



REGULATORY INFORMATION REPORT



The fire resistance performance of Hilti Firestop Intumescent
Sealant CP 611A protecting service penetrations

Client: Hilti (Aust.) Pty Ltd & Hilti New Zealand limited

Report number: 27912900 Issuing consultant: Yomal Dias

Date: 25 February 2020 Revision: RIR1.6

Amendment schedule

Revision	Date	Information relating to report		
R1.0	Issue: 13/02/2014	Reason for issue	Report issued to Hilti (Aust) Pty & Hilti New Zealand limited for review and comment.	
		Initial Issue	Prepared by	Reviewed by
	Expiry: 28/02/2019	Name	Sherry Hu	Keith Nicholls
R1.1	Issue: 14/02/2014	Reason for issue	Revised Tables 2-5 in Section 5	
		First Revision	Prepared by	Reviewed by
	Expiry: 28/02/2019	Name	Sherry Hu	Keith Nicholls
R1.2	Issue: 14/04/2014	Reason for issue	Revised to include optic fibre and other minor changes	
		Second Revision	Prepared by	Reviewed by
	Expiry: 28/02/2019	Name	Sherry Hu	Keith Nicholls
R1.3	Issue: 25/08/2014	Reason for issue	Revised to include Firestop Collars filled with CP611A protecting PVC conduits with or without Optic Fibre Cables in Walls	
		Third Revision	Prepared by	Reviewed by
	Expiry: 28/02/2019	Name	Sherry Hu	Keith Nicholls
R1.4	Issue: 21/05/2019	Reason for issue	Revised to include additional test report 53366600.2 and update to AS 1530.4:2014	
		Fourth Revision	Prepared by	Reviewed by
	Expiry: 31/05/2024	Name	Mahmoud Akl	Omar Saad
R1.5	Issue: 07/06/2019	Reason for issue	Typographical Amendments	
	Expiry: 31/05/2024	Fifth Revision	Prepared by	Reviewed by
		Name	Mahmoud Akl	Omar Saad
		Signature		
R1.6	Issue: 25/02/2020	Reason for issue	Revised to include additional single cable systems and give applicability to Dintel walls.	
	Expiry: 31/05/2024	Sixth Revision	Prepared by	Reviewed and authorized by
		Name	Yomal Dias	Omar Saad
		Signature		

Contact Information

Warringtonfire Aus Pty Ltd - ABN 81 050 241 524

NATA Registered Laboratory
Unit 2, 409-411 Hammond Road
Dandenong Victoria 3175
Australia
T: +61 (0)3 9767 1000

General conditions of use

Warringtonfire is not at liberty to discuss the contents of this report with third parties without the consent of the report sponsor(s).

All work and services carried out by Warringtonfire Australia Pty Ltd are subject to, and conducted in accordance with, the Standard Terms and Conditions of Warringtonfire Australia Pty Ltd, which are available at <https://www.element.com/terms/terms-and-conditions> or upon request.

Exova Warringtonfire rebranded to Warringtonfire on 1 December 2018. Apart from the change to our brand name, no other changes have occurred. The introduction of our new brand name does not affect the validity of existing documents previously issued by us.

Contents

Amendment schedule.....	2
Contents	4
1. Introduction	5
2. Tested prototypes	5
3. Variation to tested prototypes	6
4. Referenced test standard	10
5. Formal assessment summary.....	10
5.1 Electrical cables, Cable Bundles & Conduits in 60 min Plasterboard walls	11
5.2 AS 1530.4 D1 Standard Cable sets in 60min Plasterboard Walls	12
5.3 AS 1530.4 D2 Standard Cable Sets in 60min Plasterboard Walls.....	14
5.4 Blank Seal in 120 min Plasterboard Walls	16
5.5 Electrical Cables, Cable Bundles & Conduits in 120 min Plasterboard Walls.....	18
5.6 AS 1530.4 D1 Standard Cable Sets in 120 min Plasterboard Walls.....	20
5.7 AS 1530.4 D2 Standard Cable Sets in 120 min Plasterboard Walls.....	22
5.8 Steel Conduits ≤16mm in 120 min Plasterboard Walls	24
5.9 uPVC Electrical conduits ≤ 40mm with Retrofit Fire Collar & CP611a Intumescent Sealant in 120 min Plasterboard Walls 25	25
5.10 Blank Seal in 120 min Rigid Walls	27
5.11 Electrical Cables, Cable Bundles & Conduits in 120 min Rigid Walls.....	28
5.12 AS 1530.4 D1 Standard Cable Sets in 120 min Rigid Walls.....	39
5.13 AS 1530.4 D2 Standard Cable Sets 120 min Rigid Walls.....	43
5.14 Steel Conduits ≤ 16mm in 120 min Rigid Walls	47
5.15 uPVC Electrical conduits ≤ 40mm with Retrofit Fire Collar & CP611a Intumescent Sealant in 120 min Rigid Walls	50
5.16 Blank Seal in 120 min Solid Concrete Floors.....	52
5.17 Electrical Cables, Cable Bundles & Conduits in 120 min Solid Concrete Floors	53
5.18 AS 1530.4 D1 Standard Cable Sets 120 min Solid Concrete Floors	55
5.19 AS 1530.4 D2 Standard Cable sets 120min Solid Concrete Floors.....	57
5.20 Steel or uPVC & Tubes Conduits ≤16mm in 120 min Plasterboard Solid Concrete Floors	59
5.21 uPVC Electrical Conduits 16mm-32mm in 120 min Solid Concrete Floors.....	61
6. Direct field of application.....	62
7. Requirements	62
8. Validity	62
9. Authority	63
9.1 Applicant undertakings and conditions of use.....	63
9.2 General conditions of use	63

1. Introduction

This report contains the minimum information sufficient for regulatory compliance in accordance with AS 1530.4:2014 and refers to Assessment reports 27912900 R1.6 and FAS190067B R1.0.

The referenced assessment report 27912900 R1.6 presents an assessment of the likely fire resistance performance of Hilti Firestop intumescent Sealant CP611A protecting cable and conduit penetrations in walls and concrete floors if tested in accordance with AS 1530.4:2014 and assessed in accordance with AS 4072.1-2005.

The referenced assessment report FAS190067B R1.0 contains an assessment of the fire resistance performance of various pipe and cable services through a 155mm thick Dintel 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 general accordance with AS 1530.4:2014.

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

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

Summaries of the test data on which this assessment is based are provided in the referenced assessment reports. A summary of the critical issues leading to the assessment conclusions including the main points of argument is also discussed in the referenced assessment reports.

2. Tested prototypes

The referenced assessment report 27912900 R1.6 refers to fire resistance test report No. 14244A and No. 14247A describing tests on EN standard cables and conduits protected with CP 611A penetrating wall and floor constructions tested in accordance with EN 1366-3:2009. The tests were sponsored by Hilti AG and were conducted by Warringtonfire.

The referenced assessment report 27912900 R1.6 also refers to fire resistance tests N° 08-E-079-F and N° 07-E-317 describing tests on AS 1530.4:2005 Appendix D1 and D2 standard configuration cables and EN1366 configuration cables in a floor construction and sealed with Hilti Intumescent foam CP 660 when tested in accordance with EN 1363-1 and EN 1366-3:2006. The tests were sponsored by Hilti and were conducted by EFECTIS France.

Furthermore, the referenced assessment report 27912900 R1.6 also refers to test No. NR.8688/12 & NR.8717/12 describing tests on various cables, cable bundles, cable conduits penetrating concrete slabs and protected with various sealing systems such as Fire resistance block, fire resistant plug, intumescent sealant, Hilti Firestop Putty Bandage CFS-P BA and fire resistant filler. The tests were sponsored by Hilti AG and were conducted by Arganda del Rey's facilities

27912900 R1.6 also refers to test EWFA 2626600.4 and R13240/Project01NK13593 when tested in accordance with AS 1530.4:2005 and ASTM E 814 respectively. The tests were sponsored by Hilti and were conducted by Exova Warringtonfire Aus Pty Ltd and Underwriters Laboratories Inc. respectively.

The assessment also refers to EWFA Report No. 53366600.2 which describes a fire resistance test in accordance with AS 1530.4:2014 of various pipe and cable services in a 90mm thick non-load bearing fire rated plasterboard protected by Hilti Firestop Sealant CP611A and Firestop Cable Disc CFS-D25.

Furthermore, the referenced assessment report FAS190067B R1.0 refers to FRT190130 R2.0 which describes a fire resistance test of various pipe and cable services through a 155mm thick Dintel 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 Dintel construction system and Hilti Australia Pty Ltd, and the testing was undertaken by Warringtonfire Australia Pty Ltd.

The referenced assessment reports contain a full summary of the test data.

3. Variation to tested prototypes

1. Hilti Firestop Intumescent Sealant CP611a is identical to Hilti Firestop Intumescent Sealant CFS-IS.
2. Assess performance of various types of single cables protected with Hilti Intumescent sealant CP611a, including single cable penetrations in apertures less or equal to Ø40mm.
3. Assess performance of various types of single cables protected with Hilti Intumescent sealant CP611a and with Hilti Firestop Putty bandage CFS-P BA.
4. Assess performance of various single cables protected with Hilti Intumescent sealant CP611a in a coning configuration
5. Assess performance of various sizes and types of cable bundles protected with Hilti Intumescent sealant CP611a with and without Hilti Firestop Putty bandage CFS-P BA.
6. Assess performance of various sizes and types of cable bundles protected with Hilti Intumescent sealant CP611a with coning configuration.
7. 1-hr plasterboard wall systems shall be constructed from minimum 1 × layer of 13mm or 1 × layer of 16mm fire rated plasterboard on the each side of a steel frame, with minimum wall thickness of 90mm and be designed to achieve FRL -/60/60 or FRL 60/60/60, as per plasterboard manufacturers details.
8. 2-hr plasterboard wall systems shall be constructed from minimum 2 × layers of 13mm or 2 × layers of 16mm fire rated plaster board on the each side of a steel frame, with minimum wall thickness of 116mm and be designed to achieve FRL -/120/120 or FRL 120/120/120, as per plasterboard manufactures details.
9. For walls the support construction shall optionally be concrete, autoclaved aerated concrete, solid or hollow masonry wall, Speedpanel, Korok or plasterboard lined walls, where the minimum wall thickness is 90mm for 1hr walls and 116mm for 2-hr walls.
10. Minimum 155mm thick Dintel walls, filled with normal-weight concrete, may also be used as the wall separating element.
11. Thickness of floor slabs shall be reduced to a minimum of 120mm.
12. Confirm the performance of the AS 1530.4:2014 Appendix D1 and D2 configuration of cables if substituted with the tested cables.
13. Conduits shall optionally be empty, without sealant inside conduit or filled with optic fibres or cables as tested with a minimum length of 500mm on each side of the wall
14. Include Hilti Firestop Collar CP644/CFS-C P as tested in EWFR 2626600 filled with Hilti Firestop Intumescent sealant CP611a protecting PVC sleeves smaller than 40mm filled with or without optic fibre cables tested in Test R13240/Project01NK13593. The Firestop collar shall optionally be CP643N.
15. Plasterboard used in the construction shall include but not be limited to USG Boral Firestop, CSF Fyrecheck, Knauf Fireshield & GIB Fyrelite® and also include other types and brands of fire-resistant grade plasterboard verified by the manufacturer.
16. Mineral wool / stone wool backing used as a backing material (B) must have a minimum density of 100kg/m³ and be tested to AS1530.1 or AS 1530.4.

Distance Requirements:

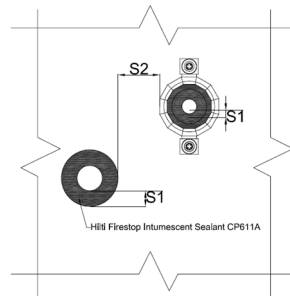


Figure 1A Distance Requirements for Penetrations

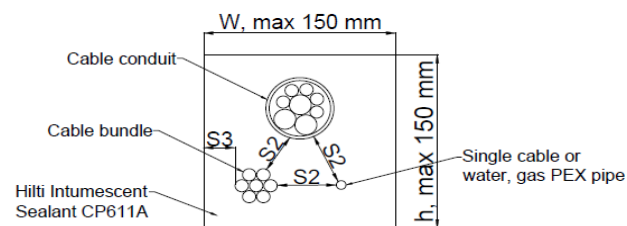


Figure 1B Distance Requirements for Multiple Penetrations

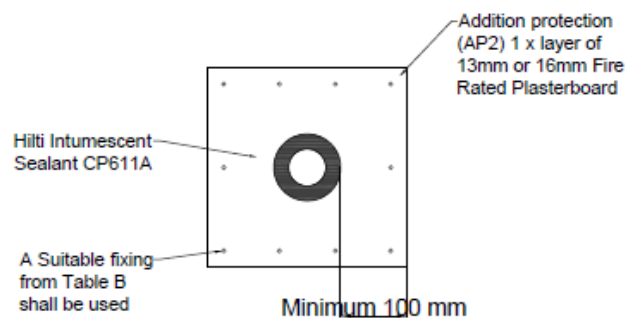


Figure 1C Build up details

Table 1A Minimum distance valid for installation of services

Minimum distance valid for installation of services	Wall (mm)
Distance between pipe and seal edge	$S_1 = 5$
Distance between pipe and edge of Hilti CFS-C P 50/1.5" Retrofit fire collar	$S_1 = 5$
Distance between cables and edge of seal	$S_3 = 0/10$
Distance between cables and other services	$S_2 = 40$
Distance between tied cable bundle and edge of seal	$S_3 = 10$
Distance between tied cable bundle and other services	$S_2 = 40$
Distance between Conduits/tubes and edge of seal	$S_3 = 10$
Distance between Conduits/tubes and other services	$S_2 = 40$

Aperture sizes for single cable penetrations single cable penetrations in apertures less or equal to Ø40mm in wall constructions are as shown in Table 1B.

Table 1B Aperture Sizes for Sealant CP 611A without Backfilling Material

PVC Insulated Copper Conducted Cable Outside Diameter Ø (mm)	Min. Aperture Diameter Ø (mm)	Max. Aperture Diameter Ø (mm)
20	30	40
25	38	40

Additional Protection or Aperture Beading details for walls and floors

Additional protection material (AP) is utilized for some applications to increase the overall wall or floor thickness and comprises of the following

- AP1:** Hilti Firestop Collar CFS-C P/CP644 50/1.5" that are installed on each side of the wall and fixed with Hilti anchors as outlined in table 2 below. The gap between the Hilti Firestop Collars (AP1) and pipe material (C) shall be fully filled with Hilti Intumescent Sealant CP611a (A) to the full depth of the collar.

AP2: Additional layers of 13mm or 16mm fire rated plasterboard strip, at least 100mm wide (figure 2) installed around the opening with the necessary number of layers to form a frame on both sides of the wall, or the topside of floor around the opening. Plasterboard layers must be secured in place with appropriate fixings from table 2.

