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Regulatory Information Report

Block CFS-BL and Flexible Firestop Foam CFS-F FX protecting cable penetrations in walls and floors

Sponsor: Hilti (Aust.) Pty Ltd

Project reference number: FAS200018 Report number: 28870 Revision: RIR6.1

Issued date: 9 December 2020 Expiry date: 31 March 2024

Quality management

Version	Date	Information relating to report			
RIR0.0	Issue: 17/03/2014	Reason for issue	Initial review		
			Prepared by	Reviewed by	Approved by
		Name	S. Hu	K Nicholls	K Nicholls
RIR1.0	Issue: 15/12/2015	Reason for issue	Revised to clarify floor seal system		
			Prepared by	Reviewed by	Approved by
		Name	D. Nicholson	K Nicholls	K Nicholls
RIR2.0	Issue: 10/01/2018	Reason for issue	Revalidation in accordance with AS 1530.4:2014		
			Prepared by	Reviewed by	Approved by
		Name	Tan Bhat	M. Akl	M. Akl
RIR3.0	Issue: 09/10/2019	Reason for issue	Revision to include AFS logical wall system		
			Prepared by	Reviewed by	Approved by
		Name	Rami Al Darwish	Omar Saad	Omar Saad
RIR4.0	Issue: 20/03/2020	Reason for issue	Revision to include Dincel wall system		
			Prepared by	Reviewed by	Approved by
		Name	Yomal Dias	Omar Saad	Omar Saad
RIR5.0	Issue: 27/07/2020	Reason for issue	Revision to include discussion on D1 and D2 cables and XLPE sheathing and amendment to the description on blank seals in floors.		
			Prepared by	Reviewed by	Approved by
		Name	Rami Al Darwish	Omar Saad	Omar Saad
RIR6.0	Issue: 29/10/2020	Reason for issue	Re-issue to Include additional services and update distance requirements of cables		
		Name	Prepared by	Reviewed by	Approved by
			Rami Al Darwish	Mahmoud Akl	Omar Saad
RIR6.1	Issue: 9/12/2020	Reason for issue	Re-issue to address minor comments from sponsor.		
	Expiry: 31/03/2024	Name	Prepared by	Reviewed by	Approved by
			Rami Al Darwish	Yomal Dias	Omar Saad
		Signature			

Executive summary

This report contains the minimum information sufficient for regulatory compliance and refers to assessment report 28870 R6.1.

The referenced assessment report,28870 R6.1, presents an assessment on the fire resistance of Firestop Block CFS-BL and Flexible Firestop Foam CFS-F FX when protecting cable penetrations in AFS, Dincel walls and concrete walls/floors in accordance with AS 1530.4:2014 and assessed in accordance to AS 4072.1:2005 (R2016).

The analysis in section 5 of The referenced assessment report found that the proposed variations are likely to achieve the FRL as shown in Table 1, if tested in accordance with AS 1530.4:2014 and assessed in accordance to AS 4072.1:2005 (R2016).

Table 1 Assessment outcome for cable penetrations, flexible / rigid wall, at least 100 mm thick with build up to 150 mm for rigid walls and 200 mm for flexible walls

Description of Services	FRL	
Blank Opening without Hilti Firestop Filler CP611A and without Hilti Firestop Putty Bandage CFS-P BA		
Blank opening or opening with services: 1000 mm × 1000 mm or equivalent area	**-/120/120**	
Standard Cable Services	With Hilti Firestop Intumescent Fillers (A_1)	With Hilti Firestop Intumescent Fillers (A_{1b}) & Hilti Firestop Putty Bandage (A_{2a} & A_{2b})
PVC or XLPE insulated D1 Power Cable included but not limited to Submain, TPS, SDI, Fire rated cable, security cable and earth cable with or without cable tray (Standard D1 cable set, in accordance with AS 1530.4:2014 Appendix D) The assessed D1 and D2 cables are applicable to other cables of the same material with diameters up to the maximum tested. The cables can be bundled in different ways provided the loading on the cable tray is the same or lower to the tested prototype. Moreover, the cables may be applied to all PVC and XLPE insulated and PVC sheathed power and communication cables with copper conductors, provided the results are for the same penetration sealing system in the same separating element and all of the specimens achieved the designated FRL or greater.	**-/120/90**	**-/120/120**
PVC or XLPE insulated D2 Communication Cable included but not limited to Data Cable, CAT6, Coxial and Optic Fibre with or without cable tray (Standard D2 cable set, in accordance with AS 1530.4:2014 Appendix D)*		
Coaxial cables: 27.8mm ≤ Ø ≤ 59.9 mm	With Hilti Firestop Intumescent Fillers (A_1) & Hilti Firestop Putty Bandage (A_{2a} & A_{2b})	
• RFS Cellflex**:** LCF 78-50 JA Ø 27.8 mm • RFS Cellflex**:** LCF 214-50 JA Ø 59.9 mm • RFS Helifex**:** HCA 78-50 JA Ø 28.0 mm • RFS Helifex: HCA 158J Ø 59.9 mm • RFS Radiaflex**:** RLKW 78-50 Ø28.5 mm • RFS Radiaflex**:** RLKU 158-50 JFLA Ø48.2 mm	**-/120/120**	
Bus bar	With Hilti Firestop Intumescent Fillers (A_1) & Hilti Firestop Putty Bandage (A_{2a} & A_{2b})	

Description of Services	FRL
• EAE ELEKTRIK • Type: E-Line KXC 40505-B; 4000A • Maximum outer dimension of the section: 37`2 mm × 150 mm • Conductor material: Copper • Maximum number of conductors: 10 • Maximum section of the conductors: 140	**-/120/120**
Cables	With Hilti Firestop Intumescent Fillers (A_1) & Hilti Firestop Putty Bandage (A_{2a} & A_{2b})
• All sheathed single cables Ø≤25 mm • All sheathed single cables 25≤Ø≤50 mm • All sheathed single cables 50≤Ø≤80 mm • Tied cable tied bundle Ø≤100 mm	**-/120/120**
Conduits and tubes	With Hilti Firestop Intumescent Fillers (A_1) & Hilti Firestop Putty Bandage (A_{2a} & A_{2b})
Plastic conduits and tubes Ø≤16 mm	**-/120/120**
Steel conduits and tubes up to 16 mm with or without cables or optic fibre cables	**-/120/120**
Single Plastic Conduits and tubes: Rigid and flexible PO: polyolefin (PE, PP, PPE, PPO); Rigid PVC: polyvinyl chloride	With Hilti Firestop Intumescent Fillers (A_1)
Single Conduits up to 40 mm filled with cables, optic fibres or empty.	**-/120/120**
Bundled Plastic Conduits and tubes: Rigid and Flexible PO: polyolefin (PE, PP, PPE, PPO); Rigid and Flexible PVC: polyvinyl chloride	With Hilti Firestop Intumescent Fillers (A_1)
Conduits up to 20 mm filled with cables, optic fibres or empty. Conduits may be bundled up to 100 mm diameter.	**-/120/120**
Mineral wool insulated metal pipes	With Hilti Firestop Intumescent Fillers (A_1) & Mineral wool insulation
• Copper pipes, up to Ø 54 mm, wall thickness 1.0/1.5 mm – 14.2 mm, insulation mineral wool, minimum length 1200 mm • Steel pipes, up to Ø 114 mm, wall thickness 1.0/2.0 mm – 14.2 mm, insulation mineral wool, minimum length 1200 mm (up to Ø 54 mm) or 1800 mm (Ø > 54 mm) • Steel pipes, up to Ø 159 mm, wall thickness 2.0 mm – 14.2 mm, insulation mineral wool, with minimum length 1800 mm	**-/120/120**
Elastomeric foam insulated metal pipes	With Hilti Firestop Intumescent Fillers (A_1) & insulation
• Copper pipes, up to Ø 54 mm, wall thickness 1.0/1.5 mm – 14.2 mm, Armaflex insulation, thickness 8.5 – 43 mm • Steel pipes, up to Ø 114 mm, wall thickness 1.0/2.0 mm – 14.2 mm, Armaflex insulation, thickness 8.5 – 43 mm	**-/120/120**

