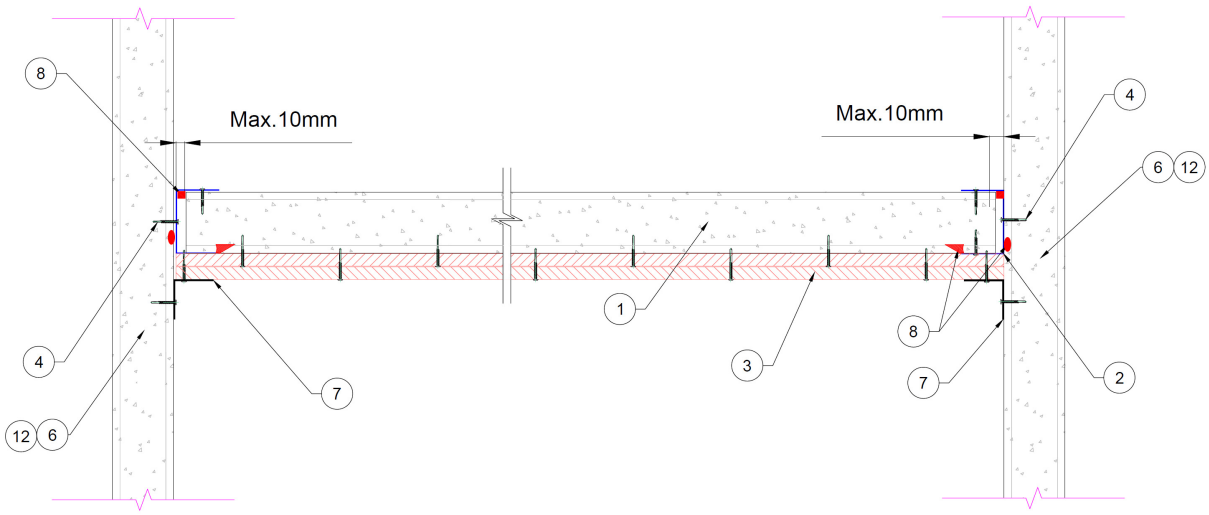


Figure 13 –Speedpanel ceiling protected with plasterboard lining (Longitudinal Section View)

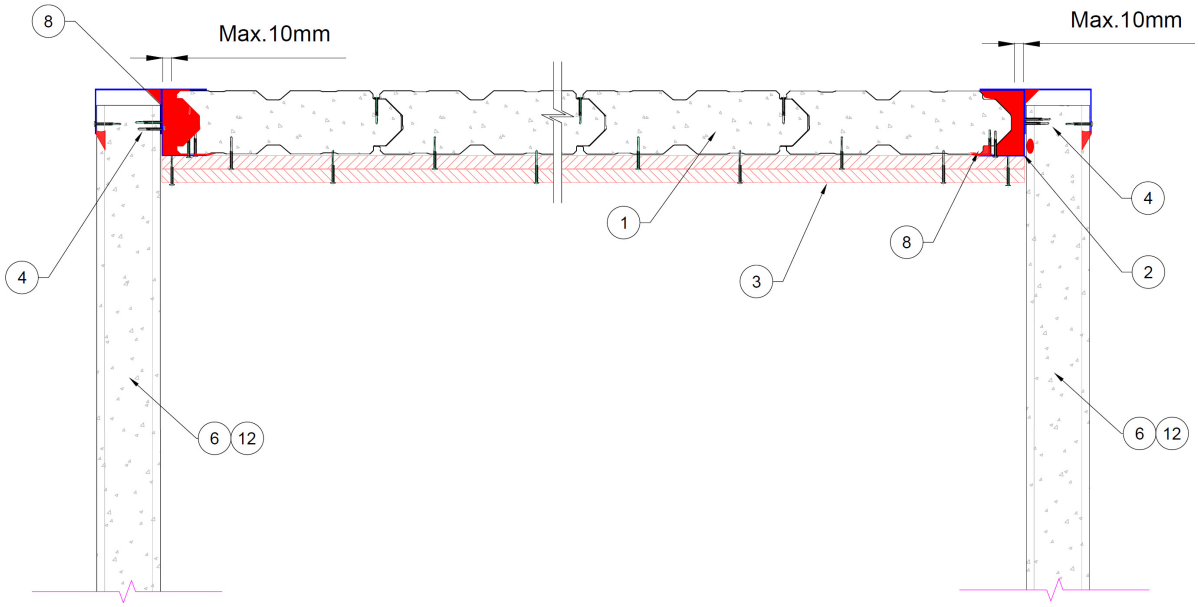


Figure 14 –Speedpanel ceiling protected with plasterboard linings (Cross Section View)

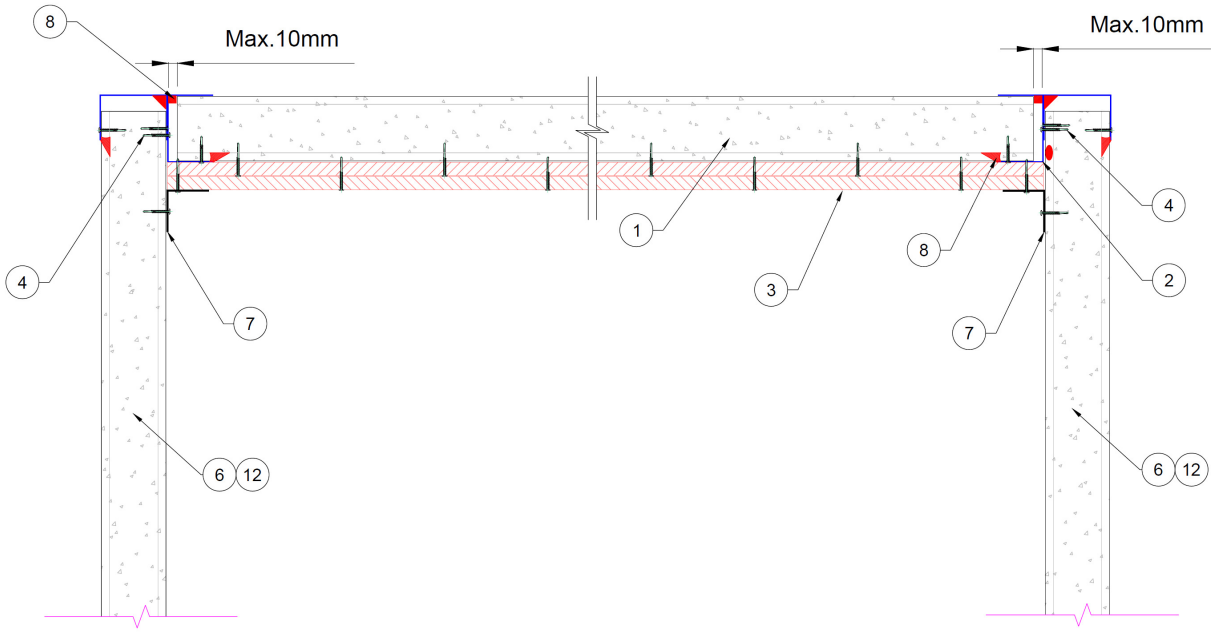


Figure 15 –Speedpanel ceiling protected with plasterboard lining (Longitudinal Section View)

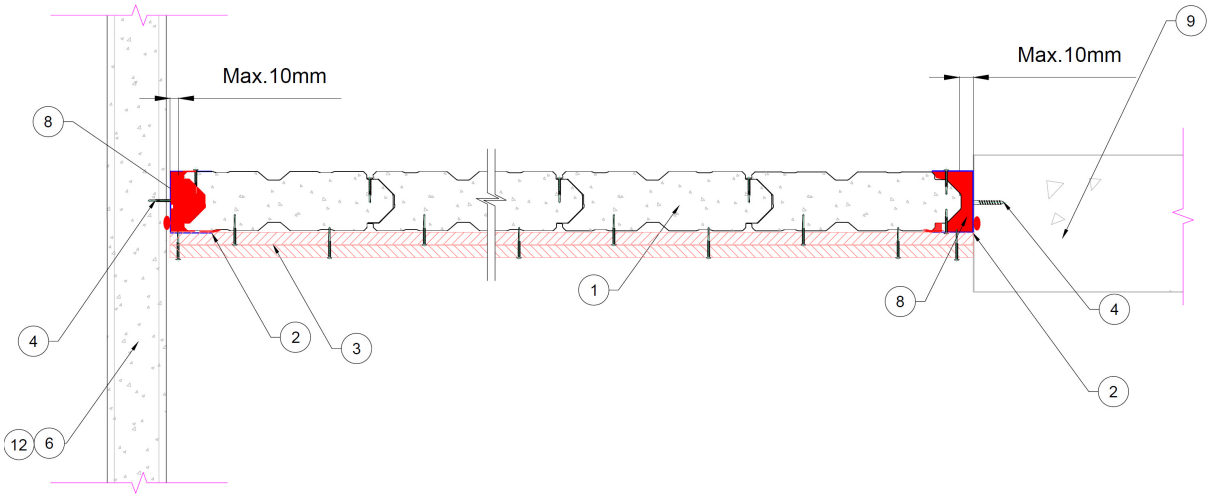


Figure 16 –Speedpanel ceiling protected with plasterboard linings (Cross Section View)

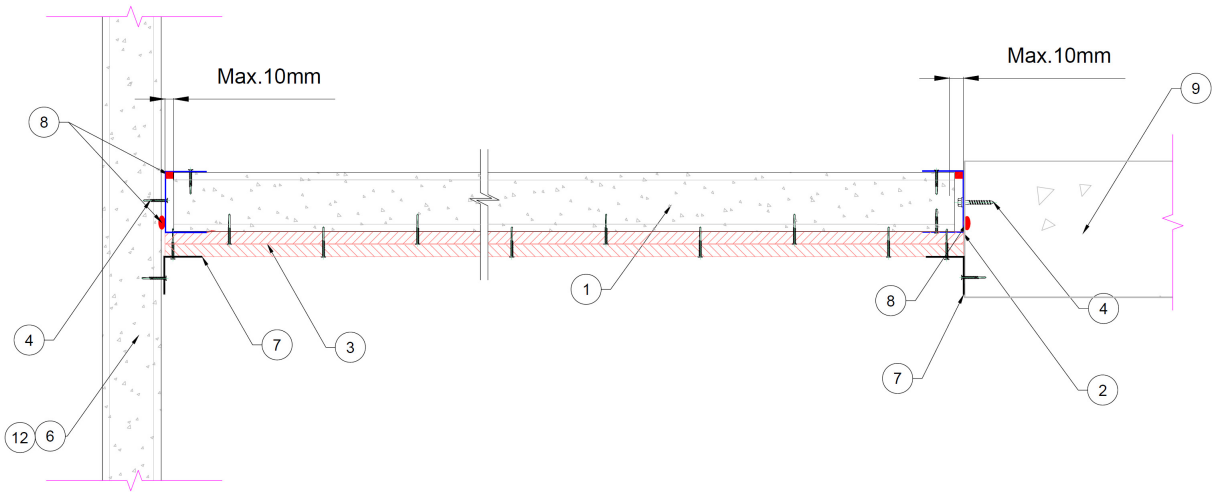


Figure 17 –Speedpanel ceiling protected with plasterboard linings (Longitudinal Section View)

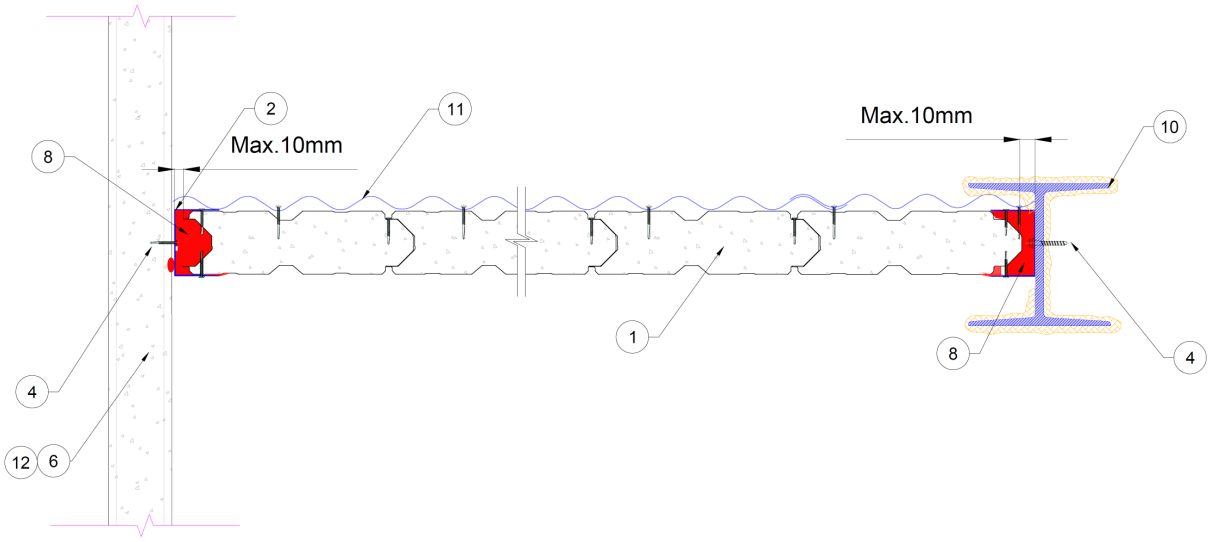


Figure 18 –Speedpanel ceiling protected with plasterboard linings (Cross Section View)

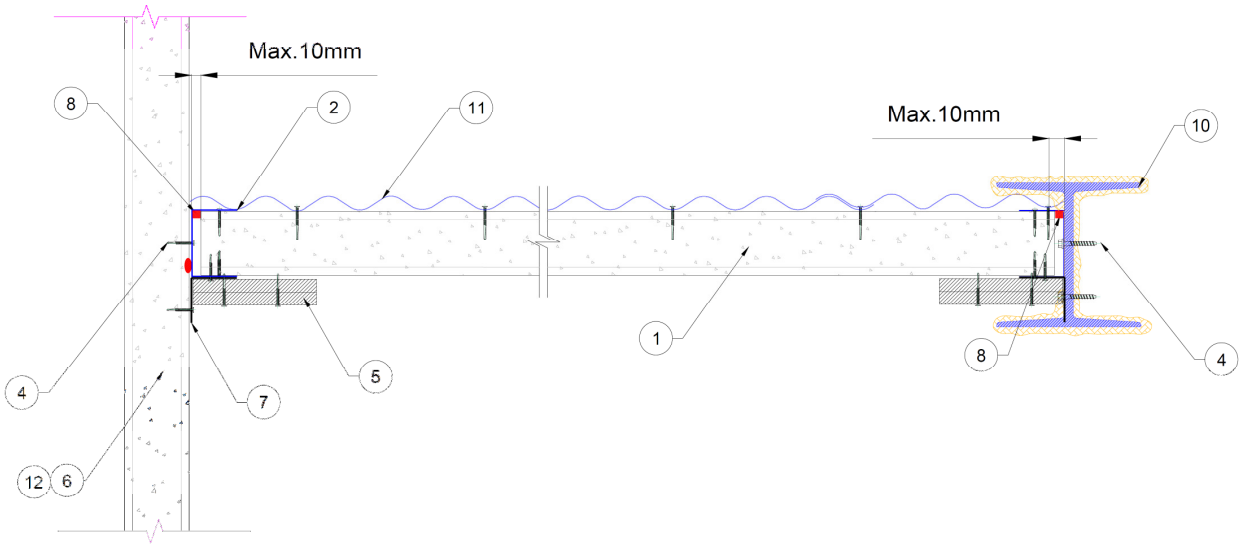


Figure 19 –Speedpanel ceiling protected with plasterboard linings (Longitudinal Section View)

