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Regulatory information report

Various services penetrating Korok walls protected with Hilti Firestopping products

Sponsor: Hilti (New Zealand) limited

Report number: FAS190143 Revision: RIR1.5

Issued date: 31 August 2021

Quality management

Version	Date	Information about the report			
RIR1.1*	Issue: 19/06/2021	Reason for issue	Initial issue		
			Prepared by	**Reviewed by**	**Authorised by**
		Name	Rami Al-Darwish	Yomal Dias	Imran Ahamed
RIR1.2	Issue: 23/06/2021	Reason for issue	Typographical amendments throughout the report.		
			Prepared by	**Reviewed by**	**Authorised by**
		Name	Yomal Dias	Omar Saad	Omar Saad
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			Prepared by	**Reviewed by**	**Authorised by**
		Name	Yomal Dias	Omar Saad	Omar Saad
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			Prepared by	**Reviewed by**	**Authorised by**
	Expiry: 31/05/2026	**Name**	Rami Al-Darwish	Yomal Dias	Yomal Dias
RIR1.5	Issue: 31/08/2021	Reason for issue	Minor typographical amendment		
			Prepared by	**Reviewed by**	**Authorised by**
	Expiry: 31/05/2026	**Name**	Rami Al-Darwish	Yomal Dias	Yomal Dias
		Signature			

RIR 1.0 was skipped to match assessment report numbering.

Executive summary

This report contains the minimum information required for regulatory compliance and refers to the referenced assessment report FAS190143 R1.5.

Hilti Firestop CP611a intumescent sealant is a firestopping solution applied in the annular gaps of service penetrations or in control joints.

Hilti Firestop CP606 sealant applied in the annular gaps of service penetrations or in control joints to provide firestopping protection.

Hilti Firestop CFS-C P collar is a fire collar designed to reinstate the integrity and insulation ratings of a separating element which has been penetrated by a service.

The analysis conducted in the referenced assessment report documents the findings of the assessment undertaken to determine the expected fire resistance level (FRL) of various services protected by Hilti fire stopping products and penetrating 51 mm and 78 mm thick Korok panel systems – if tested in accordance with AS 1530.4:2014 and assessed in accordance with AS 4072.1:2005(R2016).

The analysis in section of this report found that the proposed systems together with the described variations are expected to achieve the FRLs as shown in Table 6 to Table 26 if tested in accordance with AS 1530.4:2014 and assessed in accordance with AS 4072.1:2005(R2016).

The variations and outcome of the referenced assessment report are subject to the limitations and requirements described in sections 2, 3 and 6 of this report.

Contents

1. Introduction

This report contains the minimum information sufficient for regulatory compliance and refers to the assessment report FAS190143 R1.5.

The analysis conducted in the referenced assessment report documents the findings of the assessment undertaken to determine the expected fire resistance level (FRL) of various services protected by Hilti firestopping products and penetrating
51 mm and 78 mm thick Korok panel systems if tested in accordance with AS 1530.4:2014[1] and assessed in accordance to AS 4072.1:2005(R2016)[2].

The referenced assessment was carried out at the request of Hilti (New Zealand) limited.

The sponsor details are included in Table 1.

Table 1 Sponsor details

Sponsor	Address
Hilti (New Zealand) limited	Level 1, Building B, 600 Great South Road Ellerslie Auckland 1051 New Zealand

2. Framework for the assessment

2.1 Assessment approach

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

No specific framework, methodology, standard or guidance documents exists in Australia for doing these assessments. We have therefore followed the 'Guide to undertaking technical assessments of the fire performance of construction products based on fire test evidence' prepared by the Passive Fire Protection Forum (PFPF) in the UK in 2019[3].

This guide provides a framework for undertaking 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
- The 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.

The referenced assessment uses established empirical methods and our experience of fire testing similar products to extend the scope of application by determining the limits for the design based on the tested constructions and performances obtained. The assessment is an evaluation of the potential fire resistance performance if the elements were to be tested in accordance with AS 1530.4:2014 and assessed in accordance to AS 4072.1:2005 (R2016).

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1 Standards Australia, 2014, Methods for fire tests on building materials, components and structures – Part 4: 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: Service penetrations and control joints (Reconfirmed 2016), AS 4072.1:2005 (R2016), Standards Australia, NSW.
3 Passive Fire Protection Forum (PFPF), 2019, Guide to undertaking technical assessments of the fire performance of construction products based on fire test evidence, Passive Fire Protection Forum (PFPF), UK.

The referenced assessment has been written using appropriate test evidence generated at accredited laboratories to the relevant test standard. The supporting test evidence has been deemed appropriate to support the manufacturer's stated design.

2.2 Compliance with the National Construction Code

The referenced assessment report has been prepared to meet the evidence of suitability requirements of the National Construction Code Volumes One and Two – Building Code of Australia (NCC) 2019 including Amendments[4] under A5.2 (1) (d).

The referenced assessment has been written in accordance with the general principles outlined in EN 15725:2010[5] for extended application reports on the fire performance of construction products and building elements. It also references test evidence for meeting a performance requirement or deemed to satisfy (DTS) provisions of the NCC under A5.4 for fire resistance levels, as applicable to the assessed systems.

The referenced assessment report may also be used to demonstrate compliance with the requirements for evidence of suitability under NCC 2016 including Amendments[6].

2.3 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 report sponsor. By accepting our fee proposal on 14 April 2021, Hilti (New Zealand) limited confirmed that:

- To their knowledge the component or element of structure, which is the subject of the referenced assessment, has not been subjected to a fire test to the standard against which the referenced assessment is being made.
- They agree to withdraw the referenced 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 the referenced assessment is being made and the results are not in agreement with the referenced assessment.
- They are not aware of any information that could adversely affect the conclusions of the referenced 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

- The scope of the referenced assessment report is limited to an assessment of the variations to the tested systems described in section 4.3.
- The referenced assessment 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 the referenced assessment are applicable to service penetrations through Korok wall systems when exposed to fire from each side of the wall.
- The Korok Panel separating elements must be greater than or equal to 51 mm in thickness, with a minimum dry density of 510 kg/m^3 for 51 mm Korok wall systems and 400 kg/m^3 for 78 mm Korok wall systems.
- Any service penetration assessed through 51 mm thick Korok panel system will apply to 78 mm thick Korok panel system.

[4] National Construction Code Volumes One and Two - Building Code of Australia 2019 including Amendments, Australian Building Codes Board, Australia
[5] European Committee for Standardization, 2010, Extended application reports on the fire performance of construction products and building elements, EN 15725:2010, European Committee for Standardization, Brussels, Belgium.
[6] National Construction Code Volumes One and Two - Building Code of Australia 2016 including Amendments, Australian Building Codes Board, Australia

- The FRLs assessed for the service penetrations defined in this report are limited to the tested FRL of the separating wall system.
- The distance to the first support of the service from the separating element must be as specified in this report for each of the assessed services.
- The referenced assessment report is only valid for the assessed systems 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 the referenced assessment report – may invalidate the findings of the referenced assessment. If there are changes to the system, a reassessment will need to be done by an Accredited Testing Laboratory (ATL).
- The documentation that forms the basis for the referenced assessment report is listed in Appendix B of the referenced report.
- The referenced assessment 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 the referenced assessment report as a result.
- The referenced 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 the referenced assessment report.

4. Description of the specimen and variations

4.1 System description

The tested and assessed systems consist of various service penetrations through a 51 mm or 78 mm thick Korok panel system, protected with Hilti Firestop CP611a intumescent sealant, Hilti Firestop CP606 acrylic sealant, or Hilti Firestop CFS-C P fire collar products.

The sponsor confirmed that Hilti CP611a Intumescent sealant is identical to Hilti CFS-IS intumescent sealant. Moreover, Hilti CP606 Acrylic sealant is identical to Hilti CFS-S ACR acrylic sealant.

4.2 Referenced test data

The assessment of the variation to the tested system and the determination of the expected performance is based on the results of the fire tests documented in the reports summarised in Table 2. Further details of the tested system are included in in Appendix B of the referenced report.

Table 2 Referenced test data

Report number	Test sponsor	Test date	Testing authority
FRT190338 R1.1	Hilti (New Zealand) limited	31 December 2020	Warringtonfire Pty Ltd
FRT190339 R1.0	Hilti (New Zealand) limited	30 December 2020	Warringtonfire Pty Ltd
Nr 8686/12	HILTI AG	28 March 2012	AFITI LICOF
FRT180461a.1	Hilti Australia Pty Ltd	4 March 2019	Warringtonfire Pty Ltd
FR 3754 Issue 2	KOROK Building Systems NZ Limited	17 May 2006	BRANZ

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 using baseline test information for similar systems. The variations to the tested systems – together with the referenced standard fire tests – are described in Table 3.

Table 3 Variations to tested systems

Reference tests	Variations
FRT190338 R1.1 FRT190339 R1.0	• The proposed Korok Panel separating elements must be greater than or equal to 51 mm in thickness, with a minimum dry density of 510 kg/m^3 for 51 mm Korok walls and 400 kg /m^3 for 78 mm Korok walls • Assessment of service penetrations installed in 78 mm Korok panel with a minimum density of 400 kg/m^3. • Assessment of service penetrations installed in concrete and solid/hollow Masonry in rigid wall ≥ 51 mm thickness with minimum density of 400 kg/m^3 with an established FRL equal or greater than the assessed FRL • Assessment of various types of single cables protected with Hilti Intumescent sealant CP611a. • Assessment of various types of cable bundles protected with Hilti intumescent sealant CP611a with and without Hilti Firestop Putty Bandage CFS-P BA. • Assessment of various types of flexible and rigid conduits protected with Hilti CFS-C P Fire Collar and CP606 sealant. • Assessment of AS 1530.4:2014 standard D1 and D2 cable groups protected with Hilti CP670 Coated Boards and Hilti CP611a Intumescent sealant. • Assessment of various uPVC pipes protected by Hilti Retrofit Fire Collars CFS-C P and Hilti Firestop Acrylic Sealant CP606. • Assessment of PE-X and PE-Xb/AL/PE pipes protected by Hilti CP611a Intumescent sealant. • Assessment of various sizes and types of metal pipes with lagging and unlagged (uninsulated) installed with open/closed cell backing rod protected by Hilti Firestop acrylic sealant CP606. • Assessment of all service penetrations in 78 mm thick Korok wall system with additional protection for an increased FRL. • Plasterboard used in the construction for wall build up (Additional Protection, AP) shall include but not be limited to USG Boral Firerstop, CSF Fyrecheck, Knaurf Fireshield and GIB Fyreline®.

4.4 Purpose of the test

AS 1530.4:2014 sets out procedures for fire tests on building materials, components and structures and fire resistance tests for elements of construction. Section 2 sets out the general requirements for testing and section 10 sets out the requirements for service penetrations and control joints.

