



## Fire resistance of CSR Hebel external wall panels if tested in accordance with AS 1530.4:2014




Client: CSR Hebel

Report number: 24648 Reference number: FAS200029 Revision: RIR9.0

Issue date: 17 February 2020 Expiry date: 28 February 2025

## Amendment schedule

Version	Date	Information relating to report			
RIR 9.0	Issue: 04/06/2010	Reason for issue	Initial Issue		
			Prepared by	Reviewed by	
	Expiry: 30/06/2015	Name	K. Nicholls	S. Kettle	
24648-01	Issue: 26/10/2010	Reason for issue	Revised to include 125mm panel system		
			Prepared by	Reviewed by	
	Expiry: 30/06/2015	Name	K. Nicholls	S. Kettle	
24648-02	Issue: 03/03/2014	Reason for issue	Revision to correct typographical error		
			Prepared by	Reviewed by	
	Expiry: 30/06/2015	Name	K. Nicholls	D. Nicholson	
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			Prepared by	Reviewed by	
	Expiry: 30/06/2015	Name	K. Nicholls	D. Nicholson	
24648-04	Issue: 24/02/2015	Reason for issue	Revised to include Hebel® Service Panels and reduce cover to bolts		
			Prepared by	Reviewed by	
	Expiry: 17/02/2020	Name	K. Nicholls	S. Hu	
24648-05	Issue: 09/10/2015	Reason for issue	Revised to include Hebel Panel bolt shielding detail		
			Prepared by	Reviewed by	
	Expiry: 17/02/2020	Name	K. Nicholls	D. Nicholson	
24648-06	Issue: 01/07/2016	Reason for issue	Revised to include nil profile panels		
			Prepared by	Reviewed by	
	Expiry: 17/02/2020	Name	S. Hu	D. Nicholson	
24648-07	Issue: 20/07/2016	Reason for issue	Revised to correct typographical error		
			Prepared by	Reviewed by	
	Expiry: 17/02/2020	Name	S. Hu	D. Nicholson	
24648-08	Issue: 21/12/2018	Reason for issue	Revised to increase wall height to 15m		
			Prepared by	Reviewed by	
	Expiry: 17/02/2020	Name	T. Bhat	O. Saad	
24648 RIR9.0	Issue: 17/02/2020	Reason for issue	Revalidated and the period of validity extended by another 5 years		
			Prepared by	Reviewed by	Approved by

Version	Date	Information relating to report			
	Expiry: 28/02/2025	Name	Yomal Dias	Omar Saad	Omar Saad
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Exova Warringtonfire rebranded to Warringtonfire on 1 December 2018. Apart from the change to our brand name, no other changes have occurred. The introduction of our new brand name does not affect the validity of existing documents previously issued by us.

## Executive summary

This report contains the minimum information required for regulatory compliance and refers to the Assessment report 24648. Summaries of the test data on which this assessment is based are provided in the appendices which are only available in the full report.

The analysis conducted in the referenced assessment report presents an assessment of the fire resistance of CSR Hebel external wall panels, if tested in accordance with AS 1530.4:2014.

Based on the discussion presented in this report, it is the opinion of this registered testing authority that if the tested prototype described in Section 4.2 had been modified as described in Section 4.3, and tested in accordance with the method referenced in Section 4.4, it would likely achieve the FRLs stated below, subject to the requirements of Sections 2, 3, 5 and 7.

**Table 1 Summary of Assessed Performance for Hebel® Panel Walls with or without Hebel® Service Panel Type 1 and 2**

Minimum Panel Thickness (mm)	Maximum Wall Height (mm) Y	Maximum Wall Width (mm) X	Cover to Recessed Bolts (mm) d	FRL
150	15000	6000	0	-/60/60
			0	-/90/90
			0	-/120/120
			60	-/180/180
			75	-/240/240
			Panel Cover (refer to Figure 17)	-/240/240
125	15000	6000	0	-/60/60
			0	-/90/90
			0	-/120/120
			60	-/180/180
			75	-/240/240
			Panel Cover (refer to Figure 17)	-/240/240

**Table 2 Temperature inside Hebel® Service Panels (Additional information for consideration of others)**

Option	Detail	Temperature inside Penetration Conduit when exposed to Cellulosic Exposure					
		Type 1			Type 2		
		120 mins	180 mins	240 mins	120 mins	180 mins	240 mins
1	8-10, 14-16	171°C	231°C	274°C	171°C	232°C	275°C
2	8-9, 11, 14-16	341°C	429°C	488°C	234°C	333°C	400°C
3	8-9, 12, 14-16	342°C	432°C	497°C	234°C	333°C	401°C
4	8-9, 13, 14-16	355°C	467°C	556°C	244°C	366°C	462°C

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

The variations and outcome of the referenced assessment report are subject to the limitations and requirements described in Sections 2, 3, 5 and 7 of this report. The results of this report are valid until 28 February 2025.

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## 1. Introduction

This report contains the minimum information sufficient for regulatory compliance and refers to the Assessment report 24648.

The analysis conducted in the referenced assessment report documents the findings of the assessment undertaken to determine the likely fire resistance levels (FRL) of CSR Hebel external wall panels, if tested in accordance with AS 1530.4:2014. This assessment was carried out at the request of CSR Hebel. The sponsor details are included in Table 3.

**Table 3 Sponsor details**

Client	Address
CSR Hebel	Triniti 3, 39 Delhi Road, North Ryde NSW

## 2. Limitations of assessment

The systems described in the referenced test reports have shown robust strength, insulation and integrity characteristics in accordance with the relevant testing standards. An assessment of their performance, if tested in accordance with AS 1530.4:2014, was conducted and the period of validity of the assessment was extended for another five years.

However, Warringtonfire Australia is not in any position to dictate the validity of the assessment report beyond May 2022. The NCC 2022, when it comes into effect in 2022, may invalidate the referenced assessment report.

In order to meet the requirements and validity sections of NCC 2022 with further confidence, additional testing in accordance with the most recent version of AS 1530.4 standard is recommended.

## 3. Declaration

The guide to undertaking assessments in lieu of fire tests prepared by the PFPF in the UK requires a declaration from the client. By accepting our fee proposal dated 30 January 2020, CSR Hebel confirmed 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.
- They agree to withdraw this assessment from circulation if the component or element of structure is 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.
- 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, they agree to ask the assessing authority to withdraw the assessment.

## 4. Description of the specimen and variations

### 4.1 System description

The Hebel external wall system addressed in this assessment report is constructed using horizontally oriented Hebel autoclaved aerated concrete panels with a double internal reinforcement mesh, stacked vertically, glued along their horizontal edges using Hebel adhesive and fixed at either end to support structures (eg columns).