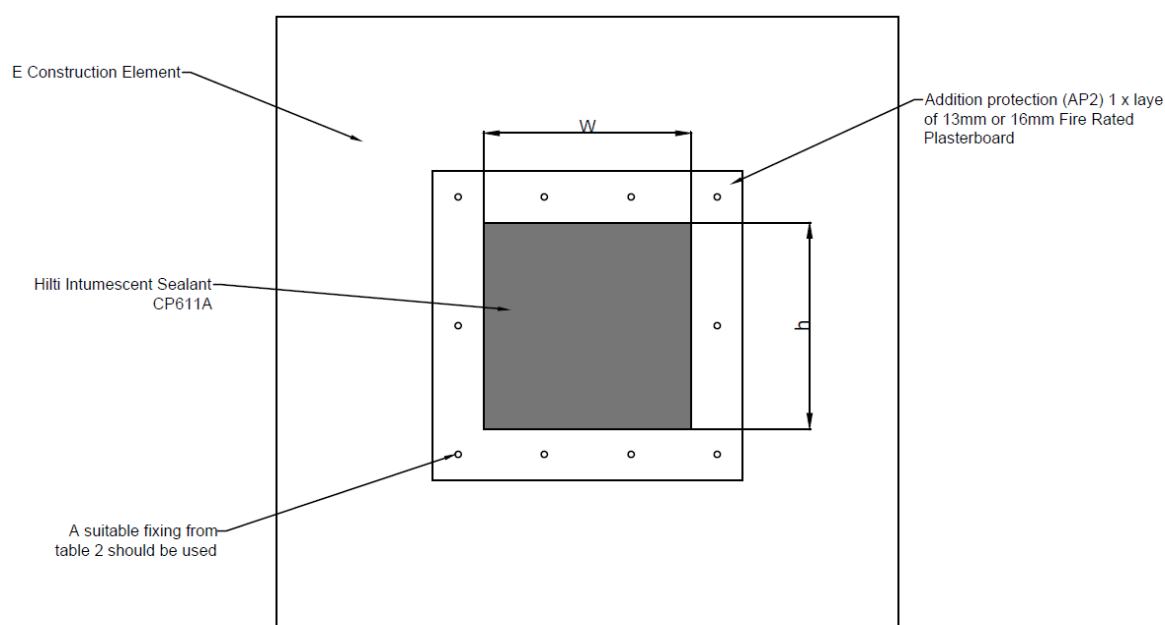


Figure 2 Aperture beading (AP2) and position for walls & floors

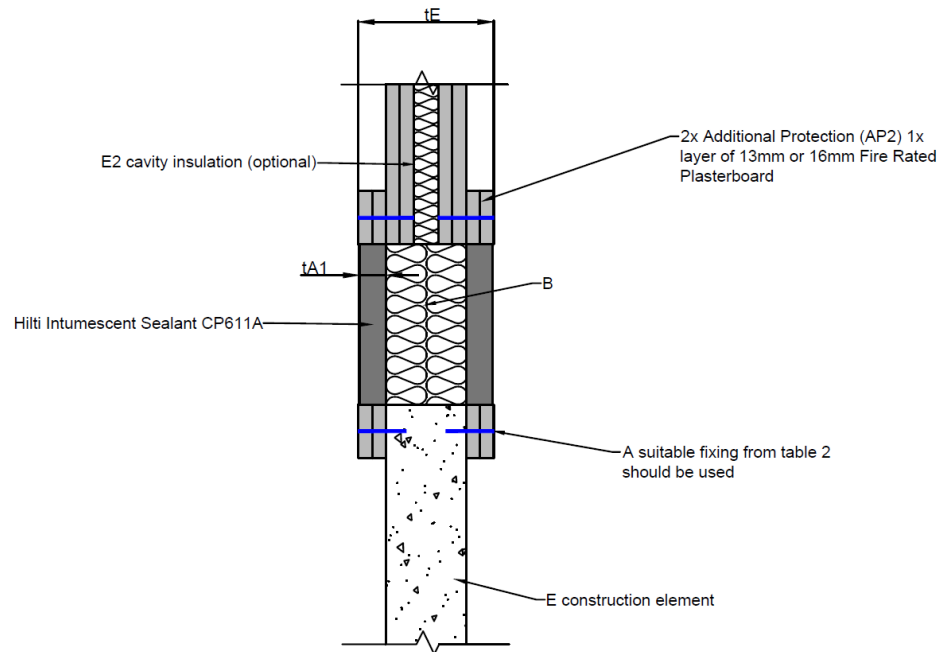


Figure 3 Aperture beading (AP2) and position of the seal in walls

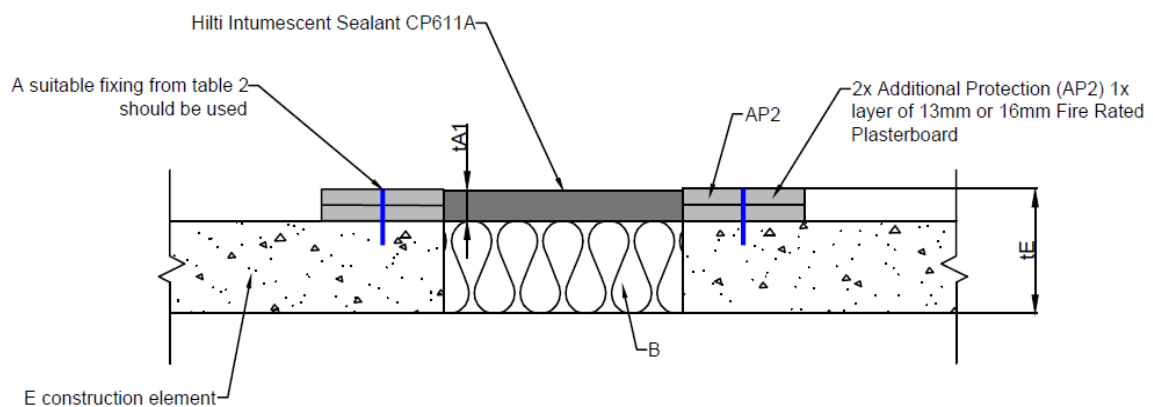


Figure 4 Aperture beading (AP2) and position of the seal in floors

Table 2 Anchor/Fixing Types

Anchoring System		Minimum Size	Flexible Wall (Plasterboard Lined)	Aerated Concrete Wall (Hebel)	Solid Concrete Walls & Floors
Hilti Screw Anchor	HUS3-P	M6		✓*	✓
	HUS3-H			✓*	✓
	HUS			✓*	✓
Hilti Expansion Anchor	HSA				✓
	HST				✓
	DBZ 6/45				✓

Anchoring System		Minimum Size	Flexible Wall (Plasterboard Lined)	Aerated Concrete Wall (Hebel)	Solid Concrete Walls & Floors
Hilti Cavity Anchor	HTB-S		✓		
	HHD-S		✓		
Others	#14/10×65mm Hex Head Type 17 screw	14g		✓	
	Laminating/Drywall/Plasterboard screws, with steel washers of at least 19mm in diameter, length as required.	10g	✓		
	Threaded Rod with Nuts & Washer	M6	✓	✓	✓

*Note: Minimum length of Hilti HUS screw required for Aerated Concrete (Hebel) =60mm

Maximum and minimum size of openings

- Openings ≤ 40 mm in diameter or equivalent surface area, backing material (B) is optional
- Openings ≥ 40 mm in diameter or equivalent surface area but ≤ 150 mm in diameter, backing material (B) is required. However, backing material is not strictly required to achieve results in Tables 13.1 to 13.9.
- Maximum size of opening, 150mm in diameter, 150mm×150mm rectangular opening or equivalent surface area of 0.023m²

4. Referenced test standard

This report is prepared with reference to the requirements of AS 1530.4:2014 and AS 4072.1-2005

5. Formal assessment summary

Based on the discussion presented in this report, it is the opinion of this testing authority that if the specimen described in section 1 had been modified within the scope of section 3, it will achieve the performance as stated below if tested in accordance with the test method referenced in section 4 and subject to the requirements section 7:

5.1 Electrical cables, Cable Bundles & Conduits in 60 min Plasterboard walls

1 hr Plasterboard walls

FRL 60/60/60 & FRL -/60/60

Electrical Cables, Cable Bundles & Conduits with Hilti Intumescent Sealant CP611a

The wall shall have a minimum thickness of 90mm (t_E) and comprise of steel stud lined on both faces with minimum 1 × layer of 13mm or 16mm thick fire grade plasterboard (E) and has been tested or otherwise assessed to achieve FRL 60/60/60 or FRL -/60/60, with or without cavity insulation (E_2).

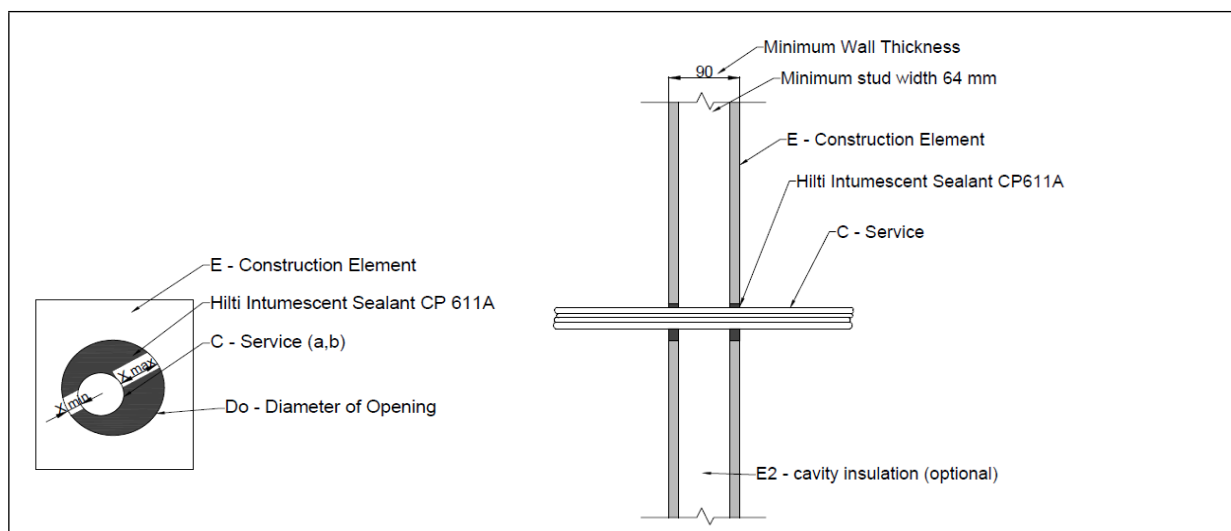


Figure 5 Front View, Position of Service in Opening

Figure 6 Side View, services (c) in the opening

Table 3 Electrical Cables, Cable Bundles & Cable Conduits as per Figure 6

Service (C)	Maximum Number of Cables in Cable Bundle/inside conduit	Diameter of Opening (Do)	Thickness/Depth of Sealant (Ts) mm	X min (mm)	X max (mm)	Figure	FRL
Up to 16mm ² , 2C+E Circular Sub-mains Cables (Single Cable)	1	40	Depth of Plasterboard/lining thickness 1×13mm=13mm Depth 1×16mm=16mm Depth	5	18	6	-/60/60
Up to 2.5mm ² , 2C+E TPS Cables (Cable Bundle)	3	40		5	15	6	-/60/60*
Cat5 & Cat6 data Cables (Cable Bundle)	7	40		5	15	6	-/60/30
Chorus Optical 12F×12 (Cable)	3	40		5	15	6	-/60/60*
RG6 Quad Shield Coax Cables (Cable Bundle)	4	40		5	18	6	-/60/30
20mm uPVC Conduit Filled with electrical cables	2	40		5	15	6	-/60/60
25mm uPVC Conduit Filled with electrical cables	4	40		5	10	6	-/60/60

*Sealant to be installed in a 25mm×25mm fillet configuration

Results in Table 3 may also be applied to rigid walls comprised of concrete, aerated concrete, autoclaved aerated concrete, Hebel, Korok, or hollow masonry walls with a minimum overall thickness of 90mm. AP2 may be applied to one side or both sides of the wall to achieve the minimum overall wall thickness of 90mm.

5.2 AS 1530.4 D1 Standard Cable sets in 60min Plasterboard Walls

1 hr Plasterboard walls

FRL 60/60/60 & FRL -/60/60

AS 1530.4 D1 Standard Cable Sets with Hilti Intumescent Sealant CP611a and Aperture Beading (AP2)

The wall shall have a minimum thickness of 90mm (t_E) and comprise of steel stud lined on both faces with minimum 1 × layer of 13mm or 16mm thick fire grade plasterboard (E), plus aperture beading (AP2) to increase wall thickness to 116mm and has been tested or otherwise assessed to achieve FRL 60/60/60 or FRL -/60/60, with or without cavity insulation (E_2).

- Maximum size of opening (D_o), 150mm in diameter, 150mm × 150mm rectangular opening or equivalent surface area of 0.023 m²
- When there is no cable tray sustained through the opening, the cables must be rigidly supported within 200mm from the wall and 2 × layers of Hilti Firestop Putty Bandage CFS-P BA must be wrapped around the individual cables/cable bundles on both sides of the wall.

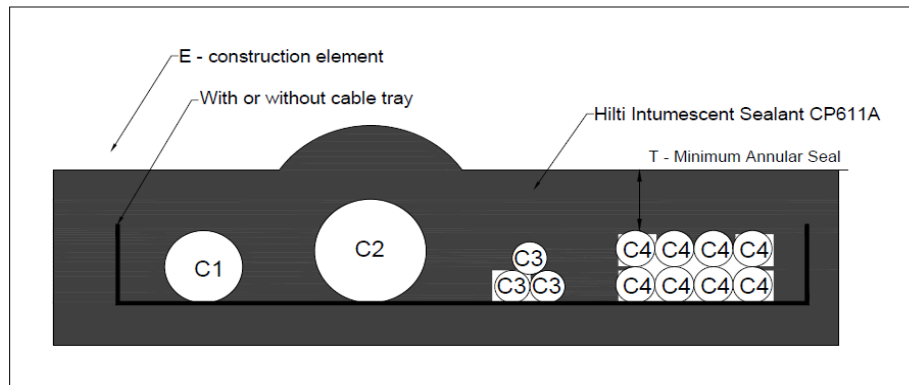


Figure 7a AS 1530.4:2014 D1 Standard Cable Sets, Front View, Seal type 4

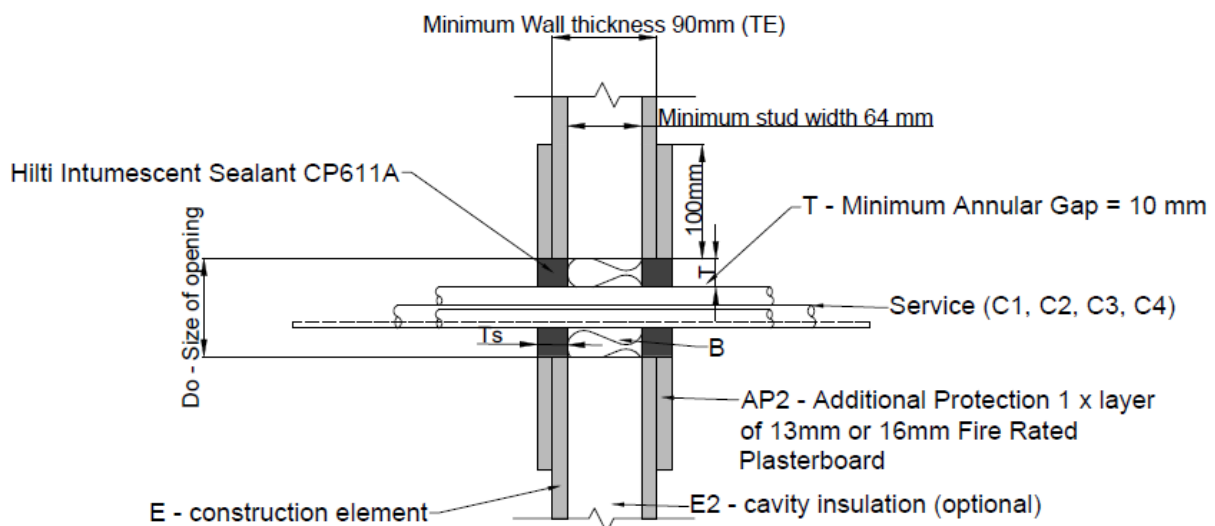


Figure 7b AS 1530.4:2014 D1 Standard Cable Sets, Side View, Seal type 4

AS 1530.4:2014 D1 Cable Set	
C ₁	1×Single Core PVC insulated, PVC sheathed for 0.6/1kV copper conductors complying with AS5000.1, 1×630mm ² (127×2.52mm conductors, insulation 2.4mm thick, OD41.4mm)
C ₂	1×three-core plus earth PVC insulated, PVC sheathed for 0.6/1kV copper conductors complying with AS5000.1, 1×185mm ² (32×2.52mm conductors, insulation 2.4mm thick OD53.8mm)
C ₃	3 × thee-core plus earth PVC insulated, PVC sheathed for 0.6/1kV copper conductors complying with AS5000.1, 3 × 6mm ² (7 × 1.04mm conductors, OD 16 mm)
C ₄	8 × thee-core plus earth PVC insulated, PVC sheathed for 0.6/1kV copper conductors complying with AS5000.1, 8 × 16mm ² (7 × 1.04mm conductors, OD 20.4 mm)

The stated cable sizes above outline the maximum number of each cable type and size that can be grouped together. Where multiple cable types exist on a cable tray, there should be a minimum spacing of 40mm between each cable group or bundle.