AS 4072.1:2005 sets out the procedure for the protection of service penetrations and control joints in fire rated separating element. Section 3 sets out the determination of fire resistance and classification of penetration systems.

5. Assessment outcomes

Details of the assessment and discussion are only available in the referenced main assessment report. Sections 5.1 to 5.10 provides summaries of the assessment outcomes.

5.1 Distance Requirements

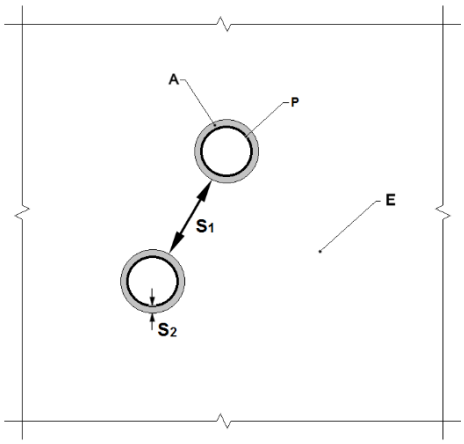

Figure 1 Distance requirements for installed service penetrations

Table 4 Distance requirements for installed service penetrations

Minimum distance valid for installation of services	Wall (mm)
Distance between edges of individual penetrations	$S_1 = 40$
Distance between wall of pipe and edge of seal	$5 \leq S_2 \leq 20$

5.2 Additional protection for penetrations

Additional Protection (AP) is utilised to increase the seal thickness of penetration through 78 mm Korok panels, to achieve a minimum seal thickness ≥ 104 mm.

- AP1**:** Layers of 13 mm or 16 mm fire rated plasterboard board, at least 100 mm wide square board added to both sides of the wall, fixed in place with a maximum spacing of 150 mm apart. The outside perimeter edge of AP1 must be sealed with Hilti Firestop Acrylic sealant CP606
  - The first layer of AP1 (1 × layer of 13 mm or 16 mm fire rated plasterboard) used for additional protection must be installed with 6g × 32 mm Course Thread Plaster Board Screw. Maximum spacing between screws is 150 mm.
  - When second layer of AP1 are used, the second layer of AP1 (1 × layer of 13 mm or 16 mm fire rated plasterboard) must be installed with 6g × 50 mm Course Thread Plaster Board Screw. Maximum spacing between screws 150 mm.
- AP2a - 1 × layer of Hilti CFS-P BA Putty Bandage covering the cables on the topside of the cable tray only. Note: White mesh should be visible, and the CFS-P BA Putty Bandage should overlap into the cable tray at each end by 20 mm when installed with a minimum width of 300 mm. Firmly press the CFS-P BA onto the services to ensure good adhesion.
- AP2b - 1 × layer of Hilti CFS-P BA Putty Bandage wrapped over the top of AP2a and around the entire cable tray, ensuring the mesh side of the CFS-P BA is visible. The putty bandage joint should overlap 20 mm. Firmly press the CFS-P BA onto to the services to ensure good adhesion. Note: Stainless Steel cables may be optionally used to secure the putty bandage around the underside of the cable tray.
- AP3 – 50 mm thick Mineral pipe sleeve (Fibertex 450) or equivalent with minimum density of 80 kg/m^3 wrapped around metal pipes on each side of the wall with minimum 600 mm length.

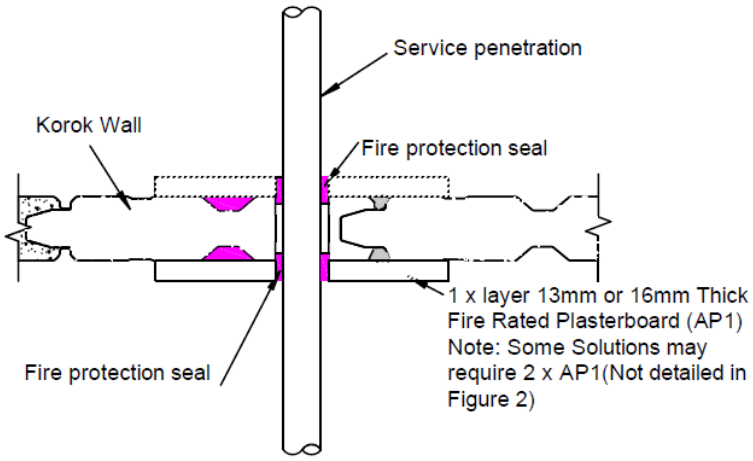

Figure 2 Horizontal cross section for additional protection AP1 in Korok panel systems

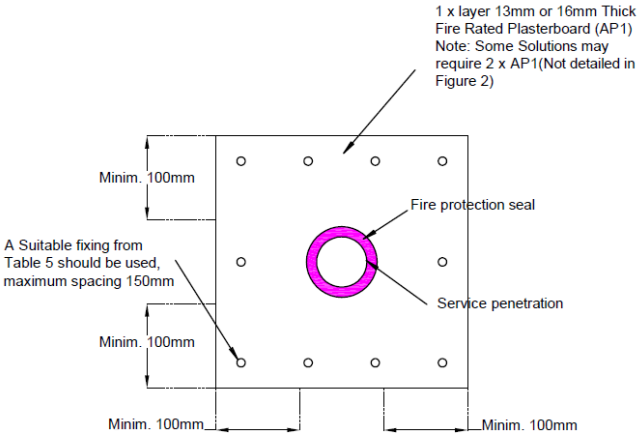

Figure 3 Elevation View for or additional protection AP1 in Korok panel systems

Table 5 Anchor Fixing Types

Anchoring System		Minimum Size	Korok 51 mm Panel	Korok 78 mm Panel
Retro-Fit Fire Collar fixings CFS-C P	12g × 35 mm Hex head self drilling screws	12g	✓	✓
Fixing Hilti CP670 coated board to Korok panel	14g × 75mm steel Hex head screws with 6 × 20 mm round washer	14g	✓	✓
AP1: Layers of 13 mm or 16 mm fire rated plasterboard board	First layer: 6g × 32 mm Course Thread Plaster Board Screw. Maximum spacing between screws is 150 mm. Second layer 6g × 50 mm Course Thread Plaster Board Screw. Maximum spacing between screws 150 mm.	6g × 32 And 6g × 50	✓	✓

The referenced assessment demonstrates that the proposed service penetrations described in Table 6 to Table 26 are expected to achieve the nominated FRLs if they are tested in accordance with AS 1530.4:2014 and assessed in accordance with AS 4072.1:2005.

5.3 Single Copper Core Cables in 51 mm and 78 mm Korok panel systems

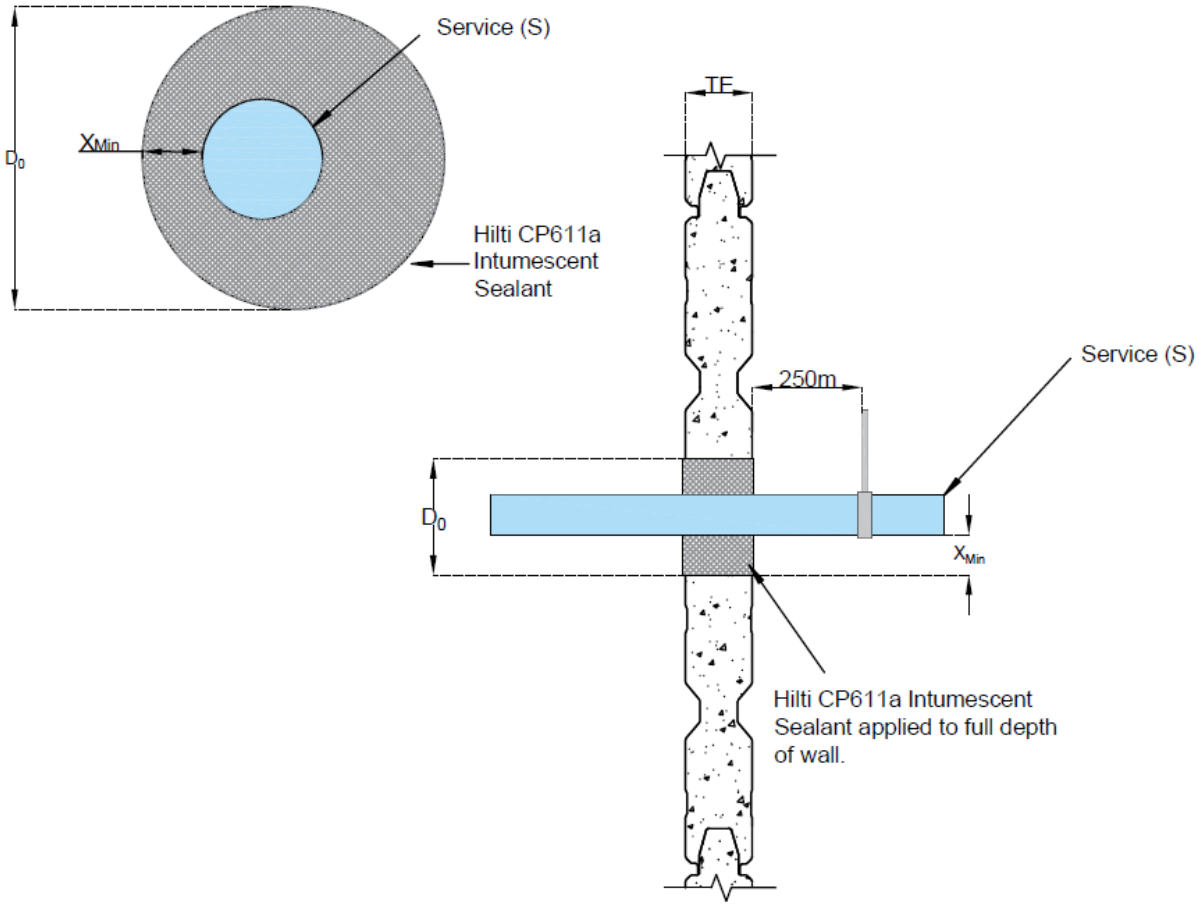

Figure 4 Single cables through 51 mm or 78 mm thick Korok panels

Table 6 Single cables through minimum 51 mm Korok panel system

Services	Maximum cable dia. (mm)	Core hole size mm	Minimum annular gap (X_{min}) (mm)	Sealant	≥ 51 mm Korok Panel
Single core copper cables PVC/PVC & XLPE/PVC (sheath/insulation) circular cables up to 25 mm^2	10	35	5	Hilti CP611a (to full depth of wall)	- /120/90
Single Telecommunication cables, Cat5/6/7/8, RG6 Coax Cables & Fibre Optic cables	10	28	5		- /120/90
Multi-core copper PVC/PVC & XLPE/PVC (Sheath/Insulation) circular & Flat 2C&3C+E cables up to 25 mm^2	23	48	5		- /120/60