## 4.2 Referenced test data

This assessment is based on fire resistance tests FSV 0081, FSV 0093, FSV 0221, and WFRA 41154.3.

The test specimen reported in FSV 0081 comprised of a non-loadbearing wall system, constructed from horizontally laid panels. The specimen was tested in accordance with AS 1530.4:1990 and sponsored by CSR Hebel Australia Pty. Ltd.

The test specimen reported in FSV 0093 comprised of a load bearing wall system, constructed from autoclaved aerated concrete blocks. The specimen was tested in accordance with AS 1530.4:1990 and sponsored by CSR Hebel Australia Pty. Ltd.

The test specimen reported in FSV 0221 comprised a non-loadbearing wall system, constructed from vertical panels of reinforced autoclaved aerated concrete panels. The specimen was tested in accordance with AS 1530.4:1990 and sponsored by CSR Hebel Australia Pty. Ltd.

The test specimen reported in WFRA 41154.3 comprised of two sections of a wall, designated as Partitions A and B. The specimen was tested in accordance with AS 1530.4:1997 with supplementary reference to a 30 second cotton pad test and was sponsored by CSR Hebel.

The test specimen reported in FSV 0979 comprised of a non-loadbearing wall system, constructed from vertically laid panels. The specimen was tested in accordance with AS 1530.4:1997 and sponsored by CSR Hebel.

This assessment also refers to test reports 2805200.3 and 2793500.2 being tests of a 150mm thick Hebel® tongue and groove wall panel system and a 75mm thick Hebel® tongue and groove panel ceiling system, respectively. Both were tested in accordance with BS EN 1364-1:1999 and exposed to the Hydrocarbon Modified (HCM) fire curve as defined in the French inter Ministry circular No. 2000-63 of 25 August 2000.

The tests were sponsored by CSR Hebel and undertaken by Exova Warringtonfire Aus Pty Ltd.

Refer to 24648 R9.0 for a detailed summary of the reference test data.

## 4.3 Variations to tested systems

The proposed construction for 150mm panels shall be as tested in FSV 0081 with the following additional variations.

- Panels are laterally supported at each column as described in Figure 1 to Figure 4.
- Panel width may be up to 6.0m.
- Panel wall systems may be up to 15.0m high. Panels may be thicker, though reinforcement depth may not decrease.
- Panels may be connected to structure with Hebel® tension ties or recessed bolts or bolts shielded with a section of Hebel Powerpanel or Powerpanel XL.
- The wall shall include horizontally orientated service panel types 1 and 2 within walls with fire exposure from one side only.
- The wall shall optionally include horizontally orientated service panel type 2 as an isolated element that is supported from below with exposure on three sides.
- Service panel type 1 is 400mm wide × 600mm high with 2 × Ø200mm penetration for service conduit.
- Service panel type 2 is 350mm wide × 600mm high with 2 × Ø150mm penetration for service conduit.
- 150mm panel edge profile shall be either tongue and groove or nil profile.
- The horizontal joints between horizontal panels shall be filled with Hebel adhesive.
- The vertical butt joints between service panels filled with a minimum 100mm deep Kaowool and faced with minimum 16mm CSR Fireseal sealant.

- The entry and exist of the conduits in the walls are excluded in the scope of the assessment; any such penetrations shall be verified by testing to not exceed the enclosure temperatures stated in the report.

The proposed construction for 125mm panels shall be as tested in FSV 0221 with the following additional variations:

- Panels are laterally supported at each column as described in Figure 1 to Figure 4.
- Panel length may be up to 6.0m.
- Panel wall systems may be up to 15.0m high. Panels may be thicker, though reinforcement depth may not decrease.
- Panels may be connected to structure with Hebel® tension ties or recessed bolts or bolts shielded with a section of Hebel Powerpanel or Powerpanel XL.
- The wall shall include horizontally orientated service panel types 1 and 2 within walls with fire exposure from one side only.
- The wall shall optionally include horizontally orientated service panel type 2 as an isolated element that supported from below with exposure on three sides.
- Service panel type 1 is 400mm wide × 600mm high with 2 × Ø200mm penetration for service conduit.
- Service panel type 2 is 350mm wide × 600mm high with 2 × Ø150mm penetration for service conduit.
- The horizontal joints between horizontal panels shall be filled with Hebel adhesive.
- The vertical butt joints between service panels filled with a minimum 100mm deep Kaowool and faced with minimum 16mm CSR Fireseal sealant.
- The entry and exist of the conduits in the walls are excluded in the scope of the assessment, any such penetrations be verified by testing to not exceed the enclosure temperatures stated in the report.

## 4.4 Purpose of the test

AS 1530.4: 2014 sets out the methods for conducting fire tests on building materials, components and structures. Specifically, Section 2 of this standard contains the general requirements for these tests. Section 3 addresses the fire resistance testing of walls.

## 4.5 Schedule of components

Table 4 outlines the schedule of components for the assessed systems subject to a fire test.

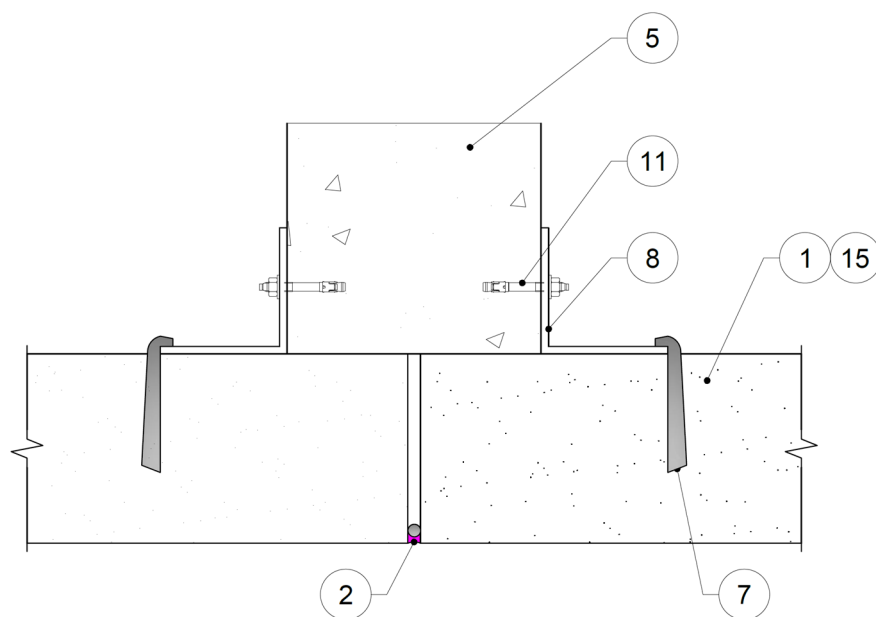
**Table 4 Schedule of components for the proposed construction**