Description of Services	FRL
• Steel pipes, Ø 159 mm, wall thickness 2.0 mm – 14.2 mm, insulation Armaflex, thickness 19 mm	

Note: Refer to Section 4.3 in the referenced assessment report for distance requirements

Table 2 Assessment outcome for Cable penetrations, rigid floor, at least 120 mm thick with build up to 200 mm

Description of Services	FRL	
Blank Opening without Hilti Firestop Filler CP611A and without Hilti Firestop Putty Bandage CFS-P BA		
Blank opening without support: 1000 mm × 700 mm, (W_2 × L)	**-/120/60**	
Blank opening with steel support strap at 500 mm spacing along width: 1000 mm × 700 mm, (W_2 × L) or equivalent area	**-/120/120**	
Blank opening without steel support strap: 500 mm × 700 mm, (W_1 × L)		
Standard Cable Services	With Firestop Intumescent Fillers (A_1)	With Firestop Intumescent Fillers (A_1) & Hilti Firestop Putty Bandage (A_{2a} & A_{2b})
PVC or XLPE insulated D1 Power Cable included but not limited to Submain, TPS, SDI, Fire rated cable, security cable and earth cable with or without cable tray (Standard D1 cable set, in accordance with AS 1530.4:2014 Appendix D) The assessed D1 and D2 cables are applicable to other cables of the same material with diameters up to the maximum tested. The cables can be bundled in different ways provided the loading on the cable tray is the same or lower to the tested prototype. Moreover, the cables may be applied to all PVC and XLPE insulated and PVC sheathed power and communication cables with copper conductors, provided the results are for the same penetration sealing system in the same separating element and all of the specimens achieved the designated FRL or greater.	**-/120/90**	**-/120/120**
PVC or XLPE insulated D2 Communication Cable included but not limited to Data Cable, CAT6, Coxial and Optic Fibre with or without cable tray (Standard D2 cable set in accordance with AS 1530.4:2014 Appendix D)*		
Coaxial cables: 27.8 mm ≤ Ø ≤ 59.9 mm	With Hilti Firestop Intumescent Fillers (A_1) & Hilti Firestop Putty Bandage (A_{2a} & A_{2b})	
• RFS Cellflex: LCF 78-50 JA Ø 27.8 mm • RFS Cellflex: LCF 214-50 JA Ø 59.9 mm • RFS Helifex: HCA 78-50 JA Ø 28.0 mm • RFS Helifex: HCA 158J Ø 59.9 mm • RFS Radiaflex: RLKW 78-50 Ø28.5 mm • RFS Radiaflex: RLKU 158-50 JFLA Ø48.2 mm	**-/120/120**	
Cables	With Hilti Firestop Intumescent Fillers (A_1) & Hilti Firestop Putty Bandage (A_{2a} & A_{2b})	
• All sheathed single cables Ø≤25 mm • All sheathed single cables 25≤Ø≤50 mm	**-/120/120**	

Description of Services	FRL
• All sheathed single cables 50≤Ø≤80 mm • Tied cable tied bundle Ø≤100 mm	
Conduits and tubes	With Hilti Firestop Intumescent Fillers (A_1) & Hilti Firestop Putty Bandage (A_{2a} & A_{2b})
Plastic conduits and tubes Ø≤16 mm	**-/120/120**
Steel conduits and tubes up to 16 mm with or without cables or optic fibre cables	**-/120/120**
Single Plastic Conduits and tubes: Rigid and flexible PO: polyolefin (PE, PP, PPE, PPO); Rigid PVC: polyvinyl chloride	With Hilti Firestop Intumescent Fillers (A_1)
Single Conduits up to 40 mm filled with cables, optic fibres or empty.	**-/120/120**
Bundled Plastic Conduits and tubes: Rigid and Flexible PO: polyolefin (PE, PP, PPE, PPO); Rigid and Flexible PVC: polyvinyl chloride	With Hilti Firestop Intumescent Fillers (A_1)
Conduits up to 20 mm filled with cables, optic fibres or empty. Conduits may be bundled up to 100 mm diameter.	**-/120/120**
Mineral wool insulated metal pipes	With Hilti Firestop Intumescent Fillers (A_1) & Mineral wool insulation
• Copper pipes, up to Ø 54 mm, wall thickness 1.0/1.5 mm – 14.24 mm, insulation mineral wool • Steel pipes, up to Ø 159 mm, wall thickness 1.0/2.09 mm – 14.24 mm, insulation LS mineral wool, minimum length 1200 mm (up to Ø 54 mm) or 1800 mm (Ø > 54 mm)	**-/120/120**
Elastomeric foam insulated metal pipes	With Hilti Firestop Intumescent Fillers (A_1) & insulation
• Steel pipes, Ø 114 mm, wall thickness 2.0 mm – 14.2 mm, insulation Armaflex, thickness 43 mm • Steel pipes, Ø 159 mm, wall thickness 2.0 mm – 14.2 mm, insulation Armaflex, thickness 19 mm	**-/120/120**

Table 3 Assessment outcome for cable penetrations, AFS Logicwall / Dincel /Rigid wall, at least 150 mm thick

Description of Services	Cable Type	Max cable OD size (mm)	Maximum cable bundle OD size (mm)	Additional protection	FRL
Electrical Cable "as per test FSP 2018"	TPS cable	12 × 6	100	Hilti firestop putty bandage CFS P BA and Hilti intumescent sealant CP 611A	-/120/120
	Fire rated cable	22			
	Submain power cable	22			
Communication Cable "as per test FSP 2018"	Date cable	7			
	Communication cable	7			
	Cat 6, cat6 Ecable	6.4			
	Coxial	15 × 7			
	security cable	7			
	earth cable	5			

Table 4 Assessment outcome for plastic pipe penetrations, flexible and rigid walls at least 100 mm thick with build up to 150 mm for rigid walls and 200 mm for flexible walls.

Sealing system	System description	Pipe details	Assessed FRL
• Block seal – material: Brick-shaped block based on a pre-cured, pre-formed polyurethane (PU) based firestop material– type: Hilti Firestop Block CFS-BL – density: 270 kg/m³ (NV) – thickness: 130 mm, width: 200 mm, height: 50 mm. • Annular sealant – Hilti Firestop sealant CP 611A – material: graphite-based acrylic dispersion – gap width: 0-5 mm – layer thickness: 20 mm. • Elastomeric rubber foam insulation – brand and type: Armaflex Tube AF Microban – material: flexible elastomeric rubberlike foam • PE-foam insulation – Thermaflex® ThermaCompact TF – material: polyethylene (PE) foam with low density polyethylene (LDPE) jacket – wall thickness: 4 mm • PE-foam insulation – Thermaflex® ThermaEco FRZ – material: polyethylene (PE) foam, thickness: 13 mm. • Maximum seal size: 1000 × 1000 mm or an area of 10,000 cm²	Blank seal	No services	-/120/120
	PE-100 or HDPE	Outer Ø: 50 mm Wall thickness: 3 mm Insulation: none	-/120/120
	PVC-U	Outer Ø: 50 mm Wall thickness: 1.5 mm – 2.4 mm Insulation: none	-/120/120
	PP-C	Outer Ø: 58 mm Wall thickness: 4 mm Insulation: none	-/120/120
	PE-S2	Outer Ø: 56 mm Wall thickness: 3.2 mm Insulation: none	-/120/120
	PE-RT II/AI/PE-RT II	Outer Ø: 16 mm – 40 mm Wall thickness: 2.25 mm – 3.5 mm Insulation: Armaflex Tube AF, thickness 8 mm – 20.5 mm	-/120/120
	PE-Xa	Outer Ø: 16 mm to 32 mm Wall thickness: 2.2 mm – 4.5 mm Insulation: Armaflex Tube AF, thickness 17 mm – 19.5 mm	-/120/120
	PP-MD	Outer Ø: 50 mm Wall thickness: 1.8 mm Insulation: none	-/120/120
	PE-RT II/AI/PE-RT II	Outer Ø: 16 mm – 32 mm Wall thickness: 2.25 mm – 3 mm Insulation: Thermaflex® ThermaCompact TF, thickness 4 mm or Thermaflex® ThermaEco FRZ, thickness 13 mm	-/120/120

The variations and outcome of the referenced assessment report are subject to the limitations and requirements described in sections 2, 4 and 14 of the referenced assessment report. The results of this report are valid until 31 March 2024.