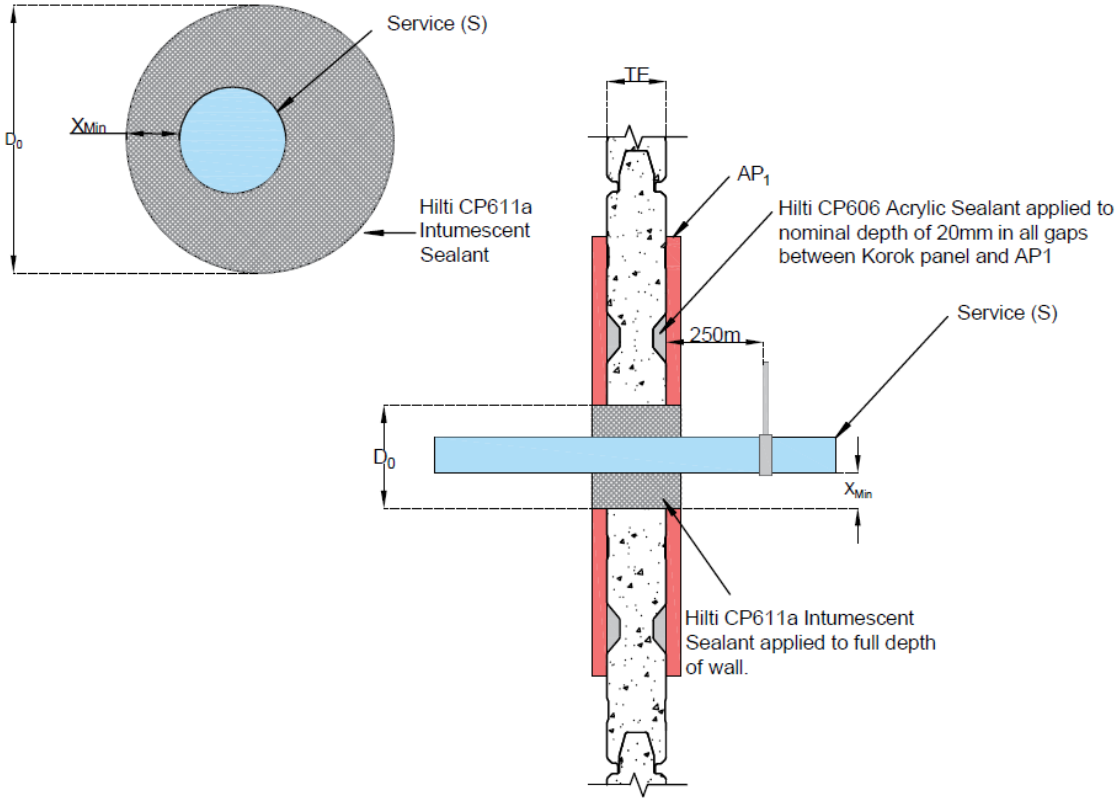

Figure 5 Single cables through 78 mm thick Korok panels with AP1 additional protection

Table 7 Single cables through 78 mm Korok wall system with additional AP1 protection

Service (S)	Maximum cable Dia. (mm)	Core hole size mm	Minimum annular gap (X_{min}) (mm)	Sealant	Additional protection	78 mm Korok Wall Panel
Single core copper cables PVC/PVC & XLPE/PVC (Sheath/Insulation) circular cables up to 25 mm^2	10	35	5	Hilti CP611a (to full depth of wall)	AP1 plasterboard build up	-/120/120
Single Telecommunication Cables, Cat5/6/7/8, RG6 Coax Cables & Fibre Optic Cables	10	28	5			-/120/120
Multi-Core Copper PVC/PVC & XLPE/PVC (Sheath/Insulation) Circular & Flat 2C&3C+E Cables up to 25mm^2	23	48	5			-/120/90

5.4 Cable Bundles < 36 mm diameter in 51 mm and 78 mm Korok panel systems

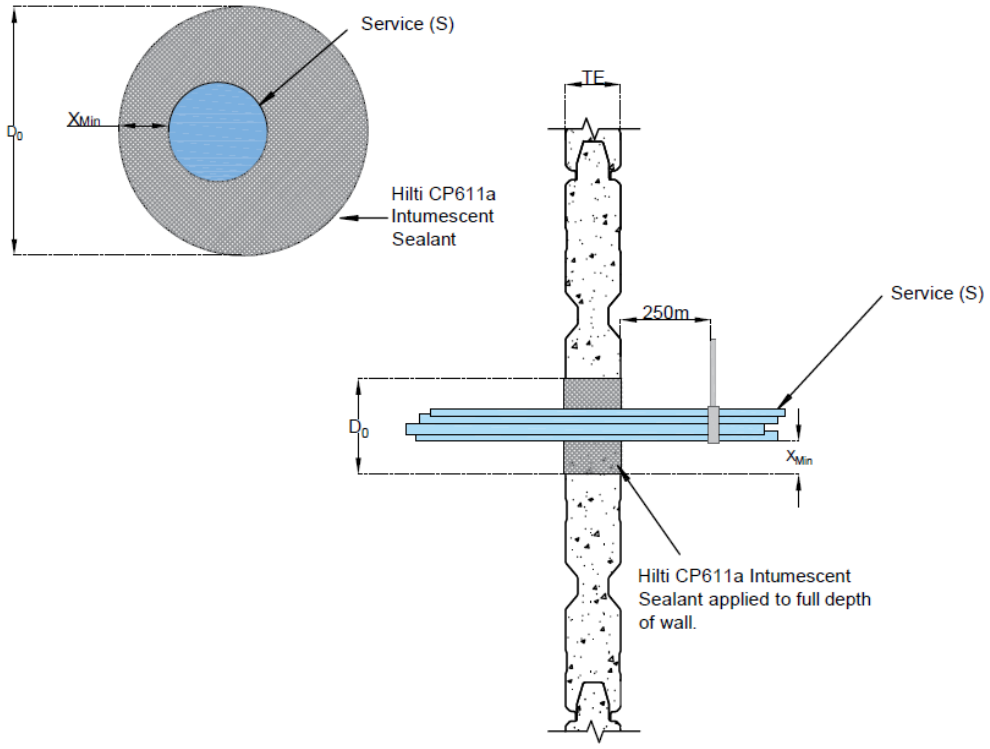

Figure 6 Cables bundles through 51 mm or 78 mm thick Korok panels

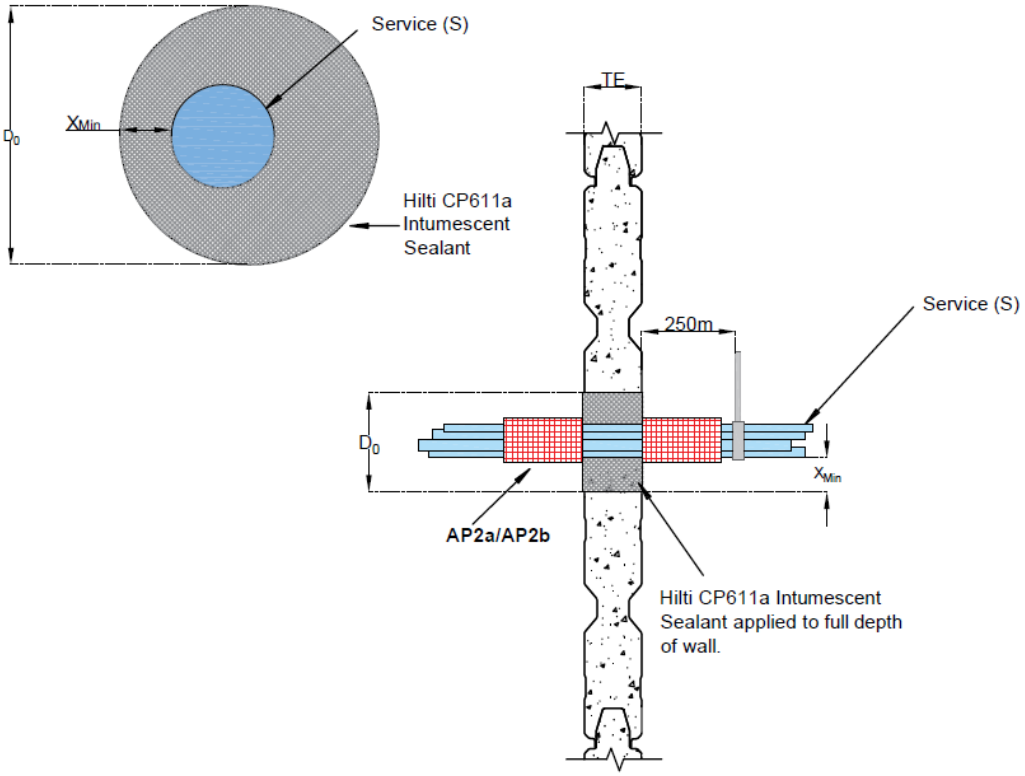

Figure 7 Cables bundles through 78 mm thick Korok panels with additional AP2 protection

Table 8 Cable bundles < 36 mm through minimum 51 mm Korok wall system

Service (S)	Maximum No. of cables in bundle	Maximum Cable bundle Dia. (mm)	Core hole size (Do) mm	Minimum annular Seal (X_{min}) (mm)	Sealant	≥ 51 mm Korok Wall Panel
TPS power cables PVC/PVC (Sheath/Insulation) flat & circular - 2C & E 1.0 mm^2 to 2.5 mm^2	8	23	54	5	Hilti CP611a Intumescent Sealant (to full depth of wall)	-/120/60
Telecommunication cables, Cat5/6/7/8, & Fibre optic cables	16	25	48	5		-/120/90
Quad Shield Coax cable	10	23	48	5		-/120/60
Any combination of the above-mentioned cables Bundled up to 36 mm in Dia.	-	36	48	5		-/120/60

Table 9 Cable bundles < 36 mm through 78 mm Korok panel system with additional AP2a and AP2b protection

Service (S)	No. of Cables	Maximum Cable Dia. (mm)	Core hole size (Do) mm	Minimum annular seal (X_{min}) (mm)	Sealant	Additional Protection	78 mm Korok Wall Panel
TPS Power cables PVC/PVC (Sheath/Insulation) Flat & Circular - 2C & E 1.0mm2 to 2.5mm^2	8	23	54	5	Hilti CP611a Intumescent Sealant (to full depth of wall)	2 × Layers of Hilti CFS-P BA Putty Bandage wrap around the cables on each side of wall (AP2a +AP2b)	-/120/90
Telecommunication cables, Cat5/6/7/8, & Fibre Optic Cables	16	10	48	5			-/120/120
Quad Shield Coax cable	10	23	48	5			-/120/90
Or Any combination of the above-mentioned cables bundled up to 36mm in Dia.	-	36	48	5			-/120/90