ID	Item	Description
1	Name	<b>Hebel® Autoclaved Aerated Concrete Panels</b>
	Size	Nominally 150mm thick x 600mm wide.
	Installation	Panels orientated horizontally and fixed to structure at the panel ends. Tongue and Groove Profile: Panels keyed together with tongue and groove system and filled with Hebel thin bed adhesive. Nil Profile: Butt join with maximum 3 mm gap filled with Hebel thin bed adhesive applied to full depth of panel.
2	Name	<b>Sealant</b>
	Material	External grade fire rated sealant capable of maintaining integrity of joint for up to - /240/240 if tested in accordance with AS 1530.4:2014

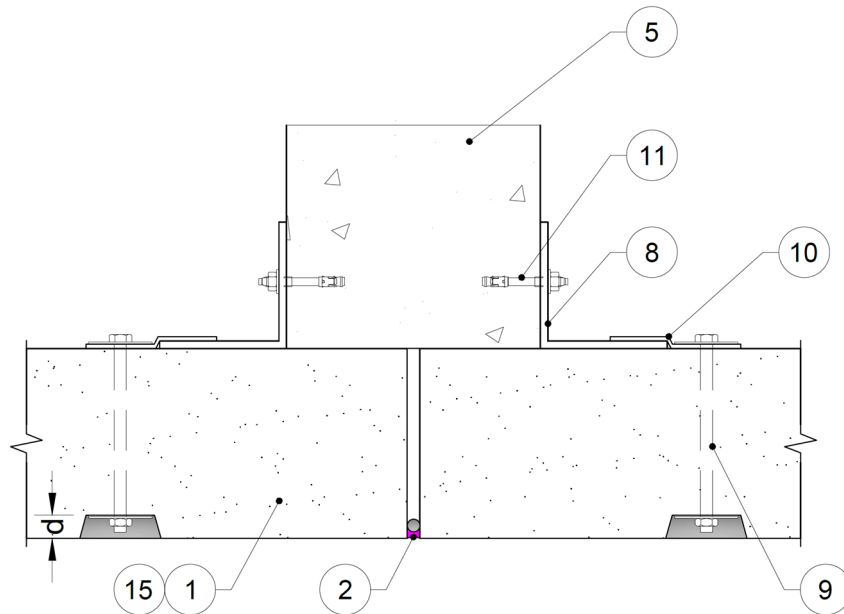
	Installation	Installed over backing rods at vertical joints in panels at panel supports. See Figure 1 to Figure 4.
3	Name	<b>Floor Structure</b>
	Material	Concrete floor slab as per engineer's specifications
4	Name	<b>Wall Structure</b>
	Material	Concrete/masonry wall to engineer's specifications
5	Name	<b>Column</b>
	Material	Steel or concrete columns as per engineer's specifications
6	Name	<b>Hebel® Thin Bed Adhesive</b>
	Material	Proprietary Cementitious adhesive
	Installation	Applied to all horizontal joints and a thickness of nominally 3mm to full depth of panel.
7	Name	<b>Hebel® Tension ties</b>
	Material	Galvanised steel
	Installation	Clip fits around flange of column or Support bracket (item 8) and is fixed into panels at the joint with Hebel® V-nails as per engineer's specifications
8	Name	<b>Support Bracket</b>
	Material	100mm x 100mm x 6mm mild steel angle
	Installation	Bolted to support structure in accordance with engineer's specifications
9	Name	<b>Panel Bolt</b>
	Size	Mild Steel bolt M10 to M16 with a 50mm x 50mm x 4 mm square steel washers.
	Installation	Bolt is recessed into panel to a specific depth and the recess is backfilled with item 14 Or Bolt is shielded with section of Hebel Powerpanel or Powerpanel XL (item 17)
10	Name	<b>Z-Clip</b>
	Size	Mild steel Z-Clip. Size and thickness in accordance with engineer's specification.
	Installation	Clip bolted panel with item 9, to connect panel to column (item 5) or bracket (item 8)
11	Name	<b>Concrete Anchor</b>
	Installation	Design to suit applied loads in accordance with engineer's specifications
12	Name	<b>Steel Angle</b>
	Material	50mm x 50mm x 0.7mm Mild steel angle
13	Name	<b>Hebel FB 8 Bracket</b>
	Material	125mm x 50mm slotted bracket
14	Name	<b>Patching for Recessed/Shielded Fixings</b>
	Material	CSR Fireseal Sealant or Hebel Adhesive
15	Name	<b>Hebel® Autoclaved Aerated Concrete Panels</b>
	Size	Nominally 125mm thick x 600mm wide.
	Installation	Panels incorporating keyed together with tongue and groove system and installed using thin bed adhesive. Panels orientated horizontally and fixed to structure at the panel ends.
16	Name	<b>Hebel® Mortar</b>

	Installation	Applied to the base of the wall to fully fill panel tongue and groove profile.
17	<b>Name</b>	<b>Panel Bolt Shield</b>
	Material	75mm Hebel Powerpanel or Powerpanel XL
	Size	300mm x 300mm x 75mm thick (minimum)
	Installation	Positioned over the panel bolt (item 9) with minimum 75mm between bolt and edge of Powerpanel section. CSR Fireseal Sealant or Hebel Adhesive to fill gap under Powerpanel and around bolt head.
	Fixing	Screw fixed to underlying Hebel panel with 14-10x150mm hex head screws minimum 100mm from edge and 150mm spacing for 300mm x 300mm panel or 400mm vertically, minimum 2 per panel.
18	<b>Name</b>	<b>Kaowool</b>
	Material	Ceramic fibre
	Size	100mm x 15-40mm
	Installation	Fitted between section of service panel as a gasket around collar.