Table 4 AS 1530.4:2014 Standard D1 Cable Sets, configurations for seal type 4

Service (C)	Thickness/Depth of Sealant (Ts) mm	Annular Gap (T)	Backing Material (B)	Seal Type	FRL
PVC Insulated Power Cables with Cable Tray. (Standard D1 Cable Set, in accordance with AS 1530.4:2014 Appendix D)	25	10	Required	Seal Type (4) Figure 7b (with or without cable tray)	-/60/60

Results in Table 4 may also be applied to rigid walls comprised of concrete, aerated concrete, autoclaved aerated concrete, Hebel, Korok, or hollow masonry walls with a minimum thickness of 75mm. Multiple layers of AP2 must be applied to one side or both sides of the wall to achieve the minimum overall wall thickness of 116mm.

Backing material must be mineral wool/ stone wool with a minimum density of 100kg/m³.

5.3 AS 1530.4 D2 Standard Cable Sets in 60min Plasterboard Walls

1 hr Plasterboard walls

FRL 60/60/60 & FRL -/60/60

AS 1530.4 D2 Standard Cable Sets with Hilti Intumescent Sealant CP611a and Aperture Beading (AP2)

The wall shall have a minimum thickness of 90mm (t_E) and comprise of steel stud lined on both faces with minimum 1 × layer of 13mm or 16mm thick fire grade plasterboard (E), plus aperture beading (AP2) to increase wall thickness to 116mm and has been tested or otherwise assessed to achieve FRL 60/60/60 or FRL -/60/60, with or without cavity insulation (E_2).

- Maximum size of opening (D_o), 150mm in diameter, 150mm×150mm rectangular opening or equivalent surface area or 0.023m²
- When there is no cable tray sustained through the opening, the cables must be rigidly supported within 200mm from the wall and 2 × layers of Hilti Firestop Putty Bandage CFS-P BA must be wrapped around the individual cables/cable bundles on both sides of the wall.

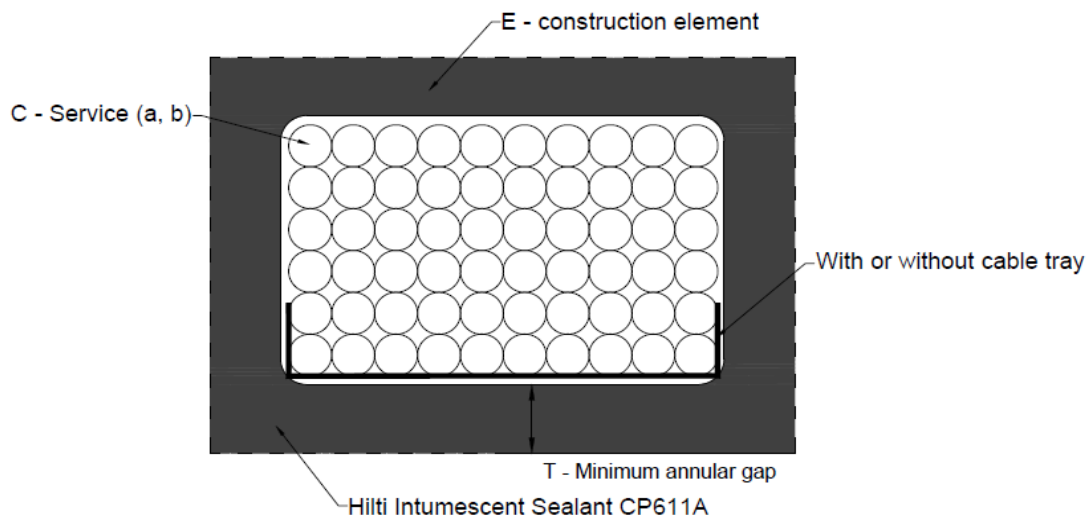


Figure 8a AS 1530.4:2014 D2, Standard Cable Sets, Front View of Seal Type 4. Refer to table 5

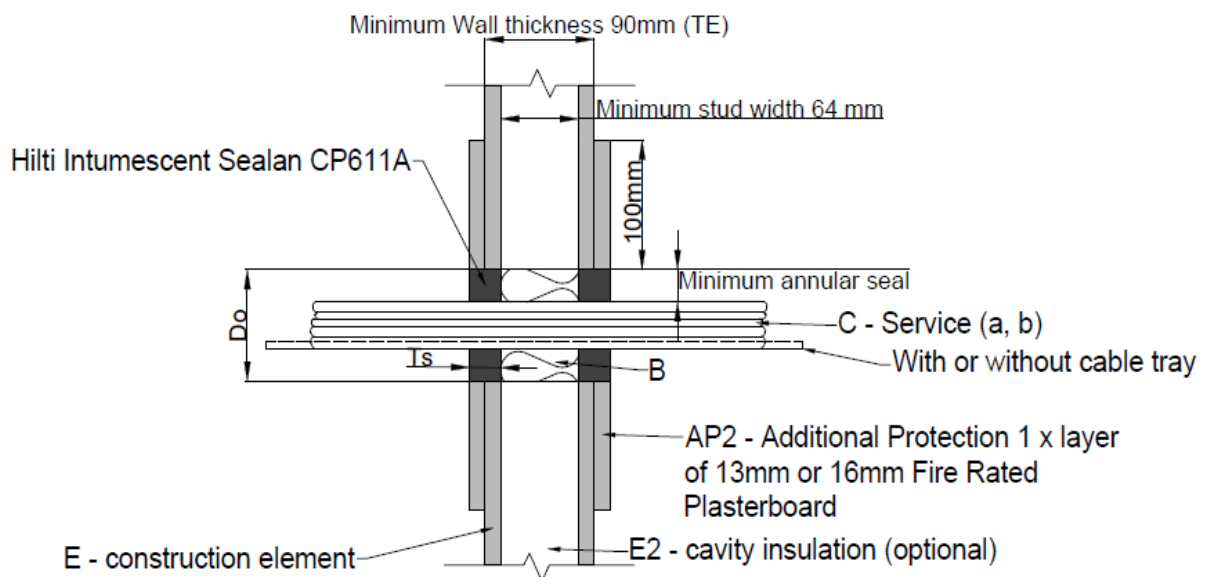


Figure 8b AS 1530.4:2014 D2 Standard Cable Sets, Front View of Seal Type 4. Refer to Table 5**AS 1530.4 D2 Cable Set:**

- a) Pack of 60 (10×6) 50 pair telecommunication cables
- b) 100 Wires, each wire, 0.5mm OD

The stated cable sizes above outline the maximum number of each cable type and size that can be grouped together. Where multiple cable types exist on a cable tray, there should be a minimum spacing of 40mm between each cable group of bundles

Table 5 AS 1530.4:2014 Standard D2 Cable Sets, configurations for seal type 4

Service (C)	Thickness/Depth of Sealant (Ts) mm	Annular Gap (T)	Backing Material (B)	Seal Type	FRL
PVC Insulated Power Cables with Cable Tray. (Standard D2 Cable Set, in accordance with AS 1530.4:2014 Appendix D)	Depth of Plasterboard lining thickness 2×13mm=26mm 2×16mm=32mm	10	Required	Seal Type (4) Figure 8b (with or without cable tray)	-/60/60

Results in Table 5 may also be applied to rigid walls comprised of concrete, aerated concrete, autoclaved aerated concrete, Hebel, Korok, or hollow masonry walls with a minimum thickness of 75mm. Multiple layers of AP2 must be applied to one side or both sides of the wall to achieve the minimum overall wall thickness of 116mm.

Backing material must be mineral wool / stone wool with a minimum density of 100kg/m³.

5.4 Blank Seal in 120 min Plasterboard Walls

2 hr Plasterboard walls

FRL 120/120/120 & FRL -/120/120

Blank Seal with Hilti Intumescent Sealant CP611a

The wall shall have a minimum thickness of 100mm (t_E) and comprise of steel stud lined on both faces with minimum 2 × layers of 13mm or 16mm thick fire grade plasterboard (E) and has been tested or otherwise assessed to achieve FRL 120/120/120 or FRL -/120/120, with or without cavity insulation (E_2).

- Opening (D_o) ≤ 40mm in diameter or equivalent surface area, backing material (B) is optional
- Opening (D_o) ≥ 40mm in diameter or equivalent surface area but ≤ 150mm in diameter, backing material (B) is required
- Maximum size of opening (D_o), 150mm in diameter, 150mm×150mm rectangular opening or equivalent surface area or 0.023m²

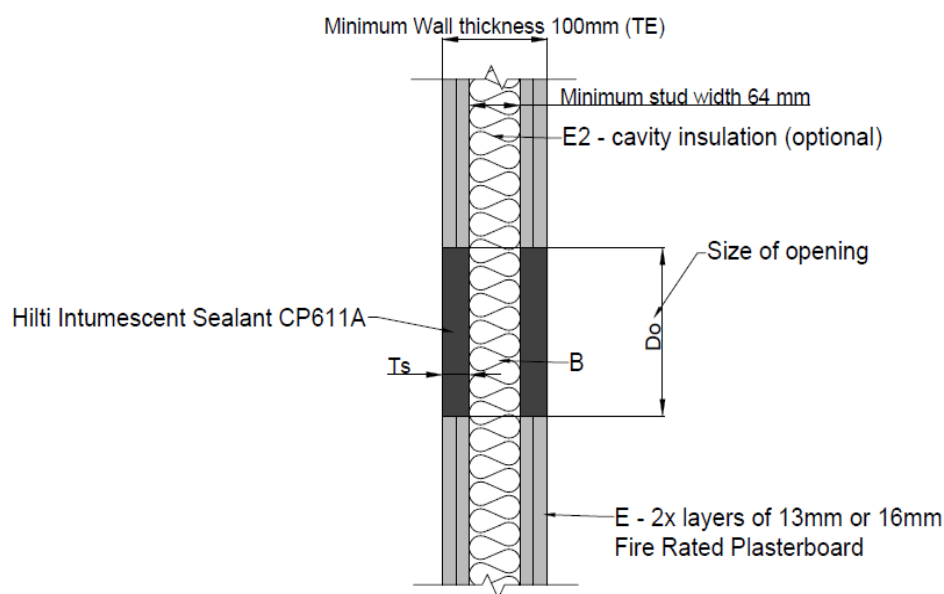


Figure 9a Blank Wall Seal, Side View of seal 1, no Services. Refer to table 6

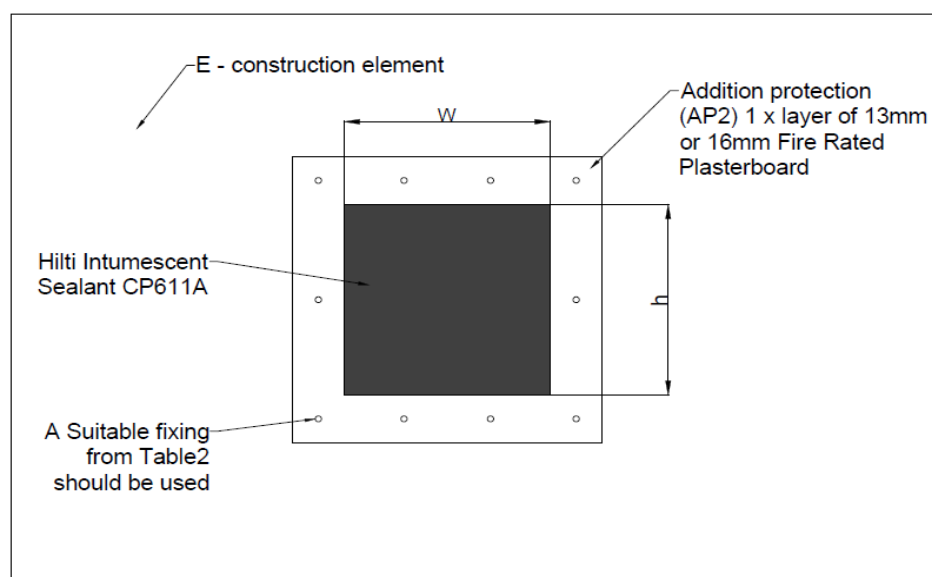


Figure 9b Blank Wall, Seal, Front View of seal 1, See table 6

Table 6 Blank openings configurations for figures 9a & 9b

Service (C)	Opening Size (D ₀): Diameter mm or Square, Length × Width (mm)	Thickness/ Depth of Sealant (Ts) mm	Backing Material (B)	Seal Type	FRL
Blank Seal	D ₀ ≤ 40	Depth of Plasterboard lining thickness 2×13mm=26mm 2×16mm=32mm	Optional	Seal Type (1) Figures 9a & 9b	-/120/120
	40 ≤ D ₀ ≤ 150		Required		

Backing material must be mineral wool / stone wool with a minimum density of 100kg/m³

5.5 Electrical Cables, Cable Bundles & Conduits in 120 min Plasterboard Walls

2 hr Plasterboard walls

FRL 120/120/120 & FRL -/120/120

Single Cables, Small Cable Bundles & Conduits with Hilti Intumescent Sealant CP611a

The wall shall have a minimum thickness of 100mm (t_E) and comprise of steel stud lined on both faces with minimum 2 × layers of 13mm or 16mm thick fire grade plasterboard (E) and has been tested or otherwise assessed to achieve FRL 120/120/120 or FRL -/120/120, with or without cavity insulation (E_2).