Contents

1. Introduction

This report contains the minimum information sufficient for regulatory compliance and refers to assessment report 28870 R6.1.

The referenced assessment report, 28870 R6.1, presents an assessment on the fire resistance of Firestop Block CFS-BL and Flexible Firestop Foam CFS-F FX when protecting cable penetrations in AFS, Dincel walls and concrete walls/floors in accordance with AS 1530.4:2014[1] and assessed in accordance to AS 4072.1:2005 (R2016)[2].

The referenced assessment report was carried out at the request of Hilti (Aust.) Pty Ltd.

The sponsor details are included in Table 5.

Table 5 Sponsor details

Sponsor	Address
Hilti Pty Ltd	1G Homebush Bay Drive RHODES NSW 2138 Australia

2. Declaration

The 'Guide to undertaking technical assessments of the fire performance of construction products based on fire test evidence' prepared by the PFPF in the UK requires a declaration from the client. By accepting our fee proposal on 15 October 2020, Hilti (Aust.) Pty Ltd 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.

3. Limitations of the referenced assessment report

- 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 are expected if the systems were tested in accordance with AS 1530.4:2014.
- The results of this assessment are applicable to fire from either side or floors exposed to fire from underside only.
- This report is only valid for the assessed system/s and must not be used for any other purpose. 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

[1] Standards Australia, 2014, Methods for fire tests on building materials, components and structures – Part 1: Fire-resistance tests for elements of construction, AS 1530.4:2014,Standards Australia, NSW
[2] 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 (R2016), Standards Australia, NSW

assessment. If there are changes to the system, a reassessment will need to be done by an Accredited Testing Laboratory (ATL).

- 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.
- This assessment is based on the proposed systems being constructed under comprehensive quality control practices and following appropriate industry regulations and Australian Standards on quality of materials, design of structures, guidance on workmanship and the expert handling, placing and finishing of the products on site. These variables are beyond the control and consideration of this report.

4. Description of the specimen and variations

4.1 Tested System description

The referenced assessment report is based on reference tests N° 08-E-079-F and N° 07-E-317 describing tests on standard configuration cables (as per AS 1530.4:2005 Appendix D1, D2 and EN1366) in a floor construction and sealed with Hilti Intumescent foam CFS-F FX tested in accordance with EN 1363-1 and EN 1366-3:2006. The tests were sponsored by Hilti and were conducted by EFECTIS France.

The referenced assessment report also refers test reports Nr 8686/12-2, Nr 8717/12-2, Nr 8718/12 and Nr 8688/12-2 describing tests on standard cables in wall and floor constructions tested in accordance with EN 1366-3: 2009. The tests were sponsored by Hilti AG and were conducted by AFITI LICOF Centre for Fire Testing and Research.

Moreover, the assessment refers to test report FSP 2018 describing test on various electrical cables, conduits and cable trays penetrating a concrete wall system. The test was sponsored by Lend Lease Building Pty Ltd.

Reference is also made to test report FSV 0917, which was sponsored by Hilti (Aust.) Pty Ltd and was conducted by CSIRO Australia.

Furthermore, The referenced assessment report refers to FRT190130 R2.0 which describes a fire resistance test of various pipe and cable services through a 155mm thick Dincel wall with polymer skins, filled with normal-weight concrete, protected by various Hilti fire protection systems including Firestop block CFS-BL, Firestop plug CFS-PL, intumescent sealant CP 611A, acrylic sealant CP 606 and Hilti Firestop Putty Bandage CFS-P BA, in accordance with AS 1530.4:2014. FRT190130 R2.0 was sponsored by Dincel construction system and Hilti Australia Pty Ltd, and the testing was undertaken by Warringtonfire Australia Pty Ltd.

4.2 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 reports summarised in Table 6. Further details of the tested system are included in Appendix A of the referenced assessment report

Table 6 Referenced test data

Report number	Test sponsor	Test date	Testing authority
FSV 0917	Hilti (Aust) Pty Ltd, 23 Egerton Road, Silver Water NSW, Australia.	31 August 2002	CSIRO – Manufacturing and Infrastructure Technology, 14 Julius Avenue, Riverside Corporate Park, North Ryde NSW 2113.
N° 08-E-079-F	HILTI, FL-9494 SCHAAN LIECHTENSTEIN.	13 March 2008	EFECTIS France, Voie Romaine, F-57280 MAIZIERES-les-METZ.
N° 07-E-317	HILTI, FL-9494 SCHAAN LIECHTENSTEIN.	11 October 2007	EFECTIS France, Voie Romaine, F-57280 MAIZIERES-les-METZ.

Report number	Test sponsor	Test date	Testing authority
Nr. 8686/12	HILTI AG, Feldkircherstrasse 100, FL-9494-SCHAAN, PRINCIPALITY OF LIECHTENSTEIN	28 March 2012	AFITI LICOF (Centre for Fire Testing and Research), Camino del Estrechillo, 8 E-28500 Arganda del Rey, Madrid Spain.
Nr. 8717/12	HILTI AG, Feldkircherstrasse 100, FL-9494-SCHAAN, PRINCIPALITY OF LIECHTENSTEIN	9 May 2012.	AFITI LICOF (Centre for Fire Testing and Research), Camino del Estrechillo, 8 E-28500 Arganda del Rey, Madrid Spain.
Nr. 8688/12	HILTI AG, Feldkircherstrasse 100, FL-9494-SCHAAN, PRINCIPALITY OF LIECHTENSTEIN	28 March 2012.	AFITI LICOF (Centre for Fire Testing and Research), Camino del Estrechillo, 8 E-28500 Arganda del Rey, Madrid Spain.
Nr. 8718/12	HILTI AG, Feldkircherstrasse 100, FL-9494-SCHAAN, PRINCIPALITY OF LIECHTENSTEIN	23 March 2012	AFITI LICOF (Centre for Fire Testing and Research), Camino del Estrechillo, 8 E-28500 Arganda del Rey, Madrid Spain.
R13240	Hilti Construction Chemicals, div. of Hilti, Inc., 5400 S 122nd East Ave, Tulsa, OK 74146.	11 and 12 July 2001	Underwriters laboratories Inc®, 333 Plingsten Road, Northbrook, IIlinois 60062-2096, United States Country Code (1).
FSV 0857	Hilti (Aust) Pty Ltd, 23 Egerton Road, Silver Water NSW, Australia.	15 June 2001	CSIRO – Manufacturing and Infrastructure Technology, 14 Julius Avenue, Riverside Corporate Park, North Ryde NSW 2113.
206171A	Hilti Entwincklungs GmbH, Hiltistrasse 22, 86916 kaufering, Germany.	15 June 2001	BRE, Fire and Risk Sciences Division, Bucknalls Lane, Garston, Watford, WD25 9XX.
19928A	Hilti AG	16 October 2019	WFRGENT nv
19929A	Hilti AG	15 October 2019	WFRGENT nv
19691A	Hilti AG	27 May 2019	WFRGENT nv

4.3 Variations to the tested systems

An identical system has not been subject to a standard fire test. We have therefore assessed the system / product / component using baseline test information for similar systems. The variations to the tested system/s – together with the referenced standard fire tests – are described in Table 7.

