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Fire assessment report

Control Joints within Dincel Walls protected by Hilti passive fire protection systems

Client: Dincel Construction System and Hilti Australia Pty Ltd

Report number: FAS190067 Revision: R1.2

Issue date: 15 October 2019 Expiry date: 31 October 2024

Amendment schedule

Version	Date	Information relating to report			
R1.0	Issue: 10/10/2019	Reason for issue	Report issued to Dincel Construction System and Hilti Australia for review and comment.		
			Prepared by	Reviewed by	Approved by
	Expiry: 31/10/2024	Name	Yomal Dias	Omar Saad	Omar Saad
		Signature			
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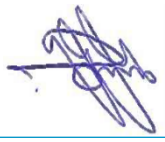
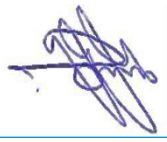
			Prepared by	Reviewed by	Approved by
	Expiry: 31/10/2024	Name	Yomal Dias	Omar Saad	Omar Saad
		Signature			
R1.2	Issue: 15/10/2019	Reason for issue	Typographical corrections throughout the report		
			Prepared by	Reviewed by	Approved by
	Expiry: 31/10/2024	Name	Yomal Dias	Omar Saad	Omar Saad
		Signature			

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General conditions of use

Executive summary

This report documents the findings of the assessments undertaken to determine the likely fire resistance levels (FRL) of various control joints and gap sealing systems, if tested in accordance with AS 1530.4:2014[1]. This assessment was carried out at the request of Dincel Construction System and Hilti Australia Pty Ltd.

The analysis conducted in Section 5 (Assessment 1) of this report found that the proposed variations described in Section 3.3.1 for the tested construction detail in FRT190129 R2.0 between a Dincel wall and a steel framed wall are likely to achieve the outcomes shown in Table 1, if tested in accordance with AS 1530.4:2014.

Table 1 Variations and outcome of Assessment 1

Dincel wall details	Steel framed wall details	Description of the construction detail	FRL
• Minimum thickness shall be 155mm • Minimum concrete density shall be 2400kg/m^3	• Two layers of 13 or 16mm fire rated plasterboard lining shall be provided • Minimum depth of steel stud shall be 64mm • Overall wall thickness shall not be less than 116mm	• The maximum distance between the plasterboard edge and the Dincel wall shall be 15mm • The minimum depth of Hilti CP 611A sealant shall be 26mm • The vertical steel stud shall be against the Dincel wall, as tested.	-/120/120[2]

[1] Standards Australia (2014) *Methods for fire tests on building materials, components and structures* Fire-resistance tests for elements of construction, AS 1530.4-2014

[2] Steel framed, plasterboard lined wall separating element shall have been tested or otherwise assessed to achieve an FRL of -/120/120, with or without cavity insulation.

The analysis conducted in Section 6 (Assessment 2) of this report found that the proposed variations described in Sections 3.3.2 and 3.3.3 for the tested controls joint between a Dincel wall and a 75mm thick autoclaved aerated concrete wall in FRT190129 R2.0 are likely to achieve the outcomes shown in Table 2, if tested in accordance with AS 1530.4:2014.

Table 2 Variations and outcome of Assessment 2

Dincel wall details	Rigid wall details	Control joint/ gap sealing system details	FRL
• Minimum thickness shall be 155mm • Minimum concrete density shall be 2400kg/m^3	• Rigid wall shall have a minimum thickness of 75mm • It shall comprise of either concrete, autoclaved aerated concrete (eg Hebel panel/ block) or concrete core filled/ solid masonry with a minimum density of 510kg/m^3	**Side abutting and T-joint control joints** • The maximum joint width shall be 30mm • The minimum depth of Hilti CP 611A sealant on either side shall be 20mm • The backing materials to the sealant shall be either PEF backing rods on either side or mineral wool insulation installed to the full depth **Side abutting and T-joint gap sealing systems** • The maximum gap width shall be 10mm • Hilti CP 611A sealant shall be applied as a fillet on either side • The minimum sealant fillet size shall be 25mm × 25mm	• -/120/120[3] • Up to -/180/180[4] only if the separating elements have been tested or assessed to achieve the same FRL by others

3 The rigid wall shall have been tested or otherwise assessed to achieve the required FRL.

4 The rigid wall shall have been tested or otherwise assessed to achieve the required FRL.

The analysis conducted in Section 7 (Assessment 3) of this report found that the proposed variations described in Sections 3.3.4 and 3.3.5 for the proposed control joints and gap sealing systems between a Dincel wall and a minimum 150mm thick autoclaved aerated concrete, concrete or masonry (rigid) wall are likely to achieve the outcomes shown in Table 3, if tested in accordance with AS 1530.4:2014

Table 3 Variations and outcome of Assessment 3

Dincel wall details	Rigid wall details	Control joint/ gap sealing system details	FRL
• Minimum thickness shall be 155mm • Minimum concrete density shall be 2400kg/m^3	• Rigid wall shall have a minimum thickness of 150mm • It shall comprise of either concrete, autoclaved aerated concrete (eg Hebel block) or concrete core filled/ solid masonry with a minimum density of 510kg/m^3	**Side abutting and T-joint control joints** • The maximum joint width shall be 30mm • The minimum depth of Hilti CP 611A sealant on either side shall be 20mm • The backing materials to the sealant shall be either PEF backing rods on either side or mineral wool insulation installed to the full depth **Side abutting and T-joint gap sealing systems** • The maximum gap width shall be 10mm • Hilti CP 611A sealant shall be applied as a fillet on either side • The minimum sealant fillet size shall be 25mm × 25mm	• -/180/180[5] • Up to -/240/240[6] only if the separating wall elements have been tested or assessed to achieve the same FRL

The variations and outcome of this assessment are subject to the limitations and requirements described in Sections 2, 4 and 8 of this report. The results of this report are valid until 31 October 2024.

[5] The rigid wall shall have been tested or otherwise assessed to achieve the required FRL.
[6] The Dincel wall and any rigid wall shall have been tested or otherwise assessed to achieve the required FRL.

Contents

1. Introduction

This report documents the findings of the assessments undertaken to determine the likely fire resistance levels (FRL) of various control joints and gap sealing systems, if tested in accordance with AS 1530.4:2014. This assessment was carried out at the request of Dincel Construction System and Hilti Australia Pty Ltd. The sponsor details are included in Table 4.

Table 4 Sponsor details

Client	Address
Assessment sponsor 1	Dincel Construction System 101 Quarry Road, Erskine Park, NSW 2759
Assessment sponsor 2	Hilti Australia Pty Ltd 1G Homebush Bay Dr, Rhodes, NSW 2138

2. Framework for the assessment

An assessment is an opinion about the likely performance of a component or element of structure if it were subject to a standard fire test.

No specific framework, methodology, standard or guidance documents exists in Australia for doing these assessments. Therefore, we have followed the Guide to Undertaking Assessments In Lieu of Fire Tests prepared by the Passive Fire Protection Federation (PFPF) in the UK[7].

This guide provides a framework to undertake assessments in the absence of specific fire test results. *'Some areas where assessments may be offered are:*

- *Where a modification is made to a construction which has already been tested*
- *Interpolation or extrapolation of results of a series of fire resistance tests, or utilisation of a series of fire test results to evaluate a range of variables in a construction design or a product*
- *Where, for various reasons – eg size or configuration – it is not possible to subject a construction or a product to a fire test.'*

Assessments will vary from relatively simple judgements on small changes to a product or construction through to detailed and often complex engineering assessments of large or sophisticated constructions.

2.1 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 10 September 2019, Dincel Construction System and Hilti Australia Pty Ltd confirmed that:

- To their knowledge, identical components or elements of construction to the ones assessed in this report have not been subjected to fire tests in accordance with the standard(s) against which this assessment is being made.
- They agree to withdraw this assessment from circulation if identical components or elements of structure to the ones assessed in this report become 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.

[7] Guide to Undertaking Assessments In Lieu of Fire Test - The Passive Fire Protection Federation (PFPF), June 2000, UK.

3. Description of the specimen and variations

3.1 System description

Systems E and F in the referenced test report FRT190129 R2.0 comprised of joints between Dincel walls and a steel framed, plasterboard lined wall. The steel framing was fixed to the Dincel wall. Hilti CP 611A sealant was applied to a depth of 26mm to fill the gap between the plasterboard edge and the Dincel wall which was 15mm wide. The tested system does not strictly qualify as a control joint. However, the tested construction detail can be assessed based on the referenced test data.