- Opening (D_o) ≤ 40mm in diameter or equivalent surface area, backing material (B) is optional
- Opening (D_o) ≥ 40mm in diameter or equivalent surface area but ≤ 150mm in diameter, backing material (B) is required
- Maximum size of opening (D_o) 150mm in diameter, 150mm×150mm rectangular opening or equivalent surface area or 0.023m²

Seal Type 2

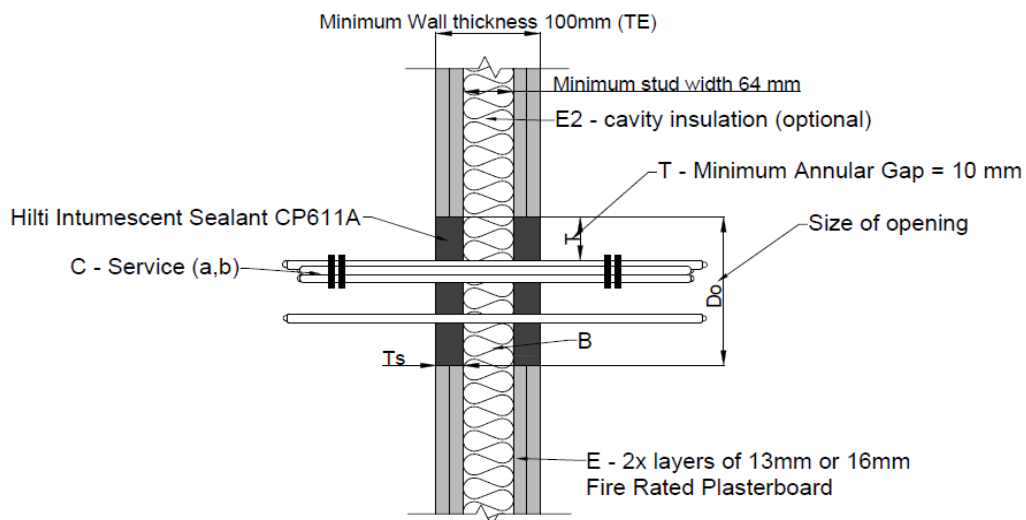


Figure 10a Single Cables, Small Cables Bundles & Conduits of Seal type 2. Refer to table 7

Seal Type 2.1

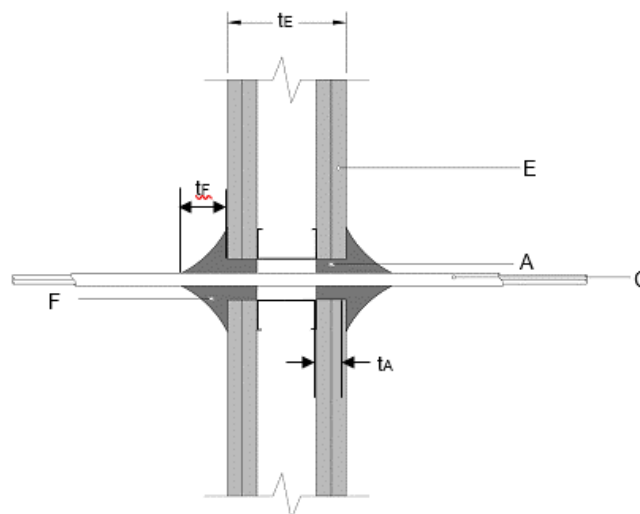


Figure 10b Single Cable in aperture ≤ 40mm with sealant fillet, type 2.1

Item	Description	Item	Description
A	Hilti Firestop Intumescent Sealant CP 611A	C	Single PVC insulated copper conducted cable penetration
t _A	Thickness (Depth) of sealant in annular gap, min. 25mm thick	E	Support construction element
F	Additional Hilti Firestop Intumescent Sealant CP 611A fillet at approximately 45° angles	E ₂	Wall cavity insulation, optional
t _F	Thickness (Depth) of additional sealant fillet min. 50mm deep	t _E	Thickness of the building element

Seal Type 3

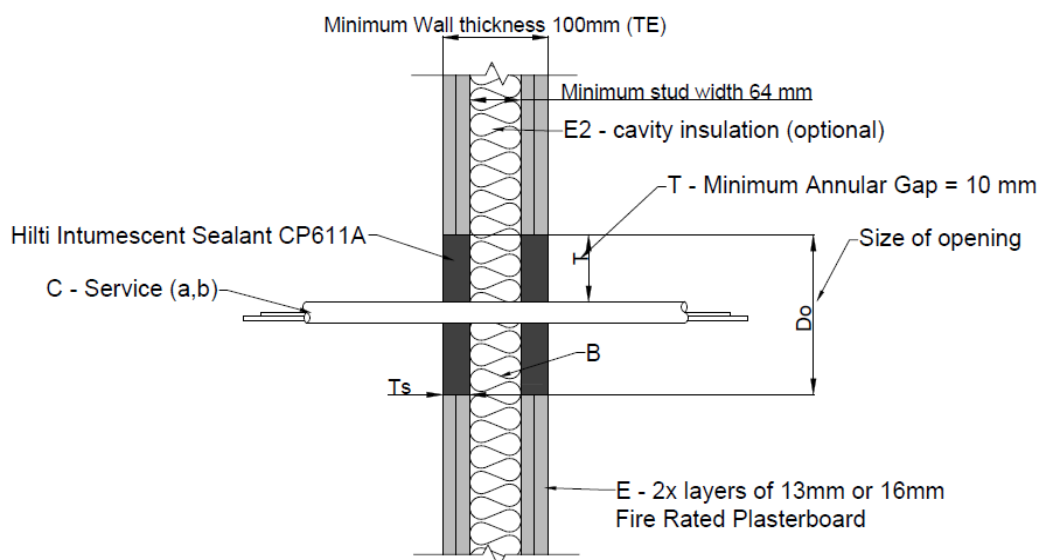


Figure 11 Electrical Conduits for Seal type 3. Refer to table 7

Table 7 Cables & Conduit configurations for Figures 10 & 11

Service (C)	Opening Size (D ₀): Diameter mm or Square, Length xWidth mm	Thickness/ Depth of Sealant (T _s) mm	Backing Material (B)	Seal Type	FRL
Single Cables ≤ 25mmØ	D ₀ ≤ 40	Depth of Plasterboard lining thickness 2×13mm=26mm 2×16mm=32mm	Optional	For cables ≤ 16mmØ – Seal Type (2), Figure 10a	-/120/120
	40 ≤ D ₀ ≤ 150		Required	For 20mmØ and 25mmØ cables – Seal type (2.1), Figure 10b	
Cable Bundles ≤ 20mmØ	D ₀ ≤ 40		Optional	Seal Type (2)	-/120/120
	40 ≤ D ₀ ≤ 150		Required	Figure 10a	
Single PVC Conduits ≤ 16mmØ	D ₀ ≤ 40		Optional	Seal Type (2)	-/120/120
	40 ≤ D ₀ ≤ 150		Required	Figure 10a	
Single PVC Conduits 20, 25& 32mmØ	40 ≤ D ₀ ≤ 150		Required	Seal Type (3) Figure 11	-/120/120

Backing material must be mineral wool / stone wool with a minimum density of 100kg/m³.

5.6 AS 1530.4 D1 Standard Cable Sets in 120 min Plasterboard Walls

2 hr Plasterboard walls

FRL 120/120/120 & FRL -/120/120

AS 1530.4:2014 Standard D1 Cable Set with Hilti Intumescent Sealant CP611A

The wall shall have a minimum thickness of 100mm (t_E) and comprise of steel stud lined on both faces with minimum 2 × layers of 13mm or 16mm thick fire grade plasterboard (E) and has been tested or otherwise assessed to achieve FRL 120/120/120 or FRL -/120/120, with or without cavity insulation (E_2).

- Maximum size of opening (D_O), 150mm in diameter, 150mm×150mm rectangular opening or equivalent surface area or 0.023m²
- When there is no cable tray sustained through the opening, the cables must be rigidly supported within 200mm from the wall and 2 × layers of Hilti Firestop Putty Bandage CFS-P BA must be wrapped around the individual cables/cable bundles on both sides of the wall.

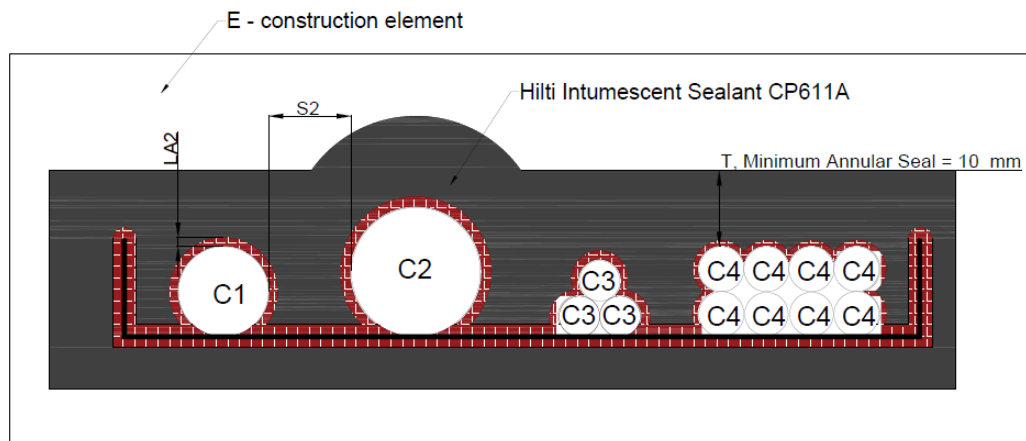


Figure 12a AS 1530.4:2014 D1 Standard Cable Sets, Front View, Seal type 4

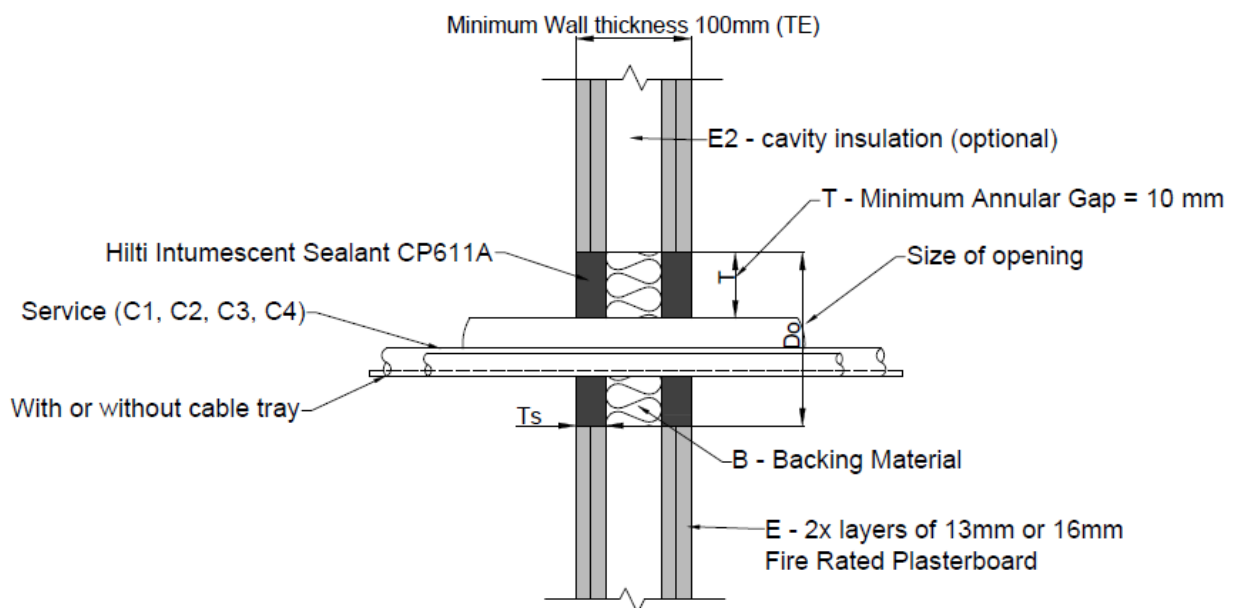


Figure 12b AS 1530.4:2014 D1 Standard Cable Sets Seal Type 4, Side View, Refer to table 8

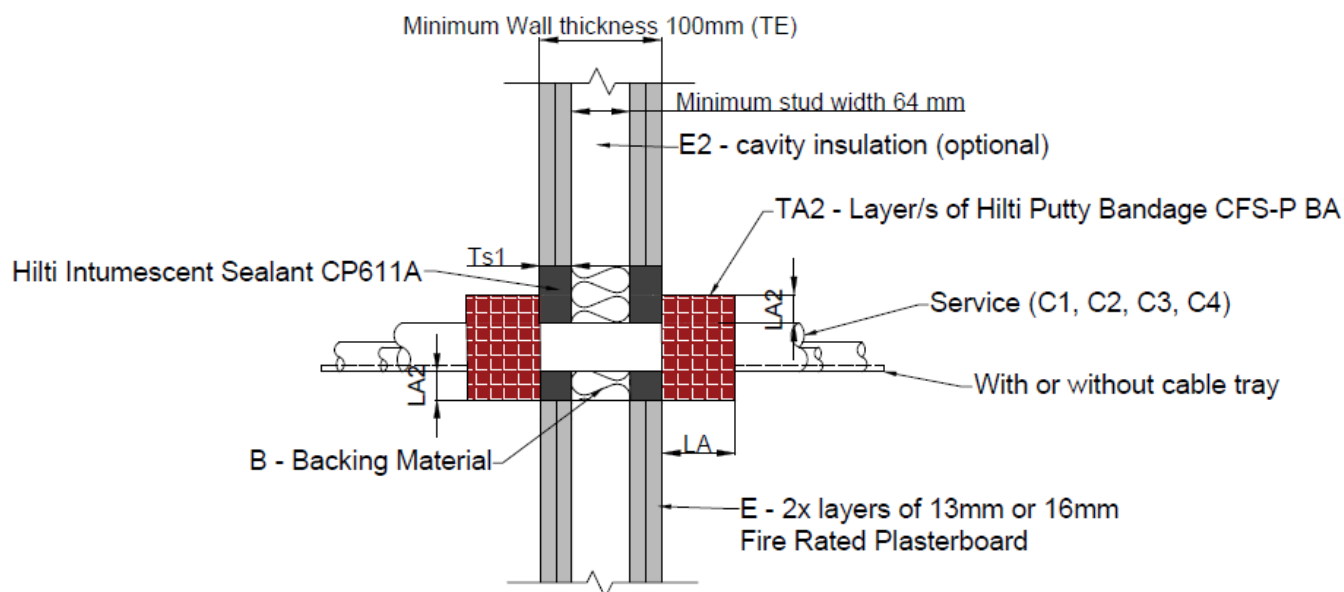


Figure 12c AS 1530.4:2014 D1 Standard Cable Sets Seal Type 5, Side View, Refer to table 8

AS 1530.4:2014 D1 Cable Set	
C₁	1×Single Core PVC insulated, PVC sheathed for 0.6/1kV copper conductors complying with AS5000.1, 1×630mm ² (127×2.52mm conductors, insulation 2.4mm thick, OD41.4mm)
C₂	1×three-core plus earth PVC insulated, PVC sheathed for 0.6/1kV copper conductors complying with AS5000.1, 1×185mm ² (32×2.52mm conductors, insulation 2.4mm thick OD53.8mm)
C₃	3 × thee-core plus earth PVC insulated, PVC sheathed for 0.6/1kV copper conductors complying with AS5000.1, 3 × 6mm ² (7 × 1.04mm conductors, OD 16 mm)
C₄	8 × thee-core plus earth PVC insulated, PVC sheathed for 0.6/1kV copper conductors complying with AS5000.1, 8 × 16mm ² (7 × 1.04mm conductors, OD 20.4 mm)

The stated cable sizes above outline the maximum number of each cable type and size that can be grouped together. Where multiple cable types exist on a cable tray, there should be a minimum spacing of 40mm between each cable group or bundle.

Table 8 AS 1530.4:2014 Standard D1 Cable Sets, configurations for seal type 4&5

Service (C)	Thickness/Depth of Sealant (Ts, Ts ₁) mm	Backing Material (B)	Seal Type	Additional Sealing Requirements	FRL
PVC Insulated Power Cables with Cable Tray. (Standard D1 Cable Set, in accordance with AS 1530.4:2014 Appendix D)	Depth of Plasterboard lining thickness 2×13mm=26mm 2×16mm=32mm	Required	Seal Type (4) Figure 12b	L _A = Not Required L _{A2} =Not Required (with or without cable tray)	-/120/60
			Seal Type (5) Figure 12c	L _A =100mm T _{2A} =10mm LA2 = (1 × layer of Hilti CFS-P BA Putty Bandage wrapped around the cables. An additional layer is required to be wrapped around the cable tray, if installed)	-/120/120

Backing material must be mineral wool / stone wool with a minimum density of 100kg/m³.

5.7 AS 1530.4 D2 Standard Cable Sets in 120 min Plasterboard Walls

2 hr Plasterboard walls

FRL 120/120/120 & FRL -/120/120

AS 1530.4:2014 Standard D2 Cable Set with Hilti Intumescent Sealant CP611a

The wall shall have a minimum thickness of 100mm (t_E) and comprise of steel stud lined on both faces with minimum 2 × layers of 13mm or 16mm thick fire grade plasterboard (E) and has been tested or otherwise assessed to achieve FRL 120/120/120 or FRL -/120/120, with or without cavity insulation (E_2).