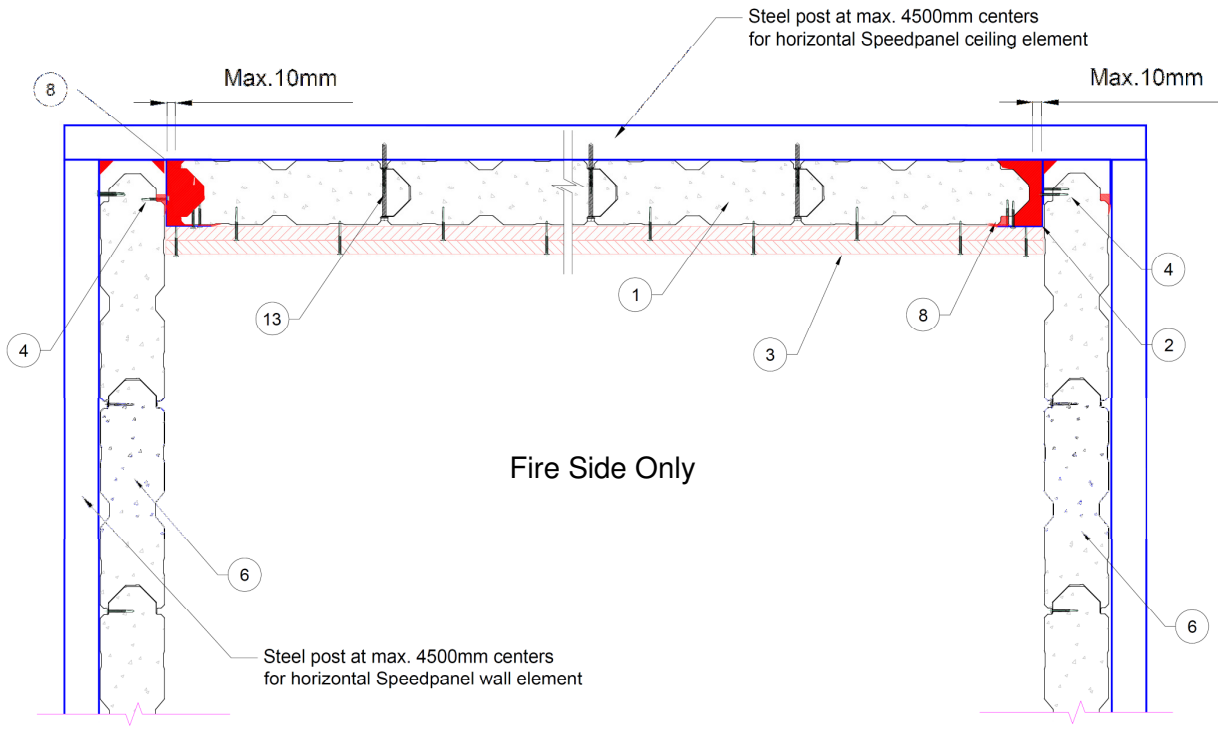


Figure 20 –Speedpanel ceiling protected with plasterboard linings (Cross Section View)

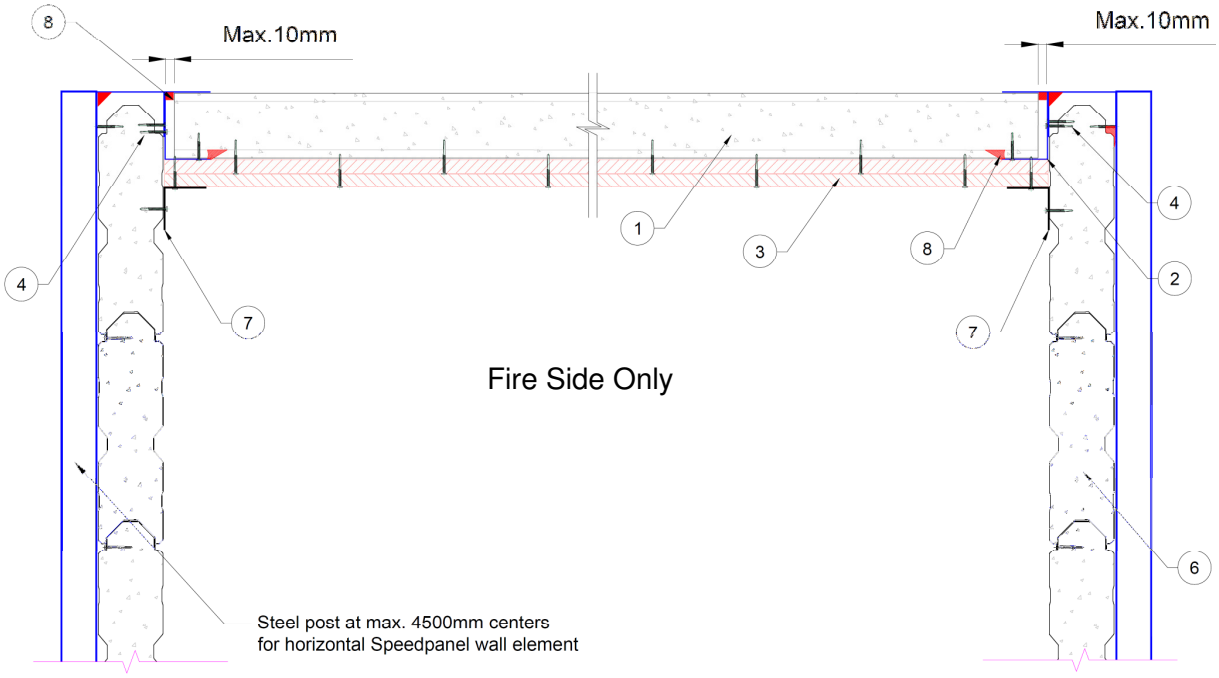


Figure 21 –Speedpanel ceiling protected with plasterboard linings (Longitudinal Section View)

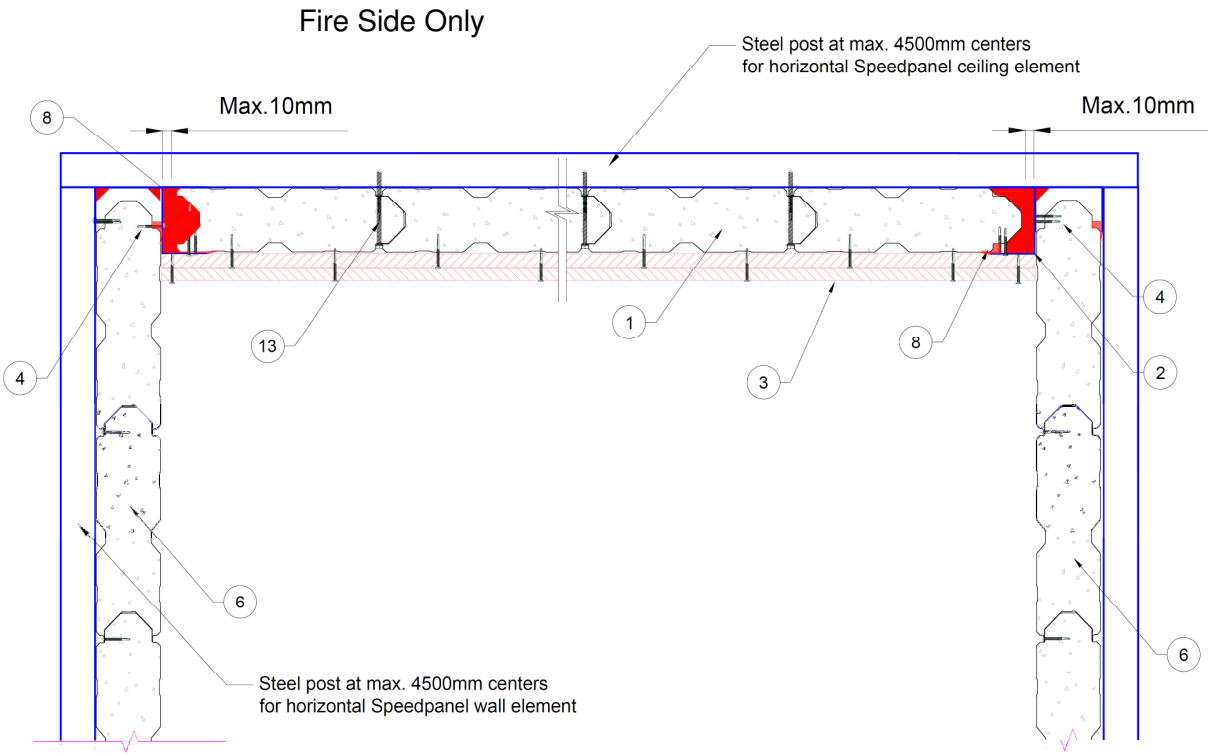


Figure 22 –Speedpanel ceiling protected with plasterboard linings (Cross Section View)

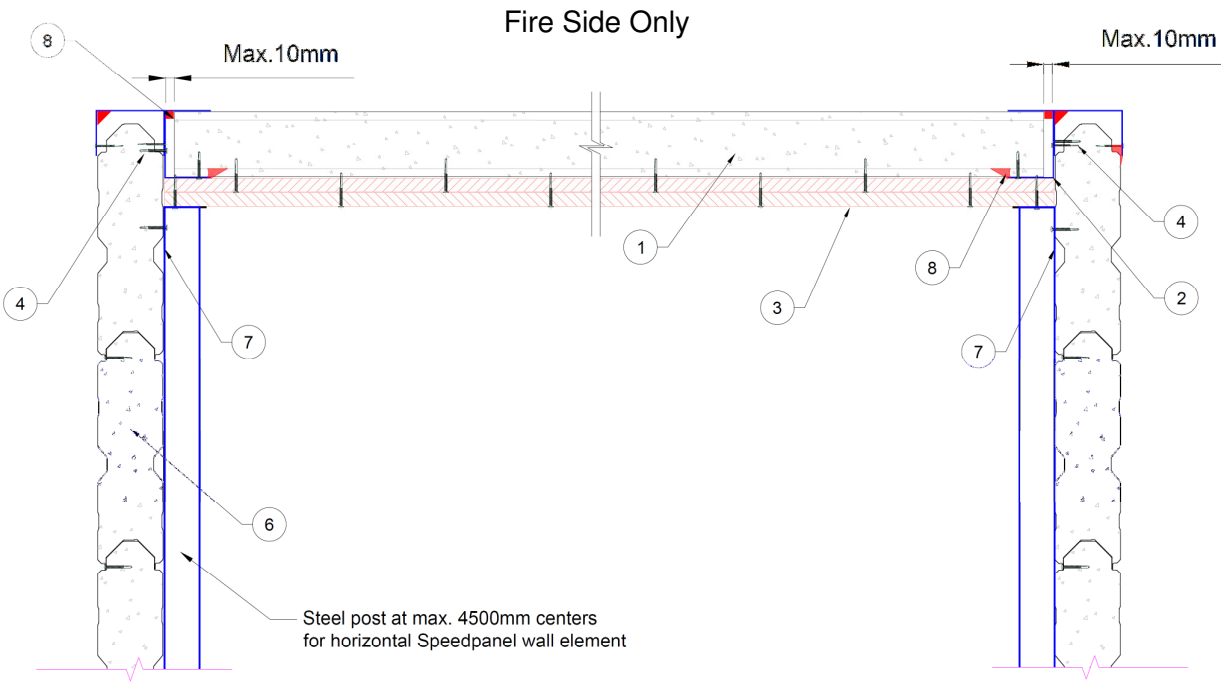


Figure 23 –Speedpanel ceiling protected with plasterboard linings (Longitudinal Section View)

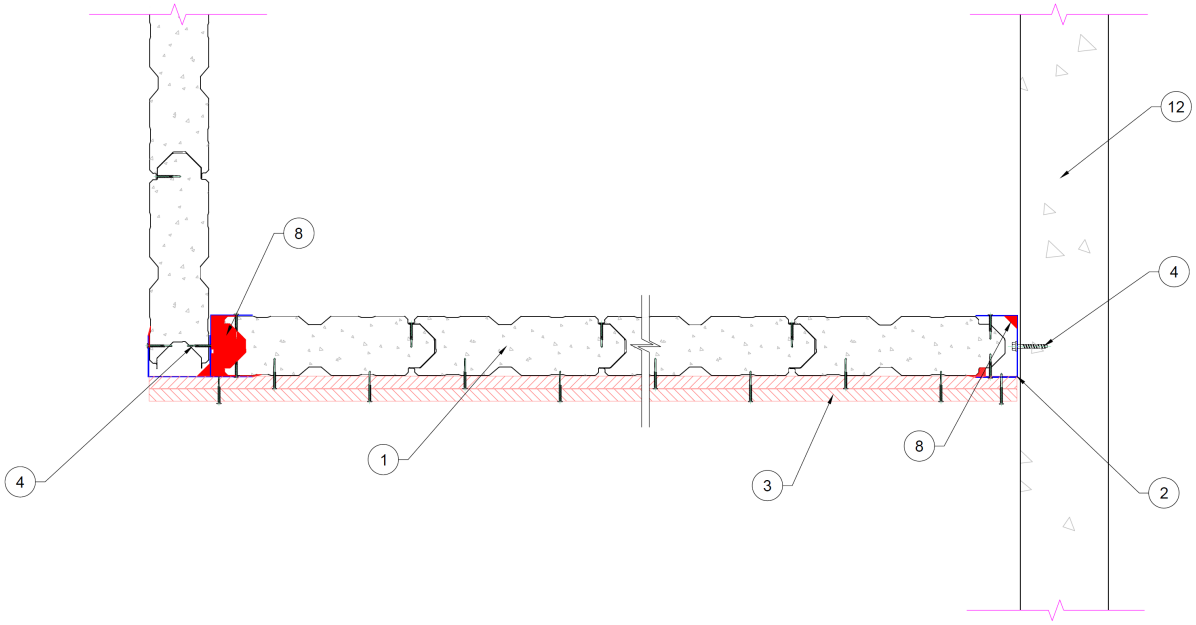


Figure 24 –Speedpanel bulkhead ceiling span protected with plasterboard linings (Cross Section View)