Systems C and D in the referenced test report FRT190129 R2.0 comprised of joints between Dincel walls and a 75mm thick autoclaved aerated concrete wall. A clear gap of 30 mm existed between the two separating elements and no mechanical connection was made between them. One joint comprised of mineral wool insulation installed within the full depth, leaving a 20mm gap on either surface. The other comprised of PEF open cell backing rods installed at a depth of 20mm on either side. In both joints, Hilti CP 611A sealant was applied to a depth of 20mm on either side. Based on the test results, similar control joints with nominated variations are assessed.

Systems B in the referenced test report FRT190129 R2.0 comprised of a direct abutting between two Dincel walls with no local fire stopping elements. It provides additional information for the assessment.

3.2 Referenced test data

The assessment of the variation to the tested system and the determination of the likely performance is based on the results of the fire tests documented in the report summarised in Table 5. Further details of the tested system are described in Appendix A.

Table 5 Referenced test data

Report number	Test sponsor	Test date	Testing authority
FRT190129 R2.0	Dincel Construction System and Hilti Australia Pty Ltd	10 July 2019	Warringtonfire Australia

3.3 Variations to tested systems

Identical systems have not been subjected to standard fire tests. We have therefore assessed the systems using baseline test information for similar systems. The variations to the tested systems, together with the referenced baseline standard fire tests, are described in the following sections.

3.3.1 Dincel wall to steel framed plasterboard lined wall gaps (gap width < 15mm)

Referenced tests

- The referenced tests for the assessment are FRT190129 R2.0 joints E and F.

Description of the proposed construction

- The tested systems comprised of two connections made by 155mm thick Dincel walls abutting a 116mm thick steel framed wall comprising of 64mm deep steel studs with two layers of 13mm thick fire rated plasterboard on either side.
- In both connections, the gap between the edge of the plasterboards and the Dincel wall were 15mm wide and had Hilti Firestop CP 611A sealant applied to a depth of 26mm on either side of the wall.
- One connection was formed through side abutting between the separating elements. The other represented a T-joint where the steel framed wall abutted the Dincel wall transversely.

Proposed variations

- Dincel walls must be 155mm, 200mm or 275mm thick, filled with concrete with a minimum density of 2400kg/m^3.

- For 10mm to 15mm wide gaps between the plasterboard edge and Dincel wall (similar to the tested systems), the sealant shall be applied to a depth not less than 26mm.
- For gaps less than 10mm in width, the joints shall have sealant fillets on either side of the joint. Fillet legs shall be not less than 25mm in length.
- The Dincel wall end capping detail can be either top cap (P-TC), end cap (P-EC) or stop end (P-SE) as per Dincel accessories.

Additional requirements

- The gap shall have a vertical steel stud underneath (see Figures 1 and 2), similar to the tested systems.
- Steel framed, plasterboard lined wall separating element shall have a minimum total thickness of 116mm.
- Steel framed, plasterboard lined wall separating element shall have been tested or otherwise assessed to achieve an FRL of -/120/120, with or without cavity insulation.

Applicability

- The proposed construction details are likely to achieve an FRL of -/120/120.

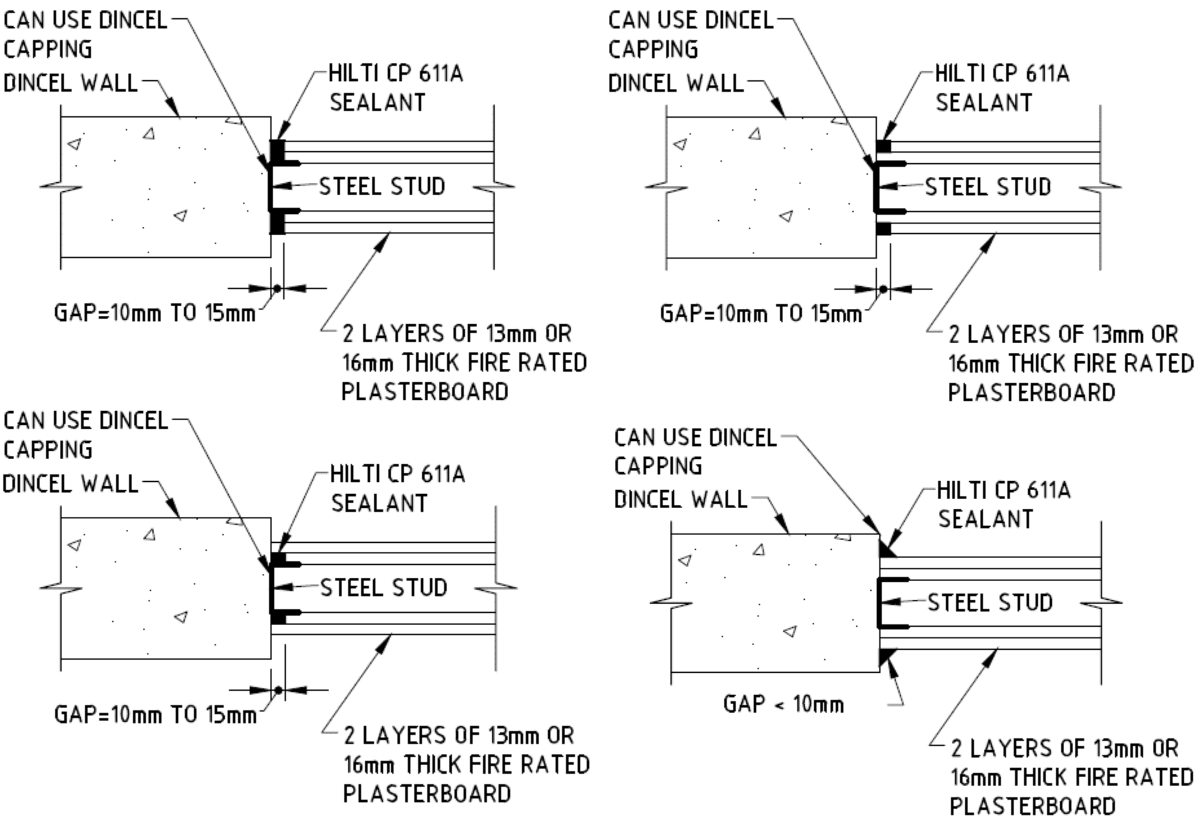

Figure 1 Plan view of butt joint (two joint widths: 10-15 mm, <10 mm)[8]

[8] The plasterboard installation configurations shall conform to the specifications of the relevant steel framed plasterboard wall installation manuals.