Table 7 Variations to tested systems

Item number	Reference test	Variations
Assessments 1 to 9	Nr 8688/12, Nr 8686/12 Nr 8718/12 and Nr 8717/12	• Confirm the performance of the AS 1530.4:2014 Appendix D1 and D2 configuration cables if substituted with the tested cables. • Spacing of services from each other and from edges of aperture confirmed (as per section 4). • Conduits and tubes shall optionally be empty or filled with optic fibre cables. • Thickness of floor slabs reduced to a minimum of 120mm.

Item number	Reference test	Variations
		• Confirmation of performance for services tested uncapped/uncapped. • For walls the support construction shall optionally be concrete, autoclaved aerated concrete masonry wall, Hebel, Korok, Speedpanel, Dincel or plasterboard lined wall. • Dincel polymer skin does not need to be stripped off to achieve FRLs indicated • The plasterboard lined wall shall comprise of steel studs lined on both faces with a minimum of 2 layers of at least, 13 or 16 mm thick fire grade plasterboard and be otherwise tested to achieve an FRL of -/120/120 or 120/120/120. • In addition, the plasterboard wall construction shall include either mineral wool or cavity insulation. The aperture of the penetration in the wall shall be lined with plasterboard to the same specification as required on each side of the wall. • For blank opening, the maximum floor opening size without supports shall be 700 mm x 500 mm or equivalent area 0.35 m^2. Maximum length can be more than 500 mm as long as equivalent area is no more than 0.35 m^2. For openings exceeding 0.3 5m^2 but less than 0.7 m^2, a 30 mm wide and 2 mm thick steel band support is required to be fixed at underside of block seal length and anchored to the surrounding concrete slab. The steel band support must be positioned such that the max. unsupported area is not more than 0.35 m^2 • For openings with services: The maximum floor opening size with services running through shall be (100 0mm x 700 mm) or equivalent area 0.7 m^2. No steel support bands are required. • Electrical and communication cable, cable bundles with Hilti Firestop block CFS-BL penetrating a 150 mm AFS logicwall. • The bare wall must have a minimum thickness of 100 mm and comprise of concrete, autoclaved aerated concrete, Hebel, Korok, Speedpanel, Dincel, AFS Logicwall, solid or hollow masonry with a minimum density of 550kg/m^3. Korok and Speedpanel walls, which are less than 100mm thick may be used provided that they have been tested or assessed to achieve -/120/120. If the thickness of a rigid wall separating element is less than 150 mm, fire rated plasterboard build up is then needed such that $t_E \geq 150$mm. • The minimum opening size is defined by the cable service area multiplied by 1.66. • Electrical cable can be either TPS cable, fire rated cable or submain power cable, cables can be mixed and matched and bundled together to up to maximum bundle size of 100 mm. Cable bundles should be spaced as per the distance requirement in Section 4. • TPS cables can be bundled up to 100 mm with a maximum single cable diameter of 21 mm, minimum spacing for TPS bundles is 5 mm as tested. If cables are not tied together, cables can have zero distance between each other. • Communication cable can be data cable, communication cable, Cat 6, Cat6 E cable, Coxial, Security cable, Earth cable. Cables can be mixed and matched and bundled together to up to maximum bundle size of 100 mm, the communication cable bundles should be spaced as per the distance requirement in Section 4.

4.3.1 Distance Requirements

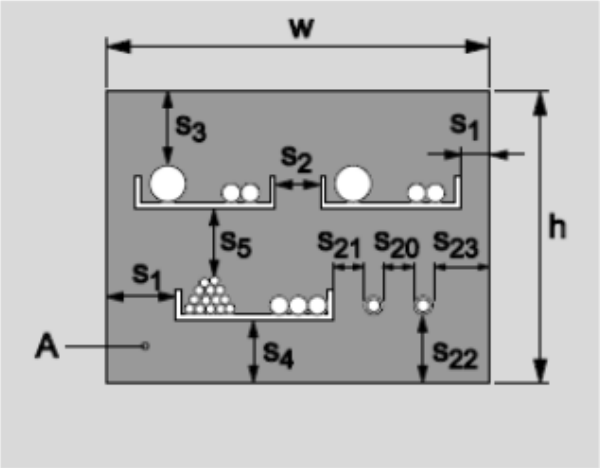

Figure 1 **Distance Requirements of Penetrations**

Distance valid for installations of services in wall and floor	Minimum distance in mm
Distance between cables/cable supports and vertical seal edge	$S_1 = 0$
Distance between cable supports	$S_2 = 0$
Distance between cables and upper seal edge	$S_3 = 0$
Distance between cable supports and bottom seal edge	$S_4 = 0$
Distance between cables and cable support above	$S_5 = 40$
Distance between single or bundle of conduits/cables and other services or seal edges	$S_{20, 21, 22, 23} = 0$ Ø<16 mm 40 Ø>16 mm
Distance between untied cables with or without cable tray	S=0
Insulated metal pipes need to be at least 50 mm from the seal edge and from other services (measured from the outer wall of the pipe rather than the insulation. PVC, PP, and PE pipes need to be at least 40 mm from the seal edge and from other services (measured from the outer wall of the pipe rather than the insulation). Other plastic pipes needs to be at least 120 mm from the seal edge and from other services (measured from the outer wall of the pipe rather than the insulation).	

Aperture Framing/Beading details for walls and floors

The penetration seal depth is always 200 mm irrespective of the thickness of the wall or floor. For flexible walls, an aperture framing or a beading must be used such that $t_E \geq 200$ mm. For rigid walls with a thickness of less than 150 mm, an aperture framing or a beading must be used such that $t_E \geq 150$ mm.

Aperture framing: Box frame 200 mm deep, perpendicular to the wall/floor surface, made of fire rated gypsum or calcium silicate board at least 12.5 mm thick, centred in the wall (Figure 2a, 2d).

Beading: Fire rated gypsum or calcium silicate board strips at least 100 mm wide (w_A, Figure 2e) are installed around the opening with the necessary number of layers to form a frame on the top side of a floor, or two frames of the same height on both sides of a wall (Figure 2b, 2c, 2e).

Walls: The penetration seal is installed centred (Figure 2a, 2b).

Floors: Flush to the soffit of the floor (Figure 2c).

Use of Firestop Foam in the Firestop Block Systems

The Hilti Firestop Foam CFS-F FX is used in areas without services as gap filling of upper space of penetration where otherwise a Hilti Firestop Block must be cut to complete penetration.