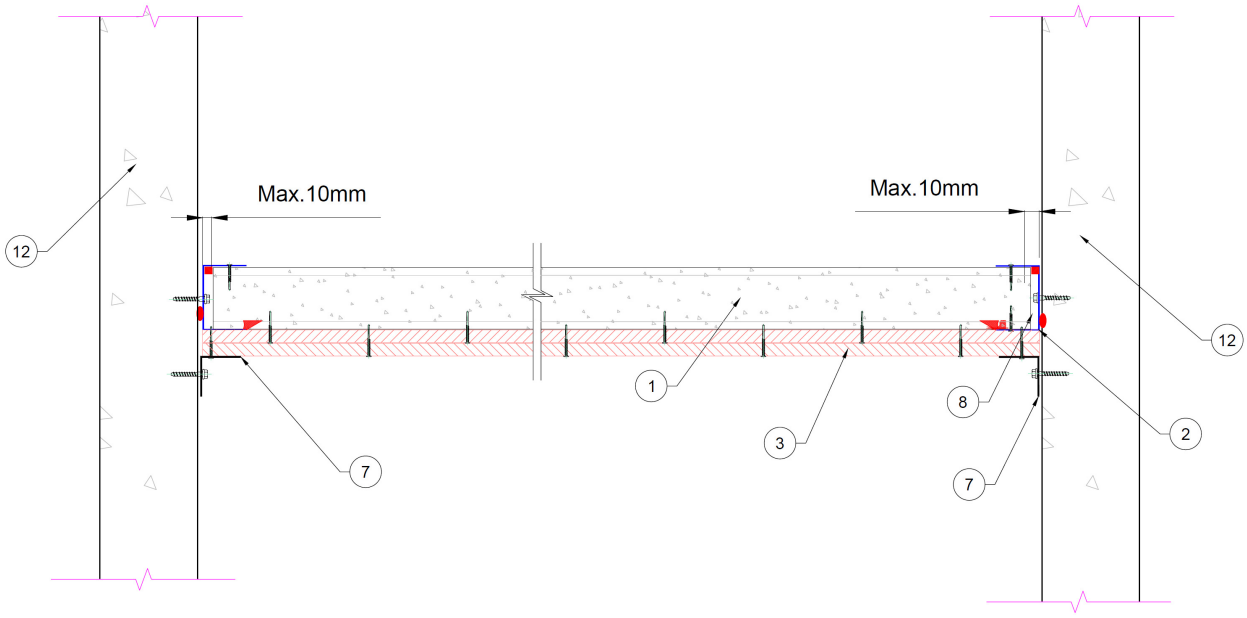


Figure 25 –Speedpanel bulkhead ceiling span protected with plasterboard linings (Longitudinal Section View)

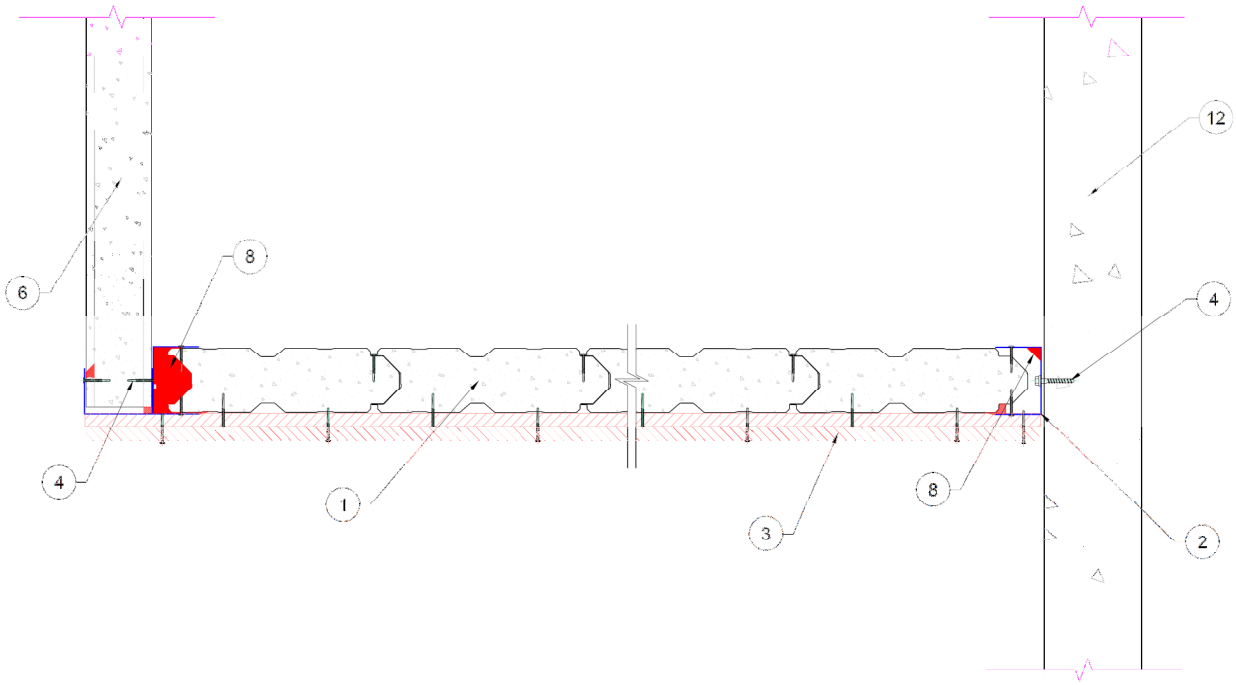


Figure 26 –Speedpanel bulkhead ceiling span protected with plasterboard linings (Cross Section View)

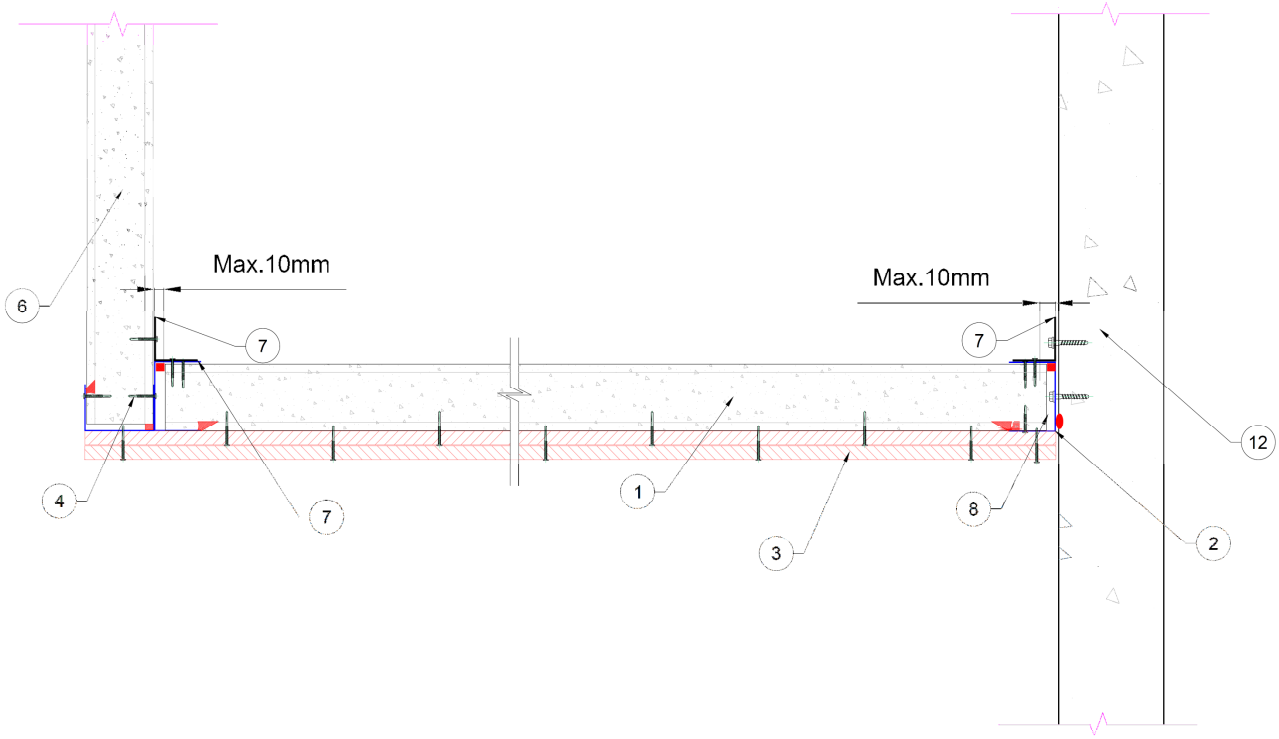


Figure 27 –Speedpanel bulkhead ceiling span protected with plasterboard linings (Longitudinal Section View)