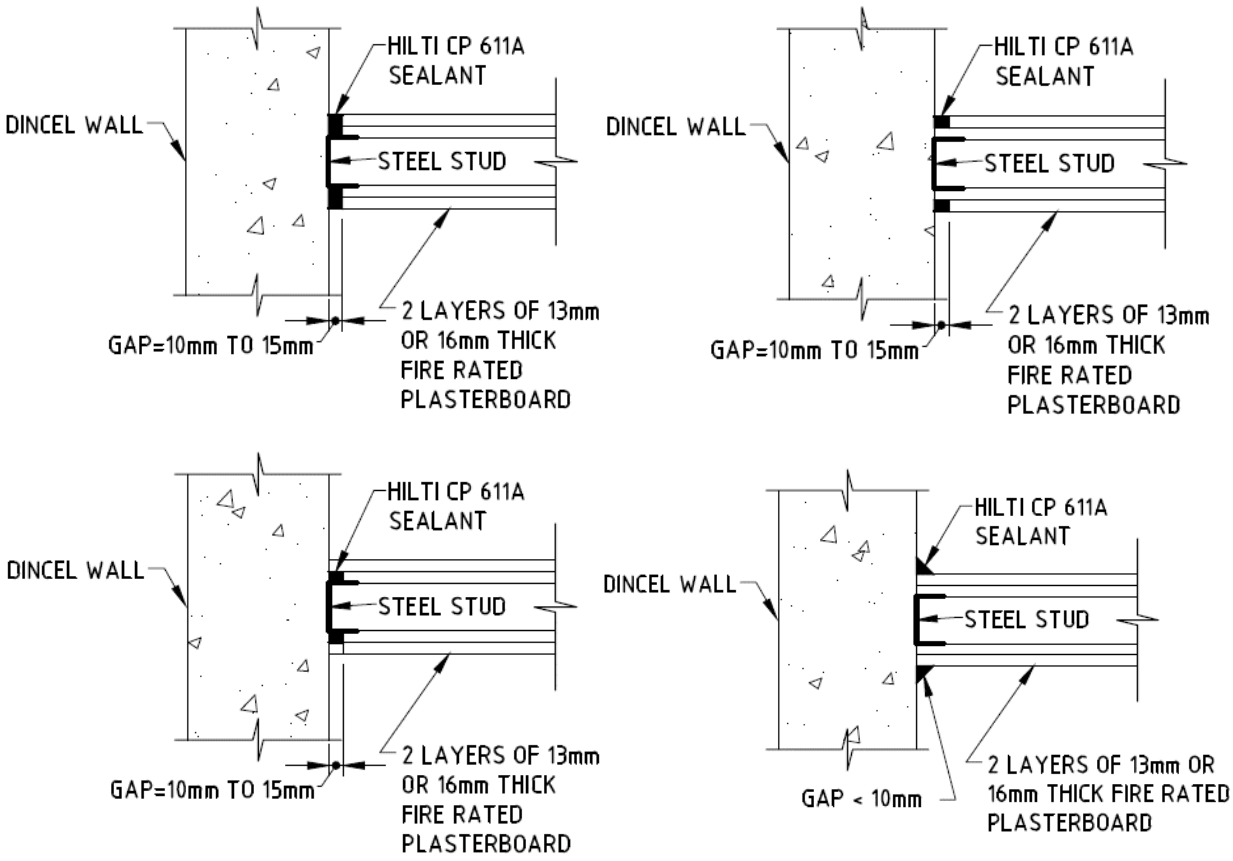

Figure 2 Plan view of T-joint (two joint widths: 10-15 mm, <10 mm)[9]

A summary of the proposed variations is presented in Table 6.

Table 6 Dincel wall to steel framed plasterboard lined wall gaps

Dincel wall details	Steel framed wall details	Description of the construction detail	Proposed FRL
• Minimum thickness shall be 155mm • Minimum concrete density shall be 2400kg/m^3	• Two layers of 13 or 16mm fire rated plasterboard lining shall be provided. • Minimum depth of steel stud shall be 64mm. • Overall wall thickness shall not be less than 116mm.	• The maximum distance between the plasterboard edge and the Dincel wall shall be 15mm • The minimum depth of Hilti CP 611A sealant shall be 26mm • The gap shall have a vertical steel stud underneath, similar to the tested systems.	-/120/120

[9] The plasterboard installation configurations shall conform to the specifications of the relevant steel framed plasterboard wall installation manuals.

3.3.2 Dincel wall to minimum 75mm thick rigid wall control joints (30mm ≥ joint width ≥ 10mm)

Referenced tests

- The referenced tests for the assessment are FRT190129 R2.0 joints C and D.

Description of the proposed construction

- The tested system comprised of two 30mm wide joints made by 275mm and 155mm thick Dincel walls abutting a 75mm thick Hebel panel wall.
- One connection was formed through side abutting between the separating elements. The other represented a T-joint where the steel framed wall abutted the Dincel wall transversely.
- In one joint, mineral wool (density ≥ 50kg/m^3) was installed within the depth of the joint with Hilti Firestop CP 611A sealant installed to a depth of 20mm on either side.
- In the other joint, open cell backing rods were installed at a depth of 20mm from either side. Hilti Firestop CP 611A sealant was then used to fill the 20mm gaps on either side of the joint up to the backing rods.

Proposed system with 75mm rigid walls

- Dincel walls must be 155mm, 200mm or 275mm thick, filled with concrete with a minimum density of 2400kg/m^3.
- The rigid wall shall have a minimum thickness of 75mm. It shall comprise of either concrete, autoclaved aerated concrete (eg Hebel panel/ block) or concrete core filled/ solid masonry with a minimum density of 510kg/m^3.
- The Dincel wall end capping detail can be either top cap (P-TC), end cap (P-EC) or stop end (P-SE) as per Dincel accessories.

Applicability

- The FRL of the control joint is limited by that of the separating elements, established through fire resistance testing in accordance with AS 1530.4:2014 Sections 2 and 3.
- For common applications with concrete, autoclaved aerated concrete (eg Hebel panel/ block) or concrete core filled/ solid masonry with a minimum density of 510kg/m^3 and a minimum thickness of 75mm, the control joint system is likely to achieve an FRL of -/120/120.
- The proposed control joint systems are likely to achieve FRL up to -/180/180, provided only if the FRL of the wall separating elements have been established to be the same through testing in accordance with AS 1530.4:2014 Sections 2 and 3.

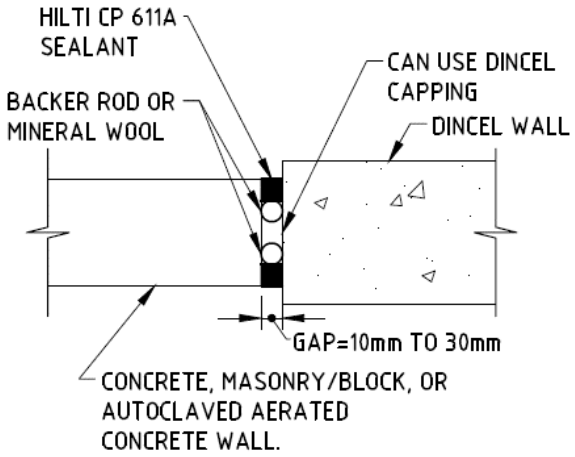

Figure 3 Plan view of butt joint

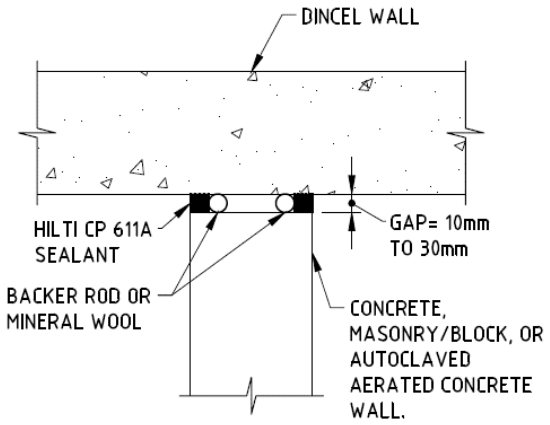

Figure 4 Plan View of T-joint arrangement-1

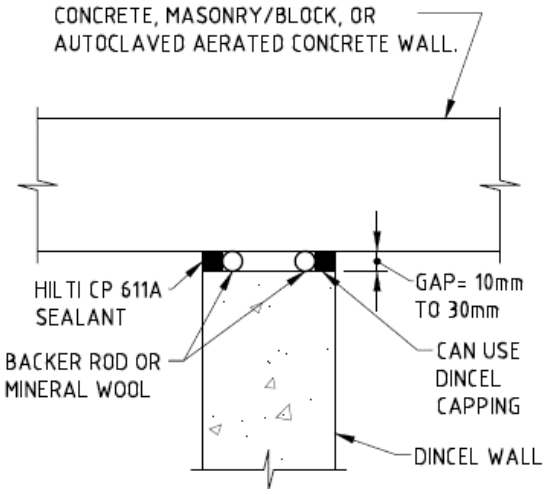

Figure 5 Plan view of T-joint arrangement-2

A summary of the proposed variations is presented in Table 7.

Table 7 Dincel wall to minimum 75mm thick rigid wall control joints

Dincel wall details	Rigid wall details	Control joint system details	Proposed FRL
• Minimum thickness shall be 155mm • Minimum concrete density shall be 2400kg/m^3	• Rigid wall shall have a minimum thickness of 75mm • It shall comprise of either concrete, autoclaved aerated concrete (eg Hebel panel/ block) or concrete core filled/ solid masonry with a minimum density of 510kg/m^3	• The maximum joint width shall be 30mm • The minimum depth of Hilti CP 611A sealant shall be 20mm • The backing materials to the sealant shall be either PEF backing rods on either side or mineral wool insulation installed to the full depth	• -/120/120[10] • Up to -/180/180[11] only if the separating elements have been tested or assessed to achieve the same FRL

[10] The rigid wall shall have been tested or otherwise assessed to achieve the required FRL.
[11] The rigid wall shall have been tested or otherwise assessed to achieve the required FRL.