5.5 Rigid uPVC conduits < 50 mm diameter in 51 mm and 78 mm Korok panel systems

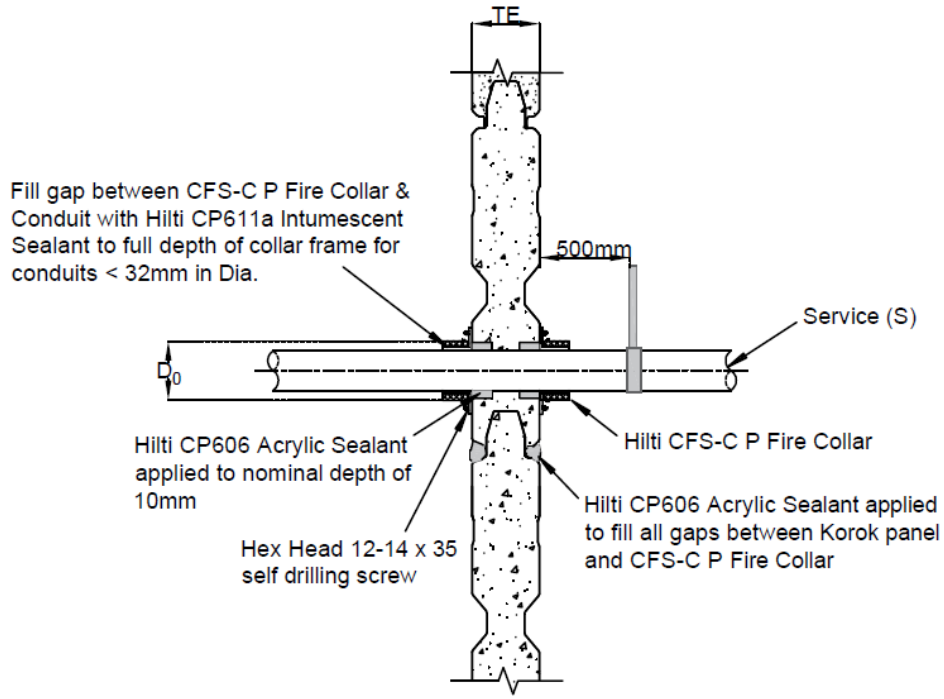

Figure 8 **Rigid conduits < 50 mm in Dia. through minimum 51 mm Korok panel system**

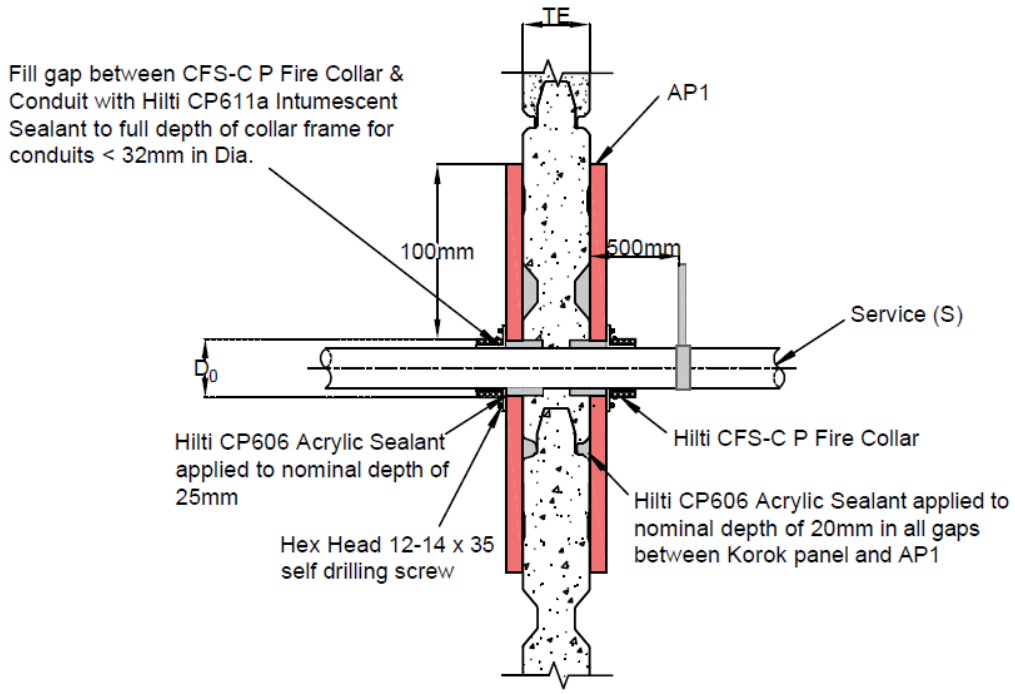

Figure 9 **Rigid conduits < 50 mm in Dia. through 78 mm Korok panel system with AP1 additional protection**

Table 10 Rigid conduits < 50 mm in Dia. through minimum 51 mm Korok panel system

Service (S)	Conduit Dia. (mm)	Minimum core hole size Dia. (mm)	Maximum core hole size Dia. (mm)	Maximum wall thickness (mm)	Fire collar	Annular sealant	Additional sealant inside collar	≥ 51 mm Korok Wall Panel
Single Rigid uPVC conduit (Empty)	16	28	54	5.0	Hilti CFS-C P 50/1.5" Fire Collar	Hilti CP606 Acrylic Sealant, Installed to Nominal Depth of 10 mm on both sides of the wall	Hilti CP611a Intumescent sealant installed to full depth of collar frame	-/120/60
	20	30						
	25	38						
	32	48						
	50	51					N/A	
Single rigid uPVC conduit, filled with cables & or Fibre optics or mixture of both fibre optics & cables.	16	28	54				Hilti CP611a Intumescent sealant installed to full depth of collar frame	-/120/60
	20	30						
	25	38						
	32	48						
	50	51					N/A	

Table 11 Rigid conduits < 50 mm in Dia. through 78 mm Korok panel system with AP1 additional protection

Service (S)	Conduit Dia. (mm)	Minimum core hole size Dia. (mm)	Maximum core hole size Dia. (mm)	Maximum wall thickness (mm)	Fire Collar	Annular Seal, Sealant	Additional Sealant inside collar	78 mm Korok Wall Panel
Single Rigid uPVC conduit (Empty)	16	28	54	5.0	Hilti CFS-C P 50/1.5" Fire Collar	Hilti CP606 Acrylic Sealant, Installed to nominal depth of 25 mm on both sides of the wall	Hilti CP611a Intumescent sealant installed to full depth of collar frame in addition to AP1 plasterboard build up	-/120/90
	20	30						
	25	38						
	32	48					AP1 plasterboard build up	
	50	51						
Single Rigid uPVC conduit, filled with Cables & or Fibre Optics or mixture of both Fibre Optics & cables.	16	28	54				Hilti CP611a Intumescent sealant installed to full depth of collar frame in addition to AP1 plasterboard build up	-/120/90
	20	30						
	25	38						
	32	48					AP1 plasterboard build up	
	50	51						

5.6 Flexible conduits < 50 mm diameter in 51 mm and 78 mm Korok panel systems

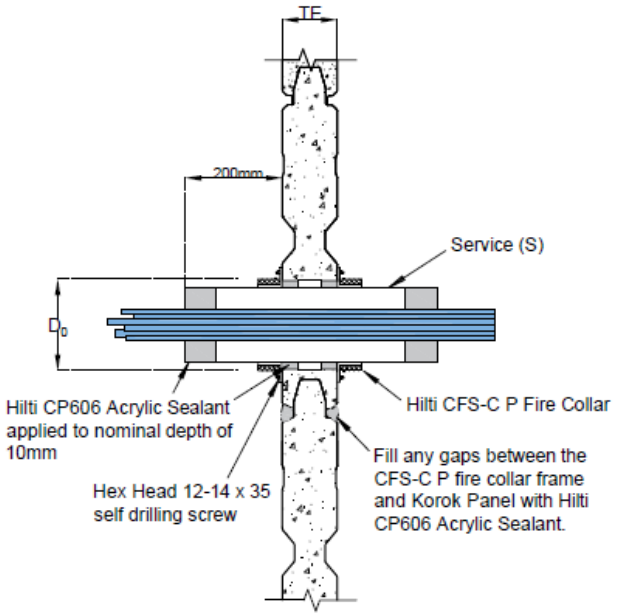

Figure 10 Flexible conduits < 50 mm in Dia. through minimum 51 mm Korok wall system

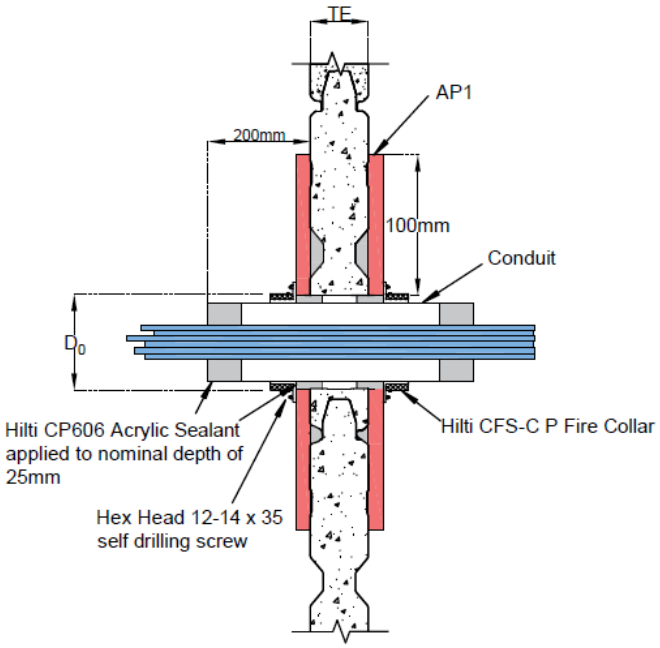

Figure 11 Flexible conduits < 50 mm in Dia. through 78 mm Korok wall system with AP1 additional protection.

Note: The stated length of the conduits can be greater than or equal to 200 mm in length. The sealant applied in the ends of the conduits is only required when the conduit is not continuous.

Table 12 Flexible conduits < 50 mm in Dia. through minimum 51 mm Korok wall system

Service (S)	Conduit Dia. (mm)	Maximum core hole size Dia. (mm)	Minimum core hole size Dia. (mm)	Wall thickness (mm)	Fire collar	Annular seal, sealant	Additional sealant inside collar	≥ 51 mm Korok Wall Panel
Single Flexible uPVC conduit (Empty)	20	27	54	0.5 – 0.55	Hilti CFS-C P 50/1.5" Fire Collar	Hilti CP606 Acrylic sealant, Installed to nominal depth of 10 mm on both sides of the wall	Hilti CP611a Intumescent sealant installed to full depth of collar frame	-/120/-
	25	38						
	32	48						
	50	51					N/A	
Single flexible uPVC conduit, filled with Cables & or Fibre optics or mixture of both fibre Optics & cables	20	27	54				Hilti CP611a intumescent sealant installed to full depth of collar frame	-/120/90
	25	38						
	32	48						
	50	51					N/A	
Single Flexible PP Conduit (Empty)	20	27	54				Hilti CP611a Intumescent Sealant installed to full depth of collar frame	-/120/-
	25							
Single Flexible PP Conduit, filled with Cables & or Fibre Optics or mixture of both Fibre Optics & Cables	20	27	54					-/120/60
	25							

Table 13 Flexible conduits < 50 mm in Dia. through 78 mm Korok wall system with AP1 additional protection.