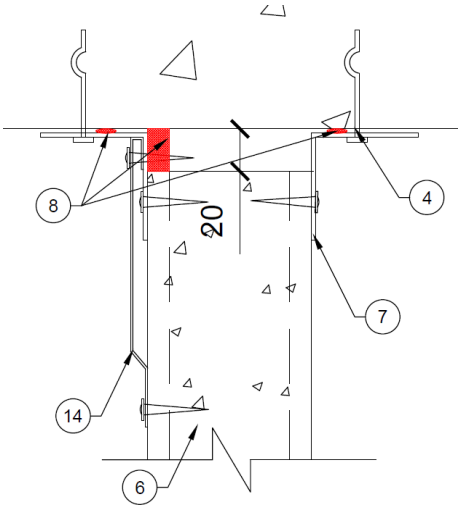


Figure 28 –Head Detail for Vertical Speedpanel Wall

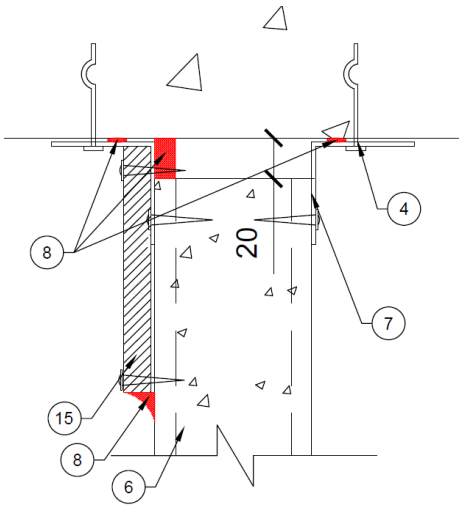


Figure 29 – Head Detail for Vertical Speedpanel Wall

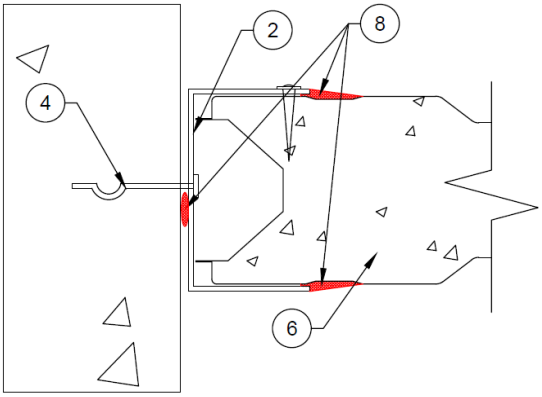


Figure 30 - Female Panel End Detail for Vertical Speedpanel Wall

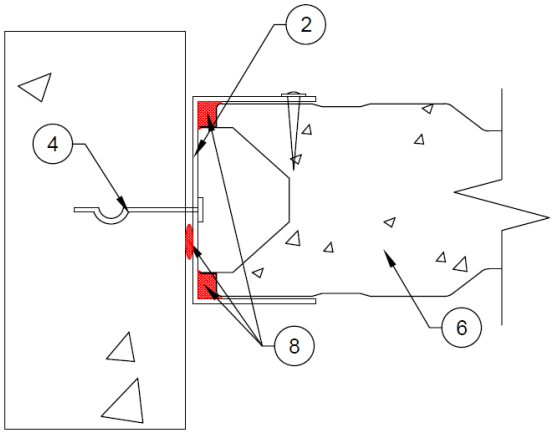


Figure 31 - Female Panel End Detail for Vertical Speedpanel Wall

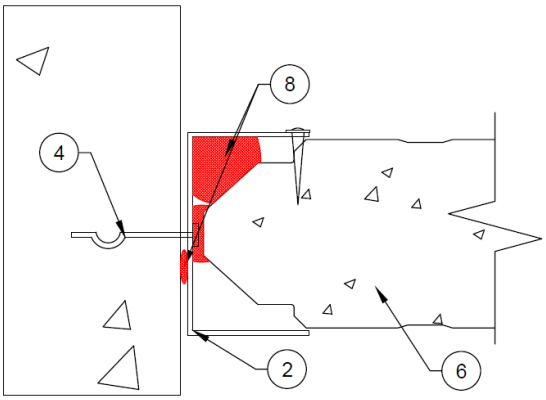


Figure 32 - Male Panel End Detail for Vertical Speedpanel Wall

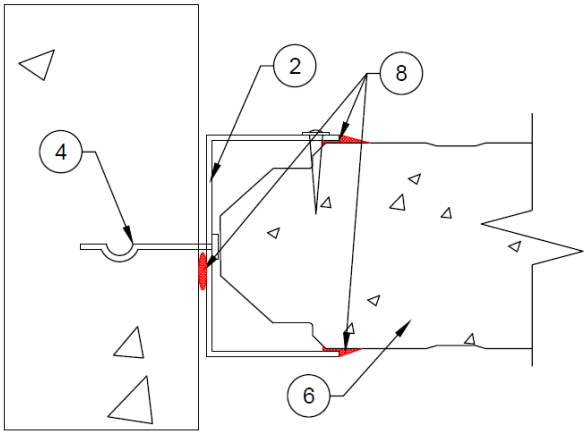


Figure 33 - Male Panel End Detail for Vertical Speedpanel Wall

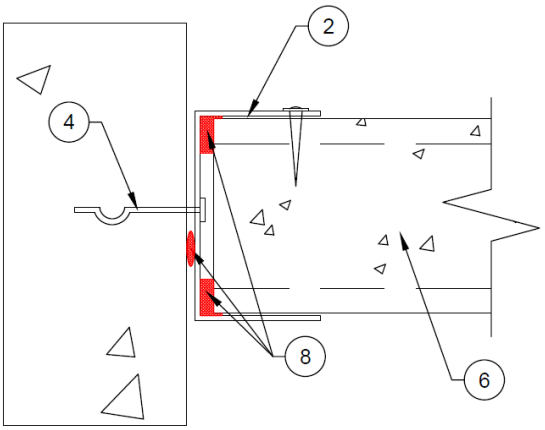


Figure 34 – Cut-off Panel End Detail for Vertical Speedpanel Wall

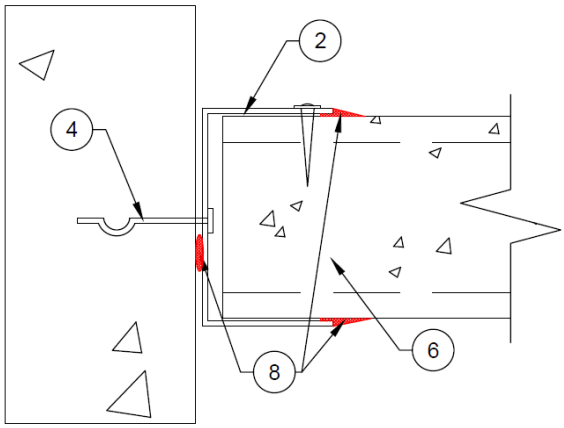


Figure 35 – Cut-off Panel End Detail for Vertical Speedpanel Wall

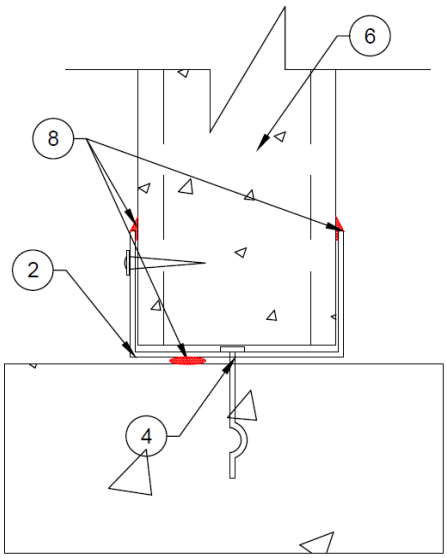


Figure 36 – Bottom Detail for Vertical Speedpanel Wall

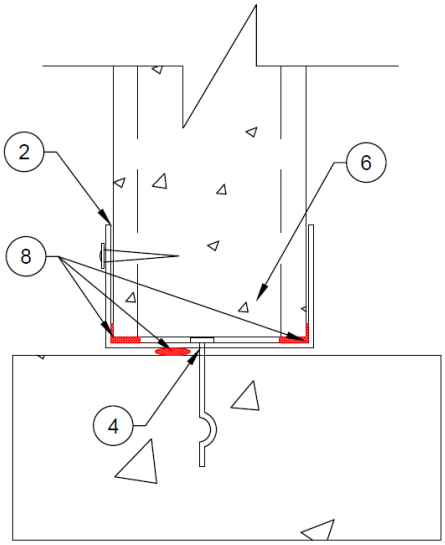


Figure 37 – Bottom Detail for Vertical Speedpanel Wall

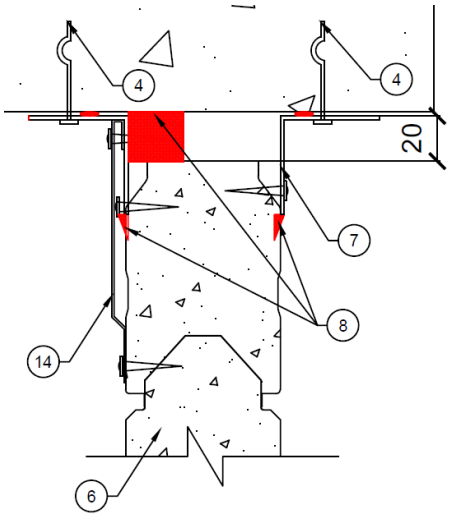


Figure 38 – Head Detail for Horizontal Speedpanel Wall

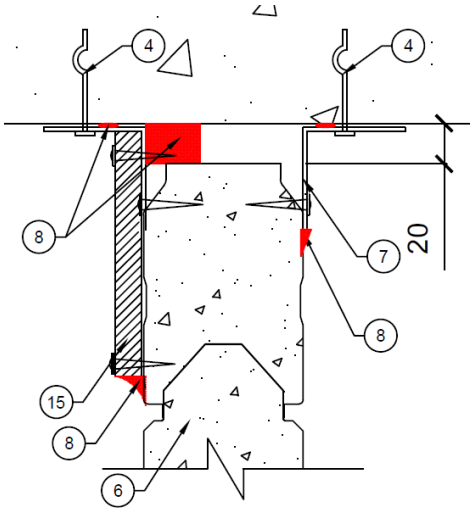


Figure 39 – Head Detail for Horizontal Speedpanel Wall

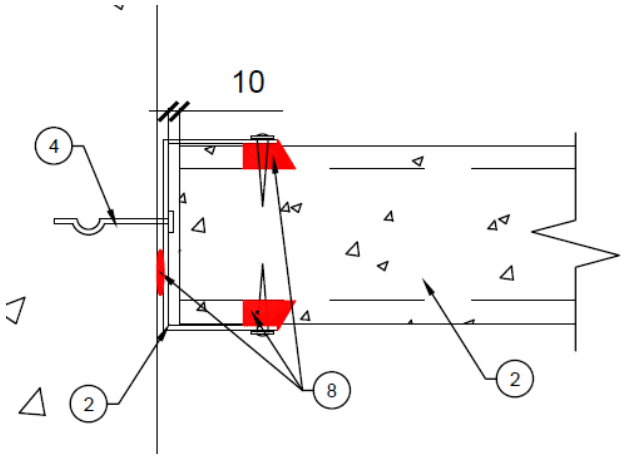


Figure 40 – Side Detail for Horizontal Speedpanel Wall

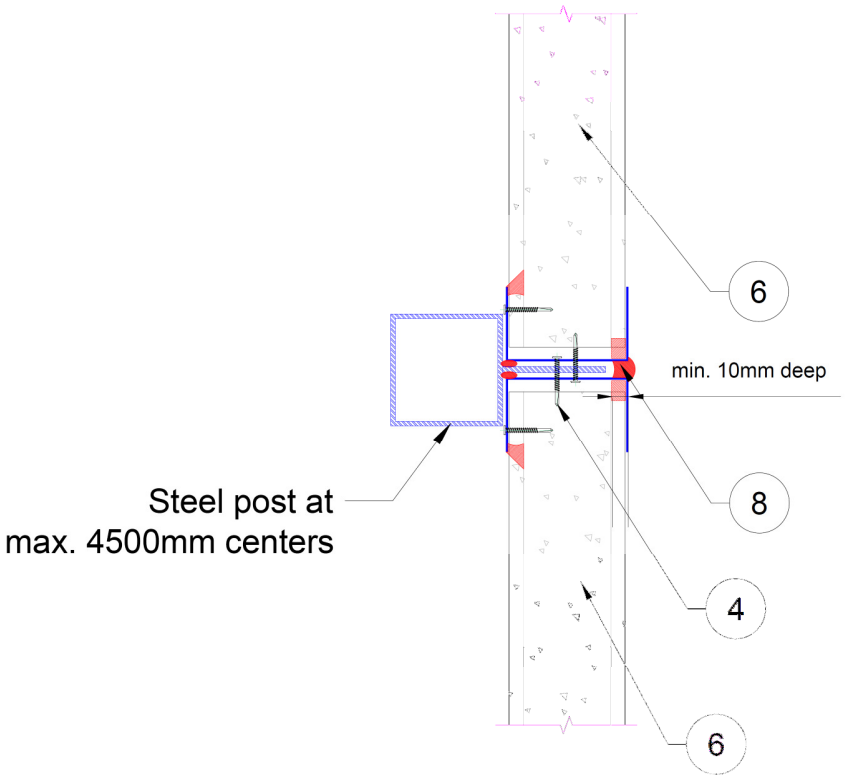


Figure 41 – Junction Detail for Horizontal Speedpanel Wall and Steel Post

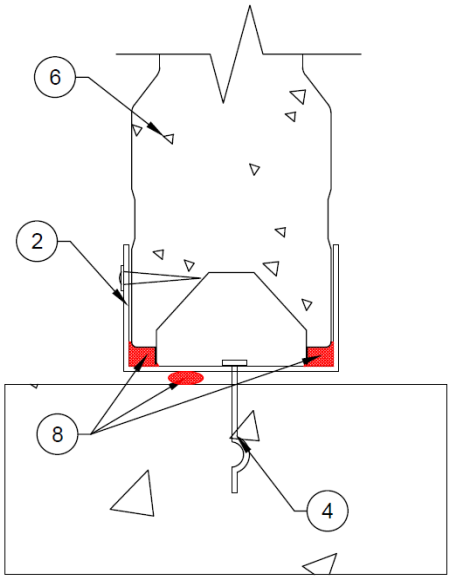


Figure 42 – Bottom Detail for Horizontal Speedpanel Wall

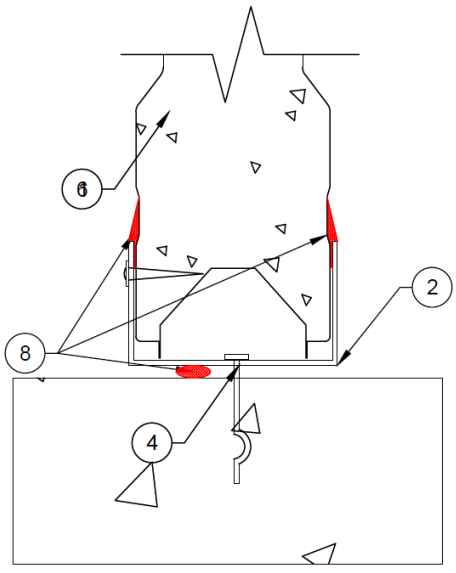


Figure 43– Bottom Detail for Horizontal Speedpanel Wall

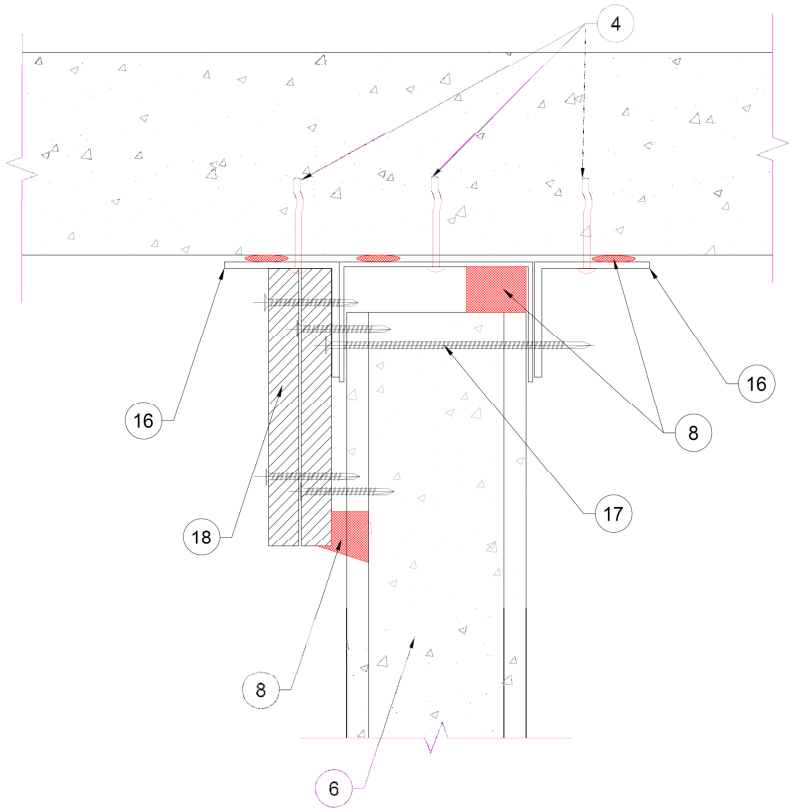


Figure 44 – Head Detail for Suspended Vertical Speedpanel Wall

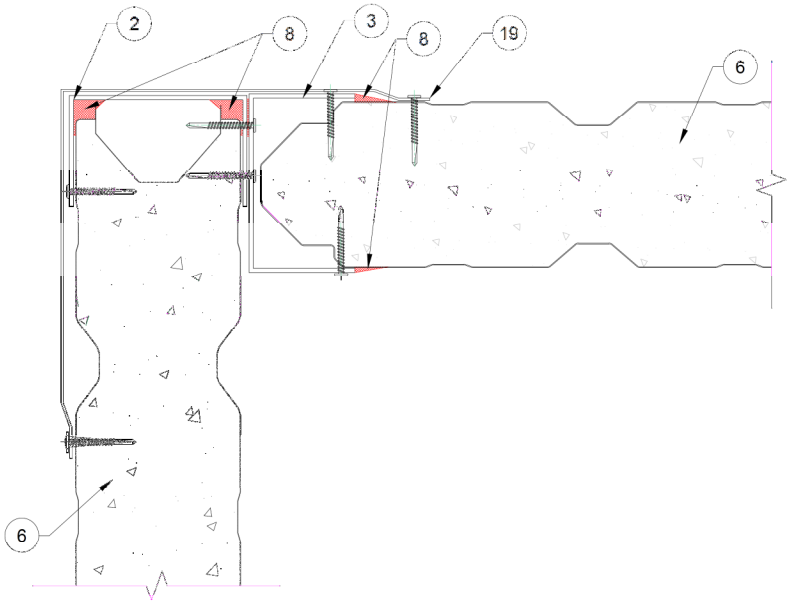


Figure 45 – Corner Detail of Bulkhead Construction with two Vertical Speedpanel Walls

4 REFERENCED TEST PROCEDURES

This report is prepared with reference to the requirements of AS1530.4-2005 Section 2 and 4 and appropriate for non-trafficable ceilings and AS1530.4-2005 Section 2 and 3 for loadbearing walls.

5 FORMAL ASSESSMENT SUMMARY

Based on the discussion presented in this report, it is the opinion of this testing authority that if the specimen described in section 1 had been modified within the scope of section 3, it will achieve the fire resistance performance (FRL) listed below, if tested in accordance with the test method referenced in Section 4 and subject to the requirements of Section 7.

Table 5.1 Performance of Horizontal Speedpanel non-trafficable Ceiling (Self Weight only)

Refer Fig.	Max. Ceiling Span L	Max. Support Wall Height Y	Max. Wall Height Above Ceiling X	Support Element	FRL	Fire Direction
1	3m	4.5m	1.5m	78mm vertical Speedpanel wall or concrete wall	120/120/120	Above or Below
2			-			Above or Below
3			1.5m			Above or Below
4			-	78mm horizontal Speedpanel wall		Below only
5			-			Above only
6 & 7	3m	-	3m	Concrete wall		Either Side of Bulkhead
8 & 9	3m	-	1.5m	Concrete Wall one end and 78mm vertical Speedpanel wall the other end		Either Side of Bulkhead

Table 5.2 - Performance of Vertical and Horizontal Speedpanel Support Walls

Refer Figure	Wall Height	FRL	Fire Direction
1	6m	120/120/120	Either Side
2	4.5m		Either Side
3	6m		Either Side
4	4.5m		Inside Only
5	4.5m		Outside Only
8	1.5m		Either Side

6 DIRECT FIELD OF APPLICATION

This assessment applies to horizontal orientated Speedpanel ceiling system and Speedpanel wall systems exposed to fire from either side or as stated.

7 REQUIREMENTS

This report details the methods of construction, test conditions and assessed results that would have been expected had the specific elements of construction described herein been tested in accordance with AS1530.4.

It is required the support walls be made from construction capable of providing adequate support for the Speedpanel ceiling system for the required FRL period.

It is required the steel post be cable of providing lateral adequate support for the horizontal Speedpanel wall system for the required FRL period.

Any further variations with respect to size, constructional details, loads, stresses, edge or end conditions, other than those identified in this report, may invalidate the conclusions drawn in this report.

8 VALIDITY

This assessment report does not provide an endorsement by Exova Warringtonfire Aus Pty Ltd of the actual products supplied.

The conclusions of this assessment may be used to directly assess the fire resistance performance under such conditions, but it should be recognised that a single test method will not provide a full assessment of the fire hazard under all fire conditions.

Because of the nature of fire resistance testing, and the consequent difficulty in quantifying the uncertainty of measurement, it is not possible to provide a stated degree of accuracy. The inherent variability in test procedures, materials and methods of construction, and installation may lead to variations in performance between elements of similar construction.

The assessment can therefore only relate only to the actual prototype test specimens, testing conditions and methodology described in the supporting data, and does not imply any performance abilities of constructions of subsequent manufacture.

This assessment is based on information and experience available at the time of preparation. The published procedures for the conduct of tests and the assessment of test results are the subject of constant review and improvement and it is recommended that this report be reviewed on or, before, the stated expiry date.