3.3.3 Dincel wall to minimum 75mm thick rigid wall gaps (gap width < 10mm)

Referenced tests

- The referenced tests for the assessment are FRT190129 R2.0 joints B, C and D.

Description of the proposed construction

- The tested system B comprised of a direct abutting between two Dincel walls with no local fire stopping elements.
- The tested systems C and D comprised of two 30mm wide joints made by 275mm and 155mm thick Dincel walls abutting a 75mm thick Hebel panel wall. One connection was formed through side abutting between the separating elements. The other represented a T-joint where the steel framed wall abutted the Dincel wall transversely. In one joint, mineral wool (density ≥ 50kg/m^3) was installed within the depth of the joint with Hilti Firestop CP 611 sealant installed to a depth of 20mm on either side. In the other joint, open cell backing rods were installed at a depth of 20mm from either side. Hilti Firestop CP 611 sealant was then used to fill the 20mm gaps on either side of the joint up to the backing rods.

Proposed system with 75mm rigid walls

- Dincel walls must be 155mm, 200mm or 275mm thick, filled with concrete with a minimum density of 2400kg/m^3.
- The rigid wall shall have a minimum thickness of 75mm. It shall comprise of either concrete, autoclaved aerated concrete (eg Hebel panel/ block) or concrete core filled/ solid masonry with a minimum density of 510kg/m^3.
- The Dincel wall end capping detail can be either top cap (P-TC), end cap (P-EC) or stop end (P-SE) as per Dincel accessories.

Additional requirements

- The rigid wall shall have been tested or otherwise assessed to achieve the required FRL (-/120/120 or -/180/180).

Applicability

- The FRL of the control joint is limited by that of the separating elements, established through fire resistance testing in accordance with AS 1530.4:2014 Sections 2 and 3.
- For common applications with concrete, autoclaved aerated concrete (eg Hebel panel/ block) or concrete core filled/ solid masonry with a minimum density of 510kg/m^3 and a minimum thickness of 75mm, the control joint system is likely to achieve an FRL of -/120/120.
- The proposed control joint systems are likely to achieve FRL up to -/180/180, provided only if the FRL of the wall separating elements have been established to be the same through testing in accordance with AS 1530.4:2014 Sections 2 and 3.

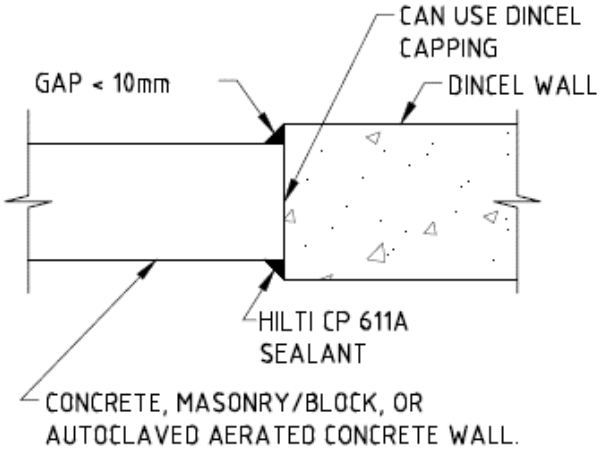

Figure 6 Plan view of butt joint

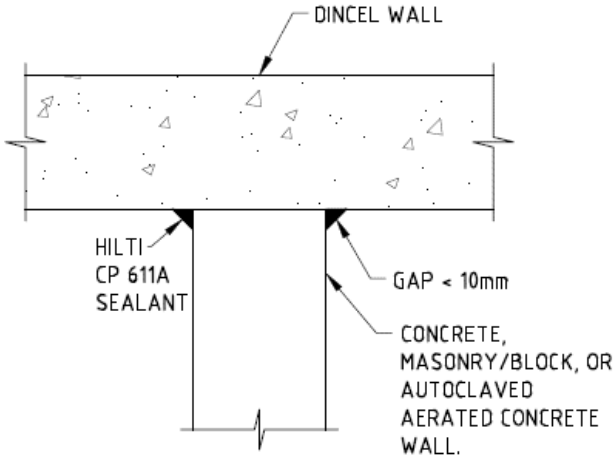

Figure 7 Plan view of T-joint arrangement-1

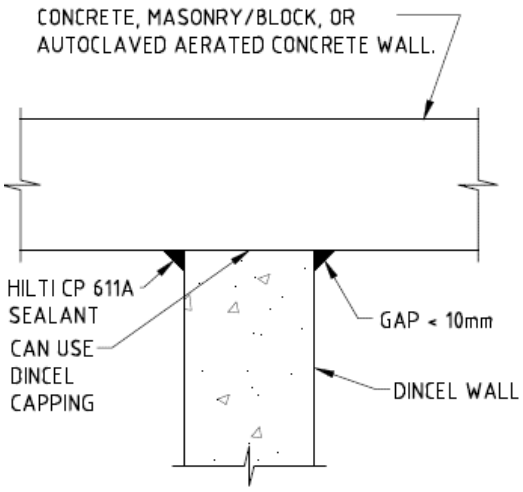

Figure 8 Plan view of T-joint arrangement-2

A summary of the proposed variations is presented in Table 8.

Table 8 Dincel wall to minimum 75mm thick rigid wall gap sealing systems

Dincel wall details	Rigid wall details	Gap sealing system details	Proposed FRL
• Minimum thickness shall be 155mm • Minimum concrete density shall be 2400kg/m^3	• Rigid wall shall have a minimum thickness of 75mm • It shall comprise of either concrete, autoclaved aerated concrete (eg Hebel panel/ block) or concrete core filled/ solid masonry with a minimum density of 510kg/m^3	• The maximum gap width shall be 10mm • Hilti CP 611A sealant shall be applied as a fillet on either side • The minimum sealant fillet size shall be 25mm × 25mm	• -/120/120[12] • Up to -/180/180[13] only if the separating elements have been tested or assessed to achieve the same FRL

[12] The rigid wall shall have been tested or otherwise assessed to achieve the required FRL.
[13] The rigid wall shall have been tested or otherwise assessed to achieve the required FRL.

3.3.4 Dincel wall to minimum 150mm thick rigid wall control joints (30mm ≥ joint width ≥ 10mm)

Referenced tests

- The referenced tests for the assessment are FRT190129 R2.0 joints C and D.

Description of the proposed construction

- The tested system comprised of two 30mm wide joints made by 275mm and 155mm thick Dincel walls abutting a 75mm thick Hebel panel wall.
- One connection was formed through side abutting between the separating elements. The other represented a T-joint where the steel framed wall abutted the Dincel wall transversely.
- In one joint, mineral wool (density ≥ 50kg/m^3) was installed within the depth of the joint with Hilti Firestop CP 611 sealant installed to a depth of 20mm on either side.
- In the other joint, open cell backing rods were installed at a depth of 20mm from either side. Hilti Firestop CP 611 sealant was then used to fill the 20mm gaps on either side of the joint up to the backing rods.

Proposed system with 150mm rigid walls

- Dincel walls must be 155mm, 200mm or 275mm thick, filled with concrete with a minimum density of 2400kg/m^3.
- The rigid wall shall have a minimum thickness of 150mm. It shall comprise of either concrete, autoclaved aerated concrete (eg Hebel block) or concrete core filled/ solid masonry with a minimum density of 510kg/m^3.
- The Dincel wall end capping detail can be either top cap (P-TC), end cap (P-EC) or stop end (P-SE) as per Dincel accessories.

Additional requirements

- The rigid wall shall have been tested or otherwise assessed to achieve the required FRL (-/180/180 or -/240/240).
- The Dincel wall shall have been tested or otherwise assessed to achieve the FRL of -/240/240, if this FRL is required.

Applicability

- The FRL of the control joint is limited by that of the separating elements, established through fire resistance testing in accordance with AS 1530.4:2014 Sections 2 and 3.
- For common applications with concrete, autoclaved aerated concrete (eg Hebel block) or concrete core filled/ solid masonry with a minimum density of 510kg/m^3 and a minimum thickness of 150mm, the control joint system is likely to achieve an FRL of -/180/180.
- The proposed control joint systems are likely to achieve FRL up to -/240/240, provided only if the FRL of the wall separating elements have been established to be the same through testing in accordance with AS 1530.4:2014 Sections 2 and 3.