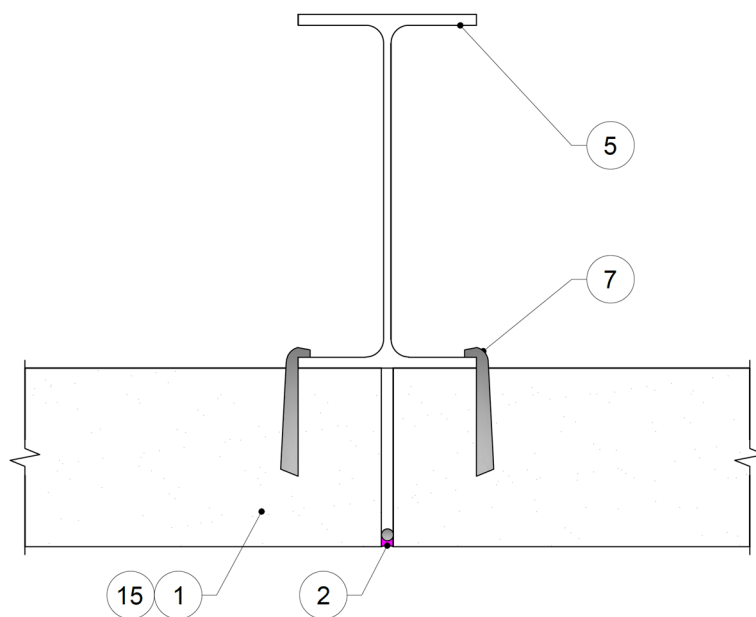
The proposed construction is summarised in Figure 1 to Figure 18.



**Figure 1 Plan section at Vertical Concrete Column – Hebel Ties**

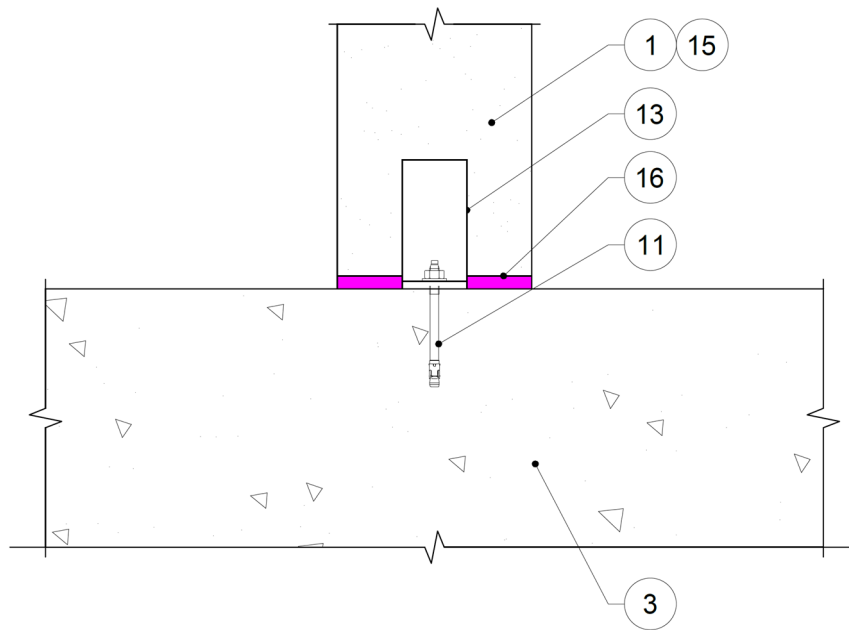


**Figure 2 Plan Section at Vertical Concrete Column – Z Clips and Recessed Bolts**

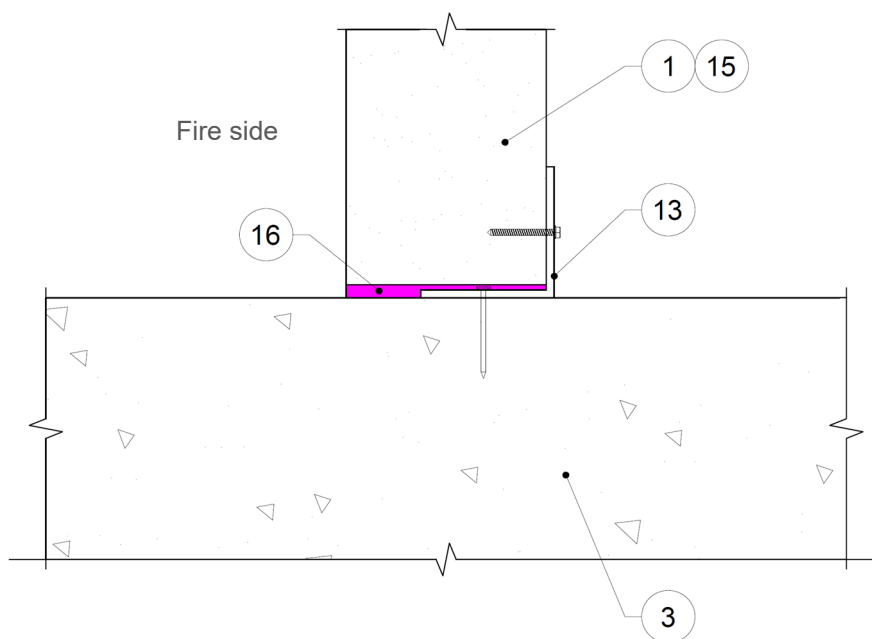


**Figure 3 Plan Section at Vertical Steel Column – Hebel Ties**

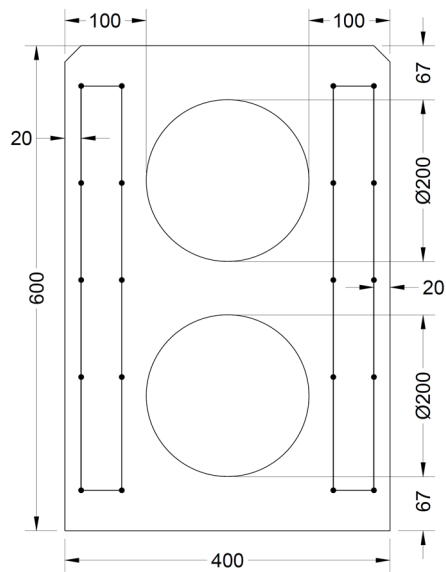




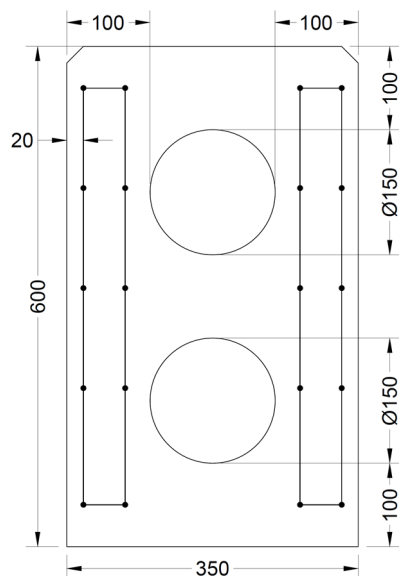
**Figure 6** Elevation Section at Base of wall