Service (S)	Conduit Dia. (mm)	Minimum core hole size Dia. (mm)	Maximum core hole size Dia. (mm)	Wall thickness (mm)	Fire Collar	Annular seal, sealant	Additional Sealant inside collar	78 mm Korok Wall Panel
Single Flexible uPVC Conduit, filled with Cables & or Fibre Optics or mixture of both Fibre Optics & Cables	20	27	54	0.5 – 0.55	Hilti CFS-C P 50/1.5" Fire Collar	Hilti CP606 Acrylic Sealant, installed to nominal depth of 25 mm on both sides of the wall with plasterboard build up.	Hilti CP611a Intumescent Sealant installed to full depth of collar frame with AP1 plasterboard build up	-/120/120
	25	38						
	32	48					AP1 plasterboard build up	
	50	51						
Single Flexible PP Conduit, filled with Cables & or Fibre Optics or mixture of both Fibre Optics & Cables	20	27	54				Hilti CP611a Intumescent Sealant installed to full depth of collar frame with AP1 plasterboard build up	-/120/90
	25							

5.7 D1 and D2 cable groups in 51 mm and 78 mm Korok panel systems with or without cable trays

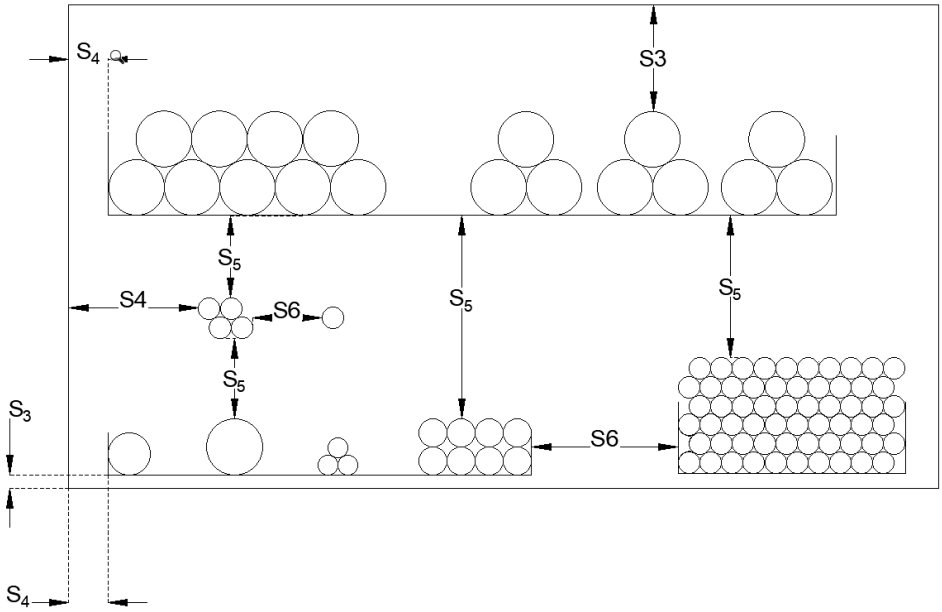

Figure 12 D1 and D2 cable group distance requirements

Table 14 Minimum distance requirements for D1 and D1 cable groups

Distance requirement	Item	Distance (mm)
minimum vertical edge distance between edge of aperture and cable tray/bundle.	S3	10
minimum horizontal edge distance between edge of aperture and cable tray/bundle.	S4	10
minimum vertical edge distance between a loaded cable tray or cable bundle and a cable tray or cable bundle above/below.	S5	110
minimum horizontal edge distance between a loaded cable tray or cable bundle and a cable tray or cable bundle.	S6	110

The maximum dimension of the aperture/opening in the Korok panel is 900 mm (W) × 450 (H) or equivalent surface area 405000 mm^2, with no single side larger than 900 mm in length. In addition, the cable tray may optionally be zinc, galvanized steel, steel or stainless steel with a maximum width of 600 mm. Hilti CFS-P BA Putty Bandage may optionally be secured in place with SS cable ties tied around the outer of the 2 × layers of the CFS-P BA Putty Bandage and around the cable tray when installed or the 2 × layers of the CFS-P BA Putty Bandage and cable bundle when no cable tray is present.

PVC/PVC or XLPE/PVC D1 Power Cable included but not limited to Submain, TPS, SDI, fire rate cables, security cables and earth cables with or without cable tray (Standard D1 cable set, in accordance with AS 1530.4:2014 Appendix D).

PVC or XLPE insulated D2 communication cables included but not limited to Data Cables, Cat5/6/7 Coaxial and Optic Fibre with or without cable tray (Standard D2 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 those stated in Table 15 to Table 19. The cables can be bundled in different ways provided the loading on the cable tray is the same or lower than those stated in Table 15 to Table 19. Moreover, the cables may be applied to all PVC/PVC and PVC/XLPE insulated/sheathed power and communication cables with copper conductors, provided the services are protected with the same sealing system and penetrating the same separating element wall type.

The aperture in the separating element is protected by 2 layers of CP670 board as shown in Figure 13. The board fixed to the face of the wall can be on either side of the wall for both 78 mm and 51 mm thick panels. The board tightly fitted within the framed opening can be recessed on one side when installed in a 78mm panel, ensuring a minimum penetration seal thickness 100mm.

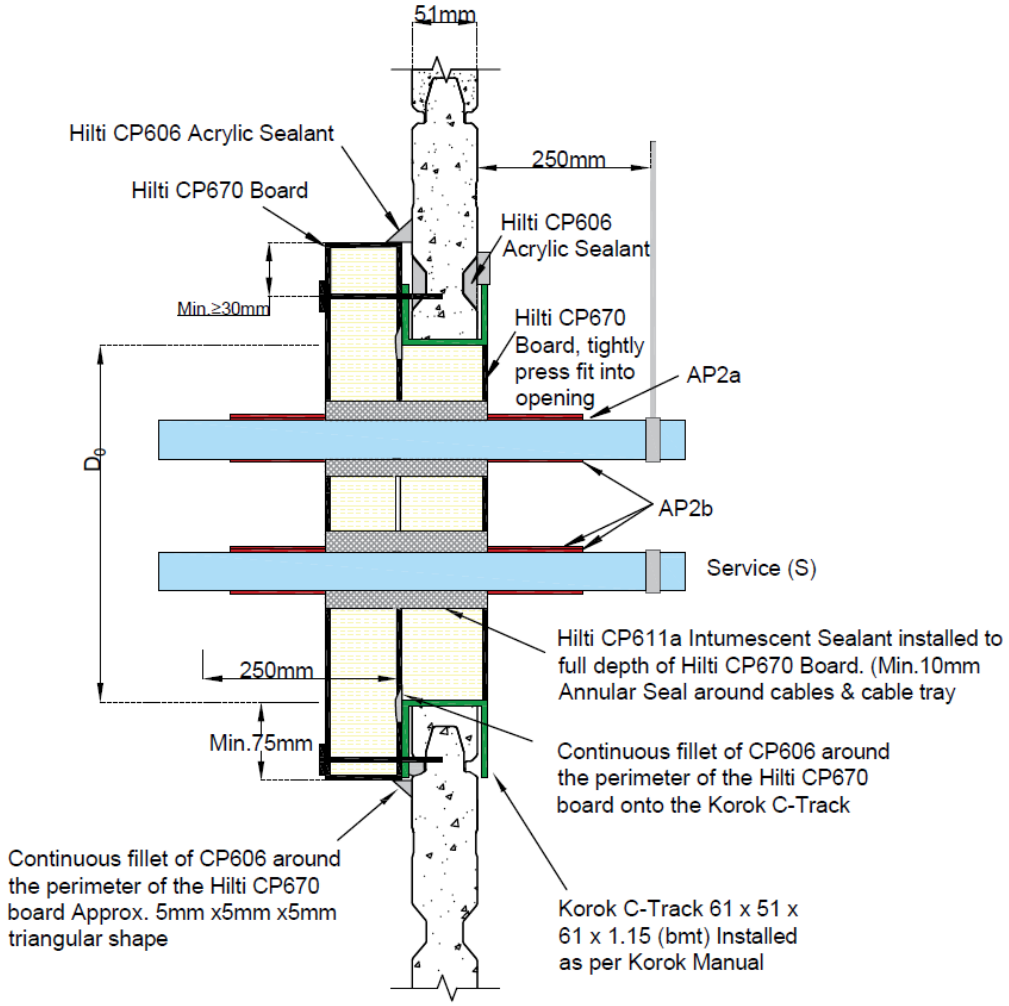

Figure 13 Large cable tray opening with D1 and D2 cable group in 51 mm and 78 mm Korok panel system