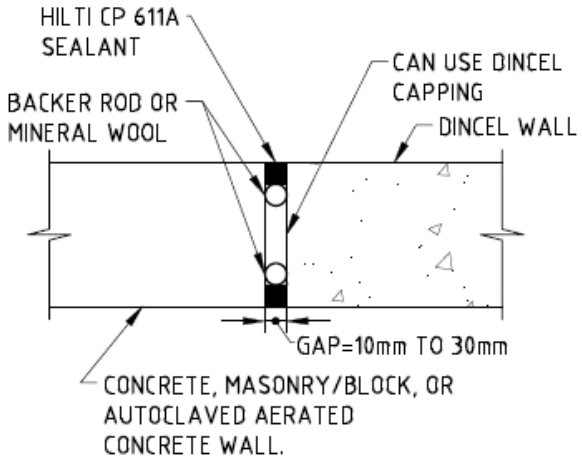

Figure 9 Plan view of butt joint

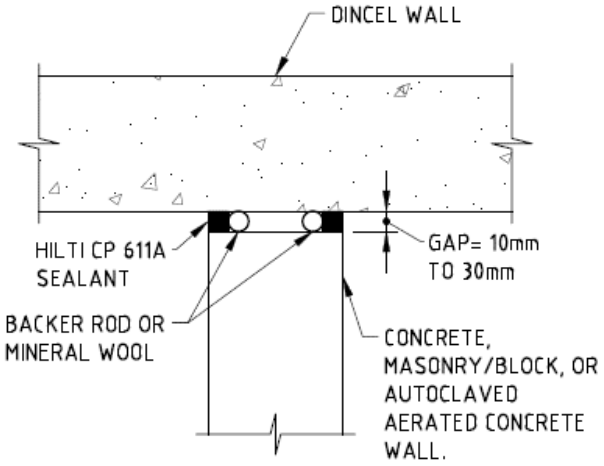

Figure 10 Plan view of T-joint arrangement-1

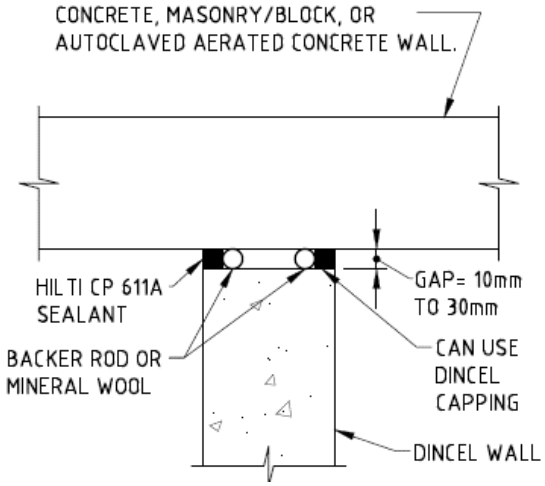

Figure 11 Plan view of T-joint arrangement-2

A summary of the proposed variations is presented in Table 9.

Table 9 Dincel wall to minimum 150mm thick rigid wall control joints

Dincel wall details	Rigid wall details	Control joint system details	Proposed FRL
• Minimum thickness shall be 155mm • Minimum concrete density shall be 2400kg/m^3	• Rigid wall shall have a minimum thickness of 150mm • It shall comprise of either concrete, autoclaved aerated concrete (eg Hebel block) or concrete core filled/ solid masonry with a minimum density of 510kg/m^3	• The maximum joint width shall be 30mm • The minimum depth of Hilti CP 611A sealant shall be 20mm • The backing materials to the sealant shall be either PEF backing rods on either side or mineral wool insulation installed to the full depth	• -/180/180[14] • Up to -/240/240[15] only if the separating wall elements have been tested or assessed to achieve the same FRL

[14] The rigid wall shall have been tested or otherwise assessed to achieve the required FRL.
[15] The Dincel wall and any rigid wall shall have been tested or otherwise assessed to achieve the required FRL.

3.3.5 Dincel wall to minimum 150mm thick rigid wall gaps (gap width < 10mm)

Referenced tests

- The referenced tests for the assessment are FRT190129 R2.0 joints B, C and D.

Description of the proposed construction

- The tested system B comprised of a direct abutting between two Dincel walls with no local fire stopping elements.
- The tested systems C and D comprised of two 30mm wide joints made by 275mm and 155mm thick Dincel walls abutting a 75mm thick Hebel panel wall. One connection was formed through side abutting between the separating elements. The other represented a T-joint where the steel framed wall abutted the Dincel wall transversely. In one joint, mineral wool (density ≥ 50kg/m^3) was installed within the depth of the joint with Hilti Firestop CP 611 sealant installed to a depth of 20mm on either side. In the other joint, open cell backing rods were installed at a depth of 20mm from either side. Hilti Firestop CP 611 sealant was then used to fill the 20mm gaps on either side of the joint up to the backing rods.

Proposed system with 150mm rigid walls

- Dincel walls must be 155mm, 200mm or 275mm thick, filled with concrete with a minimum density of 2400kg/m^3.
- The rigid wall shall have a minimum thickness of 150mm. It shall comprise of either concrete, autoclaved aerated concrete (eg Hebel block) or concrete core filled/ solid masonry with a minimum density of 510kg/m^3.
- The Dincel wall end capping detail can be either top cap (P-TC), end cap (P-EC) or stop end (P-SE) as per Dincel accessories.

Additional requirements

- The rigid wall shall have been tested or otherwise assessed to achieve the required FRL (-/180/180 or -/240/240).
- The Dincel wall shall have been tested or otherwise assessed to achieve the FRL of -/240/240, if this FRL is required.

Applicability

- The FRL of the control joint is limited by that of the separating elements, established through fire resistance testing in accordance with AS 1530.4:2014 Sections 2 and 3.
- For common applications with concrete, autoclaved aerated concrete (eg Hebel block) or concrete core filled/ solid masonry with a minimum density of 510kg/m^3 and a minimum thickness of 150mm, the control joint system is likely to achieve an FRL of -/180/180.
- The proposed control joint systems are likely to achieve FRL up to -/240/240, provided only if the FRL of the wall separating elements have been established to be the same through testing in accordance with AS 1530.4:2014 Sections 2 and 3.

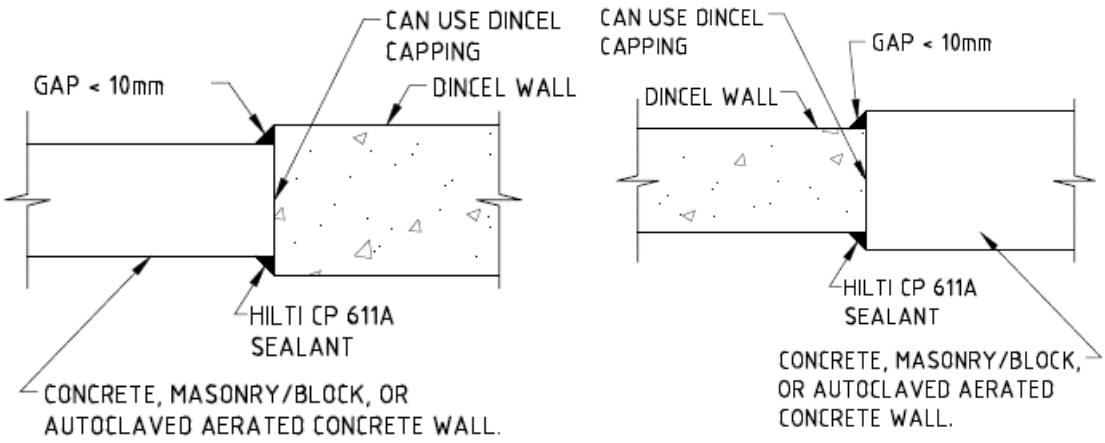

Figure 12 Plan view of butt joint

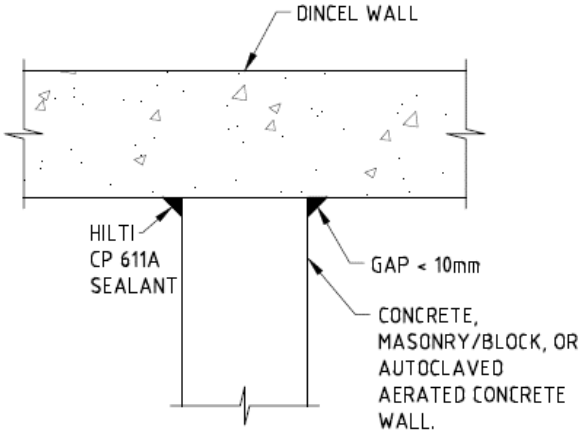

Figure 13 Plan view of T-joint arrangement-1

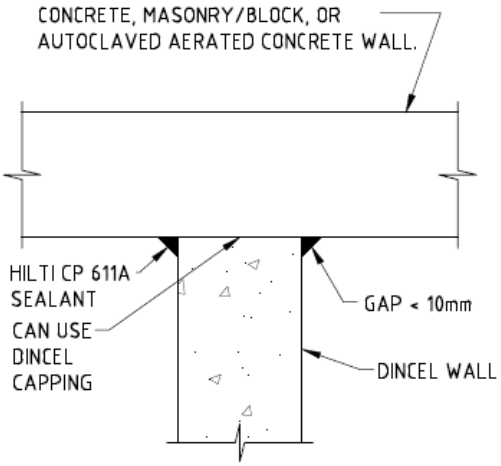

Figure 14 Plan view of T-joint arrangement-2

A summary of the proposed variations is presented in Table 10.