- Maximum size of opening (D_o), 150mm in diameter, 150mm×150mm rectangular opening or equivalent surface area or 0.023m²
- When there is no cable tray sustained through the opening, the cables must be rigidly supported within 200mm from the wall and 2 × layers of Hilti Firestop Putty Bandage CFS-P BA must be wrapped around the individual cables/cable bundles on both sides of the wall.

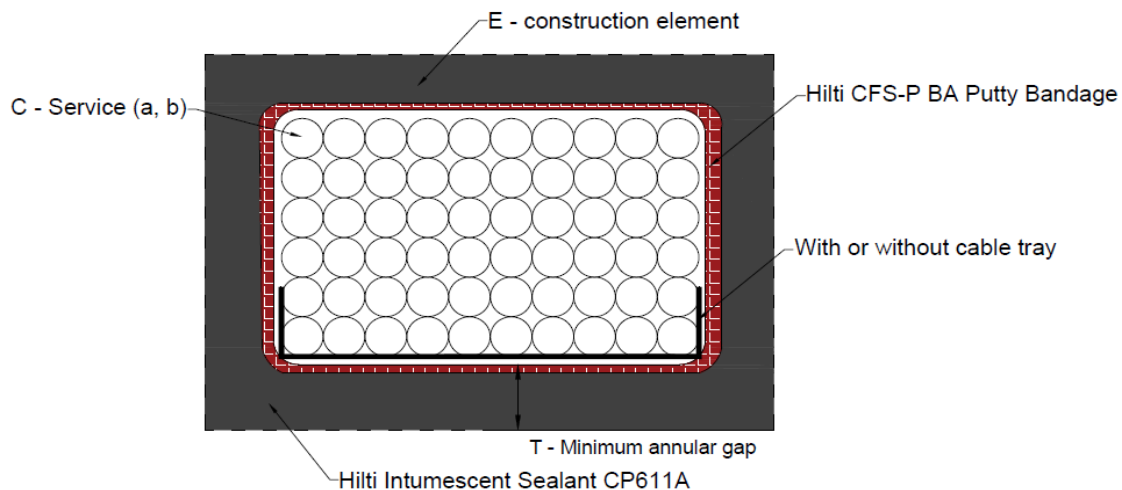


Figure 13a AS 1530.4:2014 D2 Standard Cable Sets, Front View of Seal Type 4 & 5

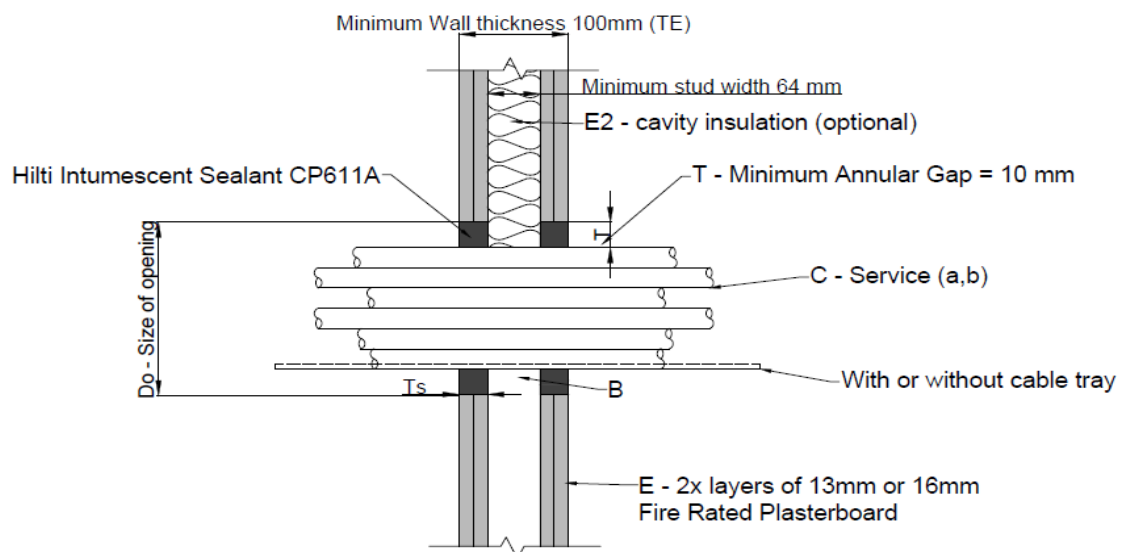


Figure 13b AS 1530.4:2014 D2 Standard Cable Sets, Side View of Seal Type 4, Refer to Table 9



b) 100 Wires, each wire, 0.5mm OD

Table 9 AS 1530.4:2014 Standard D2 Cable Sets, configurations for seal type 4&5

Backing material must be mineral wool / stone wool with a minimum density of 100kg/m³.

5.8 Steel Conduits $\leq 16\text{mm}$ in 120 min Plasterboard Walls

2 hr Plasterboard walls

FRL 120/120/120 & FRL -/120/120

Steel Conduits $\leq 16\text{mm}$ Diameter with Hilti Intumescent Sealant CP611a

The wall shall have a minimum thickness of 100mm (t_E) and comprise of steel stud lined on both faces with minimum 2 x layers of 13mm or 16mm thick fire grade plasterboard (E) and has been tested or otherwise assessed to achieve FRL 120/120/120 or FRL -/120/120, with or without cavity insulation (E_2).

- Maximum size of opening (D_o), 150mm in diameter, 150mm x 150mm rectangular opening or equivalent surface area or 0.023m^2
- Minimum size of the opening (D_o) $\geq 40\text{mm}$ in diameter or 40mm x 40mm square

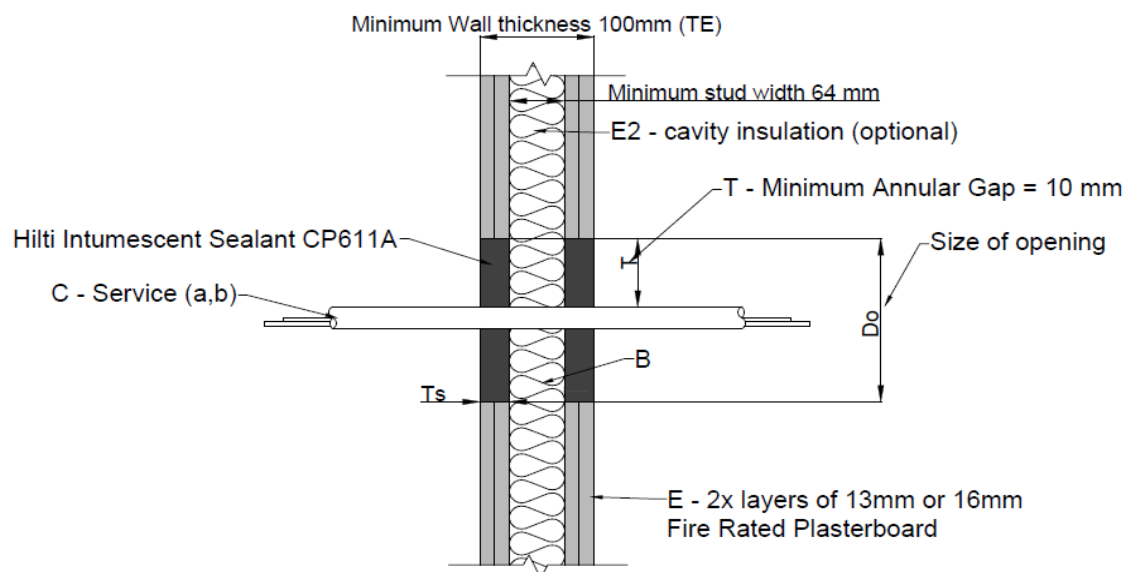


Figure 14a Steel Conduits $< 16\text{mm}$ OD, Refer to table 10

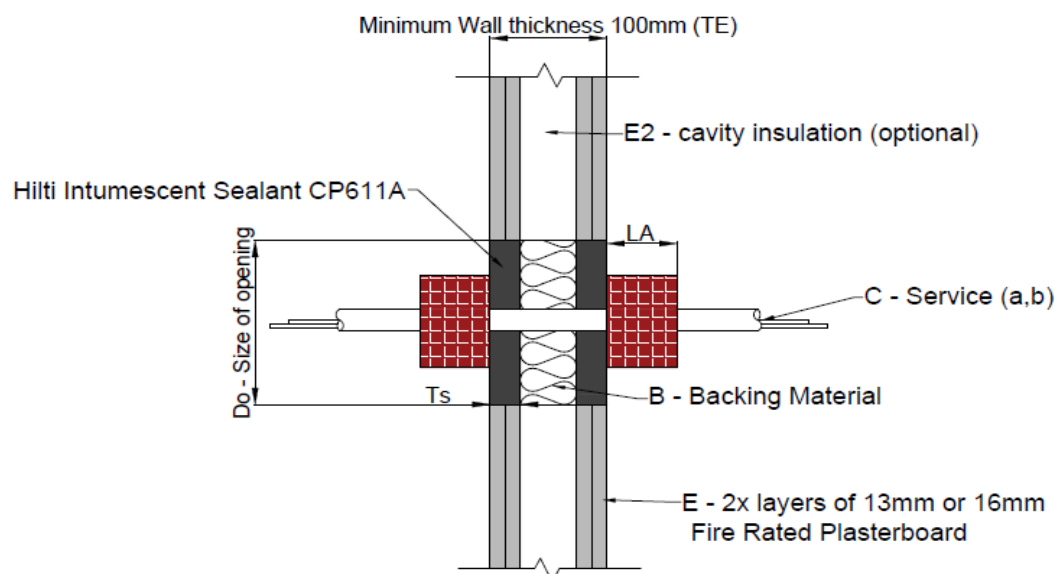


Figure 14b Steel Conduits $\leq 16\text{mm}$, with additional protection, refer to table 10

Table 10 steel conduits $\leq 16\text{mm}$ in diameter, configurations for seal type 2&6

Service C	Thickness/ Depth of Sealant (Ts) mm	Backing Material (B)	Seal Type	Additional Sealing Requirements	FRL
Single Steel Conduits and tubes up to 16mm and 1.5mm (min) wall thickness with or without cables or optic fibre cables	Depth of Plasterboard lining thickness 2×13mm=26mm 2×16mm=32mm	Optional	Seal Type (2) Figure 14A	L _A =Not Required L _{A2} = Not Required None	-/120/90
		Required	Seal Type (6) Figure 14B	L _A =100mm L _{A2} =10mm Hilti CP611a Sealant applied around the conduit	-/120/120

Backing material must be mineral wool / stone wool with a minimum density of 100kg/m³.

5.9 uPVC Electrical conduits $\leq 40\text{mm}$ with Retrofit Fire Collar & CP611a Intumescent Sealant in 120 min Plasterboard Walls

2 hr Plasterboard walls

FRL 120/120/120 & FRL -/120/120

Electrical Conduits protected with Hilti intumescent sealant CP611a + Retrofit Fire collar CFS-CP 50/1.5

The wall must have a minimum thickness of 116mm (t_E) and comprised of steel studs lined on both faces with a minimum of two layers of 13mm or 16mm thick fire grade plasterboard and be tested or otherwise assessed to achieve an FRL of -/120/120 or 120/120/120 with or without cavity insulation (E_2)

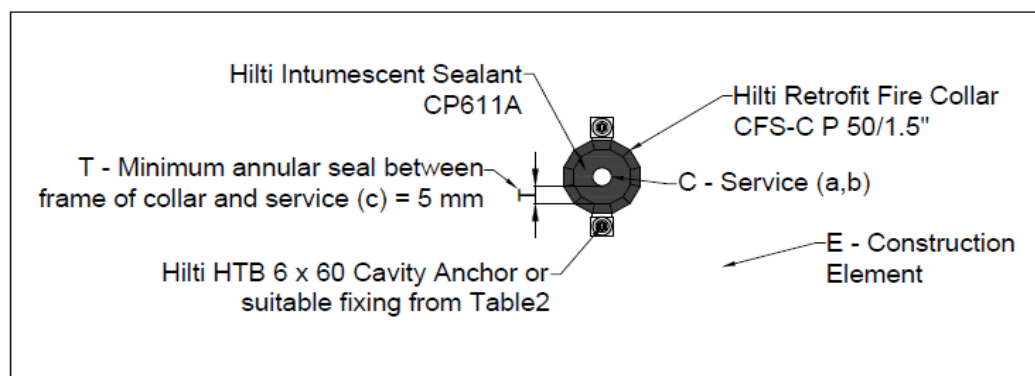


Figure 15a Front view – Conduits $\leq 40\text{mm}$ filled with cables, optic Fibres or empty, Refer to table 11

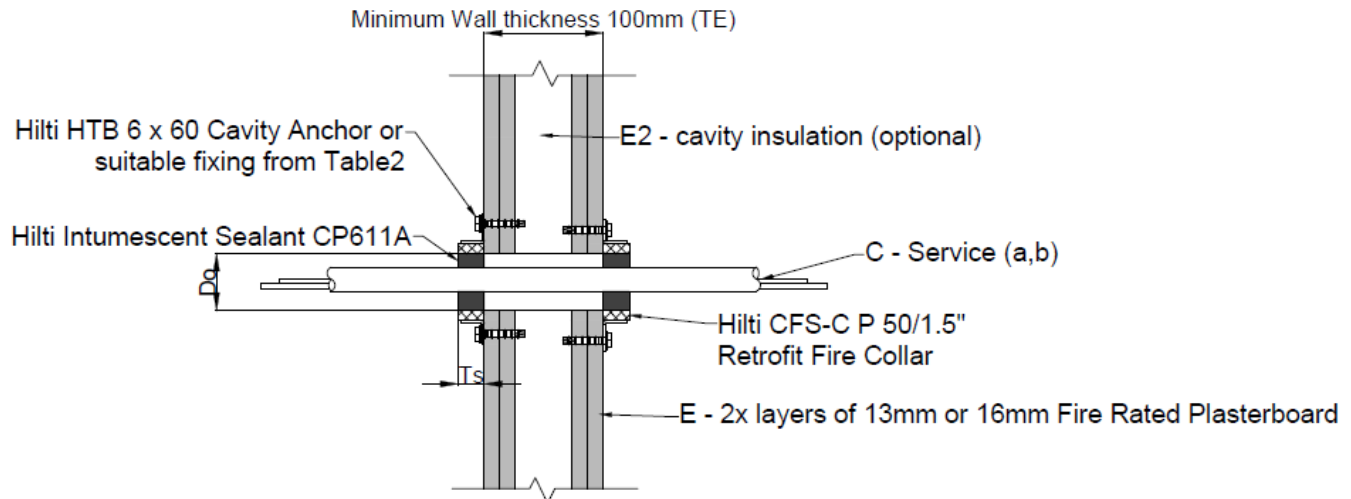


Figure 15b Side View – Conduits $\leq 40\text{mm}$ filled with Cables, optic fibres or empty, Refer to table 11

Table 11 Conduit penetrations in plasterboard walls protected with Hilti Firestop Collars

Service	Conduit Size (mm)	Collar Code	Thickness/ Depth of Sealant (t _s) mm	Construction Details	FRL T _E ≥100mm Walls
PVC conduit with or without optic fibre & electrical cables	Ø16mm×1.75mm	Hilti Firestop Collar CP 644/CFS-C P-50/1.5	Minimum 23mm or full depth of collar	Figures 15a &15b	-/120/60
	Ø20mm×1.95mm				-/120/60
	Ø25mm×1.95mm				-/120/60
	Ø32mm×2.25mm				-/120/60
	Ø40mm×2.55mm				-/120/60
	Ø16mm×1.75mm	Hilti Firestop Collar CP 643/CFS-C P-50/1.5		Figures 15a & 15b	-/120/60
	Ø20mm×1.95mm				-/120/60
	Ø25mm×1.75mm				-/120/60
	Ø32mm×2.25mm				-/120/60
	Ø40mm×2.55mm				-/120/60

5.10 Blank Seal in 120 min Rigid Walls

2 hr Rigid Walls

FRL 120/120/120 & FRL -/120/120

Blank Seal with Hilti Intumescent Sealant CP611a

The bare wall must have a minimum thickness of 75mm and be comprised of concrete, aerated concrete, autoclaved aerated concrete, Hebel, Korok or hollow masonry with a minimum density of 510kg/m³.