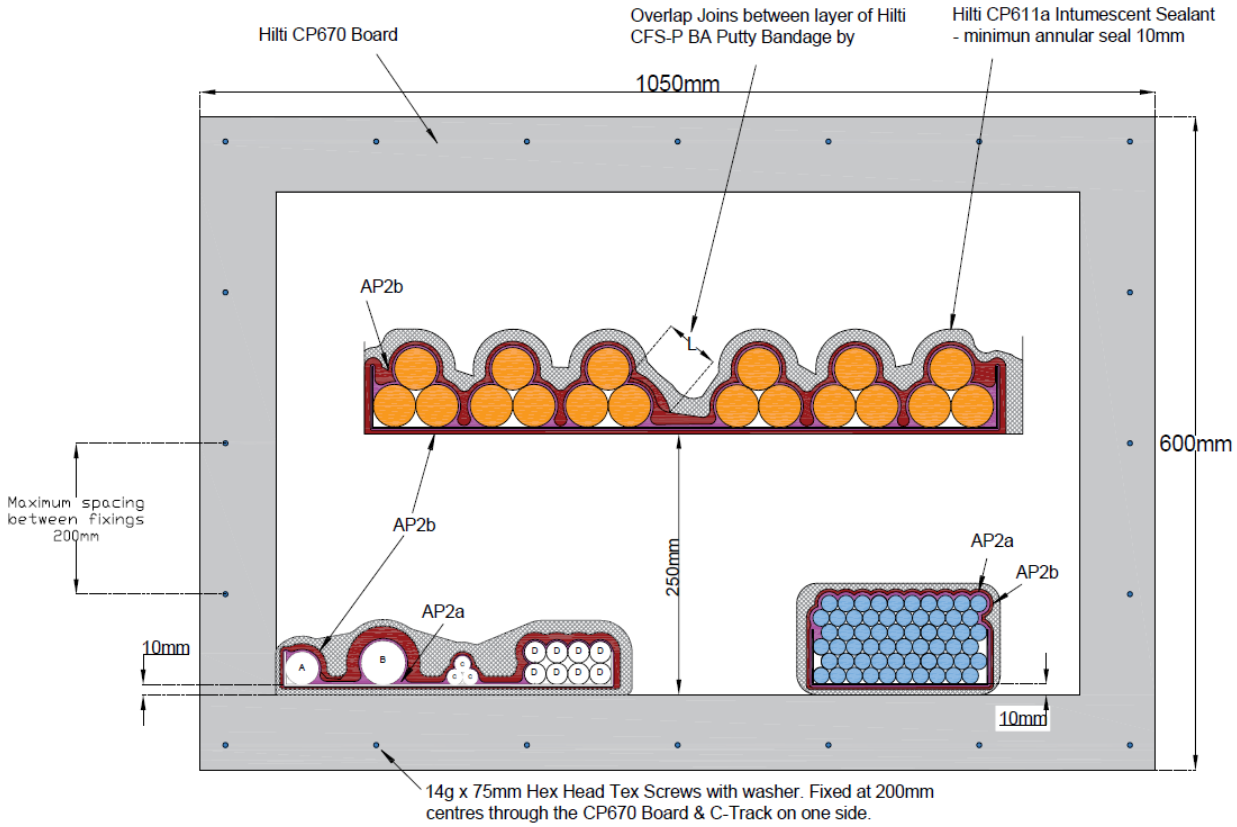

Figure 14 Front view of large cable tray opening with D1 and D2 cable group in 51 mm and 78 mm Korok panel system

Table 15 Proposed standard D1 cable sets through minimum 51 mm Korok wall system

Service (S)	Maximum no. of cables in bundle	Maximum cable Dia. (mm)	Main protection system	Annular seal (mm)	Annular sealant	Additional Protection	≥ 51 mm Korok Wall Panel
Single Core Copper PVC/PVC & XLPE/PVC (Sheath/Insulation) up to 630 mm^2	1	46	Two layers of Hilti CP670 Coated Board	10	Hilti CP611a	2 × Layers of Hilti CFS-P BA Putty Bandage (AP2a+Ap2b)	-/120/90
Multi-Core Copper PVC/PVC & XLPE/PVC (Sheath/Insulation) 3C+E up to185 mm^2	1	54		10			-/120/90
Multi-Core Copper PVC/PVC & XLPE/PVC (Sheath/Insulation) 3C+E up to 6 mm^2	3	16		10			-/120/90
Multi-Core Copper PVC/PVC & XLPE/PVC (Sheath/Insulation) 3C+E up to 16 mm^2	8	21		10			-/120/90

Table 16 Proposed standard D2 cable sets through minimum 51 mm Korok wall system

Service (S)	Maximum No. of Cables in Bundle	Maximum Cable Dia. (mm)	Main protection system	Annular Seal (mm)	Annular Seal, Sealant	Additional protection	≥ 51 mm Korok Wall Panel
Telecommunication Cables (50 Twisted Pairs of 0.2mm^2 Copper Core)	60	16	Two layers of Hilti CP670 Coated Board	10	Hilti CP611a Intumescent Sealant	2 × Layers of Hilti CFS-P BA Putty Bandage (AP2a+Ap2b)	-/90/60
Telecommunication Cables (50 Twisted Pairs of 0.2mm^2 Copper Core)	1	54		10			-/90/60

Table 17 Proposed non-standard large cable bundles on cable tray through minimum 51 mm Korok wall system

Service (S)	Maximum No. of Cables in Bundle	Maximum Cable Dia. (mm)	Main protection system	Annular Seal (mm)	Annular Seal, Sealant	Additional Protection	≥51mm Korok Wall Panel
Single Core Copper PVC/PVC & XLPE/PVC (Sheath/Insulation) up to 400 mm^2	3 pairs of 3 Cables	34	Two layers of Hilti CP670 Coated Board	10	Hilti CP611a	2 × Layers of Hilti CFS-P BA Putty Bandage (AP2a+Ap2b)	-/60/60
Single Core Aluminium PVC/PVC & XLPE/PVC (Sheath/Insulation) up to 400 mm^2	3 pairs of 3 Cables	30		10			-/60/60

Table 18 Proposed PVC/PVC & XLPE/PVC (Sheath/Insulation) Power Cables through minimum 51 mm Korok wall system

Service (S)	Maximum No. of Cables in Bundle	Maximum Cable Dia. (mm)	Main protection system	Annular Seal (mm)	Annular seal, sealant	Additional protection	≥ 51 mm Korok Wall Panel
Single Core Copper PVC/PVC & XLPE/PVC (Sheath/Insulation) up to 400 mm^2	3	34	Two layers of Hilti CP670 Coated Board	10	Hilti CP611a	2 × Layers of Hilti CFS-P BA Putty Bandage (AP2a+Ap2b)	-/60/60
Single Core Aluminium PVC/PVC & XLPE/PVC (Sheath/Insulation) up to 400 mm^2	3	30		10			-/60/60
Single Core Copper PVC/PVC & XLPE/PVC (Sheath/Insulation) up to 630 mm^2	1	46		10			-/120/90
Multi-Core Copper PVC/PVC & XLPE/PVC (Sheath/Insulation) 3C+E up to 6 mm^2	3	16		10			-/120/90
Multi-Core Copper Cables PVC/PVC & XLPE/PVC (Sheath/Insulation) Circular 3C+E up to 16mm^2 < 21 mm Dia.	8	21		10			-/120/90
Multi-Core Copper PVC/PVC & XLPE/PVC (Sheath/Insulation) 3C+E up to 185 mm^2	1	54		10			-/120/90
Any combination of AS1530.4 D1 Standard Power Cables with XLPE/PVC or PVC/PVC Sheath/Insulation with single core or multi-core copper conductors, with a maximum cable dia. of 50 mm, bundled up to 145 mm × 110 mm (or equivalent surface area of 15950 mm^2).	-	50		10			-/120/90
Multi-Core Copper Cables Flat < 50 mm Dia. or bundled up to max 145 mm × 110 mm (or equivalent surface area of 15950 mm^2).	-	50		10			-/120/90
Any combination of the above aluminium or copper core cables with XLPE/PVC or PVC/PVC sheath/insulation less than 34 mm in Dia. can be bundled up to max 145 mm × 110 mm (or equivalent surface area of 15950 mm^2).	-	34		10			-/60/60

Table 19 Proposed Telecommunication cables through minimum 51 mm Korok wall system

Service	Maximum no. of cables in bundle	Maximum cable Dia. (mm)	Main protection system	Annular seal (mm)	Annular sealant	Additional Protection	51 mm Korok Wall Panel
Telecommunication Cables (50 Twisted Pairs of 0.2mm^2 Copper Core)	60	16	Two layers of Hilti CP670 Coated Board	10	Hilti CP611a	1 x Layer of Hilti CFS-P BA Putty Bandage Over Cables + 1 x Layer of Hilti CFS-P BA Putty Bandage wrapped over the 1st layer and around the cables & cable tray	-/90/60
RG6 Coax Cables	60	6.98		10			-/90/60
Data Cables (Cat5/6/7)	60	8		10			-/90/60
Or any combination bundled up to 145 mm × 110 mm (or equivalent surface area of 15950 mm^2).	-	16		10			-/90/60

5.8 uPVC / uPVC-SC plumbing pipes in 51 mm and 78 mm Korok panel systems

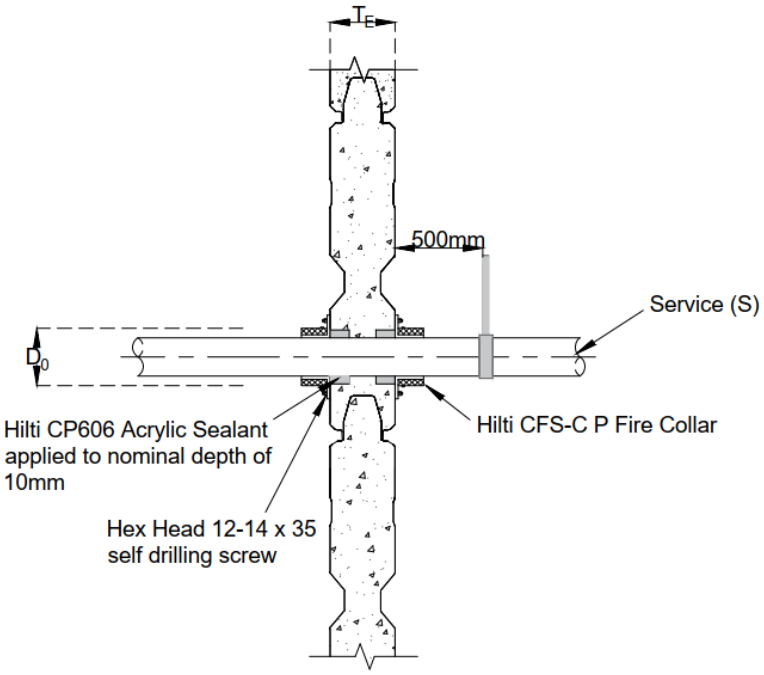

Figure 15 uPVC/uPVC-SC plumbing pipes < 150 mm in Dia. through minimum 51 mm Korok panel system

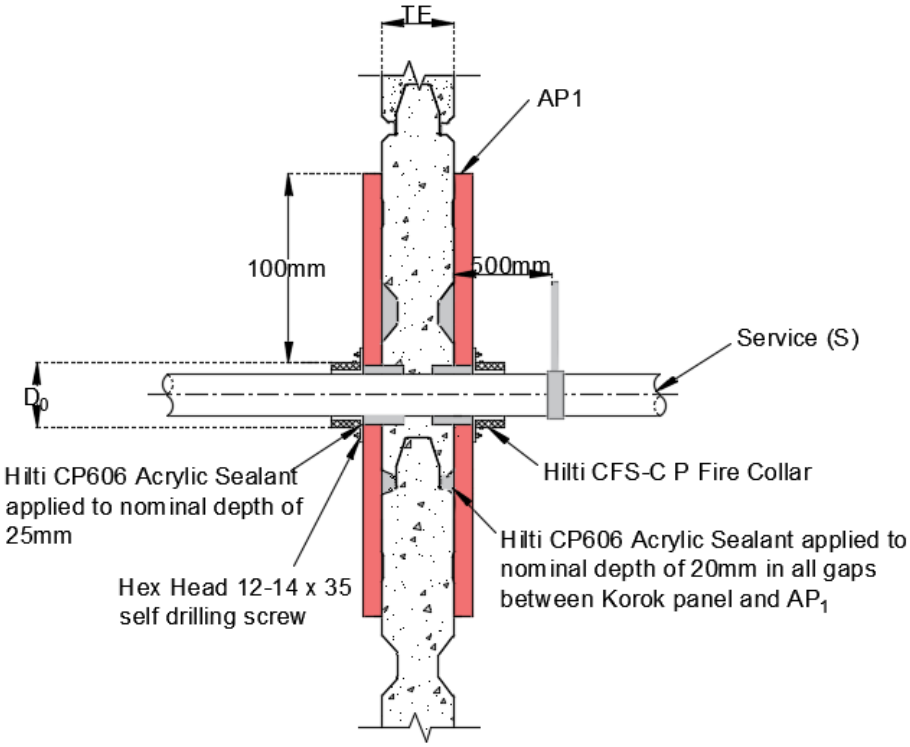

Figure 16 uPVC/uPVC-SC plumbing pipes < 150 mm in Dia. through 78 mm Korok panel system with additional protection