Table 10 Dincel wall to minimum 150mm thick rigid wall gap sealing systems

Dincel wall details	Rigid wall details	Gap sealing system details	Proposed FRL
• Minimum thickness shall be 155mm • Minimum concrete density shall be 2400kg/m^3	• Rigid wall shall have a minimum thickness of 150mm • It shall comprise of either concrete, autoclaved aerated concrete (eg Hebel block) or concrete core filled/ solid masonry with a minimum density of 510kg/m^3	• The maximum gap width shall be 10mm • Hilti CP 611A sealant shall be applied as a fillet on either side • The minimum sealant fillet size shall be 25mm × 25mm	• -/180/180[16] • Up to -/240/240[17] only if the separating elements have been tested or assessed to achieve the same FRL

[16] The rigid wall shall have been tested or otherwise assessed to achieve the required FRL.
[17] The Dincel wall and any rigid wall shall have been tested or otherwise assessed to achieve the required FRL.

3.4 Purpose of the test method

Sections 2 of AS 1530.4:2014 specify the general requirements for conducting fire resistance tests. Section 10 of AS 1530.4:2014 give guidelines for determining the fire resistance of elements of construction penetrated by services such as control joints. AS 4072.1-2005[18] sets out the minimum requirements for the construction, installation and application of fire resistance tests to sealing systems. These include control joints between building elements that are required to have a fire resistance level (FRL).

4. Scope, objective and assumptions

4.1 Scope and objective

- The scope of this report is limited to an assessment of the variations to the tested systems described in Section 3.3.
- 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 AS1530.4:2014 and AS 4072.1-2005.
- The results of this assessment are applicable to control joints/gaps sealing systems exposed to fire from either side as all the assessed systems are symmetrical.
- This report is only valid for the assessed systems. 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.

[18] Standards Australia (2005) *Components for the protection of openings in fire-resistant separating elements* Part 1: Service penetrations and control joints, AS 4072.1-2005

5. Assessment 1 – Dincel wall to steel framed plasterboard lined wall gaps (gap width < 15mm)

5.1 Description of variation

Two of the tested systems in FRT190129 R2.0 comprised of a steel framed wall, made with 64mm deep steel studs lined with two layers of 13mm thick fire rated plasterboards on either side (total wall thickness = 116mm), directly abutting 155mm thick Dincel walls. Specimen E side abutted the Dincel wall while Specimen F abutted the Dincel wall in a representative T-joint orientation.

The steel studs (plasterboard framing) was fixed to the Dincel walls. Thus, the tested systems do not allow the relative movement between the two separating elements (Dincel wall and steel framed wall). Hence, they do not accommodate the non-uniform expansion between the two different wall systems. Therefore, the system does not strictly qualify as a control joint system.

However, the construction detail can still be assessed based on the referenced test data. The assessment outcomes only apply to proposed constructions similar to the tested systems.

In the tested specimens, a gap of 15mm existed between the plasterboard edge and the Dincel wall. This gap was filled to a depth of 26mm (full depth of two 13mm thick plasterboards).

The proposed additional variations are:

- The use of 200mm and 275mm thick Dincel walls, filled with concrete with a minimum density of 2400kg/m^3, instead of 155mm thick Dincel walls as part of separating elements.
- If the gap width is within 10mm – 15mm, the proposed construction is similar to the tested system.
- For gaps less than 10mm in width, the nozzle tip is difficult to be inserted into the gap to apply the sealant within the gap. Therefore, it is proposed that the sealant is applied in the form of an external fillet with each leg of the fillet not less than 25mm in length.

The gap shall have a vertical steel stud underneath, similar to the tested systems. Steel framed, plasterboard lined wall separating element shall have a minimum total thickness of 116mm. It shall have been tested or otherwise assessed to achieve an FRL of -/120/120, with or without cavity insulation.

5.2 Methodology

The approach and method of assessment used for this assessment is summarised in Table 11.

Table 11 Method of assessment

Assessment method	
Level of complexity	Intermediate assessment
Type of assessment	Qualitative and comparative

5.3 Assessment

5.3.1 Observations from tests

For systems with a gap width of 10 – 15mm, the referenced test results are directly applicable for the purpose of the assessment. In Specimen E of FRT190129 R2.0, the top thermocouple on the gap sealant (thermocouple no 051) reached failure due to exceeding insulation temperature threshold after 140 minutes from the start of the test. Specimen F reached insulation failure after 171 minutes of fire exposure 25mm from the joint on the plasterboard (thermocouple no 106). Therefore, both systems achieve an FRL of -/120/120, in accordance with AS 1530.4:2014. In general, the thermocouples on Dincel wall separating elements recorded much lower temperature rise.

5.3.2 Applicability to side abutted systems (10mm ≤ gap width ≤ 15mm)

Proposed systems with gap widths within 10 – 15mm are identical to the tested system. Provided that the construction details are not altered, it is likely that similar gap sealing systems installed between Dincel walls and steel framed walls will also achieve similar performance, if tested in accordance with AS 1530.4: 2014.

Increasing the thickness of the Dincel wall to either 200mm or 275mm improves the thermal mass of the wall. Therefore, the unexposed surface temperature on the Dincel wall, and to an extent, those on the gap sealant, are likely to reduce if tested under similar conditions.

As Dincel top cap (P-TC), end cap (P-EC) and stop end (P-SE) are made of the same materials and are of similar thickness, the use of either one is unlikely to change the behaviour of the system significantly.

5.3.3 Applicability to side abutted systems (gap width < 10mm)

It is proposed that if the gap width is less than 10mm, the sealant is applied as a continuous fillet along the surface of the joint. Each fillet leg shall be at least 25mm in width. Thus, the throat thickness of the fillet will be approximately 17.5mm (25mm × sin (45)).

During the application of the sealant, it is expected that some of the sealant material will sink into the gap, providing some additional thickness to the filet.

The referenced test specimens were 15mm wide and the sealant depth was 26mm. It is expected that the reduced width of the gap (<10mm) will provide some passive protection by causing a reduction in the heat progression across the joint.

The fall-off of the sealant was only observed after 204 minutes of fire exposure in the tested System E due to the movement of the Dincel wall. Hence, for a period of 120 minutes, it is likely that the mechanical adhesion properties of the sealant fillet will be sufficient for it to retain in place, providing protection to the gap.

Considering these, it is likely that for gap widths less than 10mm, a 25mm × 25mm fillet size sealant would provide sufficient protection such that they achieve an FRL of -/120/120.

5.3.4 Applicability of T-jointed systems

A side abutted system is exposed to fire across the entire facing of both the separating elements. Comparatively, in a T-jointed system, one separating element acts more as a barrier. This reduces the total heat input to the gap sealing system. Based on this, it is likely that a gap sealing system tested in a side abutting orientation will perform either similarly or better when tested in a T-joint orientation.

Based on these, it is established that side abutted gap sealing systems are more onerous than T-jointed systems. Therefore, the outcomes for the side abutted gap sealing systems/ control joints are applicable to T-jointed systems.

5.4 Conclusion

Based on the above discussion, it is likely that the tested Dincel wall to steel framed wall construction detail described in Section 3.2, if varied as described in Section 3.3.1 subject to the additional requirements, and tested in accordance with the test method described in Section 3.4, will likely achieve an FRL of -/120/120. Steel framed, plasterboard lined wall separating element shall have been tested or otherwise assessed to achieve an FRL of -/120/120, with or without cavity insulation.