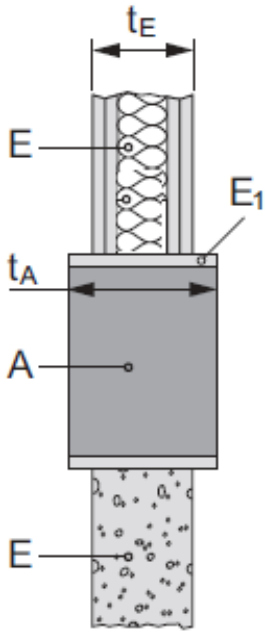

Figure 2a

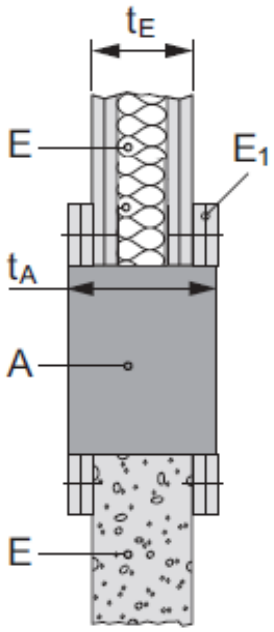

Figure 2b

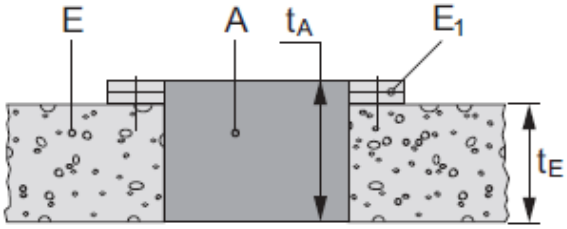

Figure 2c

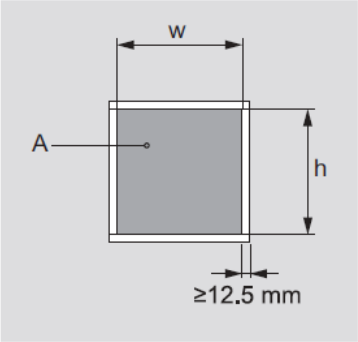

Figure 2d

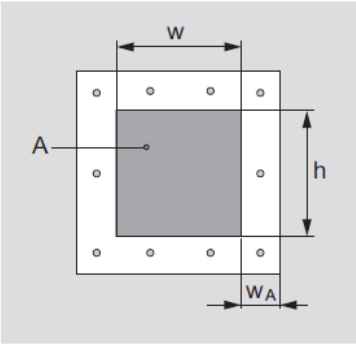

Figure 2e

Figure 2 Aperture framing / beading and position of the seal in walls / floors

Item	Description	Item	Description
A	Hilti Firestop Block CFS-BL Additional areas within blocks (Refer Section 4) using; Hilti Flexible Firestop Foam CFS-F FX,	t_E	Thickness of the building element
E	Building element (rigid or flexible wall construction, floor)	w	Width of the seal
E_1	Aperture framing 12.5 mm fire grade plasterboard.	h	Height of the seal
t_A	Thickness of the seal, min. 200 mm	w_A	Width of the frame, minimum 100 mm.

4.3.2 Wall Penetrations

Hilti Firestop block CFS-BL shall be installed at the 200 mm block length into the aperture. If the thickness of the wall separating element is less than 150 mm, fire rated plasterboard build up is then needed up to 150 mm for rigid walls and 200 mm for flexible walls.

The walls must be tested or otherwise assessed in accordance with AS 1530.4:2014 for the required fire resistance period.

Flexible wall, Figure 3, top section (E)

The wall must have a minimum thickness of 100 mm (t_E) and comprise of steel studs lined on both faces with a minimum of 2 layers of at least 13 or 16 mm thick fire grade plasterboard and be tested to achieve an FRL of -/120/120 or 120/120/120. In addition the plasterboard wall construction shall include either 50 mm thick mineral wool with density of 100kg/m^3 mineral wool cavity insulation as shown in figure 3 or the aperture of the penetration in the wall shall be lined with plasterboard to the same specification as required on each side of the wall figure 4.

Rigid wall, Figure 3, bottom section (E)

The wall must have a minimum thickness of 100 mm (t_E) and comprise of concrete, autoclaved aerated concrete, Hebel, Korok, Speedpanel, Dincel, AFS Logicwall, and solid or masonry wall with a minimum density of 550 kg/m^3. Korok and Speedpanel walls which are less than 100 mm thick may be used provided that they have been tested or assessed to achieve -/120/120. If the thickness of the wall separating element is less than 150 mm, fire rated plasterboard build up is needed such that $t_E \geq$ 150 mm.

Blank wall seal, no services, Figure 3

Maximum opening size 1000 mm x 1000 mm or equivalent area. Seal thickness = 200 mm (t_A).

Wall opening with services

Maximum opening size 1000 mm x 1000 mm or equivalent area, and 60% of the seal area can be penetrated. Seal thickness ≥ 200mm (t_A).

AFS logicwall, electrical and communication cables Figure 5, 6

The wall must have a minimum thickness of 150 mm (t_E) and comprise of fiber cement wall facings filled with normal density concrete.

Use of Firestop Foam CFS-F FX in the Firestop Block Systems

The Hilti Firestop Foam CFS-F FX is used in areas without services as gap filling of upper space of penetration where otherwise a Hilti Firestop Block has to be cut to complete penetration.

Area sealed with Firestop Foam CFS-F FX must be limited to 400 mm x 400 mm or equivalent area.

- Hilti Firestop Blocks are installed in penetration partially for e.g. in the lower part, only or Firestop Blocks are used to build a frame. This frame can be built also after applying the foam, around the foam seal.
- Services running through the opening or the block frame are sealed with Hilti Firestop Foam CFS-F FX.
- Distance rules are applied to aperture frame or services defined.

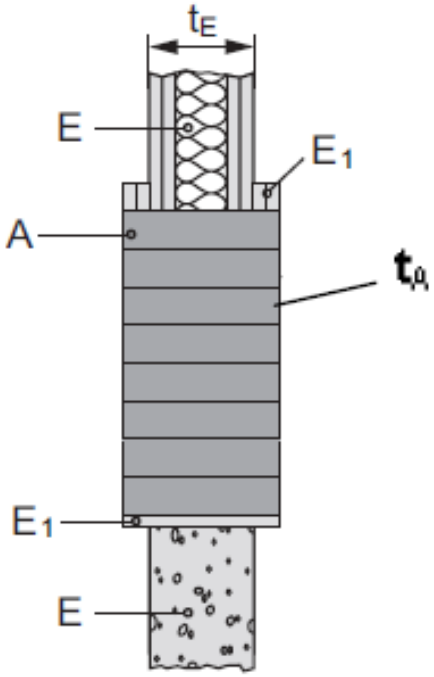

Figure 3 Blank wall seal, no service

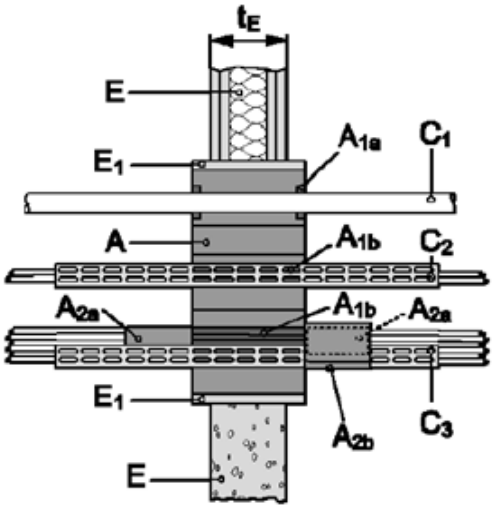

Figure 4 Details of filler (A_{1a}), and (A_{1b}), 1 × putty (A_{2a}) and 1 × putty (A_{2b})