Table 20 Proposed uPVC/uPVC-SC Plumbing Pipes through minimum 51 mm Korok wall system

Service (S)	Primary Protection	No. of Collar Fixings	Wall thickness (mm)	Secondary Protection	Core hole size (Do) mm Minimum Dia.	Core hole size (Do) mm Maximum Dia.	≥ 51 mm Korok wall Panel
40 mm (ND) uPVC DWV	Hilti CFS-C P 50/1.5" Fire Collar	2	2.4	Hilti CP606 Acrylic Sealant Annular Seal to nominal depth 10 mm - Figure 15	48	51	-/120/60
50 mm (ND) uPVC DWV	Hilti CFS-C P 63/2.0" Fire Collar	3	2.3		58	64	-/120/90
65 mm (ND) uPVC DWV	Hilti CFS-C P 75/2.5" Fire Collar	3	2.5		68	76	-/120/90
80 mm (ND) uPVC DWV	Hilti CFS-C P 90/3" Fire Collar	3	3.4		84	95	-/120/90
100 mm (ND) uPVC-SC	Hilti CFS-C P 110/4" Fire Collar	4	4		115	121	-/120/60
150 mm (ND) uPVC-SC	Hilti CFS-C P 160/4" Fire Collar	6	5		165	170	-/120/60

Table 21 Proposed uPVC/uPVC-SC plumbing pipes through 78 mm Korok wall system with additional AP1 protection

Service (S)	Primary Protection	No. of Collar Fixings	Pipe Wall thickness (mm)	Secondary Protection	Core hole size (Do) mm Minimum Dia.	Core hole size (Do) mm Maximum Dia.	78 mm Korok wall Panel
40 mm (ND) uPVC DWV	Hilti CFS-C P 50/1.5" Fire Collar	2	2.4	Hilti CP606 Acrylic Sealant Annular Seal to Nominal depth 25 mm with plasterboard build up (AP1) - Figure 16	48	51	-/120/90
50 mm (ND) uPVC DWV	Hilti CFS-C P 63/2.0" Fire Collar	3	2.3		58	64	-/120/120
65 mm (ND) uPVC DWV	Hilti CFS-C P 75/2.5" Fire Collar	3	2.5		68	76	-/120/120
80 mm (ND) uPVC DWV	Hilti CFS-C P 90/3" Fire Collar	3	3.4		84	95	-/120/120
100 mm (ND) uPVC-SC	Hilti CFS-C P 110/4" Fire Collar	4	4		115	121	-/120/90
150 mm (ND) uPVC-SC	Hilti CFS-C P 160/4" Fire Collar	6	5		165	170	-/120/90

5.9 PE-X and PE-Xb/AL/PE pipes in 51 mm and 78 mm Korok panel systems

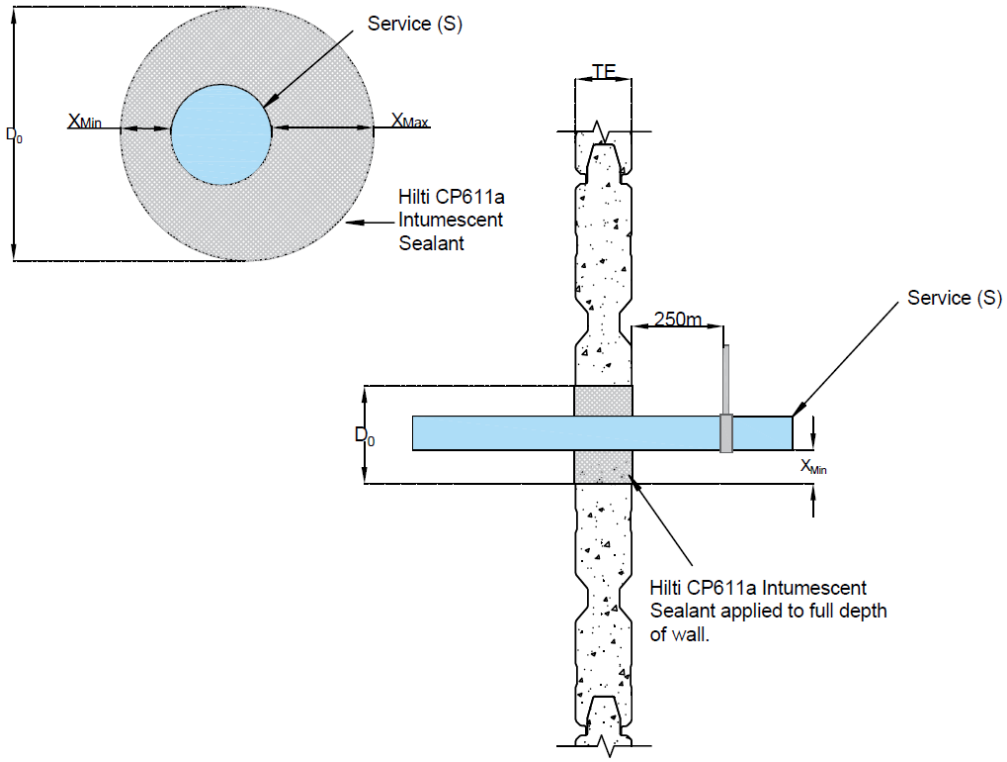

Figure 17 Gas and water supply pipes through 51 mm and 78 mm Korok wall system

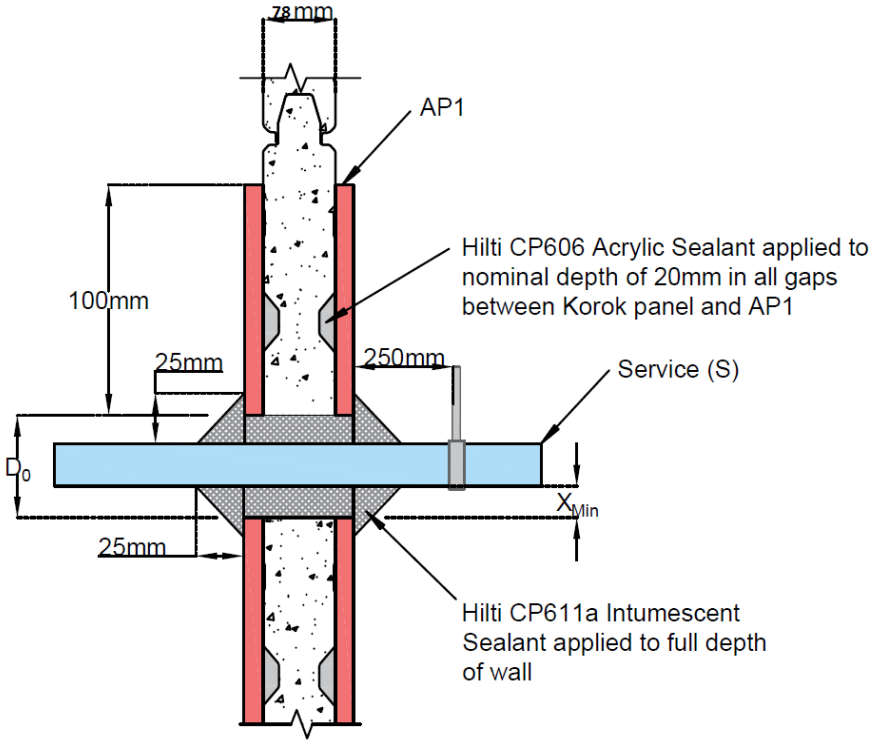

Figure 18 Gas and water supply Pipes through 78 mm Korok wall system with AP1 and cone additional protection

Table 22 Proposed gas and water supply pipes through 51 mm and 78 mm Korok wall system

Service (S)	Pipe Dia. (mm)	Pipe Wall Thickness Range (mm)	Core hole size (Do) mm	Minimum annular Seal (X_{min}) (mm)	Annular seal, sealant	51 mm Korok Wall Panel	78 mm Korok Wall Panel
PE-Xa	16	1.2 - 2.4	38	5	Hilti CP611a Intumescent Sealant	-/120/90	-/120/90
	20	2.3 - 3.4	40	5		-/120/90	-/120/90
	25	2.8 - 3.9	48	5		-/120/90	-/120/90
PE-X/AL/PE	16	2.0 - 2.6	38	5		-/120/60	-/120/60
	20	2.3 - 2.9	40	5		-/120/60	-/120/60
	25	3.5 - 3.7	48	5		-/120/60	-/120/60
	32	3.5 - 3.7	54	5		-/120/60	-/120/60

Table 23 Proposed gas and water supply Pipes through 78 mm Korok wall system with AP1 additional protection

Service (S)	Pipe Dia. (mm)	Pipe Wall Thickness Range (mm)	Core hole size (Do) mm	Minimum annular Seal (X_{min}) (mm)	Annular Seal, Sealant	Additional Protection	78 mm Korok Wall Panel
PE-Xa	16	1.2 - 2.4	38	5	Hilti CP611a Intumescent Sealant	1 × layer of 13 mm fire rated plasterboard patch on each side of the wall (AP1), with 25 mm × 25 mm Cone of CP611a Intumescent Sealant	-/120/120
	20	2.3 - 3.4	40	5			-/120/120
	25	2.8 - 3.9	48	5			-/120/120
PE-Xb	16	1.2 - 2.4	38	5			-/120/120
	20	1.9 - 2.4	40	5			-/120/120
	25	2.3 - 2.9	48	5			-/120/120
PE-X/AL/PE	16	2.0 - 2.6	38	5			-/120/90
	20	2.3 - 2.9	40	5			-/120/90
	25	3.5 - 3.7	48	5			-/120/90
	32	3.7 – 4.7	54	5			-/120/90
PE-Xb/AL/PE-Xb	16	2.0 - 2.6	38	5			-/120/90
	20	2.0 - 2.9	40	5			-/120/90
	25	2.4 - 3.7	48	5			-/120/90