**Figure 7** Elevation Section at Base of wall

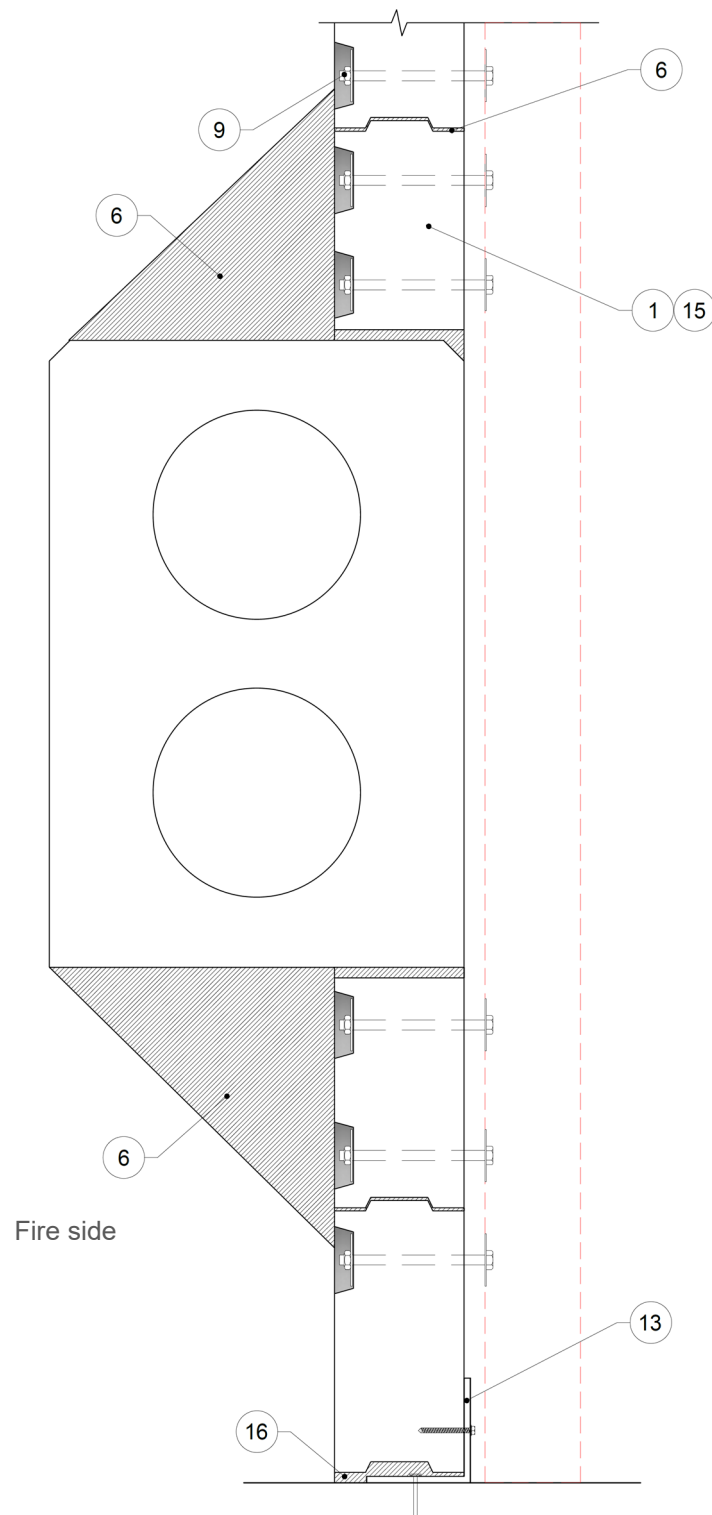


**Figure 8 Hebel® Service Panel Type 1**

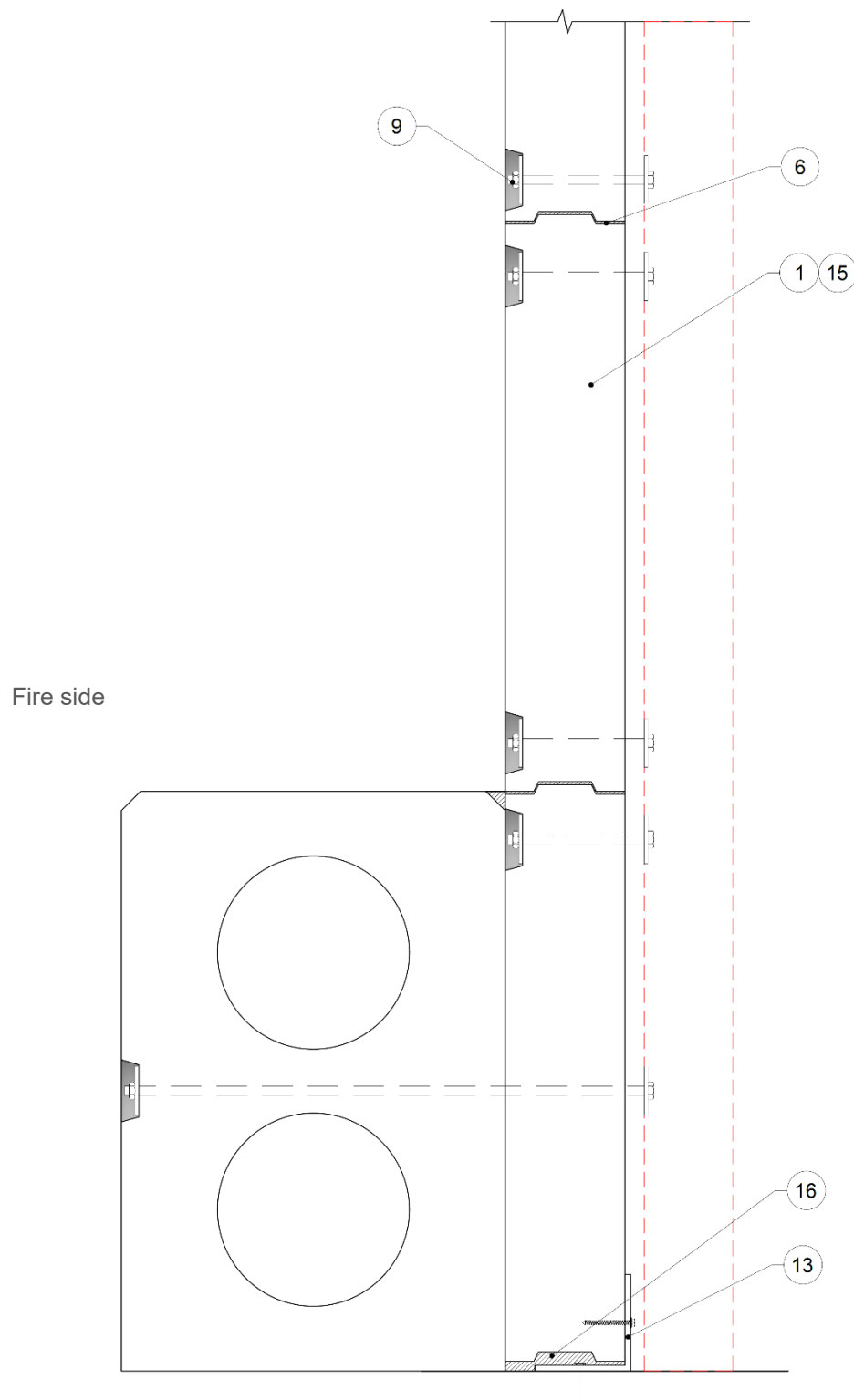


**Figure 9 Hebel® Service Panel Type 2**