Table 8 Schedule of components for Figure 3 and Figure 4

Item	Description	Item	Description
A, A_1, A_2,	**A:** Hilti Firestop Block CFS-BL Additional areas within blocks (Refer Section 4) using; Hilti Flexible Firestop Foam CFS-F FX **A_1:** Hilti Intumescent Sealant CP 611A. **A_2:**Hilti Firestop Putty Bandage CFS-P BA	A_{1b}	Hilti Intumescent Sealant CP 611A Sealant/filler to the full depth of seal
C, C_1, C_2,	**C:** Service penetrations **C_1:** Cable or conduit services without cable supports in the penetration seal **C_2:** Services on cable supports in the penetration seal	A_{2a}	1 layer of 100mm wide Hilti Firestop Putty Bandage CFS-P BA each side
E, E_1,	**E:** Support Construction elements (wall) **E_1:** Aperture Lining 13 or 16mm Fire grade plasterboard.	A_{2b}	Additional layer of 100mm wide Hilti Firestop Putty Bandage CFS-P BA on unexposed side
t_A	Thickness of penetration seal	t_E	Thickness of the building element
A_{1a}	Hilti Intumescent Sealant CP 611A Sealant/filler to a depth of min. 20mm		

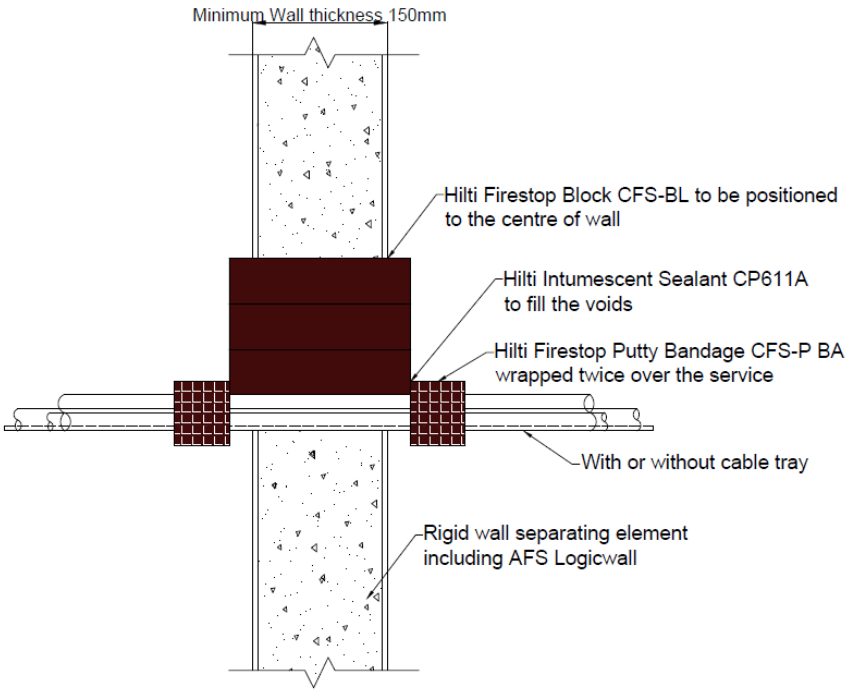

Figure 5 Service penetrations in AFS wall as tested in FSP 2018

4.3.3 Floor Penetrations

Hilti Firestop Block CFS-BL shall be installed at the 200 mm block length into the aperture. If the thickness of the floor separating element is less than 200 mm, fire rated plasterboard build up is then needed such that $t_E \geq 200$ mm.

The floors must be tested or otherwise assessed in accordance with AS 1530.4:2014 for the required fire resistance period.

The maximum aperture area size in floor orientation shall be 0.7 m² and no wider than 700 mm. 60% of the seal area can include penetrations. Seal thickness ≧ 200 mm (tA).

Blank floor seal, no services, Figure 6

For blank aperture length longer than 500 mm, a 30 mm wide and 2mm thick steel band support (E2) is required to be fixed at the underside of block seal at maximum 500 mm centres along seal length and anchored to the surrounding concrete slab with the following Hilti Anchors.

For blank opening, the maximum floor opening size without supports shall be 700 mm x 500 mm or equivalent area 0.35 m². Maximum length can be more than 500 mm as long as equivalent area is no more than 0.35 m². For openings exceeding 0.3 5m² but less than 0.7 m², a 30 mm wide and 2 mm thick steel band support is required to be fixed at underside of block seal length and anchored to the surrounding concrete slab. The steel band support must be positioned such that the max. Unsupported area is not more than 0.35 m²

The maximum floor opening size can be increased to 1000mm x 700mm or equal area 0.7m2 without steel support if the insulation rating required is only 60 minutes. The resulting FRL of the application shall then be -/120/60.

For openings with services: The maximum floor opening size with services running through shall be (1000 mm × 700 mm) or equivalent area 0.7 m². No steel support bands are required.

A calculation was performed based on a worst case scenario where the steel strap is supporting the full weight of the blocks. It showed that the maximum tensile force in the strap was below the proposed fixing estimated shear capacity for up to 120 minutes.

Table 9 Steel Strap Support Fixing for blank seals

Anchoring Solution		Minimum Size
Screw anchors	HUS	M8
Expansion anchors	HSA	
	HST	
	DBZ 6/45	
Internally threaded anchor	HKD	

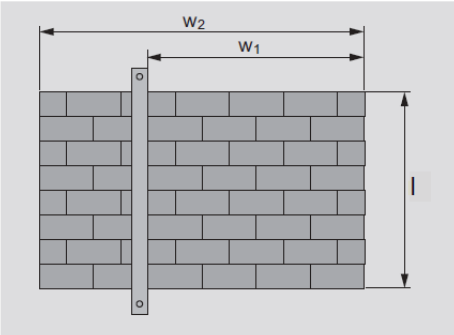

Figure 6 Strap Support for Blank Floor Seal, No Services

Rigid floor, Figure 7, (E)

The floor must have a minimum thickness of 120 mm (t_E) and comprise of autoclaved aerated concrete or concrete with a minimum density of 550 kg/m^3.

Use of Firestop Foam CFS-F FX in the Firestop Block Systems

The Hilti Firestop Foam CFS-F FX is used in areas without services as gap filling of upper space of penetration where otherwise a Hilti Firestop Block has to be cut to complete penetration.

Area sealed with Firestop Foam CFS-F FX must be limited to 400 mm × 400 mm or equivalent area.

- Hilti Firestop Blocks are installed in penetration partially for e.g. in the lower part, only or Firestop Blocks are used to build a frame. This frame can be built also after applying the foam, around the foam seal.
- Services running through the opening or the block frame are sealed with Hilti Firestop Foam CFS-F FX.
- Distance rules are applied to aperture frame or services defined.

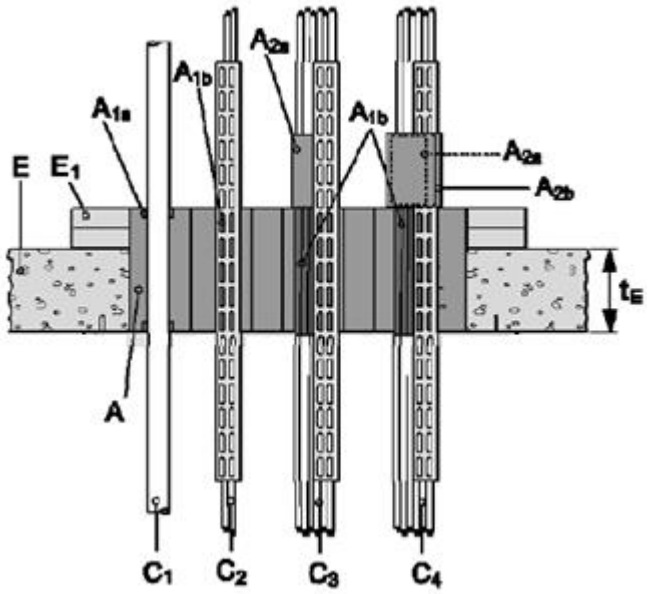

Figure 7 – Details of filler (A1a), and (A1b) 1 × putty (A2a) and 1 × putty (A2b)