The information contained in this report shall not be used for the assessment of variations other than those stated in the conclusions above. The assessment is valid provided no modifications are made to the systems detailed in this report. All details of construction should be consistent with the requirements stated in the relevant test reports and all referenced documents.

9 AUTHORITY

9.1 APPLICANT UNDERTAKINGS AND CONDITIONS OF USE

By using this report as evidence of compliance or performance, the applicant(s) confirms that:

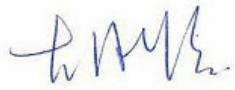
- to their knowledge the component or element of structure, which is the subject of this assessment, has not been subjected to a fire test to the Standard against which this assessment is being made, and
- they agree to withdraw this assessment from circulation should the component or element of structure be the subject of a fire test by a test authority in accordance with the Standard against which this assessment is being made and the results are not in agreement with this assessment, and
- they are not aware of any information that could adversely affect the conclusions of this assessment and if they subsequently become aware of any such information, agree to ask the assessing authority to withdraw the assessment.

9.2 GENERAL CONDITIONS OF USE

This report may only be reproduced in full without modifications by the report sponsor. Copies, extracts or abridgments of this report in any form shall not be published by other organisations or individuals without the permission of Exova Warringtonfire Aus Pty Ltd.

9.3 AUTHORISATION ON BEHALF OF EXOVA WARRINGTONFIRE AUS PTY LTD

Prepared by:



S. Hu

Reviewed by:

K. Nicholls

9.4 DATE OF ISSUE

29/07/2015

9.5 EXPIRY DATE

31/07/2020

APPENDIX A - SUMMARY OF SUPPORTING DATA

A.1 TEST REPORT – EWFA 2848400.1

A.1.1 Test Sponsor

A.1.1.1 Speedpanel Vic, Pty. Ltd., 89-91 Canterbury Road, Kilsyth, Vic 3137.

A.1.2 Test Laboratory

A.1.2.1 Bodycote Warringtonfire Aus Pty Ltd, Unit 2, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.

A.1.3 Test Date

A.1.3.1 The test was conducted on 19th July 2013.

A.1.4 Test standard prescribed

A.1.4.1 The test was conducted in accordance with AS 1530.4-2005 Sections 2 & 3.

A.1.5 Variations to Test Standard

A.1.5.1 The percentage deviation in the area of the curve of the average temperature recorded by furnace thermocouples exceeded limits prescribed in AS1530.4-2005 Clause 2.10.2.2 between 147 and 157 minutes.

A.1.6 Description of Tested Assembly

A.1.6.1 The tested configuration incorporated 78mm thick Speedpanel panels horizontally orientated to form a ceiling system with 3000mm long Z-purlin supporting the ceiling system at mid-span. A 3000mm wide x 400mm high Speedpanel wall was installed on the west edge of the ceiling system simulating wall-ceiling interface. The panels incorporate a 'tongue and groove' detail on their edges.

A.1.7 Instrumentation

A.1.7.1 The test instrumentation was in accordance with AS 1530.4-2005.

A.1.8 Results

A.1.8.1 The test was terminated at 180 minutes.

A.1.8.2 The ambient temperature at the start of the test was 19℃ and varied between 19℃ and 23℃ during the test.

A.1.8.3 The performance of the unloaded ceiling system is summarised below:

Criteria		Result	Location
Structural Adequacy	Panels between supports	140 minutes	121mm of deflection at the west mid-span of double fixed panels
	Z-purlin	143 minutes	85mm and 165mm of deflection at mid-span of support at 140 minutes and 150 minutes respectively. The failure time represent a linear interpolation between those two datum points
Integrity		105 minutes	Flaming for greater than 10 seconds on 4th joint from South edge at West end (≈ 150mm from end wall.
Insulation	Edge Tracks	54 minutes	Temperature recorded on Mid-span (East) of the North free edge exceeded the initial temperature by more than 180K
	Panels	121 minutes	Temperature recorded on North east quarter point exceeded the initial temperature by more than 180℃.

A.2 TEST REPORT – EWFA 2848300.2

A.2.1 Test Sponsor

A.2.1.1 Speedpanel Vic, Pty. Ltd., 89-91 Canterbury Road, Kilsyth, Vic 3137.

A.2.2 Test Laboratory

A.2.2.1 Exova Warringtonfire Aus Pty Ltd, Unit 2, 409-411 Hammond Road, Dandenong, VIC 3175.

A.2.3 Test Date

A.2.3.1 The test was conducted on 29th May 2013

A.2.4 Test standard prescribed

A.2.4.1 The test was stated to be conducted in accordance with AS 1530.4-2005

A.2.5 Variations to Test Standard

A.2.5.1 None.

A.2.6 Description of Tested Assembly

A.2.6.1 The test assembly comprised a nominal 3000mm wide × 3000mm high × 64mm thick Speedpanel wall system.

A.2.6.2 The tested configuration incorporated 64mm thick Speedpanel panels vertically orientated to form a vertical wall system with 0.75mm BMT perimeter track. The panels incorporate a 'tongue and groove' detail on their vertical edges.

A.2.6.3 The side and bottom tracks were made of 67mm wide × 51mm deep × 0.8mm galvanised steel track.

A.2.6.4 Flat top self-drilling, zinc coated steel screws, 10g × 16mm fixed the side tracks to the panels at 500mm centres on exposed and unexposed side.

A.2.6.5 Flat top self-drilling, zinc coated steel screws, 10g × 30mm, fixed the head and bottom tracks to the panels at every second panel join on both exposed and unexposed sides. Head fixings were staggered.

A.2.6.6 Flat top self-drilling, zinc coated steel screws, 10g × 16mm used to fix panels to each other at every second panel join at 1500mm height from bottom on both exposed and unexposed sides.

A.2.6.7 These fixings were staggered such that one join had one screw fixing at 1500mm height.

A.2.6.8 Hilti CP 606 Fire resistant joint filler (now marked as Hilti CP 606 Flexible firestop sealant) applied to the joints between the panel and the C-track at head, base and vertical edges on both exposed and unexposed sides and also applied to joints between tracks and surround block work along head, base and fixed edges.

A.2.7 Instrumentation

A.2.7.1 The test instrumentation was stated to be in accordance with AS 1530.4-2005.

A.2.8 Results

A.2.8.1 The test was terminated at 181 minutes.

A.2.8.2 The ambient temperature at the start of the test was 18oC and did not vary significantly throughout the duration of the test.

Head and Side Track Performance

Criteria	Result	Location
Structural Adequacy	Not applicable	Not applicable
Integrity	133 minutes	Sustained flaming at base track
Insulation	14 minutes	The maximum temperature measured at the head track of the specimen in line with join exceeded the maximum temperature rise of 180K.

Wall Panel Performance

Criteria	Result	Location
Structural Adequacy	Not applicable	Not applicable
Integrity	No failure	Not applicable
Insulation	93 minutes	The maximum temperature measured at 15mm from a vertical join exceeded the maximum temperature rise of 180K.

A.3 TEST REPORT – BWA 2257600

A.3.1 Report Sponsor

A.3.1.1 Speedpanel VIC Pty Ltd, 89-91 Canterbury Road, Kilsyth VIC 3137.

A.3.2 Test Laboratory

A.3.2.1 Bodycote Warringtonfire (Aus) Pty. Ltd., 409-411 Hammond Rd, Dandenong, VIC- 3175

A.3.3 Test Date

A.3.3.1 The test was conducted in 6th March 2008.

A.3.4 Test standard

A.3.4.1 The test was conducted in general accordance with AS AS1530.4-1997 Sections 2 & 3.

A.3.5 Description of Tested Assembly

A.3.5.1 The test assembly comprised a nominal 3000mm wide × 3000mm high × 78mm thick non-load bearing panel wall comprised horizontally orientated Speedpanel panels to form a vertical wall. The panels incorporate a “tongue and groove” detail on their horizontal edges. The panels were supported at their ends on vertical edges. The top and bottom edges are unrestrained. At the top there was nominal 25mm clearance to the concrete block surround, with a nominal 80mm clearance to the steel restraint frame at the bottom.

A.3.5.2 The panels were fixed by 83mm wide × 54mm high × 1.19mm thick steel C-tracks on the vertical edges at every second panel join (500mm centres) on both exposed and unexposed sides with 35mm long self-tapping screws. The wall consisted of a number of different installation details.

A.3.5.3 Top and bottom C-track was not fixed to concrete block surround. Both the top and bottom panels were fixed to the top and bottom C-track at 450mm centres with 35mm long self-tapping screws.

A.3.5.4 The first horizontal panel joint from the bottom was fixed at 250mm centres with 35mm long self-tapping screws. The second horizontal panel joint from the bottom was fixed at 500mm centres with 35mm long self-tapping screws. No other fixings were applied to any other joints on either face of the panels.

A.3.6 Instrumentation

A.3.6.1 The instrumentation was provided in accordance with AS 1530.4- 1997 Sections 2 & 3.

A.3.7 Test results

A.3.7.1 The ambient temperature at the start of the test was 29°C and varied between 29°C and 30°C during the test.

A.3.7.2 The test was terminated after 242 minutes.

A.3.7.3 The specimen achieved the following performance when tested in general accordance with AS1530.4-1997 Section 2 & 3.

Results of Panel	
Criteria	**Performance**
Integrity	128 minutes, flaming of cotton pad in the upper half of the wall
Insulation on Panel	117 minutes, temperature measured at 15mm below a horizontal join in the upper half of the wall exceeded initial temperature of 180K rise.
Results of Perimeter	
Criteria	**Performance**
Integrity	No failure at 242 minutes
Insulation	23 minutes, temperature measured on the east edge at the section where there was only sealant on the unexposed side.

A.3.7.4 The upper west C-track which had sealant to both side failed insulation criteria at 43 minutes.

A.3.7.5 The upper east C-track had sealant to both sides and intumescent paint to inner area of C-track failed insulation criteria at 101 minute.

A.3.7.6 The middle-east C-track had sealant to unexposed side failed insulation criteria at 70 minutes.

A.3.7.7 The lower west C-track had sealant to unexposed side failed insulation criteria at 114 minutes.

A.3.7.8 The mid-span deflection at 120 minutes was 140mm.

A.4 TEST REPORT – BWA 2286900.5

A.4.1 Test Sponsor

A.4.1.1 Speedpanel Vic, Pty. Ltd., 89-91 Canterbury Road, Kilsyth, Vic 3137.

A.4.2 Test Laboratory

A.4.2.1 Bodycote Warringtonfire Aus Pty Ltd, Unit 2, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.

A.4.3 Test Date

A.4.3.1 The test was conducted on 18th August 2008.

A.4.4 Test standard prescribed

A.4.4.1 The test was conducted in accordance with AS 1530.4-2005 Sections 2 & 3.

A.4.5 Variations to Test Standard

A.4.5.1 None

A.4.6 Description of Tested Assembly

A.4.6.1 The test specimen comprised a nominal 2790mm wide x 3000mm high x 78mm thick loadbearing wall made of vertically oriented 78mm thick Speedpanel panels that incorporated a “tongue and groove” detail on their vertical edges. The panels were made from 0.42mm galvanized mild steel.

A.4.6.2 The perimeter framing comprised 83mm wide x 58mm high x 1.2mm thick steel C-tracks on the top and bottom of the wall system. The end cap on the west side was 50mm wide x 59mm high x 0.6mm thick and the C-track and on the east side was 17mm wide x 60mm high x 0.6mm thick.

A.4.6.3 The panels were fixed to the top and bottom C-tracks at nominal 250mm centres and fixed to each other along the horizontal centreline on both exposed and unexposed sides with 15mm long self-tapping screws.

A.4.6.4 Fire rated acrylic sealant was used to seal any gaps in the construction prior to testing.

A.4.6.5 The wall was loaded from the base of the wall at six points, at 500mm centres. The average load that was applied at each point for the duration of the test was approximately 2.0kN per load point (4.3kN/m).

A.4.7 Instrumentation

A.4.7.1 The test instrumentation was in accordance with AS 1530.4-2005.

A.4.8 Conditioning

A.4.8.1 The test load was applied to the wall for 15 minutes prior to the commencement of the fire resistance test.

A.4.9 Results

A.4.9.1 The test was terminated at 144 minutes.

A.4.9.2 The ambient temperature at the start of the test was 29℃ and varied between 29℃ and 30℃ during the test.

A.4.9.3 The deflection of the free edge was 60mm at 120 minutes

A.4.9.4 The specimen achieved the following performance:

Criteria	Performance
Structural adequacy	144 minutes
Integrity	120 minutes Ignition of sealant at interface of top C-track and panel initiated failure of specimen by sustained flaming for longer than 10 seconds.
Insulation (Wall System)	64 minutes Maximum temperature on top C-track (T/C B6) exceeded 180 K above the initial temperature.
Insulation (Panel only)	80 minutes Maximum temperature 15 mm from the edge of a vertical joint (T/C B8) exceeded 180 K above the initial temperature.

A.5 TEST REPORT – EWFA 2741700.1

A.5.1 Test Sponsor

A.5.1.1 Speedpanel Vic, Pty. Ltd., 89-91 Canterbury Road, Kilsyth, Vic 3137.

A.5.2 Test Laboratory

A.5.2.1 Exova Warringtonfire Aus Pty Ltd, Unit 2, 409-411 Hammond Road, Dandenong, VIC 3175.

A.5.3 Test Date

A.5.3.1 The test was conducted on 20th July 2012.

A.5.4 Test standard prescribed

A.5.4.1 The test was stated to be conducted in accordance with AS 1530.4-2005

A.5.5 Variations to Test Standard

A.5.5.1 None

A.5.6 Description of Tested Assembly

A.5.6.1 The test assembly comprised a nominal 2950mm wide × 3000mm high × 78mm thick non-loadbearing wall system made of vertically orientated 285mm × 78mm thick Speedpanel panels incorporated a " tongue and groove" detail on their vertical edges. The specimen was tested unloaded and with free vertical edges. The wall incorporated two Pyropanel FR Maxi doors, both opening inwards towards the furnace. The panels were made from an aerated concrete core encased in a 0.4mm BMT galvanised steel skin.

A.5.6.2 The test assembly was asymmetric that the head details varied from the East side to the West side. Fire rated sealant was applied in the 20mm gap between top C-track and wall panels. The five tested head track protecting options are summarised below:

- Option 1: Flashing installed on the exposed side only. (Temperatures recorded by T/C 121 and 122 on the unexposed side.)
- Option 2: One layer of 13mm thick × 120mm deep CSR Fyrchek plasterboard on the unexposed side only. (Temperatures recorded by T/C 123 and 124 on the unexposed side.)
- Option 3: One layer of 13mm thick × 120mm deep CSR Fyrchek plasterboard on each side of the head tracks. (Temperatures recorded by T/C 125 and 126 on the unexposed side.)
- Option 4: Flashing installed on the unexposed side only. (Temperature recorded by T/C 127 and 128 on the unexposed side.)
- Option 5: One layer of 13mm thick × 120mm deep CSR Fyrchek plasterboard on the exposed side only. (Temperatures recorded by T/C 129 and 130 on the unexposed side.)

A.5.6.3 The perimeter framing comprised head and bottom tracks made of 82mm deep × 50mm high × 1.2mm thick galvanised steel C-tracks and side tracks made of 82mm deep × 50mm high × 0.5mm thick galvanised steel C-tracks.