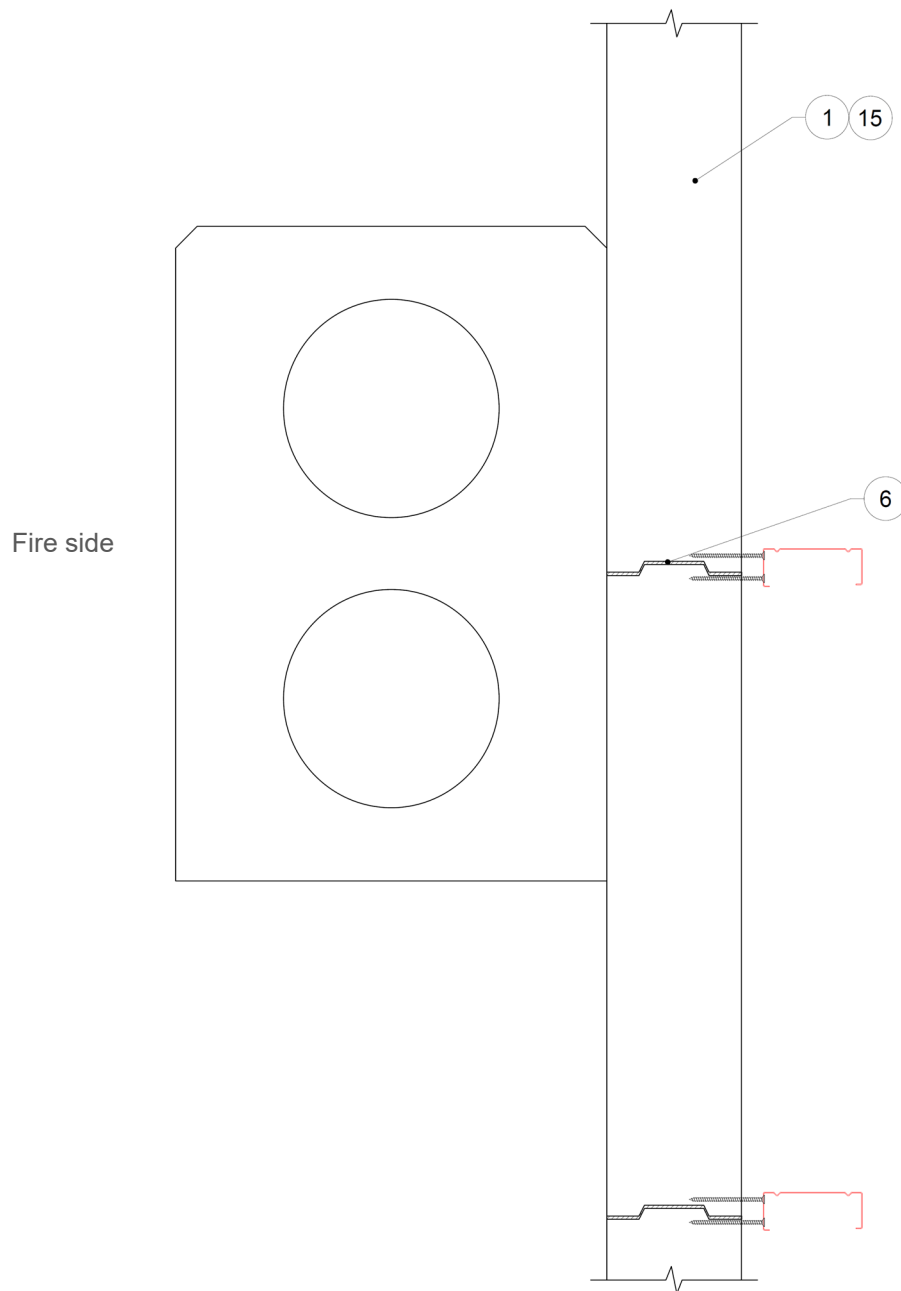




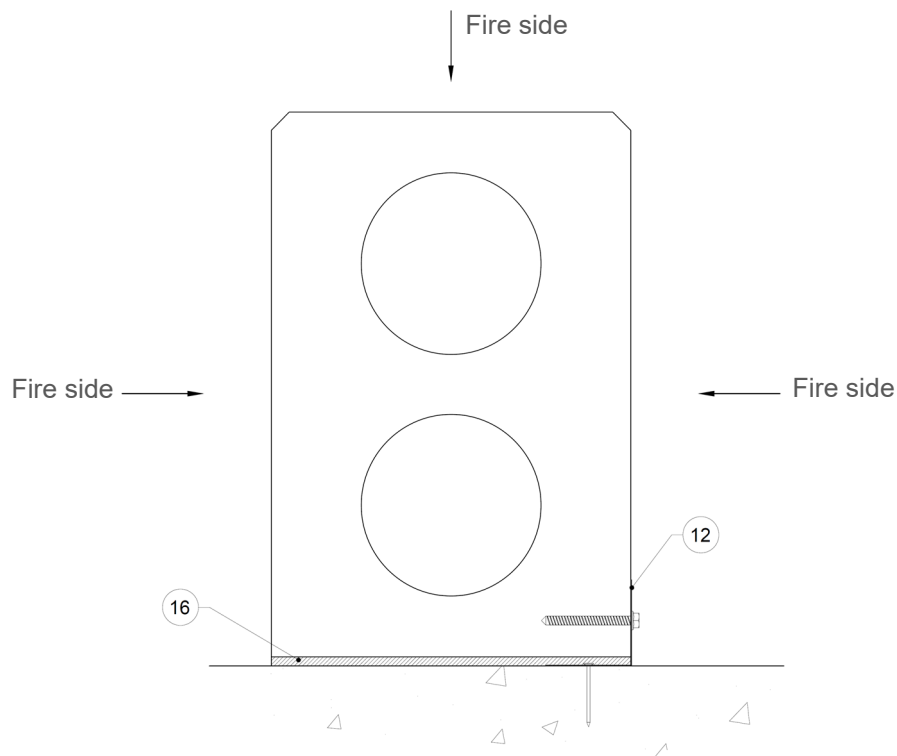
**Figure 10** Service Panel Installation Option 1 (Tongue and Groove edge profile shown can optionally be nil profile for 150mm panels)