Table 10 Table of contents for Figure 7

Item	Description	Item	Description
A, A_1, A_2,	A: Hilti Firestop Block CFS-BL Additional areas within blocks (Refer Section 4) using; Hilti Flexible Firestop Foam CFS-F FX A_1: Hilti Intumescent Sealant CP 611A A_2:Hilti Firestop Putty Bandage CFS-P BA	t_A	Thickness of penetration seal

Item	Description	Item	Description
C, C_1, C_2,	C: Service penetrations C_1: Cable or conduit services without cable supports in the penetration seal C_2: Services on cable supports in the penetration seal	t_E	Thickness of the support element
E, E_1	E: Building elements (wall, floor) E_1: Aperture Lining minimum 12.5 mm gypsum or calcium silicate board	A_{2a}	1 layer of 100mm wide Hilti Firestop Putty Bandage CFS-P BA on top side
L	Height of penetration seal	A_{2b}	Additional layer of 100 mm wide Hilti Firestop Putty Bandage CFS-P BA on top side
A_{1a}	Hilti Intumescent Sealant CP 611A Sealant/filler to a depth of min. 20 mm	W_1	Max size of floor penetration without support
A_{1b}	Hilti Intumescent Sealant CP 611A Sealant/filler to the full depth of seal	W_2	Max size of floor penetration with support

4.4 Purpose of the test

The referenced assessment report is prepared with reference to the requirements of AS 1530.4:2014 as appropriate for walls. AS 1530.4:2014 sets out the procedures for conducting fire resistance tests on building materials, components and structures. Specifically, section 2 of this standard contains general requirements for these tests and section 10 addresses the fire resistance testing of service penetrations in walls and control joints

5. Conclusion

Based on the above discussions presented in the referenced assessment report, it is confirmed that the proposed construction will achieve an insulation and integrity performance of 120 minutes respectively for the services shown Table 11 to Table 14 if tested in accordance with AS 1530.4:2014.

Table 11 Assessment outcome for Cable penetrations, flexible / rigid wall, at least 100 mm thick with build up to 150 mm for rigid walls and 200 mm for flexible walls

Description of Services	FRL	
Blank Opening without Hilti Firestop Filler CP611A and without Hilti Firestop Putty Bandage CFS-P BA		
Blank opening or opening with services: 1000 mm × 1000 mm or equivalent area	**-/120/120**	
Standard Cable Services	With Hilti Firestop Intumescent Fillers (A_1)	With Hilti Firestop Intumescent Fillers (A_{1b}) & Hilti Firestop Putty Bandage (A_{2a} & A_{2b})
PVC or XLPE insulated D1 Power Cable included but not limited to Submain, TPS, SDI, Fire rated cable, security cable and earth cable with or without cable tray (Standard D1 cable set, in accordance with AS 1530.4:2014 Appendix D) The assessed D1 and D2 cables are applicable to other cables of the same material with diameters up to the maximum	**-/120/90**	**-/120/120**

Description of Services	FRL	
tested. The cables can be bundled in different ways provided the loading on the cable tray is the same or lower to the tested prototype. Moreover, the cables may be applied to all PVC and XLPE insulated and PVC sheathed power and communication cables with copper conductors, provided the results are for the same penetration sealing system in the same separating element and all of the specimens achieved the designated FRL or greater.		
PVC or XLPE insulated D2 Communication Cable included but not limited to Data Cable, CAT6, Coxial and Optic Fibre with or without cable tray (Standard D2 cable set, in accordance with AS 1530.4:2014 Appendix D)*		
Coaxial cables: 27.8 mm ≤ Ø ≤ 59.9 mm	With Hilti Firestop Intumescent Fillers (A_1) & Hilti Firestop Putty Bandage (A_{2a} & A_{2b})	
• RFS Cellflex**:** LCF 78-50 JA Ø 27.8 mm • RFS Cellflex**:** LCF 214-50 JA Ø 59.9 mm • RFS Helifex**:** HCA 78-50 JA Ø 28.0 mm • RFS Helifex: HCA 158J Ø 59.9 mm • RFS Radiaflex**:** RLKW 78-50 Ø28.5 mm • RFS Radiaflex**:** RLKU 158-50 JFLA Ø48.2 mm	**-/120/120**	
Bus bar	With Hilti Firestop Intumescent Fillers (A_1) & Hilti Firestop Putty Bandage (A_{2a} & A_{2b})	
• EAE ELEKTRIK • Type: E-Line KXC 40505-B; 4000A • Maximum outer dimension of the section: 37`2 mm × 150 mm • Conductor material: Copper • Maximum number of conductors: 10 • Maximum section of the conductors: 140	**-/120/120**	
Cables	With Hilti Firestop Intumescent Fillers (A_1) & Hilti Firestop Putty Bandage (A_{2a} & A_{2b})	
• All sheathed single cables Ø≤25 mm • All sheathed single cables 25≤Ø≤50 mm • All sheathed single cables 50≤Ø≤80 mm • Tied cable tied bundle Ø≤100 mm	**-/120/120**	
Conduits and tubes	With Hilti Firestop Intumescent Fillers (A_1) & Hilti Firestop Putty Bandage (A_{2a} & A_{2b})	
Plastic conduits and tubes Ø≤16 mm	**-/120/120**	
Steel conduits and tubes up to 16 mm with or without cables or optic fibre cables	**-/120/120**	
Single Plastic Conduits and tubes: Rigid and flexible PO: polyolefin (PE, PP, PPE, PPO); Rigid PVC: polyvinyl chloride	With Hilti Firestop Intumescent Fillers (A_1)	
Single Conduits up to 40 mm filled with cables, optic fibres or empty.	**-/120/120**	

Description of Services	FRL
Bundled Plastic Conduits and tubes: Rigid and Flexible PO: polyolefin (PE, PP, PPE, PPO); Rigid and Flexible PVC: polyvinyl chloride	With Hilti Firestop Intumescent Fillers (A_1)
Conduits up to 20 mm filled with cables, optic fibres or empty. Conduits may be bundled up to 100 mm diameter.	**-/120/120**
Mineral wool insulated metal pipes	With Hilti Firestop Intumescent Fillers (A_1) & Mineral wool insulation
• Copper pipes, up to Ø 54 mm, wall thickness 1.0/1.5 mm – 14.2 mm, insulation mineral wool, minimum length 1200 mm • Steel pipes, up to Ø 114 mm, wall thickness 1.0/2.0 mm – 14.2 mm, insulation mineral wool, minimum length 1200 mm (up to Ø 54 mm) or 1800 mm (Ø > 54 mm) • Steel pipes, up to Ø 159 mm, wall thickness 2.0 mm – 14.2 mm, insulation mineral wool, with minimum length 1800 mm	**-/120/120**
Elastomeric foam insulated metal pipes	With Hilti Firestop Intumescent Fillers (A_1) & insulation
• Copper pipes, up to Ø 54 mm, wall thickness 1.0/1.5 mm – 14.2 mm, Armaflex insulation, thickness 8.5 – 43 mm • Steel pipes, up to Ø 114 mm, wall thickness 1.0/2.0 mm – 14.2 mm, Armaflex insulation, thickness 8.5 – 43 mm • Steel pipes, Ø 159 mm, wall thickness 2.0 mm – 14.2 mm, insulation Armaflex, thickness 19 mm	**-/120/120**

Note: Refer to Section 4.3 in the referenced assessment report for distance requirements

Table 12 Assessment outcome for Cable penetrations, rigid floor, at least 120 mm thick with build up to 200 mm