Bare walls less than 100mm thick must have build up (AP2) such that the total seal thickness is 100mm.

Dintel walls at least 155mm thick and filled with normal weight concrete may be used as the wall separating element. No build up is required in this case.

- Maximum size of opening, 150mm in diameter, 150mm (w) × 150mm (h) rectangular opening or equivalent surface area of 0.023m²

Seal Type 1 – Concrete Walls ≥ 100mm

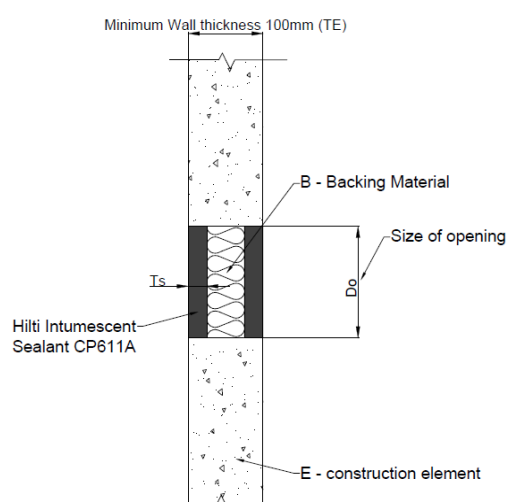


Figure 16a Side View - Blank Seal, no services. Refer to table 12

Seal Type 2 – Concrete Walls ≥ 75mm + AP2

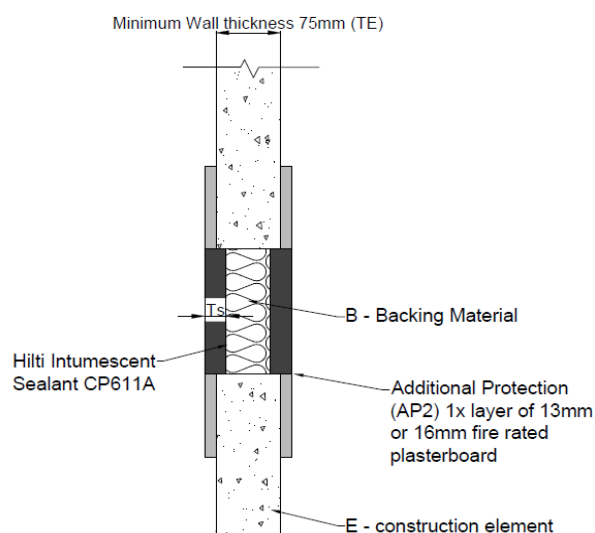


Figure 16b Side View - Blank Seal Additional Protection (AP2) both sides of wall, Refer to table 12

Table 12 Blank Openings in concrete walls configurations for seal type 1 and 2

Service (C)	Opening Size (D _o): Diameter mm or Square, Height (h) × Width (w) mm	Thickness / Depth of Sealant (T _s) mm	Backing Material (B)	Seal Type	FRL
Blank Seal	D _o ≤ 40	25mm for 100mm wall thickness	Optional	Seal Type 1 Figure 16a & b	-/120/120
	40 ≤ D _o ≤ 150	25mm+ Depth of AP2 for 75mm wall thickness	Required	Seal Type 2 Figure 16a & b	

Backing material must be mineral wool / stone wool with a minimum density of 100kg/m³.

5.11 Electrical Cables, Cable Bundles & Conduits in 120 min Rigid Walls

2 hr Rigid Walls

FRL 120/120/120 & FRL -/120/120 (including minimum 155mm thick Dintel walls)

Single Cables, Conduits & Small Cable Bundles with Hilti Intumescent Sealant CP611a

The bare wall must have a minimum thickness of 75mm and be comprised of concrete, aerated concrete, autoclaved aerated concrete, Hebel, Korok or hollow masonry with a minimum density of 510kg/m³.

When openings are larger than the allowable ranges listed in Table 13.1 to Table 13.9, bare walls less than 100mm thick must have build up (AP2) such that the total seal thickness is 100mm.

Dintel walls at least 155mm thick and filled with normal weight concrete may be used as the wall separating element. No build up is required in this case.

Maximum size of opening, 150mm in diameter, 150mm × 150mm rectangular opening or equivalent surface area or 0.023m²

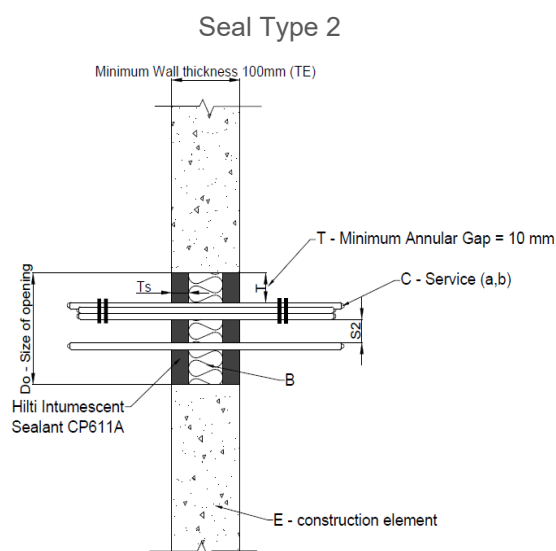


Figure 17a Side View - 100mm thick concrete wall Small Cables, Seal type 2, Bundles & Conduits, refer to table 13

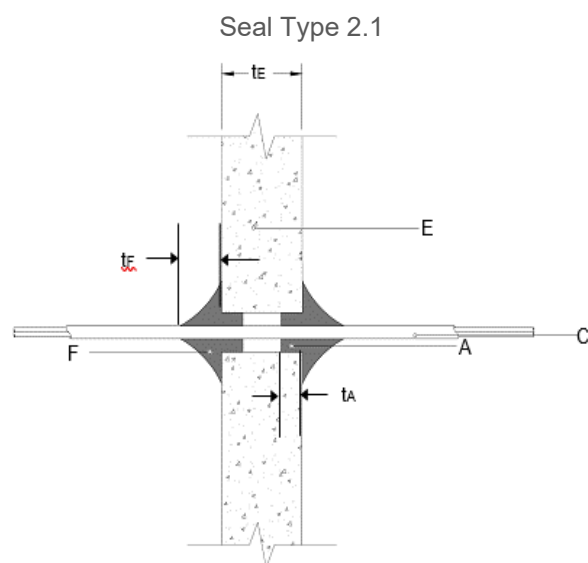


Figure 17b Single Cable in aperture ≤ 40mm with sealant fillet, Seal type 2.1

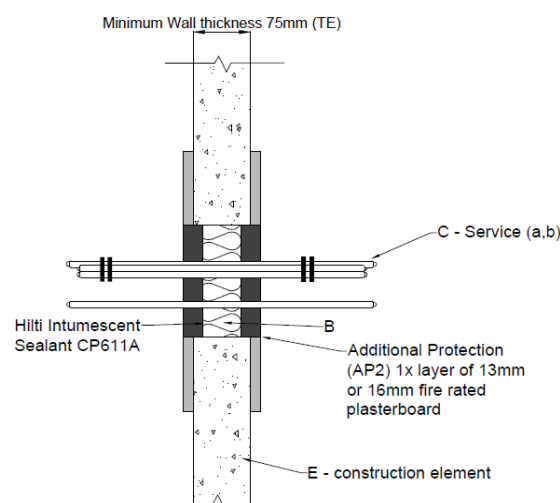


Figure 17c Side View - 75mm thick concrete wall + (AP2) for Small Cables, Bundles & Conduits, refer to table 13

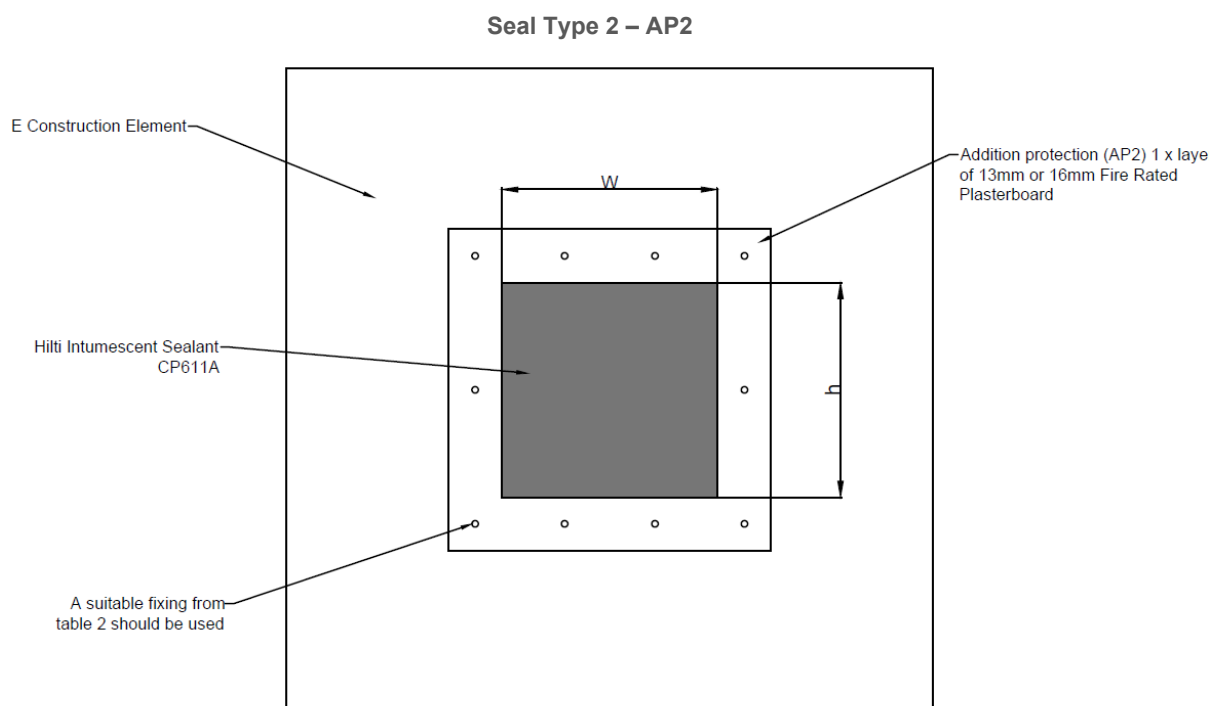


Figure 17d Front View of AP2, WA = 100mm, w/h ≤ 150mm

Table 13 Single Cables, Conduits & Small Cable Bundles in concrete walls configurations for seal type

Service (C)	Opening Size (D _o): Diameter mm or Square, Length × Width mm	Thickness / Depth of Sealant (T _s) mm	Backing Material (B)	Seal Type	FRL
Single Cables ≤ 25mm Ø	D _o ≤ 40	25mm for 100mm wall thickness & 25mm+ Depth of AP2 for 75mm wall thickness	Optional	For cables ≤ 16mmØ – Seal Type (2), Figure 17a and Figure 17d	-/120/120
	40 ≤ D _o ≤ 150		Required	For 20mmØ and 25mmØ cables – Seal type (2.1), Figure 17b and Figure 17d	
Cable Bundles ≤ 20mm Ø	D _o ≤ 40		Optional	Seal Type 2	-/120/120
	40 ≤ D _o ≤ 150		Required	Figures 17a & 17d	
Single PVC Conduits less than 16mm OD, with or without cables, fibre Optics	D _o ≤ 40		Optional	Seal Type 2 Figures 17a & 17d	-/120/120
Single PVC Conduits 20, 25 & 32mm Ø, with or without cables, fibre Optics	40 ≤ D _o ≤ 150		Required	Seal Type 3 Figure 17c & 17d	-/120/120

Backing material must be mineral wool / stone wool with a minimum density of 100kg/m³.

Single Cable protected with Hilti Intumescent Sealant CP611a (1/3)

The bare wall can be 75mm Hebel wall with dry density of 510 kg/m³ or rigid wall which must have a minimum thickness of 75mm and comprise of concrete, aerated concrete, solid or hollow masonry with a minimum density of 510 kg/m³. No build up is required.

Backing rod is recommended to position the service at the centre of the hole and to control the sealant depth of 25 mm each side. Alternatively, CP 611a sealant can be installed without backing rod at full depth of the wall. The service can be installed **off centre** with a minimum edge distance S1 = 5mm as specified in Table 1A.

System can either be installed as per figure and table or alternatively, a core hole of 20 mm larger than the service diameter is allowed given the S1 value as described.

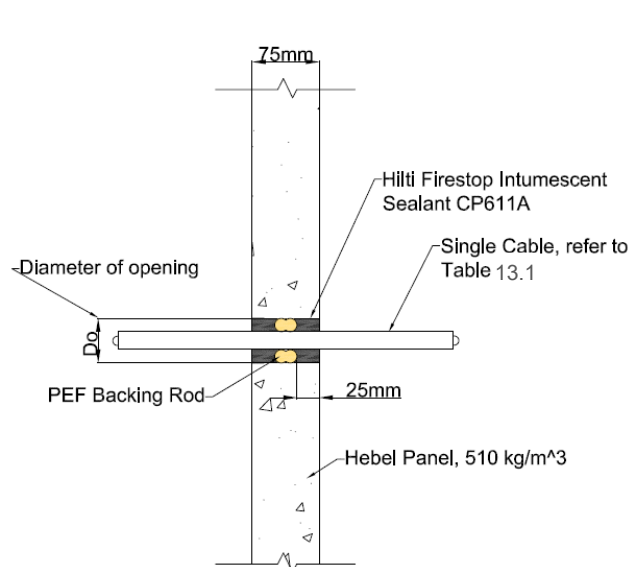


Figure 17e Side view- single cable with PEF backing rod

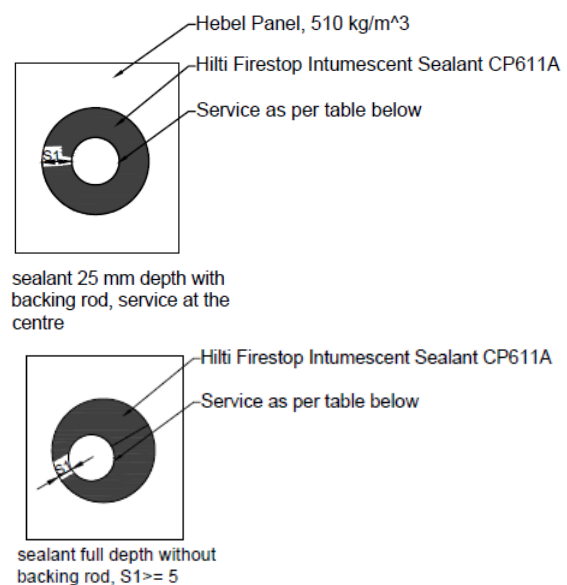


Figure 17f Front View- single cable

Table 13.1 Assessment summary of Single cables configurations as per Figure 17e and 17f

Service	Cable diameter (mm)	Diameter of the opening, D ₀ (mm)	Backing Material	Depth of sealant, t _s	FRL (Hebel wall)	FRL (Dintel wall)
Single Cable, Circular Sub-Mains 1.5mm ² - 16mm ² 2C+E	Up to 21	38	With PEF Backing rod or sealant at full depth	25	-/120/60	-/120/120
Single Cable, Flat TPS 1.0mm ² - 16mm ² 2C+E	9.3×4.6 - 14.5×6.5	38		25	- /120/120	-/120/120
RG6 Quad shield coax cables	8.9	22		25	- /120/120	-/120/120
Cat6, Data Cable	5.8	20		25	-/120/60	-/120/120

Single Cable protected with Hilti Intumescent Sealant CP611a in coning configuration (2/3)

The bare wall can be 75mm Hebel wall with dry density of 510 kg/m³ or rigid wall which must have a minimum thickness of 75mm and comprise of concrete, aerated concrete, solid or hollow masonry with a minimum density of 510 kg/m³. No build up is required.