A.5.6.4 The panels were fixed to the top and bottom C-tracks at nominal 400mm centres and fixed to each other at 500mm centres on both exposed and unexposed side with 16mm long flat top self-drilling, zinc coated steel screws.

A.5.6.5 Fire rated acrylic sealant was used to seal any gaps in the construction prior to testing.

A.5.6.6 Details of the doors are not relevant to this assessment report.

A.5.7 Instrumentation

A.5.7.1 The test instrumentation was stated to be in accordance with AS 1530.4-2005.

A.5.8 Results

A.5.8.1 The test was terminated at 132 minutes.

A.5.8.2 The ambient temperature at the start of the test was 17oC and varied between 17℃ and 19℃ during the test.

A.5.8.3 The maximum temperature recorded on the unexposed side of head C-track protected by the flashing cap fixed on the exposed side at 120 minutes was 177℃.

A.5.8.4 The maximum temperature recorded on the unexposed side of head C-track protected by one layer of 13mm thick CSR Fyrchek plasterboard fixed on the fire side at 120 minutes was 154℃

A.5.8.5 The maximum temperature recorded on the unexposed side of head C-track protected by one layer of 13mm thick CSR Fyrchek plasterboard fixed on both sides at 120 minutes was 163℃.

A.5.8.6 The maximum temperature recorded on the unexposed side of head C-track protected by one layer of 13mm thick CSR Fyrchek plasterboard fixed on the non-fire side at 120 minutes was 145℃.

A.5.8.7 The maximum temperature recorded on the unexposed side of head C-track protected by flashing cap fixed on the non-fire side at 120 minutes was 177℃.

A.6 TEST REPORT – FAR 3754

A.6.1 Test Sponsor

A.6.1.1 Speedwall New Zealand Ltd, 78 Maui Street, Te Rapa Hamilton, New Zealand.

A.6.2 Test Laboratory

A.6.2.1 BRANZ Limited, Moonshire Road, Judgeford, Private Bag 50908, Porirua City, New Zealand.

A.6.3 Test Date

A.6.3.1 The test was conducted on 17th May 2006.

A.6.4 Test standard prescribed

A.6.4.1 The test was conducted in accordance with AS 1530.4-1997 Sections 2 & 3.

A.6.5 Variations to Test Standard

A.6.5.1 None

A.6.6 Description of Tested Assembly

A.6.6.1 The test specimen consisted of a non-loadbearing Speedwall® panel wall 3000mm high by 3000mm wide. The wall comprised eleven interlocking panels (tongue and groove), each 285mm wide × 76mm thick × 2900mm high and one interlocking panel 250mm wide.

A.6.6.2 The panels consisted of a light weight concrete core with 0.44mm thick galvanised steel sheathing to form a 76mm thick panel.

A.6.6.3 The 64mm × 55mm × 1.15mm thick steel angles were fixed to the top, base and left hand perimeter edges of the wall with bolts at 500mm centres. The angels were sealed to the specimen frame and the panels with Bostik Firecaulk fire rated acrylic sealant.

A.6.6.4 The panel were fixed together and to the angles with Hilti DB7 6mm diameter fasteners. The panels were fixed to the angles at the top and base at each end of the panel on each face. Along the left hand vertical edge the panel was fixed to the angle at 400-450mm centres. Each panel was fixed to the nest at 1000mm centres.

A.6.6.5 A 10mm expansion gap was provided between the top edge of the panels and the specimen frame, and filled with a bead of sealant. A second set of angles were screws fixed to the unexposed face of the panels at the top, base and left hand side with Hilti DB7 fasteners at 400-450mm centres and a bead of sealant, and to the specimen frame at 500m centres and a bead of sealant.

A.6.7 Instrumentation

A.6.7.1 The test instrumentation was in accordance with AS 1530.4-1997.

A.6.8 Results

A.6.8.1 The test was terminated at 245 minutes.

A.6.8.2 The ambient temperature at the start of the test was 16°C.

A.6.8.3 The specimen achieved the following performance:

Criteria	Performance
Integrity	No failure at 245 minutes
Insulation (Wall System)	123 minutes, the maximum temperature rise measured by any of the thermocouples exceeded the failure criterion of 180K on the left hand side of the top edge channel.

APPENDIX B - ASSESSMENT OF SPECIFIC VARIATIONS

B.1 PERFORMANCE OF HORIZONTAL SPEEDPANEL CEILING ELEMENT

B.1.1 Proposed Construction

B.1.1.1 The proposed construction shall be horizontal orientated 78mm thick Speedpanel ceiling system as tested in EWFA 2848400.1 with consideration of the following variations:

- Modify support detail and fix two layers of 16mm thick fire grade plasterboard directly to the underside or top side of Speedpanel. The fixing spacing shall be as per the maximum spacing of a previous tested or assessed plasterboard ceiling systems that achieves an FRL of 90/90/90/ the maximum span of the ceiling shall be 3m and the ceiling shall be non-trafficable and support its own weight only.
- Modify support detail and fixed a layer of corrugated steel sheeting to the top surface of the ceiling system. The maximum span of the ceiling shall be 3m and the ceiling shall be non-trafficable and support its own weight only.
- Include concrete wall, protected steel structure or vertical 78mm Speedpanel as support options.
- Refer to figures *1-5 and 10-23*

B.1.1.2 The proposed construction comprises a horizontal panel element, support connection and support construction. This section of the assessment discusses the performance of the horizontal panel element and the support connection. The support construction is discussed in section B2 and B3.

B.1.1.3 The horizontal element in non-trafficable and assessed for self-weight of the panels and linings.

B.1.2 Discussion

Panel Remote from Supports - Structural Adequacy and Integrity

Exposed to Fire from the Below Figures 1-4

B.1.2.1 The proposed construction in figures 1-5 and 10-23 comprises an unloaded 78mm thick horizontally orientated Speedpanel ceiling, 3m wide and supported at the ends by various connection methods including concrete wall, protected steel structure or vertically orientated 78mm Speedpanel

B.1.2.2 The tested specimen in test EWFA 2848400.1 comprised a tested unloaded 78mm thick Speedpanel panels formed a ceiling system with 3000mm long Z-purlin supporting the ceiling system at mid-span (2m wide each side of z-purlin). The west mid-span panel joints were fixed on both fire side and non-fire side at 500mm centres whereas the east mid-span panels joints were fixed on fire side only at 500mm centres.

B.1.2.3 When tested, the ceiling system failed structural adequacy at 140 minutes in accordance with AS1530.4-2005 Clause 2.12.1(b). The deflection recorded at the centre of west mid-span of double fixed panels at 120 minutes was 58mm. The system achieved an integrity performance of 105 minutes when flaming occurred for greater than 10 seconds on panel joints.

B.1.2.4 The proposed ceiling span is 3m wide and is wider than that tested in EWFA 2848400.1. The thermally driven deflection can conservatively be estimated as being proportional to the overall thickness of the panel if the surfaces reach the same temperature.

B.1.2.5 Based on a calculation the deflection measured in EWFA 2448400.1, the expected deflection at mid-span of a 3000mm wide and 3000mm long Speedpanel ceiling span made of 78mm thick panels could be 131mm at 120 minutes.

B.1.2.6 The expected deflection at mid-span of 3000mm wide Speedpanel ceiling made of 78mm thick panel is less than the critical deflection for laterally loaded element calculated in accordance with AS1530.4-2005 Clause 2.12.1(b).

B.1.2.7 The proposed construction in figures 12 to 17 and 20 to 23 comprises two layers of 16mm thick fire grade plasterboard lining or two layers of 16mm thick plasterboard strips fixed to the underside or topside of Speedpanel ceiling panels.

B.1.2.8 The two layers of 16mm fire grade plasterboard linings/strips are considered both reasonable and conservative to remain in place for at least 15 to 20 minutes and to maintain a temperature differential of at least 100℃ to 200℃.

B.1.2.9 The Speedpanel panels above the two layers of 16mm thick fire grade plasterboard is therefore not directly exposed to the fire for at least 15 to 20 minutes and accordingly will be much cooler and the integrity of the Speedpanel panels will be maintained for a loner period. It is expected that is exposure time is decreased the deflection will also be reduced. Hence it tendency of gap formation at panel joints will be reduced albeit while the Speedpanel support slightly higher dead load of the plasterboard.

B.1.2.10 The proposed construction in 10, 11, 17 and 19 comprises corrugated steel sheeting which is fixed to middle of each Speedpanel panel at nominal 250mm centres and as such an improvement in the stability and tightness of the joints is expected. The improvement on the joint stability is likely to prevent the local hot spots occurring until later in the test and this adds confidence that the proposed panel would maintain integrity performance for up to 120 minutes.

B.1.2.11 Based on the above demonstration of sufficient residual bending capacity and likely construction of the fire grade plasterboard lining to protect and prolong the performance of the Speedpanel ceiling panels it is considered the proposed construction will maintain structural adequacy and integrity performance for 120 minutes without any foreseeable weaknesses if tested in accordance with AS1530.4-2005.

Exposed to Fire from the Above Figures 1-3 and 5

B.1.2.12 It is considered if the proposed construction exposed to fire from the above, the panel will deflect towards to the heating and hence it is likely to deflect less due to the own weight.

B.1.2.13 It is therefore expected the performance of proposed horizontal ceiling span would behave similarly if not slightly better than if exposed to fire from below.

B.1.2.14 Based on the above, it is considered the proposed construction will maintain structural adequacy and integrity performance of 120 minutes if exposed to fire from the above if tested in accordance with AS1530.4-2005.

Panel Remote from Supports - Insulation Performance

B.1.2.15 With reference to test EWFA 2848400.1, the maximum temperature measured on the unexposed side of horizontal orientated Speedpanel ceiling panel was 194℃ at 120 minutes is less than permitted temperature rise of 180K.

B.1.2.16 The presence of additional layers of fire grade plasterboard strips or corrugated steel sheeting add confidence to the proposal that the temperature on the unexposed side will be much cooler than that tested in EWFA 2848400.1.

B.1.2.17 Based on the above, it is considered the proposed construction will maintain insulation performance for 120 minutes if tested in accordance with AS1530.4-2005.

Support Connection - Structural Adequacy and Integrity Performance

B.1.2.18 The proposed horizontally orientated Speedpanel ceiling system is supported by concrete, masonry wall protected steel structure or vertically or horizontally orientated 78mm thick Speedpanel wall.

B.1.2.19 With reference to test EWFA 2848400.1, the tested specimen comprised a 3000mm wide and 400mm high Speedpanel wall which was installed on one edge side of the ceiling system. This detail somewhat simulates the wall-ceiling interface of figures 10-23.

B.1.2.20 50mm x 50mm x 1.2mm steel angles used to fix the ceiling panels to the Speedpanel wall and fixed to vertical panels at every joint with 10g x 30mm SDS screws.

B.1.2.21 When tested, the tested wall-ceiling interface maintained structural adequacy and integrity performance for at least 120 minutes without introduce any foreseeable weaknesses.

B.1.2.22 The proposed connection detail for protection the fire side comprises two layers of 16mm thick strops of fire grade plasterboard fixed at 250mm centres. Additional steel angle of 50mm x

50mm x 1.2mm thick in size is proposed either between C-track and two layers of fire grade plasterboard or adjacent to the plasterboard strips and fixed into surround by 10 gauge x 30mm SDS screws at 250mm centres in a similar manner for the C-track.

B.1.2.23 It is considered if the proposed construction was exposed from the two layers of 16mm thick fire grade plasterboard side at least one layer of plasterboard would remain in place to protect the C-track at 120 minutes.

B.1.2.24 Further confidence in both layers being retained is offered by the proposed steel angle which will act to prevent detachment of plasterboard.

B.1.2.25 With reference to test EWFA 2848400.1, the maximum temperature measured at wall-ceiling interface was 341℃ at 120 minutes and the maximum temperature measured on the unexposed side of panel was 194℃ at 120 minutes.

B.1.2.26 Based on the above discussion, it is considered the proposed connection detail will maintain the structural capacity of the side track connection for a period of 120 minutes thereby allowing it to provide lateral support of the ceiling.

B.1.2.27 Based on the above, it is considered Based on the above, it is considered the proposed support options for Speedpanel configurations will maintain structural adequacy and integrity performance up to 120 minutes if exposed from either the above or the below.

Support Connection - *Insulation Performance*

B.1.2.28 With reference to test EWFA 2848400.1, the maximum temperature measured at wall-ceiling interface was 341℃ at 120 minutes.

B.1.2.29 The proposed connection detail for protection the fire side comprises two layers of 16mm thick strops of fire grade plasterboard fixed at 250mm centres. Additional steel angle of 50mm x 50mm x 1.2mm thick in size is proposed either between C-track and two layers of fire grade plasterboard or adjacent to the plasterboard strips and fixed into surround by 10 gauge x 30mm SDS screws at 250mm centres in a similar manner for the C-track.

B.1.2.30 It is considered if the proposed construction was exposed from the two layers of 16mm thick fire grade plasterboard side at least one layer of plasterboard would remain in place to protect the C-track at 120 minutes.

B.1.2.31 Further confidence in both layers being retained is offered by the proposed steel angle which will act to prevent detachment of plasterboard.

B.1.2.32 With reference to test EWFA 2848400.1, the maximum temperature measured at wall-ceiling interface was 341℃ at 120 minutes and the maximum temperature measured on the unexposed side of panel was 194℃ at 120 minutes.

B.1.2.33 Based on the above discussion it is expected the temperature on the unexposed side of construction will be less than 180K rise at 120 minutes.

B.1.2.34 Based on the above, it is considered the proposed end joint will not introduce any detrimental effect on the insulation performance for at least 120 minutes.

B.2 PERFORMANCE OF VERTICAL SPEEDPANEL WALL ELEMENT

B.2.1 Proposal

B.2.1.1 The proposed construction is made 78mm thick vertically orientated Speedpanel as tested in BWA2286900.5 with consideration given to the following variations:

- Walls shall be up to 6m high and the general arrangements are shown in figure 1 and 3.
- Walls shall be up to 4.5m high and the general arrangement is shown in figure 2.
- Walls shall be supported by concrete floor construction at the base of the wall.
- Head details shall be as shown in figures 28 and 29.
- Wall edge details shall be as shown in figures 30 to 35.
- Wall base details shall be as shown in figures 36 and 37.

B.2.1.2 The proposed vertical Speedpanel element is a loadbearing element that vertically supports the weight of the non-trafficable horizontal ceiling elements in as shown in figure 1-3.

B.2.2 Discussion

Structural Adequacy and Integrity Performance

Vertical Speedpanel Wall Arrangement Figure 1, 2 and 3

B.2.2.1 The important aspect of structural adequacy and integrity performance of walls supporting ceiling span is the potential for greater bending stress in the vertical support wall.

B.2.2.2 The bending stress in the vertical Speedpanel wall element during the fire exposure is a combination of the thermally driven deflection in addition to the load driven p-Delta effect that amplify lateral deflection after they become apparent.

B.2.2.3 Upon inspection the proposed vertical Speedpanel wall in figure 1, 2 and 3, it is noted the worst scenario is as per figure 1 and 3 that the weight of horizontal Speedpanel ceiling span and the vertical Speedpanel wall section above the ceiling are likely to amplify the bending moment of the vertical Speedpanel wall section below the ceiling span.