Description of Services	FRL	
Blank Opening without Hilti Firestop Filler CP611A and without Hilti Firestop Putty Bandage CFS-P BA		
Blank opening without support: 1000 mm × 700 mm, (W_2 × L)	**-/120/60**	
Blank opening with steel support strap at 500 mm spacing along width: 1000 mm × 700 mm, (W_2 × L) or equivalent area	**-/120/120**	
Blank opening without steel support strap: 500 mm × 700 mm, (W_1 × L)		
Standard Cable Services	With Firestop Intumescent Fillers (A_1)	With Firestop Intumescent Fillers (A_1) & Hilti Firestop Putty Bandage (A_{2a} & A_{2b})
PVC or XLPE insulated D1 Power Cable included but not limited to Submain, TPS, SDI, Fire rated cable, security cable and earth cable with or without cable tray (Standard D1 cable set, in accordance with AS 1530.4:2014 Appendix D)	**-/120/90**	**-/120/120**

Description of Services	FRL	
The assessed D1 and D2 cables are applicable to other cables of the same material with diameters up to the maximum tested. The cables can be bundled in different ways provided the loading on the cable tray is the same or lower to the tested prototype. Moreover, the cables may be applied to all PVC and XLPE insulated and PVC sheathed power and communication cables with copper conductors, provided the results are for the same penetration sealing system in the same separating element and all of the specimens achieved the designated FRL or greater.		
PVC or XLPE insulated D2 Communication Cable included but not limited to Data Cable, CAT6, Coxial and Optic Fibre with or without cable tray (Standard D2 cable set in accordance with AS 1530.4:2014 Appendix D)*		
Coaxial cables: 27.8 mm ≤ Ø ≤ 59.9 mm	With Hilti Firestop Intumescent Fillers (A_1) & Hilti Firestop Putty Bandage (A_{2a} & A_{2b})	
• RFS Cellflex: LCF 78-50 JA Ø 27.8 mm • RFS Cellflex: LCF 214-50 JA Ø 59.9 mm • RFS Helifex: HCA 78-50 JA Ø 28.0 mm • RFS Helifex: HCA 158J Ø 59.9 mm • RFS Radiaflex: RLKW 78-50 Ø28.5 mm • RFS Radiaflex: RLKU 158-50 JFLA Ø48.2 mm	**-/120/120**	
Cables	With Hilti Firestop Intumescent Fillers (A_1) & Hilti Firestop Putty Bandage (A_{2a} & A_{2b})	
• All sheathed single cables Ø≤25 mm • All sheathed single cables 25≤Ø≤50 mm • All sheathed single cables 50≤Ø≤80 mm • Tied cable tied bundle Ø≤100 mm	**-/120/120**	
Conduits and tubes	With Hilti Firestop Intumescent Fillers (A_1) & Hilti Firestop Putty Bandage (A_{2a} & A_{2b})	
Plastic conduits and tubes Ø≤16 mm	**-/120/120**	
Steel conduits and tubes up to 16 mm with or without cables or optic fibre cables	**-/120/120**	
Single Plastic Conduits and tubes: Rigid and flexible PO: polyolefin (PE, PP, PPE, PPO); Rigid PVC: polyvinyl chloride	With Hilti Firestop Intumescent Fillers (A_1)	
Single Conduits up to 40 mm filled with cables, optic fibres or empty.	**-/120/120**	
Bundled Plastic Conduits and tubes: Rigid and Flexible PO: polyolefin (PE, PP, PPE, PPO); Rigid and Flexible PVC: polyvinyl chloride	With Hilti Firestop Intumescent Fillers (A_1)	
Conduits up to 20 mm filled with cables, optic fibres or empty. Conduits may be bundled up to 100 mm diameter.	**-/120/120**	
Mineral wool insulated metal pipes	With Hilti Firestop Intumescent Fillers (A_1) & Mineral wool insulation	
• Copper pipes, up to Ø 54 mm, wall thickness 1.0/1.5 mm– 14.24 mm, insulation mineral wool	**-/120/120**	

Description of Services	FRL
• Steel pipes, up to Ø 159 mm, wall thickness 1.0/2.09 mm – 14.24 mm, insulation LS mineral wool, minimum length 1200 mm (up to Ø 54 mm) or 1800 mm (Ø > 54 mm)	
Elastomeric foam insulated metal pipes	With Hilti Firestop Intumescent Fillers (A_1) & insulation
• Steel pipes, Ø 114 mm, wall thickness 2.0 mm – 14.2 mm, insulation Armaflex, thickness 43 mm • Steel pipes, Ø 159 mm, wall thickness 2.0 mm – 14.2 mm, insulation Armaflex, thickness 19 mm	**-/120/120**

Table 13 Assessment outcome for cable penetrations, AFS Logicwall / Dincel /Rigid wall, at least 150 mm thick

Description of Services	Cable Type	Max cable OD size (mm)	Maximum cable bundle OD size (mm)	Additional protection	FRL
Electrical Cable "as per test FSP 2018"	TPS cable	12 × 6	100	Hilti firestop putty bandage CFS P BA and Hilti intumescent sealant CP 611A	-/120/120
	Fire rated cable	22			
	Submain power cable	22			
Communication Cable "as per test FSP 2018"	Date cable	7			
	Communication cable	7			
	Cat 6, cat6 Ecable	6.4			
	Coxial	15 × 7			
	security cable	7			
	earth cable	5			

Table 14 Assessment outcome for plastic pipe penetrations, flexible and rigid walls at least 100 mm thick with build up to 150 mm rigid walls and 200 mm for flexible walls

Sealing system	System description	Pipe details	Assessed FRL
• Block seal – material: Brick-shaped block based on a pre-cured, pre-formed polyurethane (PU) based firestop material– type: Hilti Firestop Block CFS-BL – density: 270 kg/m³ (NV) – thickness: 130 mm, width: 200 mm, height: 50 mm. • Annular sealant – Hilti Firestop sealant CP 611A – material: graphite-based acrylic dispersion – gap width: 0-5 mm – layer thickness: 20 mm. • Elastomeric rubber foam insulation – brand and type: Armaflex Tube AF Microban – material: flexible elastomeric rubberlike foam • PE-foam insulation – Thermaflex® ThermaCompact TF – material: polyethylene (PE) foam with low density polyethylene (LDPE) jacket – wall thickness: 4 mm	Blank seal	No services	-/120/120
	PE-100 or HDPE	Outer Ø: 50 mm Wall thickness: 3 mm Insulation: none	-/120/120
	PVC-U	Outer Ø: 50 mm Wall thickness: 1.5 mm – 2.4 mm Insulation: none	-/120/120
	PP-C	Outer Ø: 58 mm Wall thickness: 4 mm Insulation: none	-/120/120
	PE-S2	Outer Ø: 56 mm Wall thickness: 3.2 mm Insulation: none	-/120/120

Sealing system	System description	Pipe details	Assessed FRL
• PE-foam insulation – Thermaflex® ThermaEco FRZ – material: polyethylene (PE) foam, thickness: 13 mm. • Maximum seal size: 1000 × 1000 mm or an area of 10,000 cm^2	PE-RT II/Al/PE-RT II	Outer Ø: 16 mm – 40 mm Wall thickness: 2.25 mm – 3.5 mm Insulation: Armaflex Tube AF, thickness 8 mm – 20.5 mm	-/120/120
	PE-Xa	Outer Ø: 16 mm to 32 mm Wall thickness: 2.2 mm – 4.5 mm Insulation: Armaflex Tube AF, thickness 17 mm – 19.5 mm	-/120/120
	PP-MD	Outer Ø: 50 mm Wall thickness: 1.8 mm Insulation: none	-/120/120
	PE-RT II/Al/PE-RT II	Outer Ø: 16 mm – 32 mm Wall thickness: 2.25 mm – 3 mm Insulation: Thermaflex® ThermaCompact TF, thickness 4 mm or Thermaflex® ThermaEco FRZ, thickness 13 mm	-/120/120

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