5.10 Metal pipes < 200 mm in diameter in 51 mm and 78 mm Korok panel systems

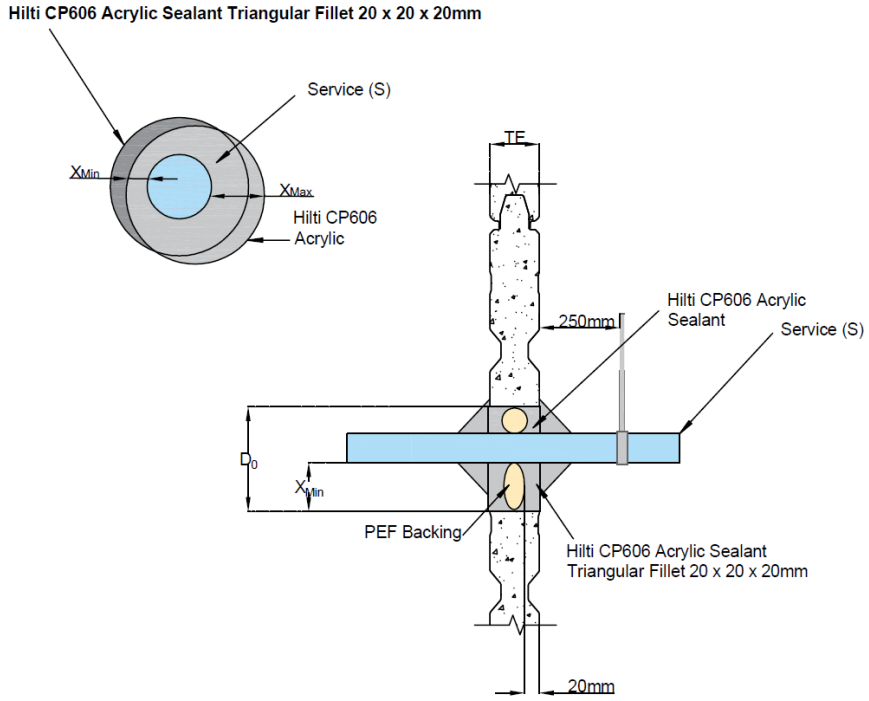

Figure 19 Uninsulated metal pipes in minimum 51 mm Korok panel system

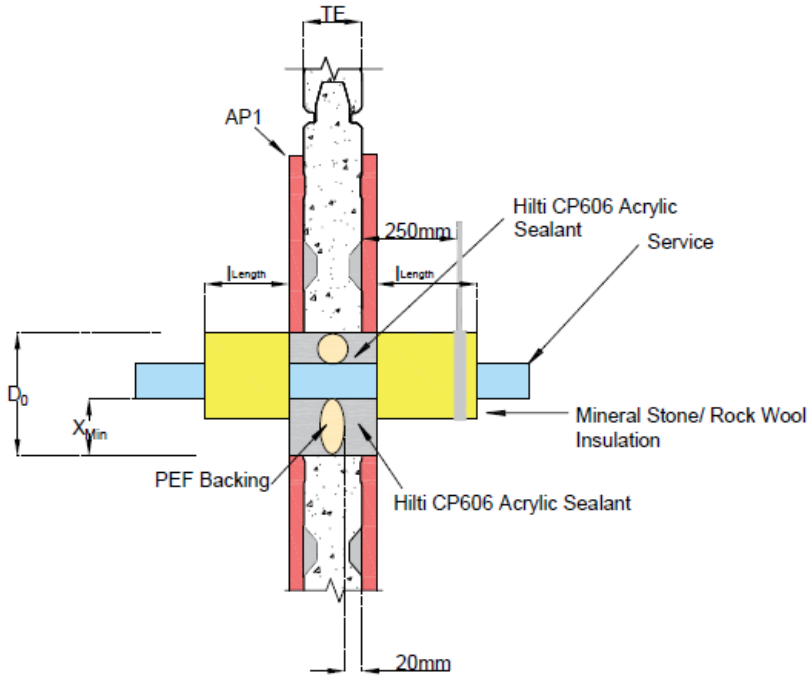

Figure 20 Metal pipes in minimum 51 mm Korok panel system with AP1 and AP3 additional protection

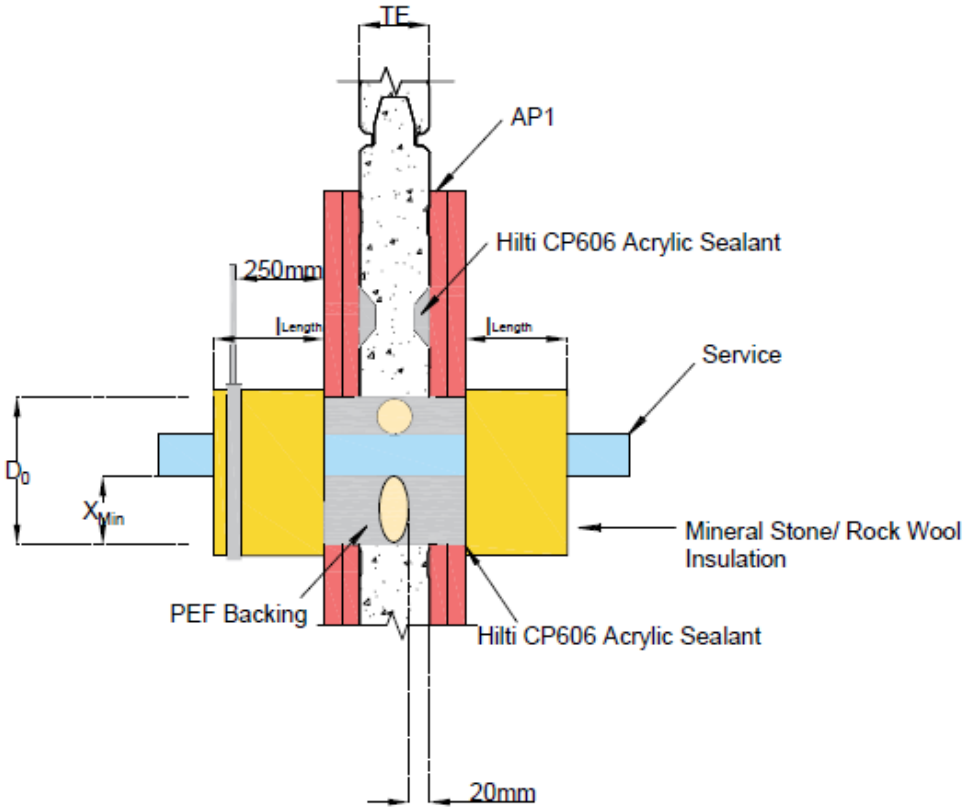

Figure 21 Metal pipes in minimum 51 mm Korok panel system with 2 × AP1 and AP3 additional protection

Table 24 Uninsulated various metal Pipes through minimum 51 mm Korok wall system

Service (S)	Minimum Nominal Pipe Dia. (mm)	Maximum Nominal Pipe Dia. (mm)	Minimum Pipe Wall Thickness (mm)	Minimum edge distance (X_{min}) (mm)	Maximum annular gap. (X_{max}) (mm)	Annular Seal, Sealant	Additional Protection	≥ 51 mm Korok Wall Panel
Copper, Ferrous (Steel, SS, Iron) or Brass Pipes	16	32	0.91	5	20	Hilti CP606 Acrylic Sealant to depth of 20 mm supported by PEF Backing Rod	Hilti CP606 Acrylic Sealant 20 mm × 20 mm fillet of sealant	-/120/-
	32	65	0.91					
	80	100	1.22					
Copper, Ferrous (Steel, SS, Iron) or Brass Pipes	125		1.42					
	150		1.63					
	200		1.63					

Table 25 Insulated metal Pipes through 51 mm and 78 mm Korok wall system with AP1 and AP3 additional protection.

Service (S)	Minimum Nominal Pipe Dia. (mm)	Maximum Nominal Pipe Dia. (mm)	Minimum Pipe Wall Thickness (mm)	Minimum Edge Distance (X_{min}) (mm)	Maximum Annular Gap. (X_{max}) (mm)	Annular Seal, Sealant	Additional Protection	51 mm Korok Wall Panel	78 mm Korok Wall Panel
Copper, Ferrous (Steel, SS, Iron) or Brass Pipes	16	32	0.91	5	20	Hilti CP606 Acrylic Sealant to depth of 20 mm from edge of Korok wall plus plasterboard patch thickness supported by PEF Backing Rod	1 × (AP1) layer of 13 mm fire rated plasterboard patch on each side of the wall, with Mineral Pipe Sleeve (Fibretex 450) 600 mm long each side of wall	-/120/30	-/120/60
	32	65	0.91						
	80	100	1.22						
Copper, Ferrous (Steel, SS, Iron) or Brass Pipes	125		1.42						
	150		1.63						
	200		1.63						

Table 26 Metal Pipes through 78 mm Korok wall system with addition 2 × AP1 and AP3 protection

Service (S)	Minimum nominal Pipe Dia. (mm)	Maximum nominal Pipe Dia. (mm)	Minimum Pipe wall thickness (mm)	Minimum edge distance (X_{min}) (mm)	Maximum annular (X_{max}) gap. (mm)	Annular seal, sealant	Additional Protection	78 mm Korok Wall Panel
Copper, Ferrous (Steel, SS, Iron) or Brass Pipes	16	32	0.91	5	20	Hilti CP606 Acrylic Sealant to depth of 20 mm from edge of Korok wall plus plasterboard patch thickness supported by PEF Backing Rod	2 × (AP1) layer of 13 mm fire rated plasterboard patch on each side of the wall, with Mineral Pipe Sleeve (Fibretex 450) 600 mm long each side of wall	-/120/90
	32	65	0.91					
	80	100	1.22					
Copper, Ferrous (Steel, SS, Iron) or Brass Pipes	125		1.42					
	150		1.63					
	200		1.63					

6. Assessment outcomes

This assessment demonstrates that the proposed service penetrations described in Table 6 to Table 26 are expected to achieve the nominated FRLs in the same tables – if they were tested in accordance with AS 1530.4:2014 and assessed in accordance with AS 4072.1:2005.

7. Validity

Warringtonfire Australia does not endorse the tested or assessed product in any way. The conclusions of the referenced 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.

The referenced 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 the referenced assessment report be reviewed on, or before, the stated expiry date.

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

The referenced assessment is provided to Hilti (New Zealand) limited for their own specific purposes. The referenced assessment report may be used as Evidence of Suitability in accordance with the requirements of the relevant National Construction Code. Building certifiers and other third parties are responsible for deciding if systems listed within the referenced assessment are accepted for a particular installation.

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