Backing rod is recommended to position the service at the centre of the hole and to control the sealant depth of 25 mm each side. Alternatively, CP 611a sealant can be installed without backing rod at full depth of the wall. The service can be installed **off centre** with a minimum edge distance S1 = 5mm as specified in Table 1A.

System can either be installed as per figure and table or alternatively, a core hole of 20 mm larger than the service diameter is allowed given the S1 value as described.

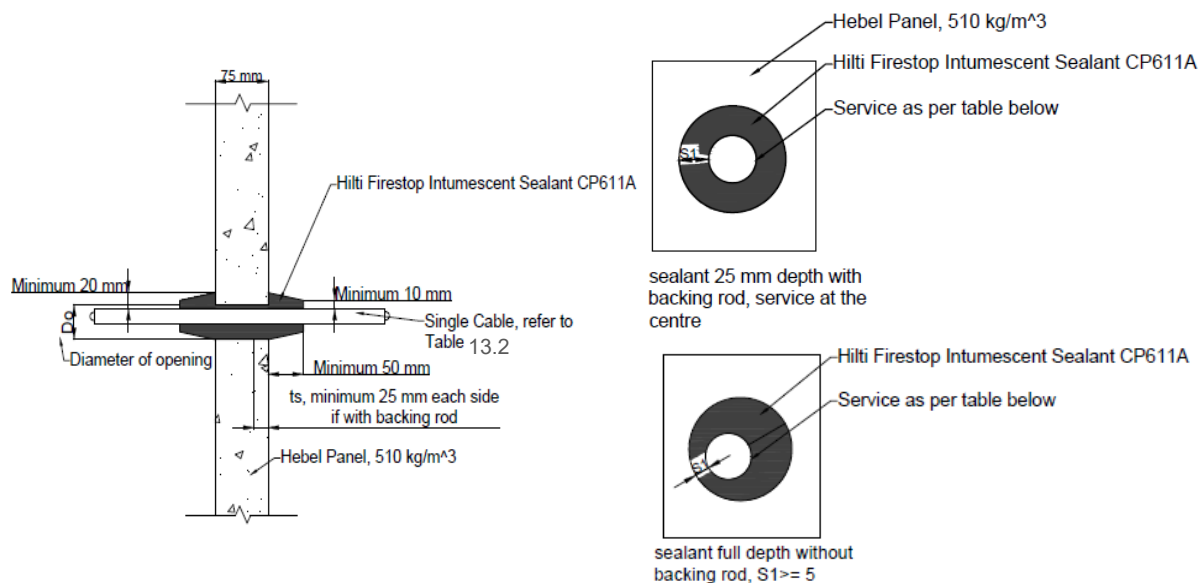


Figure 17g Side view- single cable with PEF backing rod

Figure 17h Front View- single cable

Table 13.2 Assessment summary of single cables configurations as per Figure 17g and 17h

Service	Cable diameter (mm)	Diameter of the opening, D ₀ (mm)	Additional protection	Depth of sealant, t _s	FRL
Single Cable, Circular Sub-Mains 1.5mm ² - 16mm ² 2C+E	Up to 21	38	Coning detail please refer to Figure 1.2a. With PEF backing rod or sealant at full depth	25	-/120/120
Single Cable, Flat TPS 1.0mm ² - 16mm ² 2C+E	9.3×4.6 - 14.5×6.5	38		25	-/120/120
RG6 Quad shield coax cables	8.9	22		25	-/120/120
Cat6, Data Cable	5.8	20		25	-/120/120

Single Cable protected with Hilti Intumescent Sealant CP611a, 2 layers of Hilti Firestop Putty Bandage CFS-P BA (3/3)

The bare wall can be 75mm Hebel wall with dry density of 510 kg/m³ or rigid wall which must have a minimum thickness of 75mm and comprise of concrete, aerated concrete, solid or hollow masonry with a minimum density of 510 kg/m³. No build up is required.

Backing rod is recommended to position the service at the centre of the hole and to control the sealant depth of 25 mm each side. Alternatively, CP 611a sealant can be installed without backing rod at full depth of the wall. The service can be installed **off centre** with a minimum edge distance $S1 = 5\text{mm}$ as specified in Table 1A.

System can either be installed as per figure and table or alternatively, a core hole of 20 mm larger than the service diameter is allowed given the $S1$ value as described.

The Hilti Firestop Putty Bandage CFS-P BA must be installed, such that the white mesh is visible from outside. For Dintel walls, an additional single layer of Hilti Firestop Putty Bandage shall be provided next to the 2 layers of putty bandage placed adjacent to the wall, on either side, externally, such that the total length of the putty bandage is 200mm.

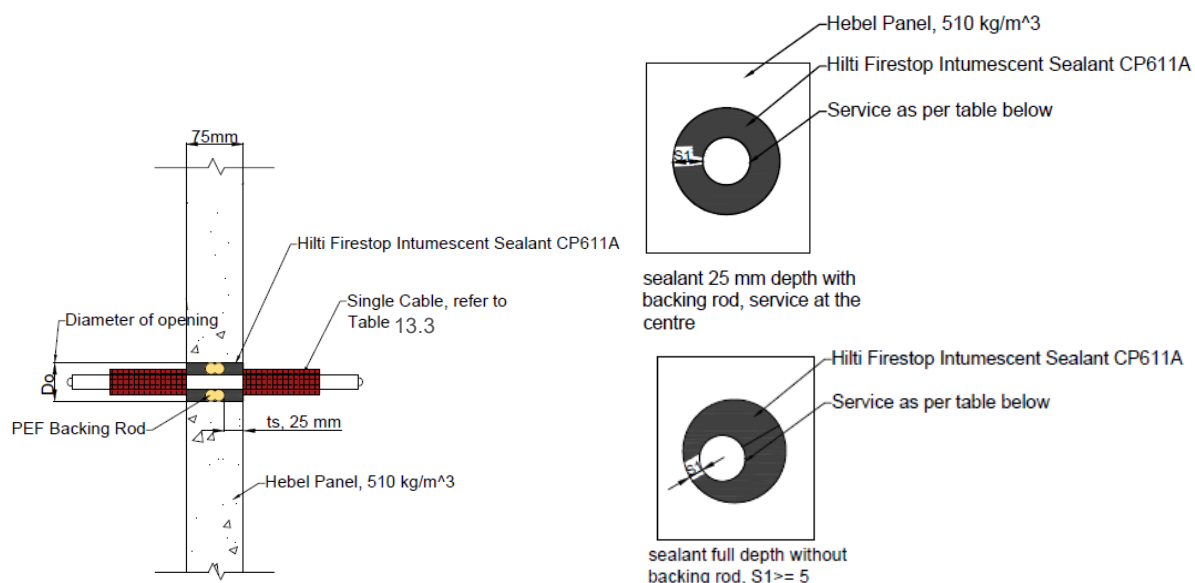


Figure 17i Side view- single cable with PEF backing rod

Figure 17j Front View- single cable

Table 13.3 Assessment summary of Single cables configurations as per Figure 17i and 17j

Service	Cable diameter (mm)	Diameter of the opening, D_0 (mm)	Additional protection	Depth of sealant, t_s	FRL
Single Cable, Circular Sub-Mains 1.5mm ² - 16mm ² 2C+E	Up to 21	38	Additional two layers of 100mm wide Hilti Firestop Putty Bandage CFS-P BA on both sides of the wall	25	-/120/120
Single Cable, Flat TPS 1.0mm ² - 16mm ² 2C+E	9.3×4.6 - 14.5×6.5	38		25	-/120/120
RG6 Quad shield coax cables	8.9	22		25	-/120/120
Cat6, Data Cable	5.8	20		25	-/120/120

2hr 75mm Hebel Wall FRL -/120/120 &

Rigid Walls FRL -/120/120 & FRL 120/120/120 (including minimum 155mm thick Dintel walls)

Cable Bundle protected with Hilti Intumescent Sealant CP611a (1/5)

The bare wall can be 75mm Hebel wall with dry density of 510 kg/m³ or rigid wall which must have a minimum thickness of 75mm and comprise of concrete, aerated concrete, solid or hollow masonry with a minimum density of 510 kg/m³. No build up is required.

Backing rod is recommended to position the service at the centre of the hole and to control the sealant depth of 25 mm each side. Alternatively, CP 611a sealant can be installed without backing rod at full depth of the wall. The service can be installed **off centre** with a minimum edge distance $S_1 = 5\text{mm}$ as specified in Table 1A.

System can either be installed as per figure and table or alternatively, a core hole of 20 mm larger than the service diameter is allowed given the S_1 value as described.

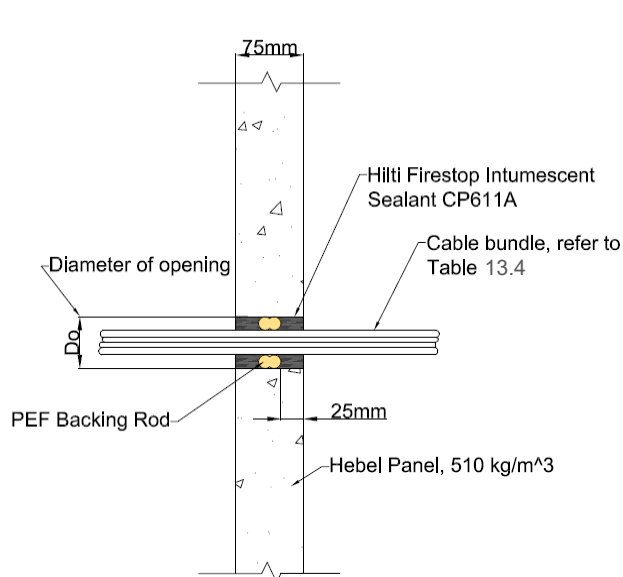


Figure 17k Side View- Cable Bundle with PEF backing rod

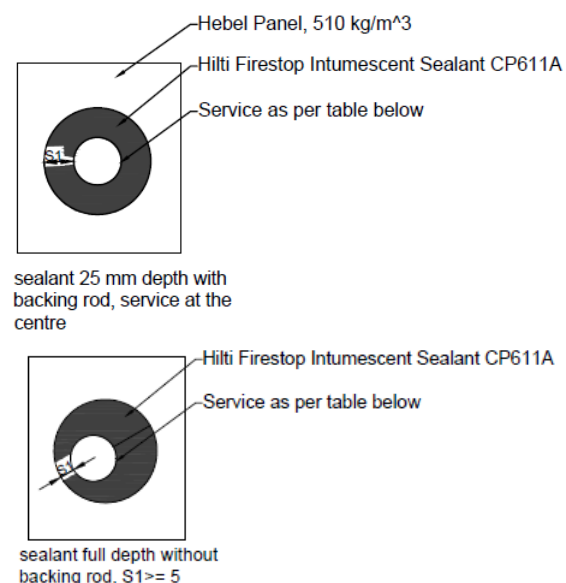


Figure 17l Front View-Cable bundle

Table 13.4 Assessment table of cable bundle configuration as per Figure 17k and 17l

Service	Maximum Cable Bundle (mm)	Diameter of the Opening, D_0 (mm)	Depth of sealant, t_s (mm)	Backing Rod	FRL
Cable bundle (fire rated cable, submain, TPS, RG6, CAT6 and other electrical communication cables)	21	38	25	With PEF Backing rod or sealant at full depth	-/120/30
Cable bundle (fire rated cable, submain, TPS, RG6, CAT6 and other electrical and communication cables)	36	50	25		-/120/30

2hr 75mm Hebel Wall FRL -/120/120 &

Rigid Walls FRL -/120/120 & FRL 120/120/120 (including minimum 155mm thick Dincel walls)

Cable Bundles protected with Hilti Intumescent Sealant CP611a and Hilti Retrofit Fire Collar CFS-C P 50/1.5" (2/5)

The bare wall can be 75mm Hebel wall with dry density of 510 kg/m³ or rigid wall which must have a minimum thickness of 75mm and comprise of concrete, aerated concrete, solid or hollow masonry with a minimum density of 510 kg/m³. No build up is required.

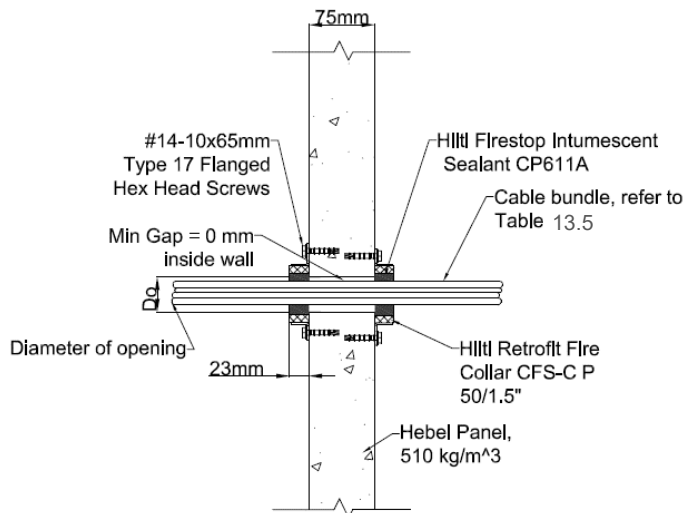


Figure 17m Side View- cable bundle with Hilti Retrofit Fire Collar CFS-C P 50/1.5"

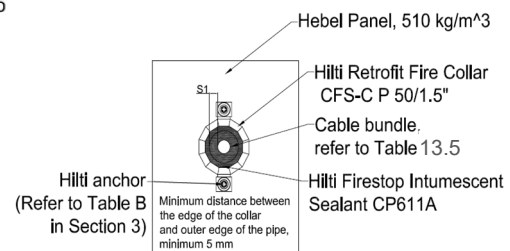


Figure 17n Front View-cable bundle with Hilti retrofit fire collar CFS-C P 50/1.5"

Table 13.5 Assessment table of cable bundle configuration as per Figure 17m and 17n

Service	Maximum Cable Bundle diameter (mm)	Minimum Diameter of the Opening, D ₀ (mm)	Maximum Diameter of the Opening, D ₀ (mm)	Hilti Retrofit Firestop Collar CFS-CP Size and Sealant	Depth of sealant, t _s (mm)	FRL
Cable bundle (fire rated cable, submain, TPS, RG6, CAT6 and others inclusive)	21	25	38	CFS-CP 50/1.5" & CP611A	23	-/120/30
Cable bundle (fire rated cable, submain, TPS, RG6, CAT6 and others inclusive)	36	38	50	CFS-CP 50/1.5" & CP611A	23	

2hr 75mm Hebel Wall FRL -/120/120 &

Rigid Walls FRL -/120/120 & FRL 120/120/120 (including minimum 155mm thick Dincel walls)

Cable bundles protected with Hilti Intumescent Sealant CP611a in coning configuration (3/5)

The bare wall can be 75mm Hebel wall with dry density of 510 kg/m³ or rigid wall which must have a minimum thickness of 75mm and comprise of concrete, aerated concrete, solid or hollow masonry with a minimum density of 510 kg/m³. No build up is required.

Backing rod is recommended to position the service at the centre of the hole and to control the sealant depth of 25 mm each side. Alternatively, CP 611a sealant can be installed without backing rod at full depth of the wall. The service can be installed **off centre** with a minimum edge distance S1 = 5mm as specified in Table 1A.

System can either be installed as per figure and table or alternatively, a core hole of 20 mm larger than the service diameter is allowed given the S1 value as described.