6. Assessment 2 – Dincel wall to minimum 75mm thick rigid wall joints

6.1 Description of variation

Two of the tested systems in FRT190129 R2.0 comprised of an autoclaved aerated concrete wall (75mm thick Hebel panel wall), directly abutting 275mm and 155mm thick Dincel walls. Specimen D side abutted the Dincel wall while Specimen C abutted the Dincel wall in a representative T-joint orientation.

The tested systems allow the relative movement between the two separating elements (Dincel wall and autoclaved aerated concrete wall). Hence, they accommodate the non-uniform expansion between the two different wall systems. Therefore, the system qualifies as a control joint system.

The control joints can be assessed based on the referenced test data. The assessment outcomes apply to proposed constructions similar to the tested systems.

In the tested specimens, a gap of 30mm existed between the wall edge and the Dincel wall. This gap was filled to a depth of 20mm.

The proposed additional variations are:

- The use of 200mm and 275mm thick Dincel walls, filled with concrete with a minimum density of 2400kg/m^3, instead of 155mm thick Dincel walls.
- The use of other autoclaved aerated concrete, concrete and masonry walls with a minimum density of 510kg/m^3 and a minimum thickness of 75mm instead of the autoclaved aerated concrete panel used in the referenced test (Hebel panels)
- The Dincel wall end capping detail can be either top cap (P-TC), end cap (P-EC) or stop end (P-SE) as per Dincel accessories.
- If the gap width is within 10mm – 30mm, the proposed construction is similar to the tested system.
- For gaps less than 10mm in width, the nozzle tip is difficult to be inserted into the gap to apply the sealant within the gap. Therefore, it is proposed that the sealant is applied in the form of an external fillet with each leg of the fillet not less than 25mm in length.

Local fire protection shall be applied in the form of either:

- Mineral wool with a minimum density of 50kg/m^3 installed within the depth of the joint with Hilti Firestop CP 611 sealant installed to a depth of 20mm on either side; or,
- Open cell backing rods installed at a depth of 20mm from either side, and Hilti Firestop CP 611 sealant used to fill the 20mm gaps on either side of the joint up to the backing rods.

6.2 Methodology

The approach and method of assessment used for this assessment is summarised in Table 11.

Table 12 Method of assessment

Assessment method	
Level of complexity	Intermediate assessment
Type of assessment	Qualitative and comparative

6.3 Assessment

6.3.1 Observations from tests

For systems with a gap width of 10 – 30mm, the referenced test results are directly applicable for the purpose of the assessment. In Specimen C of FRT190129 R2.0, the thermocouple 25mm from the joint on the Hebel separating element (thermocouple no 037) reached failure due to exceeding insulation temperature threshold after 227 minutes from the start of the test. Specimen D reached insulation failure after 190 minutes of fire exposure 25mm from the joint on the Hebel separating element (thermocouple no 044). Therefore, both systems achieve an FRL of -/180/180, in accordance with AS 1530.4:2014. In general, the thermocouples on Dincel wall separating elements recorded much lower temperature rise.

6.3.2 Discussion points

The simplified referenced systems do not account for the numerous additional details that are encountered in an actual gap sealing system installed onsite. Furthermore, the referenced test does not qualify the 75mm thick autoclaved aerated concrete wall to have an FRL of -/180/180. The FRL of the separating rigid wall requires to be established separately.

The FRL of the gap sealing system/ control joint is limited by that of the separating element. Therefore, when used in conjunction with any rigid wall system (conforming to the minimum thickness and density requirements as specified earlier), the FRL of the gap sealing system shall be limited by that of the wall system.

However, based on the readings from the thermocouples on the 75mm thick autoclaved aerated concrete panel in Systems C and D in the referenced test report (FRT 190129 R2.0), there is reasonable confidence that a similar system installed onsite, between a Dincel wall (minimum thickness = 155mm, minimum concrete density = 2400kg/m^3) and a 75mm thick rigid wall (autoclaved aerated concrete, concrete or masonry; minimum density = 510kg/m^3) will likely achieve an FRL of -/120/120.

Provided that the FRL of the 75mm thick separating element has been established to be greater than -/120/120, either through testing in accordance with AS 1530.4:2014 or an assessment from a registered testing authority, the FRL of the gap sealing system may be increased to a maximum of -/180/180.

Increasing the thickness of the Dincel wall to either 200mm or 275mm improves the thermal mass of the wall. Therefore, the unexposed surface temperature on the Dincel wall, and to an extent, those on the gap sealant, are likely to reduce if tested under similar conditions.

As Dincel top cap (P-TC), end cap (P-EC) and stop end (P-SE) are made of the same materials and are of similar thickness, the use of either one is unlikely to change the behaviour of the system significantly.

6.3.3 Applicability to side abutted systems (10mm ≤ gap width ≤ 30mm)

Proposed systems with gap widths within 10 – 30mm are identical to the tested system. Provided that the construction details are not altered, it is likely that similar gap sealing systems installed between a Dincel wall and a minimum 75mm thick rigid wall will also achieve similar performance, if tested in accordance with AS 1530.4: 2014.

6.3.4 Applicability to side abutted systems (gap width < 10mm)

It is proposed that if the gap width is less than 10mm, the sealant is applied as a continuous fillet along the surface of the joint. Each fillet leg shall be at least 25mm in width (Minimum fillet size shall be 25mm × 25mm). Thus, the throat thickness of the fillet will be approximately 17.5mm (25mm × sin (45)).

During the application of the sealant, it is expected that some of the sealant material will sink into the gap, providing some additional thickness to the filet.

Fall-off of sealant was not observed in the tested Systems C and D throughout the test duration (241 minutes). Hence, the mechanical adhesion properties between the sealant and the separating elements are deemed adequate for the sealant fillet to remain in place for the required duration.

The referenced test specimens were 30mm wide and the sealant depth was 20mm. It is expected that the reduced width of the gap (<10mm) will provide some passive protection by causing a reduction in the heat progression across the joint.

6.3.5 Applicability of T-jointed systems

It was previously established that side abutted gap sealing systems are more onerous than T-jointed systems. Therefore, the outcomes for the side abutted gap sealing systems/ control joints are applicable to T-jointed systems.

6.4 Conclusion

Based on the above discussion, it is likely that the proposed Dincel wall (minimum thickness = 155mm, minimum concrete density = 2400kg/m^3) to autoclaved aerated concrete, concrete or masonry wall (minimum thickness = 75mm, minimum density = 510kg/m^3) gap sealing systems described in Section 3.2, if varied as described in Sections 3.3.2 and 3.3.3 subject to the additional requirements, and tested in accordance with the test method described in Section 3.4, will likely achieve an FRL of -/120/120. The FRL of the 75mm thick autoclaved aerated concrete, concrete or masonry wall separating elements shall have been established to be -/120/120, either through testing in accordance with AS 1530.4:2014 or an assessment from a registered testing authority.

Provided that the FRL of the 75mm thick autoclaved aerated concrete, concrete or masonry wall separating elements have been established to be greater than -/120/120, either through testing in accordance with AS 1530.4:2014 or an assessment from a registered testing authority, the FRL of the gap sealing system may be increased to a maximum of -/180/180.

7. Assessment 3 – Dincel wall to minimum 150mm thick rigid wall joints

7.1 Description of variation

The tested systems in FRT190129 R2.0 did not comprise of a 150mm thick rigid wall. However, based on the available test results, an opinion on the likely fire resistance performance of similar systems to those tested (Systems C and D), installed between a Dincel wall and a rigid wall made of autoclaved aerated concrete, concrete or masonry with a minimum thickness of 150mm and a minimum density of 510kg/m^3 can be provided.

The proposed additional variations are:

- The use of 200mm and 275mm thick Dincel walls, filled with concrete with a minimum density of 2400kg/m^3, instead of 155mm thick Dincel walls.
- The use of other autoclaved aerated concrete, concrete and masonry walls with a minimum density of 510kg/m^3 and a minimum thickness of 150mm instead of the autoclaved aerated concrete panel used in the referenced test (Hebel panels)
- The Dincel wall end capping detail can be either top cap (P-TC), end cap (P-EC) or stop end (P-SE) as per Dincel accessories.
- If the gap width is within 10mm – 30mm, the proposed construction is similar to the tested system.
- For gaps less than 10mm in width, the nozzle tip is difficult to be inserted into the gap to apply the sealant within the gap. Therefore, it is proposed that the sealant is applied in the form of an external fillet with each leg of the fillet not less than 25mm in length.