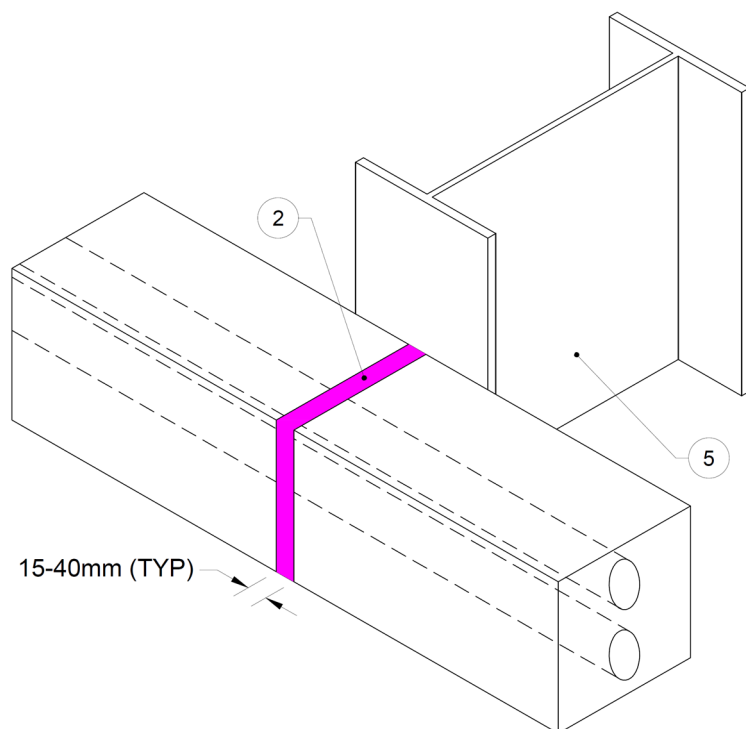
**Figure 11** Service Panel Installation Option 2 (Tongue and Groove edge profile shown can optionally be nil profile for 150mm panels)



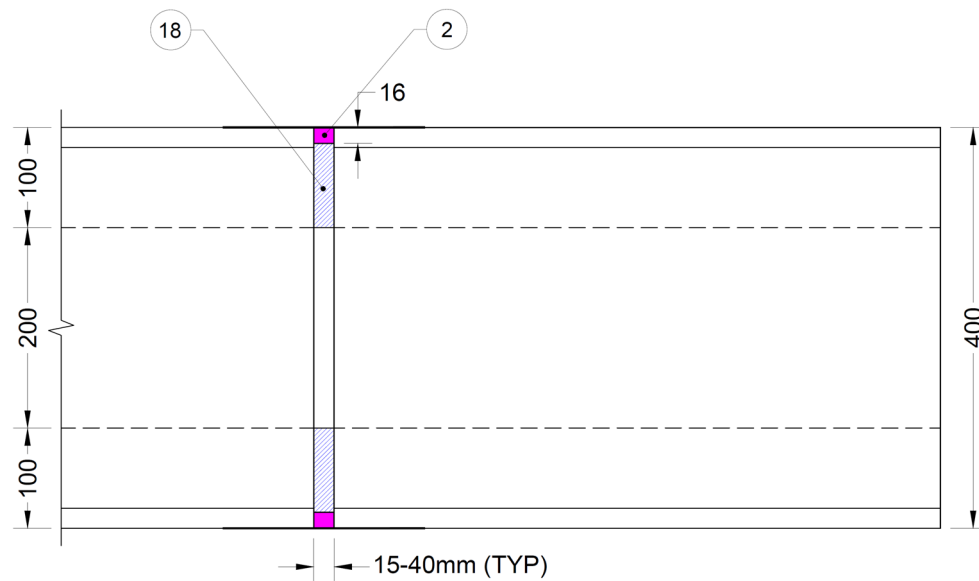
**Figure 12** Service Panel Installation Option 3 (Plan View) (Tongue and Groove edge profile shown can optionally be nil profile for 150mm panels)



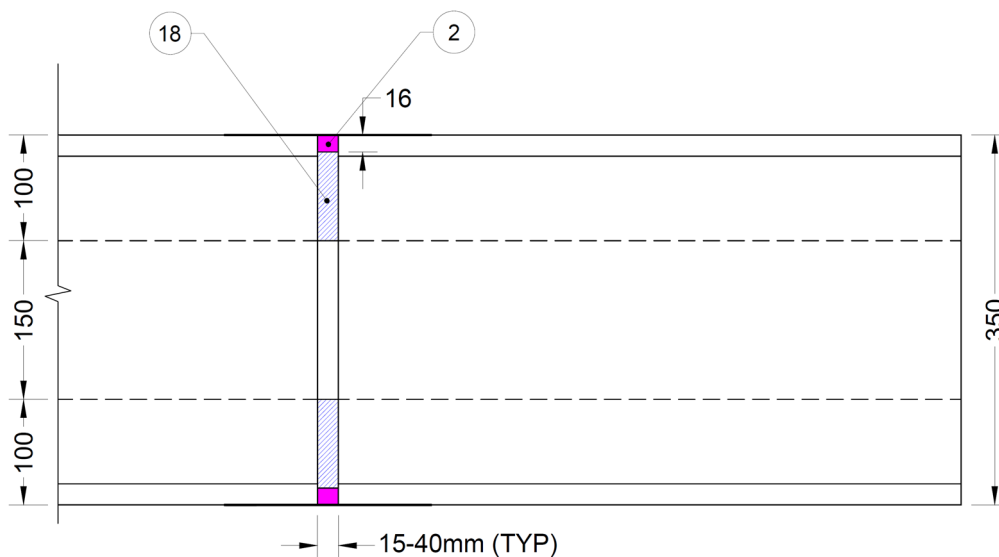
**Figure 13 Service Panel Installation Option 4**