B.2.2.4 The wall system tested in BWA 2286900.5 comprised 78mm thick panels that were tested in a loadbearing configuration 3110mm high and supporting 4.3KN/m reasonably evenly distributed along the lower edge of the wall at 6 locations.

B.2.2.5 When tested, the 78mm vertical Speedpanel wall maintain structural adequacy of 144 minutes and integrity performance of 120 minutes when ignition of sealant at interface of top track and panel initiated failure by sustained flaming for longer than 10 seconds. The measured lateral deflection was approximately 180mm after 120 minutes and increased marginally at 144 minutes.

B.2.2.6 The ultimate moment capacity of wall tested in BWA 2286900.5 was calculated from the test at failure (at this case, at 120minutes when integrity failure occurred) and compared with that the proposed 4.5m high wall section applied with 1.5m high wall section above and 3m wide ceiling span supported.

B.2.2.7 When tested in BWA 2286900.5, it was verified the ultimate bending capacity of the panel was 0.62kN.m at 120 minutes.

B.2.2.8 The proposed vertical Speedpanel wall element is similar to that tested in BWA 2286900.5, the wall section below the ceiling is maximum 4500mm high and the wall section above the ceiling is maximum 1500mm high. A significant weight of wall section above the ceiling and 3m wide and 78mm thick horizontal Speedpanel ceiling element must be supported, which could be up to 0.71kN/m applied to the 4.5m high vertical Speedpanel wall section.

B.2.2.9 The vertical Speedpanel wall section below the ceiling is higher than that tested in BEW 2286900.5. The increase height will tend to increase the total deflection of the wall for the same thermal curvature. The thermally driven deflection can conservatively be estimated as being proportional to the overall thickness of the panel, if the surfaces reach the same temperature.

B.2.2.10 In this assessment a conservative approach has been applied to estimate a potential maximum deflection (most likely larger than the actual lateral deflection) and calculate the potential opening of the joints to separate in the transition zone at the end of the wall.

B.2.2.11 It is proposed the 4.5m wall with be at the same temperature as the 3m wall at 120 minutes therefore it is considered the reasonable to expect the wall to have the same or less curvature at 4.5m as at 3m when tested.

B.2.2.12 Based on this conservative approach for a notional lateral deflection at mid-height of a 4.5m high wall at the same curvature as the 3m high wall tested could be conservatively estimated as less than 413mm. This overall deflection of the wall will induce a tendency for the panel joints to open near support walls and will be used to determine there is sufficient overlap.

B.2.2.13 It is calculated the bending moment of the proposed 4.5m vertical Speedpanel wall section below the ceiling at 120 minutes is 0.53kN.m is 15% less than the ultimate bending moment capacity tested in BWA 2286900.5 at 120 minutes.

B.2.2.14 Based on a deflection of 413mm, the horizontal section through the wall from a vertical supported edge to the panel of maximum deflection say 2500mm away, the wall surface has a width 110mm greater than the original width.

B.2.2.15 The panel joints incorporate 20mm overlaps at 250mm centre over 2500mm from the edge to the panel of maximum deflection. It is considered that the 110mm increase in width, in the form of gaps, could be taken up by as little as 11mm gap at each joint. This would easily accommodate for the expected total gap width of 110mm.

B.2.2.16 Based on the above discussion, it is considered reasonable that the proposed construction would maintain integrity at the joint locations for a period of at least 120 minutes.

B.2.2.17 Additional confidence in the proposed construction is offered by the increased fixing spacing of the panel joins in the vicinity of wall junctions. This will have the added effect of making the joint gap opening more uniform.

B.2.2.18 Based on the above, it is considered the proposed vertical Speedpanel wall in figure 1, 2 and 3 will maintain structural adequacy and integrity performance for 120 minutes if tested in accordance with AS1530.4-2005.

Steel Angle Head Detail Figure 28 and 29

B.2.2.19 With reference to BWA 2286900, the maximum temperature measured on the unexposed side of head track of 78mm thick Speedpanel wall was around 317℃.

B.2.2.20 The proposed unexposed side steel angle is not directly exposed to the heat source and the 20mm gap between concrete lintel and Speedpanel panel is sealed with fire resistant sealant at one side. Steel flashing or 13mm thick fire grade plasterboard is protected at the one side.

B.2.2.21 It is therefore considered the temperature on the unexposed side steel angle would be much less than the cold side flange of C-tracks tested.

B.2.2.22 As discussed previously, it is confirmed the head details protected with either a steel flashing or a layer of 13mm thick fire grade plasterboard on either fire side or non-fire side, the maximum temperature of cold flange of C-track would remain below 180℃.

B.2.2.23 It is therefore considered the proposed steel angles head detail will maintain the structural capacity of the steel angle head connection for up to 120 minutes based on designs and thereby allowing to provide vertical some support the top of the wall. In addition, it is expected the temperature on the unexposed side steel angle would be less than 180℃ for up to 120 minutes based on designs.

Head Detail Figure 14 and 15

B.2.2.24 The head track detail for protection one side comprises two layers of 16mm thick strips of fire grade plasterboard. Optional Steel angle of 50mm × 50mm × 1.2mm thick in size is proposed adjacent to the plasterboard strip.

B.2.2.25 With reference to test BWA 2286900, the tested specimen comprised a Speedpanel wall using C-channels around the perimeter. Top C-track was fixed to the concrete block at nominal 450mm centres. When tested, the temperature recorded on the unexposed side of top C-track at 120 minutes was around 317℃.

B.2.2.26 Based on the above observations, it is considered if the proposed construction was exposed from the top C-track side, the temperature at the interface between C-track and two layers of

16mm thick plasterboard would be around 300℃ or less thereby maintaining the structural adequacy of the non-fire side of the track.

B.2.2.27 As discussed previously, The 16mm fire grade plasterboard is also considered both reasonable and conservative measure to maintain a temperature differential of at least 100℃ to 200℃ and keep the unexposed temperature rise below 180℃ at 120 minutes, thereby maintain the insulation performance of the detail.

B.2.2.28 It is also considered if the proposed construction was exposed from the two layers of 16mm thick fire grade plasterboard side at least one layer of plasterboard would remain in place to protect the top C-track at 120 minutes.

B.2.2.29 Further confidence in both layers being retained is offered by the proposed metal capping and angle which will act to prevent detachment of plasterboard.

B.2.2.30 With reference to the test BWA 2286900, the temperature of the unexposed side of top C-track at 120 minutes was around 317℃ and the maximum temperature of the unexposed side of Speedpanel wall panels was around 150℃ at 120 minutes.

B.2.2.31 Based on the above discussion, it is considered the proposed head detail will maintain the structural capacity of the head track connection for a period of 120 minutes thereby allowing it to provide vertical some support the top of the wall . In addition it is expected the temperature on the unexposed side of construction will be less than 180℃ at 120 minutes.

Insulation Performance

Panel Performance

B.2.2.32 The important aspect of insulation performance of walls of extended height is the potential for the joints and track connections to maintain their insulation performance

B.2.2.33 The wall system tested in BWA 2286900.5 comprised 78mm thick panels that were tested in a loadbearing configuration 3110mm high and supporting 4.3KN/m reasonably evenly distributed along the lower edge of the wall at 6 locations.

B.2.2.34 At 120 minutes, two of the unexposed face temperatures in the vicinity of joins had risen above 195^{o}C (rise of 180^{o}K) while others remained at 100^{o}C at the panel moisture was being driven off. The average and maximum unexposed temperature was 124^{o}C and 310^{o}C at 120 minutes. The temperature recorded on the unexposed side of top C-track at 120 minutes was around 317℃.

B.2.2.35 With reference to FR 3754, which comprised a 78mm Speedpanel system incorporating panel joints fixings at 1000mm centres. When tested it achieved an insulation performance of 123 minutes.

B.2.2.36 The wall system tested in BWA 2286900.5 comprised 78mm thick panels that were tested in a loadbearing configuration 3110mm high and supporting 4.3KN/m reasonably evenly distributed along the lower edge of the wall at 6 locations.

B.2.2.37 At 120 minutes, two of the unexposed face temperatures in the vicinity of joins had risen above 195^{o}C (rise of 180^{o}K) while others remained at 100^{o}C at the panel moisture was being driven off. The average and maximum unexposed temperature was 124^{o}C and 310^{o}C at 120 minutes. The temperature recorded on the unexposed side of top C-track at 120 minutes was around 317℃.

B.2.2.38 The proposed construction is to include screws into the panel joints at 1000mm centres similar to that tested in FR 3754 and as such an improvement in the stability and tightness of the joints is expected. The improvement on the joint stability is likely to prevent the local hot spots form occurring until later in the test and this adds confidence that the proposed panel fixing assisting the panel maintain an insulation performance of 120 minutes.

Based on the above, it is considered the proposed vertical Speedpanel wall is capable of maintaining insulation performance for a period of 120 minutes.

Alternate Base and Wall Edge Details Figure 30 to 37

B.2.2.39 The proposed base and wall edge details incorporate variation sealant location options are shown in figure 30 to 37.

B.2.2.40 The presence of the sealant between C-track flange and wall panel is expected prevent hot gases from the exposed side from freely passing through to the C-track, at least until the sealants fall away.

B.2.2.41 Wall edge details shown in Figure 30, 33 and 35 and base edge detail shown in Figure 32 are identical to the base details tested in EWFA 2741700.1. With reference to EWFA 2741700.1, there was no sign of impending insulation failure to be observed at the bottom track and of tested Speedpanel wall during the test duration.

B.2.2.42 With reference to side details tested in 2848300.2, which comprised 64mm Speedpanel, the side detail achieved an insulation performance of 137 minutes

B.2.2.43 The proposed wall edge and base details in Figure 31, 32, 34 and 36 comprised fire rated sealant filled within the cavity between the C-tracks and panels.

B.2.2.44 The presence of the sealant within cavity between the head C-track and panel is expected to significantly interrupt the steam from the panel core and the hot gases from exposed side to heat up the unexposed side flange of C-track.

B.2.2.45 In addition, the sealant located within the cavity is protected by the surrounding C-tracks and will stay in place longer.

B.2.2.46 Based on the above, it is considered that the difference between the proposed sealant location variation will not introduce any insulation weakness for at least 120 minutes,

B.2.2.47 Based on the above, it is considered the proposed construction is positively assessed for the insulation performance up to 120 minutes if tested in accordance with AS1530.4-2005.

B.3 PERFORMANCE OF HORIZONTAL SPEEDPANEL WALL ELEMENT

B.3.1 Proposal

B.3.1.1 The proposed construction is made 78mm thick horizontally orientated Speedpanel wall elements as tested in BWA 2257600 with consideration given to the following variations:

- Walls shall be up to 4.5m high and the general arrangements are shown in figure 4 and 5.
- Steel posts are installed at the ends of the 78mm horizontal Speedpanel wall for lateral support at maximum 4500mm centres.
- Walls shall be vertically supported by concrete floor construction at the base of the wall.
- Wall edge and junction details shall be as shown in figures 40 and 41.
- Wall base details shall be as shown in figures 42 and 43.

B.3.2 Discussion

Structural Adequacy and Integrity Performance

Horizontal Speedpanel Wall Arrangement Figures 4 and 5

B.3.2.1 The tested specimen in BWA 2257600 incorporated 78mm thick Speedpanel panels horizontally orientated to form a vertical wall. The panels were supported at their ends on the vertical edges of the assembly. The top and bottom of the specimen were unrestrained.

B.3.2.2 The panels were fixed by 83mm wide × 54mm high × 1.19mm thick steel C-tracks on the vertical edges at every second panel join (500mm centres) on both exposed and unexposed sides with 35mm long self-tapping screws. Both the top and bottom panels were fixed to the top and bottom C-track at 450mm centres with 35mm long self-tapping screws.

B.3.2.3 The first horizontal panel joint from the bottom was fixed at 250mm centres with 35mm long self-tapping screws. The second horizontal panel joint from the bottom was fixed at 500mm centres with 35mm long self-tapping screws. No other fixings were applied to any other joints on either face of the panels.

B.3.2.4 When tested, the panels remained together at the horizontal joints and deflected in unison for at least 120 minutes. The panel deflection at the centre of the wall was 135mm at 120 minutes.

B.3.2.5 In this assessment a conservative approach has been applied to estimate a potential maximum deflection (most likely larger than the actual lateral deflection) and calculate the potential opening of the joints to separate in the transition zone at the end of the wall.

B.3.2.6 It is proposed the 4.5m wall with be at the same temperature as the 3m wall at 120 minutes therefore it is considered the reasonable to expect the wall to have the same or less curvature at 4.5m as at 3m when tested.

B.3.2.7 The radius of curvature of the panels at a horizontal section through the wall is 16887mm. For a wall size 4500mm × 4500mm a similar or lower curvature is expected though the mid-span deflection expected at 120 minutes is 380mm. This overall deflection of the wall will induce a tendency for the panel joints to open near support walls and will be used to determine there is sufficient overlap.

B.3.2.8 The overlap between two horizontally orientated panels is 35mm wide at 250mm centres and it is considered that the 380mm increase in height, in the form of gaps, could be taken up by as little as 19mm at each horizontal joint. This would easily accommodate for the expected total gap width of 380mm.

B.3.2.9 Due to the horizontal orientation of the panel joins and panel support, the panels will tend to be propped from the base of the wall though will also be able to laterally deflect from the base, thereby reducing the difference in the deflection of the panels at the top of the wall from that of the bottom.

B.3.2.10 This reduction of difference in the deflection will further reduce the tendency for lateral instability of the panel wall. Additional confidence in the proposed panel size offered by the lack of any observed integrity or insulation weakness in the lowest horizontal panel.

B.3.2.11 Based on the above, it is considered that the proposed construction will not introduce significantly integrity weakness for up to 120 minutes if tested in accordance with AS1530.4-2005.

Perimeter Connection Details

B.3.2.12 The tested specimen in test EWFA 2736001.1 incorporated 78mm thick Speedpanel panels arranged to form a vertically orientated 1920mm high × 2970mm wide wall system positioned above a horizontal orientated 1040mm high × 3000mm wide wall system.

B.3.2.13 The 82mm wide × 50mm high × 1.15mm thick galvanised steel side C-tracks of the bottom horizontal section of the wall were fixed to perimeter block work using 6.5mm diameter × 50mm long, mushroom head, galvanised steel spikes at nominal 400mm centres. Horizontal panels were fixed to the side track at each side and at every second joint by using 10g × 16mm flat top self-drilling, zinc coated steel screws at 255mm and 755mm from the bottom of the specimen respectively. The weight of top vertically orientated Speedpanel wall was supported by the bottom horizontally orientated Speedpanel wall.

B.3.2.14 When tested, the bottom horizontally orientated Speedpanel wall maintained structural adequacy for 151 minutes the duration of the test. The specimen failed integrity at 98 minutes when flaming had become evident at head of vertically orientated Speedpanel wall. Upon inspection of test observation, the bottom horizontally orientated Speedpanel wall maintained integrity for 151 minutes with no sign of impending integrity failure during the duration of the test. The temperature measured on the C-track was around 350°C.