Local fire protection shall be applied in the form of either:

- Mineral wool with a minimum density of 50kg/m^3 installed within the depth of the joint with Hilti Firestop CP 611 sealant installed to a depth of 20mm on either side; or,
- Open cell backing rods installed at a depth of 20mm from either side, and Hilti Firestop CP 611 sealant used to fill the 20mm gaps on either side of the joint up to the backing rods.

7.2 Methodology

The approach and method of assessment used for this assessment is summarised in Table 11.

Table 13 Method of assessment

Assessment method	
Level of complexity	Intermediate assessment
Type of assessment	Qualitative and comparative

7.3 Assessment

7.3.1 Implications on insulation and integrity performance

Insulation performance

The referenced test results have shown that 30mm wide gap sealing system C and D achieved an FRL of -/180/180 with a 75mm thick autoclaved aerated concrete separating rigid wall element. Increasing the thickness of this rigid wall element to 150mm would double its thermal mass. Consequently, if the behaviour of the gap sealant remained similar to the tested system, the temperature rise on the unexposed side of the 150mm thick separating element, if tested under similar conditions, would be lower. It is likely that the time taken for the unexposed side temperatures on the separating rigid wall element, 25mm from the gap sealing system, to increase by 180°C, would be greater than 240 minutes.

Integrity performance

Integrity failure was not observed in the referenced systems C and D in FRT190129 R2.0 until the termination of the test. While expansion of the sealant on the exposed side caused the dislocation of the sealant on the unexposed side, this did not cause integrity failure due to sustained flaming or the ignition of the cotton pad.

If the thickness of the separating rigid wall element was increased to 150mm, it would provide further space for the expansion of the fire side sealant within the gap, before dislocating the unexposed side sealant. Therefore, the integrity performance is likely to reach 240 minutes.

7.3.2 Discussion points

Based on above discussion, there is reasonable confidence that a similar system installed onsite, between a Dincel wall (minimum thickness = 155mm, minimum concrete density = 2400kg/m^3) and a 150mm thick rigid wall (autoclaved aerated concrete, concrete or masonry; minimum density = 510kg/m^3) will likely achieve an FRL of -/180/180.

The FRL of the gap sealing system/ control joint is limited by that of the separating element. Therefore, when used in conjunction with any rigid wall system (conforming to the minimum thickness and density requirements as specified earlier), the FRL of the gap sealing system shall be limited by that of the wall system.

Provided that the FRL of the 150mm thick separating element has been established to be greater than -/180/180, either through testing in accordance with AS 1530.4:2014 or an assessment from a registered testing authority, the FRL of the gap sealing system may be increased to a maximum of -/240/240.

Increasing the thickness of the Dincel wall to either 200mm or 275mm improves the thermal mass of the wall. Therefore, the unexposed surface temperature on the Dincel wall, and to an extent, those on the gap sealant, are likely to reduce if tested under similar conditions.

Fall-off of sealant was not observed in the tested Systems C and D throughout the test duration (241 minutes). Hence, the mechanical adhesion properties between the sealant and the separating elements are deemed adequate for the sealant fillet to remain in place for the required duration.

As Dincel top cap (P-TC), end cap (P-EC) and stop end (P-SE) are made of the same materials and are of similar thickness, the use of either one is unlikely to change the behaviour of the system significantly.

7.3.3 Applicability to side abutted systems (10mm ≤ gap width ≤ 30mm)

Based on the above discussion, proposed systems with gap widths within 10 – 30mm, installed between Dincel walls and rigid walls (minimum thickness = 150mm), are likely to achieve similar performance, if tested in accordance with AS 1530.4: 2014.

7.3.4 Applicability to side abutted systems (gap width < 10mm)

It is proposed that if the gap width is less than 10mm, the sealant is applied as a continuous fillet along the surface of the joint. Each fillet leg shall be at least 25mm in width (Minimum fillet size shall be 25mm × 25mm). Thus, the throat thickness of the fillet will be approximately 17.5mm (25mm × sin (45)).

During the application of the sealant, it is expected that some of the sealant material will sink into the gap, providing some additional thickness to the filet.

The referenced test specimens were 30mm wide and the sealant depth was 20mm. It is expected that the reduced width of the gap (<10mm) will provide some passive protection by causing a reduction in the heat progression across the joint.

7.3.5 Applicability of T-jointed systems

It was previously established that side abutted gap sealing systems are more onerous than T-jointed systems. Therefore, the outcomes for the side abutted gap sealing systems/ control joints are applicable to T-jointed systems.

7.4 Conclusion

Based on the above discussion, it is likely that the proposed Dincel wall (minimum thickness = 155mm, minimum concrete density = 2400kg/m^3) to autoclaved aerated concrete, concrete or masonry wall (minimum thickness = 150mm, minimum density = 510kg/m^3) gap sealing systems described in Sections 3.3.4 and 3.3.5 subject to the additional requirements, and tested in accordance with the test method described in Section 3.4, will likely achieve an FRL of -/180/180. The FRL of the 150mm thick autoclaved aerated concrete, concrete or masonry wall separating elements shall have been established to be -/180/180, either through testing in accordance with AS 1530.4:2014 or an assessment from a registered testing authority.

Provided that the FRL of the Dincel wall and the 150mm thick autoclaved aerated concrete, concrete or masonry wall separating elements have been established to be greater than -/180/180, either through testing in accordance with AS 1530.4:2014 or an assessment from a registered testing authority, the FRL of the gap sealing system may be increased to a maximum of -/240/240.

8. 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 Dincel Construction System and Hilti Australia Pty Ltd for their 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.

Appendix A Summary of supporting test data

A.1 Test report – FRT190129 R2.0

Table 14 Information about test report

Item	Information about test report
Report sponsor	Dincel Construction System and Hilti Australia Pty Ltd
Test laboratory	Warringtonfire Australia, Unit 2, 409-411 Hammond Road, Dandenong, Victoria 3175, Australia.
Test date	The fire resistance test was completed on 10 July 2019.
Test standards	The test was done in accordance with AS 1530.4:2014.
Variation to test standards	The pressure was 1Pa below the limits prescribed in the standard during the 30-40 minute period and it was 7 Pa and 3Pa down during the 45-50 and 65-70 minute periods, respectively. The pressure was 2Pa and 4Pa above the limits prescribed in the standard during the 90-95 and 95-100 minute periods, respectively. The pressure and temperature were within the limits for the rest of the test duration. So, these under and above pressures are unlikely to have affected the outcome of the test.
General description of tested specimen	The test comprised of five gap sealing systems including two control joints (Specimens C and D), and three general construction details which do not strictly qualify as control joints, but can be considered as general gap sealing systems and assigned an FRL (Specimens B, E and F). Further information on each of the specimens are provided in Table 15.
Instrumentation	The test report states that the instrumentation was in accordance with AS 1530.4:2014.

Table 15 FRT190129 R2.0 specimen information

Specimen	Separating elements	Joint/gap width (mm)	Local fire stopping protection
A	Concrete lintel – 155mm Dincel wall	30	Rockwool batts installed to full depth leaving 20mm on either side. Hilti CP 611A sealant installed to a depth of 20mm on either side.
B	155mm Dincel wall – 275mm Dincel wall	No gap. N12 dowels were provided at 300mm spacing between the separating elements.	No local fire stopping element was provided.
C	275mm Dincel wall – 75mm Hebel wall	30	Rockwool batts installed to full depth leaving 20mm on either side. Hilti CP 611A sealant installed to a depth of 20mm on either side.
D	75mm Hebel wall – 155mm Dincel wall	30	Open cell backing rod installed to a depth of 10mm on either side. Hilti CP 611A sealant installed to a depth of 20mm on either side.
E	155mm Dincel wall – 116mm steel framed wall	15	Hilti CP 611A sealant installed to a depth of 26mm on either side within the gap between the plasterboard edge and Dincel wall.
F	116mm steel framed wall to 155mm Dincel wall (transverse orientation)	15	Hilti CP 611A sealant installed to a depth of 26mm on either side within the gap between the plasterboard edge and Dincel wall.

The test specimen achieved the results shown in Table 16.

Table 16 Results summary for this test report

Performance criteria	FRL
A	-/240/240
B	-/240/240
C	-/240/180
D	-/180/180
E	-/180/120
F	-/180/120