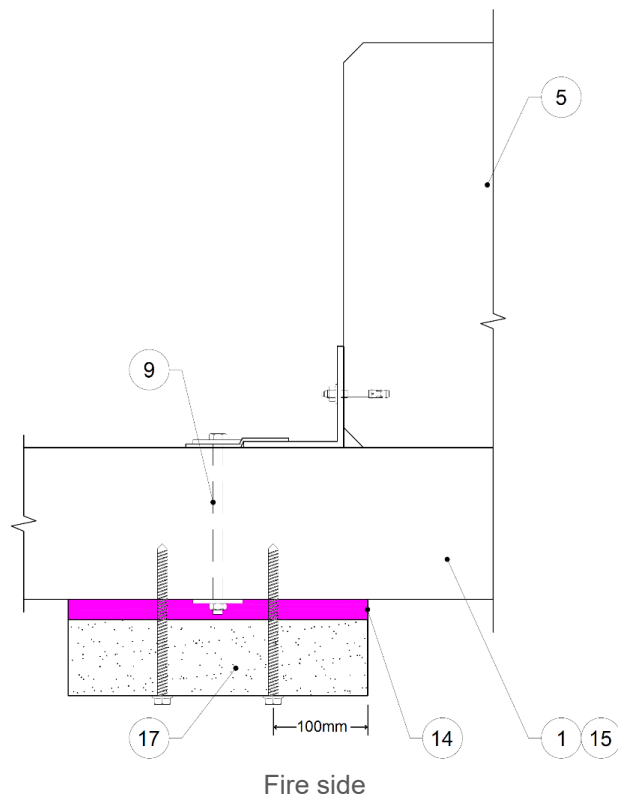
**Figure 14 Service Panel Joint Detail**



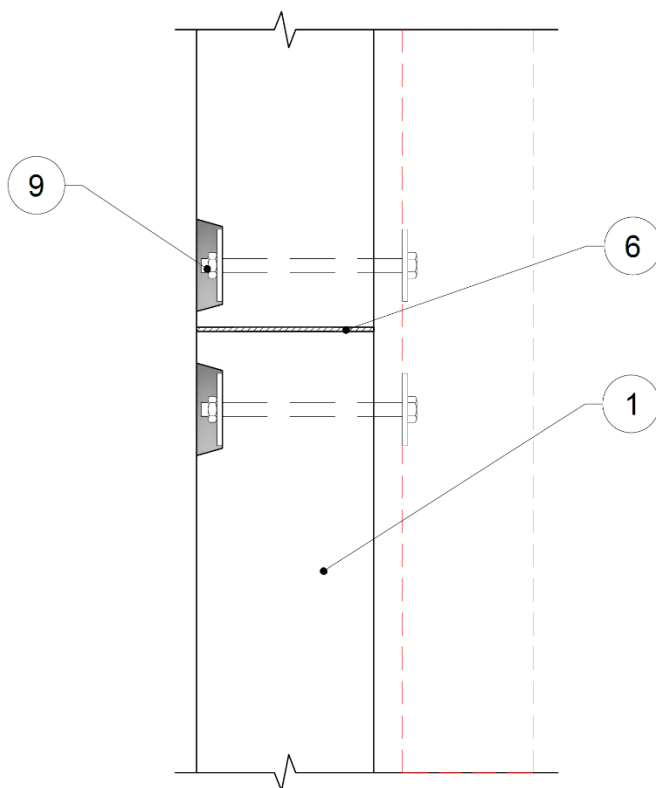
**Figure 15 Service Panel Type 1 Joint Detail –Plan View**



**Figure 16 Service Panel Type 2 Joint Detail –Plan View**



**Figure 17 Hebel Powerpanel or Powerpanel XL Bolt Shielding**



**Figure 18 Example of nil profile edge of 150mm thick panel**

## 5. Scope, objective and assumptions

### 5.1 Scope and objective

- The scope of this report is limited to an assessment of the variations to the tested systems described in Section 4.3.
- This report details the methods of construction, test conditions and assessed results that would have been expected if the specific elements of construction described here had been tested in accordance with AS 1530.4:2014.
- The results of this assessment are applicable to wall systems exposed to the fire from one side only.
- This report is only valid for the assessed system/s. Any changes with respect to size, construction details, loads, stresses, edge or end conditions, other than those identified in this report, may invalidate the findings of this assessment. If there are changes to the system, a reassessment will be needed to verify consistency with the assessment in this report.
- The data, methodologies, calculations and conclusions documented in this report specifically relate to the assessed system/s and must not be used for any other purpose.
- This report has been prepared based on information provided by others. Warringtonfire has not verified the accuracy and/or completeness of that information and will not be responsible for any errors or omissions that may be incorporated into this report as a result.

## 6. Conclusion

Details of the assessment and discussion are only available in the referenced main assessment report. A summary of the assessment outcome is outlined in Table 5 and Table 6.

**Table 5 Summary of Assessed Performance for Hebel® Panel Walls with or without Hebel® Service Panel Type 1 and 2**

Minimum Panel Thickness (mm)	Maximum Wall Height (mm) Y	Maximum Wall Width (mm) X	Cover to Recessed Bolts (mm) d	FRL
150	15000	6000	0	-/60/60
			0	-/90/90
			0	-/120/120
			60	-/180/180
			75	-/240/240
			Panel Cover (refer to Figure 17)	-/240/240
125	15000	6000	0	-/60/60
			0	-/90/90
			0	-/120/120
			60	-/180/180
			75	-/240/240
			Panel Cover (refer to Figure 17)	-/240/240

**Table 6      Temperature inside Hebel® Service Panels (Additional information for consideration of others)**

Option	Detail	Temperature inside Penetration Conduit when exposed to Cellulosic Exposure					
		Type 1			Type 2		
		120 mins	180 mins	240 mins	120 mins	180 mins	240 mins
1	8-10, 14-16	171°C	231°C	274°C	171°C	232°C	275°C
2	8-9, 11, 14-16	341°C	429°C	488°C	234°C	333°C	400°C
3	8-9, 12, 14-16	342°C	432°C	497°C	234°C	333°C	401°C
4	8-9, 13, 14-16	355°C	467°C	556°C	244°C	366°C	462°C

## 7. Validity

Warringtonfire Australia does not endorse the tested or assessed product in any way. The conclusions of this assessment may be used to directly assess fire hazard, but it should be recognised that a single test method will not provide a full assessment of fire hazard under all conditions.

Due to the nature of fire 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.

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 subject to constant review and improvement. It is therefore recommended that this report be reviewed on or, before, the stated expiry date.

This assessment represents our opinion about the performance likely to be demonstrated on a test in accordance with AS 1530.4:2014, based on the evidence referred to in this report.

This assessment is provided to the CSR Hebel for its own purposes and we cannot express an opinion on whether it will be accepted by building certifiers or any other third parties for any purpose.