B.3.2.15 By inspection of the load path of the tested configuration, the key components govern the structural adequacy performance of tested support connection are summarised below:

Components	Tested Product	Fixing spacing
Fixing to horizontal panel on both exposed and unexposed side	10g × 16mm self-drilling screws	At 500mm centres
C-track capping	82mm × 50mm × 1.15BMT galvanised steel C-track	-

Fixing to surrounding concrete block	M6.5 × 50mm mushroom head, galvanised steel spikes	At 400mm centres

B.3.2.16 The capacity of each single fixing screw fixed to horizontal panel to support the tested wall weight up to 120 minutes has been calculated to be 87.6kg. In other words, the tested support connection is able to support 175.2kg horizontal Speedpanel panels per meter height without introduce any foreseeable weakness to the structural adequacy and integrity performance up to 120 minutes if tested in accordance with AS1530.4-2005.

Perimeter Detail Figure 40 and 41

B.3.2.17 The proposed perimeter connection detail connecting horizontal orientated wall to concrete wall or steel structure as shown in figure 40 and 41.

B.3.2.18 The ends of the horizontally orientated Speedpanel panels are cut square to fit between the intersecting walls up to 10mm clearance at each end. The gaps between side track and surrounding construction and between side track and horizontal orientated wall panels are sealed with fire rated sealant.

B.3.2.19 By inspection of the load path of the proposed support connection configuration, the key components govern the structural adequacy performance of proposed support connection are summarised below:

Components	Proposed Product	Fixing spacing
Fixing to horizontal panel on both exposed side and unexposed side	10g × 30mm self-drilling screws	At 250mm centres
C-track capping	82mm × 50mm × 1.15BMT galvanised steel C-track	-
Fixing to surrounding concrete block	M6.5 × 50mm mushroom head, galvanised steel spikes	At 400mm centres

B.3.2.20 The proposed connection detail in Figure 40 is similar to that tested in EWFA 2736001.1 and the fixing spacing for fixing C-track to horizontal panel is reduce to 250mm centres.

B.3.2.21 By inspection of the load path of the proposed construction in Figure 40, the weight of 4.5m wide panel carried by the connection detail in Figure 40 is 105kg per meter high.

B.3.2.22 The proposed horizontal Speedpanel wall element also supports 3m wide Speedpanel ceiling span as shown in figures 4 and 5.

B.3.2.23 It is calculated the additional weight carried by the connection detail contributed by the 3m wide Speedpanel ceiling span is 31.5kg per meter high. Hence the total weight carried is 136.5kg per meter high.

B.3.2.24 As discussed previously, the tested support connection is able to support 175.2kg per meter height without introduce any foreseeable weakness to the structural adequacy performance up to 120 minutes.

B.3.2.25 Based on the above, it is expected the proposed connection detail in Figure 40 will maintain structural adequacy for 120 minutes if tested in accordance with AS1530.4-2005.

Integrity of Head Details

B.3.2.26 The proposed head detail is shown in figure 38 and 39.

B.3.2.27 The tested assembly in test EWFA 2741700 comprised 78mm thick vertically orientated Speedpanel panel wall incorporating two doorsets. The standard 82mm deep × 1.2mm BMT head C-track of Speedpanel wall was protected by a flashing cap or 13mm thick × 120mm deep fire grade plasterboard strip protected at either fire exposed side or unexposed side.

B.3.2.28 The proposed head C –track is similar to that tested in EWFA 2741700 except there is no fire rated sealant is filled in the gap between head track and wall panels. When tested both head details achieved an integrity performance of 132 minutes.

B.3.2.29 Based on the above, it is considered the proposed construction is capable of maintaining integrity performance for a period of 120 minutes.

Integrity of Base Details

B.3.2.30 The proposed base and wall edge details are shown in figure 42 and 43.

B.3.2.31 For the proposed details the presence of the sealant between C-track flange and wall panel is expected prevent hot gases from the exposed side from freely passing through to the C-track, at least until the sealants fall away.

B.3.2.32 Wall base details shown in figures 42 and 43 are similar to the wall side detail tested in EWFA 2848300.2, which comprised 64mm thick Speedpanel panels. When tested the side detail achieved an integrity performance of 181 minutes.

B.3.2.33 The presence of the sealant within cavity between the head C-track and panel is expected to significantly interrupt the steam from the panel core and the hot gases from exposed side to heat up the unexposed side flange of C-track.

B.3.2.34 In addition, the sealant located within the cavity is protected by the surrounding C-tracks and will stay in place longer.

B.3.2.35 Based on the above, it is considered that the difference between the proposed connections will not introduce any integrity weakness for at least 120 minutes when applied to 78mm thick panels.

Insulation Performance

B.3.2.36 The important aspect of insulation performance of walls of extended height is the potential for the joints and track connections to maintain their insulation performance

B.3.2.37 The wall system tested in BWA 2286900.5 comprised 78mm thick panels that were tested in a loadbearing configuration 3110mm high and supporting 4.3KN/m reasonably evenly distributed along the lower edge of the wall at 6 locations.

B.3.2.38 At 120 minutes, two of the unexposed face temperatures in the vicinity of joins had risen above 195℃ (rise of 180℃) while others remained at 100℃ at the panel moisture was being driven off. The average and maximum unexposed temperature was 124℃ and 310℃ at 120 minutes. The temperature recorded on the unexposed side of top C-track at 120 minutes was around 317℃.

B.3.2.39 With reference to FR 3754, which comprised a 78mm Speedpanel system that incorporated panel joints fixings of 1000mm centres and achieved an insulation performance of 123 minutes.

B.3.2.40 With reference to EWFA 2257600, which comprised a 78mm Speedpanel wall with panels orientated horizontally orientated and no screws were fixed into panel joints. The insulation performance of the panel was 117 minutes remote from the perimeter before a hot spot developed on panel joint in the middle of the wall.

B.3.2.41 The proposed construction is to include screws into the panel joints at 1000mm centres similar to that tested in FR 3754 and as such an improvement in the stability and tightness of the joints is expected. The improvement on the joint stability is likely to prevent the local hot spots form occurring until later in the test and this adds confidence that the proposed panel fixing assisting the panel maintain an insulation performance of 120 minutes.

B.3.2.42 Based on the above, it is considered the proposed wall panel construction in figure 1 capable of maintaining insulation performance for a period of 120 minutes.

Insulation Performance of Head Detail Figure 38 and 39

B.3.2.43 The tested assembly in test EWFA 2741700 comprised 78mm thick vertically orientated Speedpanel panel wall incorporating two doorsets. The standard 82mm deep × 1.2mm BMT head C-track of Speedpanel wall was protected by a flashing cap or 13mm thick × 120mm deep fire grade plasterboard strip protected at either fire exposed side or unexposed side.

B.3.2.44 With reference to the test results of EWFA 2741700, it was observed the maximum temperature recorded on the unexposed side at 120 minutes for flashing cap fixed on either

the fire side or non-fire side of head C-track was 177℃ with a 20℃ margin to meet the maximum temperature rise criteria.

B.3.2.45 With reference to the test results of EWFA 2741700, it was observed the maximum temperature recorded on the unexposed side at 120 minutes for 13mm fire grade plasterboard strip fixed on either the fire side or non-fire side of head C-track was 165℃.

B.3.2.46 The proposed head detail in figure 38 and 39 is similar to the head detail options tested in EWFA 2741700 except there is no fire rated sealant is filled in the gap between head track and wall panels and the panels are horizontal.

B.3.2.47 With reference to test BWA 2286900, test results indicates the concrete core of 78mm Speedpanel wall panel started dehydrating around 120 minutes, the temperature on the Speedpanel wall panel at 120 minutes was around 120℃. It is therefore expected up to 120 minutes in this particular case, the proposed 20mm gap between head track and panel is still expected to be filled with steam from the panel interrupting radiant heat transfer across this cavity and dominating the surface temperature in the vicinity of the head. The heat transfer in the direction of the surrounding construction via conduction (contact) and convection (in this case the 20mm gap between panels and head track) was much weaker. It is therefore considered the temperature recorded on the unexposed side will not significantly different the partially filled gap at the top is removed.

B.3.2.48 Based on the above, it is considered the proposed head details 38 and 39 are capable of maintaining insulation performance for a period of 120 minutes.

Insulation Performance of Side and Base Details Figures 40, 41, 42 and 43

B.3.2.49 The proposed base, edge and corner details are shown in figures 40, 41, 42 and 43.

B.3.2.50 For the proposed details the presence of the sealant between C-track flange and wall panel is expected prevent hot gases from the exposed side from freely passing through to the C-track, at least until the sealants fall away.

B.3.2.51 Wall base details shown in figures 40, 41, 42 and 43 are similar the wall side detail tested EWFA 2848300.2, which comprised 64mm Speedpanel. When tested the side detail achieved an insulation performance of 137 minutes.

B.3.2.52 The presence of the sealant within cavity between the head C-track and panel is expected to significantly interrupt the steam from the panel core and the hot gases from exposed side to heat up the unexposed side flange of C-track.

B.3.2.53 In addition, the sealant located within the cavity is protected by the surrounding C-tracks and will stay in place longer.

B.3.2.54 Based on the above, it is considered that the difference between the proposed sealant location variation will not introduce any insulation weakness for at least 120 minutes when applied to 78mm thick panels

B.4 PERFORMANCE OF SPEEDPANEL BULKHEAD CONSTRUCTION

B.4.1 Proposed Construction

B.4.1.1 The proposed construction comprises Speedpanel bulkhead constructions as shown in figure 6 and 7, 8 and 9.

B.4.1.2 The proposed bulkhead construction in figure 6 and 7 comprises 3m wide horizontal Speedpanel ceiling section and 3m high horizontal Speedpanel wall section are supported by concrete walls.

B.4.1.3 The proposed bulkhead construction in figure 8 and 9 comprises 3m wide horizontal Speedpanel ceiling section and 1.5m high vertical Speedpanel wall section are supported by concrete wall at one end and suspended 1.5m high vertical Speedpanel wall section at the other end.

B.4.2 Discussion

Bulkhead Construction as per Figures 6 and 7

B.4.2.1 The proposed construction comprises a 3m wide horizontal orientated ceiling section which is supported in a similar manner as in figure 1 to 5.

B.4.2.2 It is therefore considered the discussion in Section B.1 is valid for the ceiling section of Speedpanel bulkhead construction.

B.4.2.3 The proposed construction also comprises a 3m long horizontally orientated Speedpanel wall section and the perimeter support details are as shown in figure 38, 39 and 40.

B.4.2.4 It is therefore considered the discussion in Section B.3 is also valid for the wall section of Speedpanel bulkhead construction.

B.4.2.5 In the case of figure 24 the junction incorporates a connection detail of horizontally orientated wall section and horizontally orientated ceiling section. The proposed connection is protected by two layers of 16mm thick fire grade plasterboard similarly as for the side support connection detail. This is considered a conservative though necessary approach for the detail that is no different to test in a representative manner.

B.4.2.6 Based on the above, it is considered the proposed bulkhead detail will maintain structural adequacy, integrity and insulation performance of 120 minutes if tested in accordance with AS1530.4-2005.

Bulkhead Construction as per Figures 8 and 9

B.4.2.7 The proposed construction comprises a 3m wide horizontal orientated ceiling section which is support in a similar manner as in figure 1 to 5.

B.4.2.8 It is therefore considered the discussion in Section B.1 is valid for the ceiling section of Speedpanel bulkhead construction.

B.4.2.9 The proposed construction comprises a 1.5m high and 3m long non-loadbearing vertically orientated Speedpanel wall section and the perimeter support to concrete ceiling and concrete wall are as shown in figures 28 to 35.

B.4.2.10 It is therefore considered the discussion in Section B.2 is also valid for the non-loadbearing wall section of bulkhead construction

B.4.2.11 In case of figure 26 the junction incorporates a connection detail of horizontally orientated ceiling section and non-loadbearing vertically orientated wall section. The proposed connection is protected by two layers of 16mm thick fire grade plasterboard similarly as for the side support connection. This is considered a conservative though necessary approach for the detail that is no different to test in a representative manner.

B.4.2.12 The proposed construction also comprises a 1.5mm high loadbearing vertically orientated Speedpanel wall section which supports the 3m wide ceiling section.

B.4.2.13 The proposed head detail suspending loadbearing vertically orientated Speedpanel wall section from concrete slab above is as shown in figure 44.

B.4.2.14 The proposed two 50 x 50 x 3BMT steel angles and head C-track are firstly fixed to the concrete slab above by using M6.5 × 50mm mushroom head, galvanised steel spikes. The 78mm Speedpanel panels are then installed and hanging in place by 14-20 gauge x 115mm long tek screws fully penetrated through steel angle at one side, c-track and into the steel angle at the other side.

B.4.2.15 By inspection of the load path of the proposed support connection configuration, the key components govern the structural adequacy performance of proposed support connection are summarised below:

Components	Proposed Product	Fixing spacing
Fixing to vertical panel on both exposed side and unexposed side	14-20 gauge x 115mm long tek screw	At 250mm centres
Steel angles	50mm × 50mm × 3BMT steel angle on each side of C-track	-
C-track capping	82mm × 50mm × 1.15BMT galvanised steel C-track	-
Fixing to surrounding concrete block	M6.5 × 50mm mushroom head, galvanised steel spikes	At 400mm centres

B.4.2.16 The proposed head detail in Figure 44 is expected to be stronger than that tested in EWFA 2736001.1 considered the fixing spacing for fixing C-track to Speedpanel panels is reduced to 250mm centres and the number of fixings to concrete slab above is increased.

B.4.2.17 By inspection of the load path of the proposed construction in Figure 44, the weight (combined of 1.5m high wall section and 3m wide ceiling section below) carried by the connection detail in Figure 44 is 140kg per meter wide.

B.4.2.18 As discussed previously, the tested support connection is able to support 175.2kg per meter height without introduce any foreseeable weakness to the structural adequacy performance up to 120 minutes.

B.4.2.19 Based on the above, it is expected the proposed connection detail in Figure 44 will maintain structural adequacy for 120 minutes if tested in accordance with AS1530.4-2005.

B.4.2.20 With reference to BWA 2286900, the maximum temperature measured on the unexposed side of head track of 78mm thick Speedpanel wall was around 317℃.

B.4.2.21 The proposed unexposed side steel angle is not directly exposed to the heat source and the 20mm gap between concrete lintel and Speedpanel panel is sealed with fire resistant sealant at one side. Two layers of 16mm thick fire grade plasterboard are protected at the one side.

B.4.2.22 It is therefore considered the temperature on the unexposed side steel angle would be much less than the cold side flange of C-tracks tested.

B.4.2.23 As discussed previously, it is confirmed the head details protected with two layers of 16mm thick fire grade plasterboard on either fire side or non-fire side, the maximum temperature of cold flange of C-track would remain below 180℃.

B.4.2.24 It is therefore considered the proposed head detail will maintain integrity performance for up to 120 minutes. In addition, it is expected the temperature on the unexposed side steel angle would be less than 180℃ for up to 120 minutes based on designs.

B.4.2.25 In case of figure 27 the junction incorporates a connection detail of horizontally orientated ceiling section and loadbearing vertically orientated wall section. The proposed connection protected by two layers of 16mm thick fire grade plasterboard and additional steel angle is similarly as for the side support connection discussed. This is considered a conservative though necessary approach for the detail that is no different to test in a representative manner.

B.4.2.26 Based on the above, it is considered the proposed bulkhead detail will maintain structural adequacy, integrity and insulation performance of 120 minutes if tested in accordance with AS1530.4-2005.