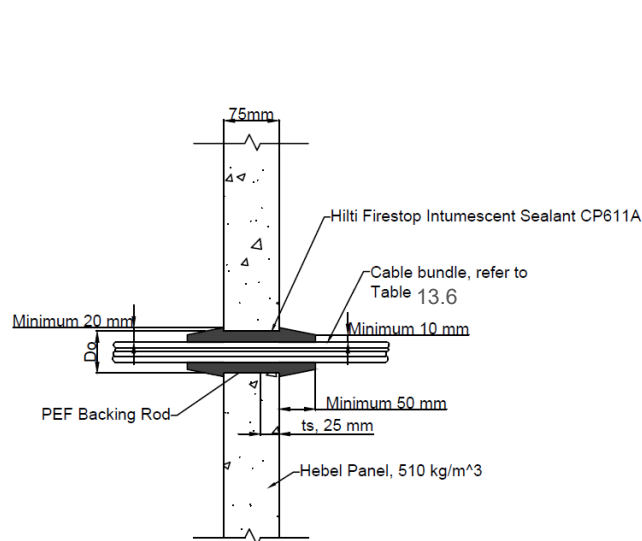


Figure 17o Side view- Cable bundle with coning

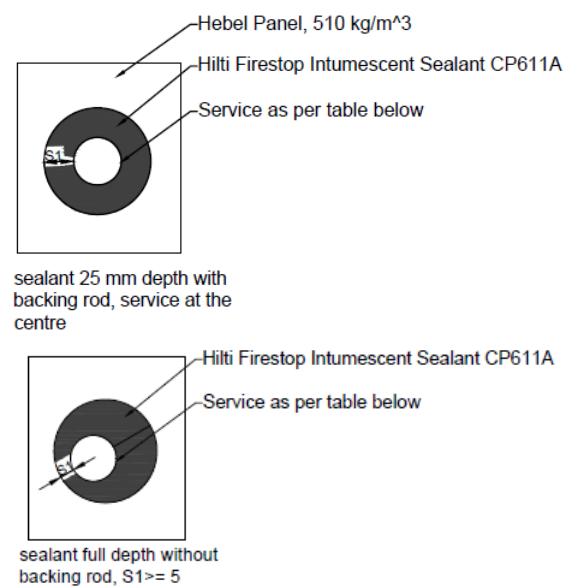


Figure 17p Front view- Cable bundle protected with coning

Table 13.6 Assessment table of Cable bundle configuration as per Figure 17o and 17p

Service	Maximum Cable bundle diameter (mm)	Diameter of the opening, D ₀ (mm)	Depth of sealant, t _s (mm)	Additional Protection	Depth of sealant, t _s (mm)	FRL
Cable bundle (fire rated cable, submain, TPS, RG6, CAT6 and others inclusive)	21	38	25	Coning detail please refer to Figure 2.3a.	25	-/120/120
	35	50	25	With PEF backing rod or sealant at full depth		

2hr 75mm Hebel Wall FRL -/120/120 &

Rigid Walls FRL -/120/120 & FRL 120/120/120 (including minimum 155mm thick Dintel walls)

Cable bundles protected with Hilti Intumescent Sealant CP611a, 2 layers of Hilti Firestop Putty Bandage CFS-P BA (4/5)

The bare wall can be 75mm Hebel wall with dry density of 510 kg/m³ or rigid wall which must have a minimum thickness of 75mm and comprise of concrete, aerated concrete, solid or hollow masonry with a minimum density of 510 kg/m³. No build up is required.

Backing rod is recommended to position the service at the centre of the hole and to control the sealant depth of 25 mm each side. Alternatively, CP 611a sealant can be installed without backing rod at full depth of the wall. The service can be installed **off centre** with a minimum edge distance S1 = 5mm as specified in Table 1A.

System can either be installed as per figure and table or alternatively, a core hole of 20 mm larger than the service diameter is allowed given the S1 value as described.

The Hilti Firestop Putty Bandage CFS-P BA must be installed, such that the white mesh is visible from outside. For Dintel walls, an additional single layer of Hilti Firestop Putty Bandage shall be provided next to the 2 layers of putty bandage placed adjacent to the wall, on either side, externally, such that the total length of the putty bandage is 200mm.

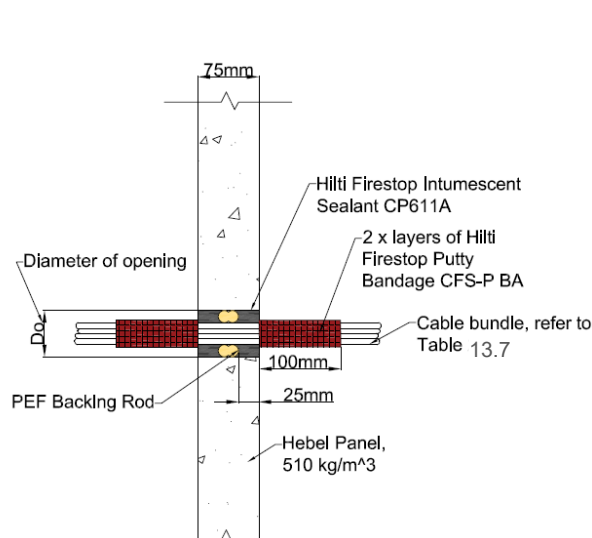


Figure 17q Side view- Cable bundle protected
With Hilti Firestop Putty Bandage CFS-P BA and CP611a

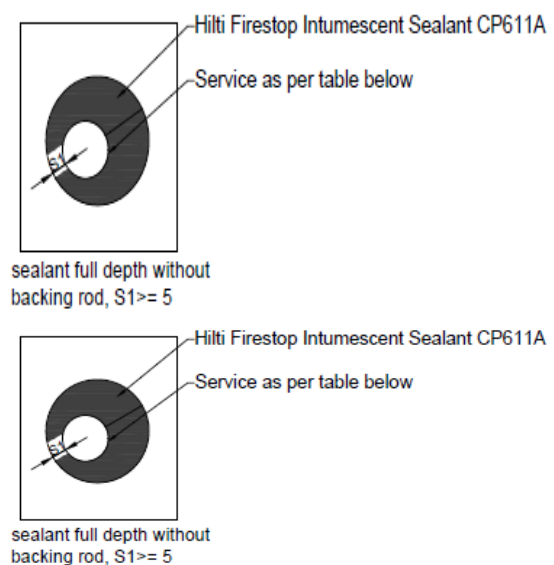


Figure 17r Front view- Cable bundle
protected with Hilti Firestop Putty Bandage
CFS-P BA and CP611a

Table 13.7 Assessment table of Cable bundle configuration as per Figure 17q and 17r

Service	Maximum Cable bundle diameter (mm)	Diameter of the opening, D ₀ (mm)	Depth of sealant, t _s (mm)	Additional Protection	Backing Option	FRL
Cable bundle (fire rated cable, submain, TPS, RG6, CAT6 and others inclusive)	21	38	25	Additional two layers of 100mm wide Hilti Firestop Putty Bandage CFS-P BA on both sides of the wall	With PEF Backing rod or sealant at full depth	-/120/120
	35	50	25			

2hr 75mm Hebel Wall FRL -/120/120 &**Rigid Walls FRL -/120/120 & FRL 120/120/120 (including minimum 155mm thick Dintel walls)****Cable Bundles protected with Hilti Intumescent Sealant CP611a, Hilti Retrofit Fire Collar CFS-C P 50/1.5" and 2 layers of Hilti Firestop Putty Bandage CFS-P BA (5/5)**

The bare wall can be 75mm Hebel wall with dry density of 510 kg/m³ or rigid wall which must have a minimum thickness of 75mm and comprise of concrete, aerated concrete, solid or hollow masonry with a minimum density of 510 kg/m³. No build up is required.

The Hilti Firestop Putty Bandage CFS-P BA must be installed, such that the white mesh is visible from outside. For Dintel walls, an additional single layer of Hilti Firestop Putty Bandage shall be provided next to the 2 layers of putty bandage placed adjacent to the wall, on either side, externally, such that the total length of the putty bandage is 200mm.

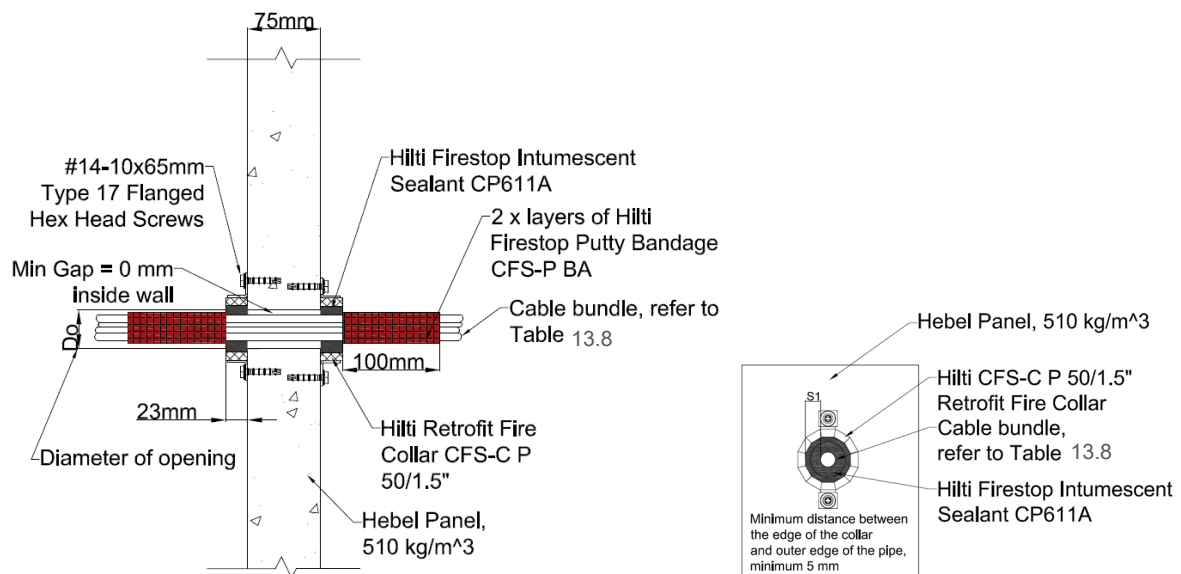


Figure 17s Side view- Cable Bundle protected by Hilti Retrofit Collar CFS-C P and 2 layers of Hilti Firestop Putty Bandage CFS-P BA

Figure 17t Front View- Cable bundle with Hilti Retrofit Fire Collar CFS-C P and 2 layers of Hilti Firestop Putty Bandage CFS-P BA

Table 13.8 Assessment table of Cable Bundle configuration as per Figure 17s and 17t

Service	Maximum Cable Bundle Diameter (mm)	Minimum Diameter of the Opening, D ₀ (mm)	Maximum Diameter of the Opening, D ₀ (mm)	Hilti Firestop Collar CFS-CP Size and sealant	Depth of sealant, t _s (mm)	Additional Protection	FRL
Cable bundle (fire rated cable, submain, TPS, RG6, CAT6 and others inclusive)	21	25	38	CFS-CP 50/1.5" & CP 611A	23	Two layers of 100mm wide Hilti Firestop Putty Bandage CFS-P BA on both sides of the wall	-/120/120
	36	38	50		23		-/120/120

2hr 75mm Hebel Wall FRL -/120/120 &

Rigid Walls FRL -/120/120 & FRL 120/120/120 (including minimum 155mm thick Dintel walls)

Cable Conduits protected with Hilti Intumescent Sealant CP611a (1/1)

The bare wall can be 75mm Hebel wall with dry density of 510 kg/m³ or rigid wall which must have a minimum thickness of 75mm and comprise of concrete, aerated concrete, solid or hollow masonry with a minimum density of 510 kg/m³. No build up is required.

Backing rod is recommended to position the service at the centre of the hole and to control the sealant depth of 25 mm each side. Alternatively, CP 611a sealant can be installed without backing rod at full depth of the wall. The service can be installed **off centre** with a minimum edge distance $S_1 = 5\text{mm}$ as specified in Table 1A.

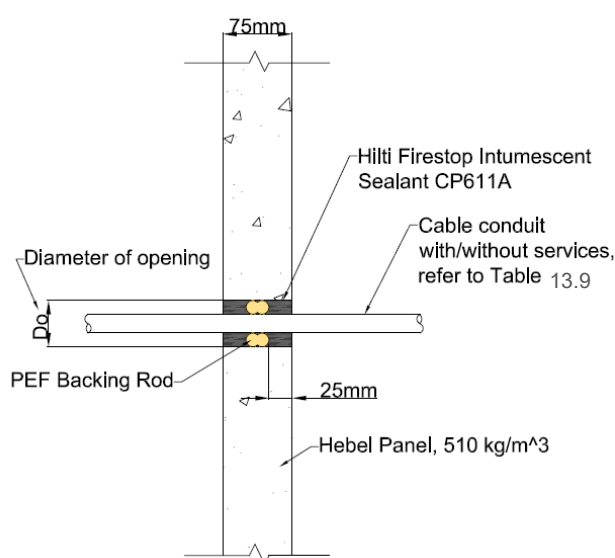


Figure 17u Side view- Cable conduit with PEF backing rod

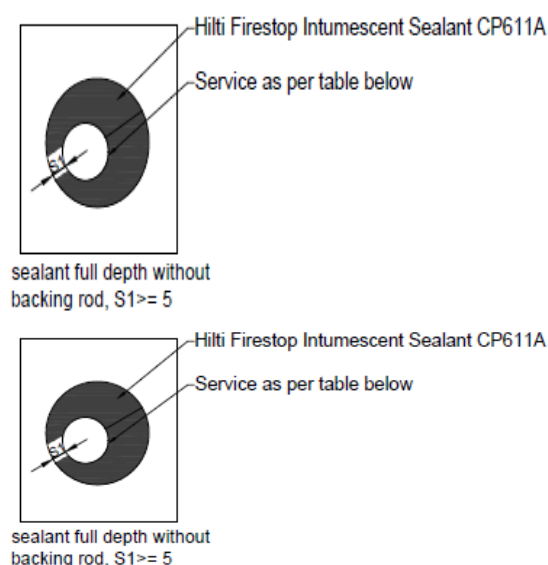


Figure 17v Front view-Cable conduit

Table 13.9 Assessment table of Cable conduits configuration as per Figure 17u and 17v

Service	Minimum Diameter of the Opening, D_0 (mm)	Maximum Diameter of the Opening, D_0 (mm)	Depth of sealant, t_s (mm)	Backing Option	FRL
Single uPVC, NBN conduit 16mm filled with cables, optic fibres, or mixtures of cable and fibre optic cable or empty	35	42	25	With PEF Backing rod or sealant at full depth	-/120/120
Single uPVC, NBN conduit 20mm filled with cables, optic fibres, or mixtures of cable and fibre optic cable or empty	38	45	25		-/120/120
Single uPVC, NBN conduit 25mm filled with cables, optic fibres, or mixtures of cable and fibre optic cable or empty	45	50	25		-/120/120
Single uPVC, NBN conduit 32mm filled with cables, optic fibres, or mixtures of cable and fibre optic cable or empty	50	54	25		-/120/120

For NBN conduit, the diameter refers to the pipe internal diameter

5.12 AS 1530.4 D1 Standard Cable Sets in 120 min Rigid Walls

2 hr Rigid Walls

FRL 120/120/120 & FRL -/120/120

AS 1530.4:2014 Standard D1 Cable Set with Hilti Intumescent Sealant CP611a

The bare wall must have a minimum thickness of 75mm and comprise of concrete, autoclaved aerated concrete, Hebel, Korok or Hollow masonry with a minimum density of 510kg/m³. Bare walls less than 100mm thick build up (AP2) shall be applied such that $t_E \geq 100\text{mm}$

Minimum 155mm thick Dintel walls, filled with normal-weight concrete, may also be used as the wall separating element. However, the additional protection specified below is required.

- Maximum size of opening, 150mm in diameter, 150mm × 150mm rectangular opening or equivalent surface area or 0.023m²
- When there is no cable tray sustained through the opening, the cables must be rigidly supported within 200mm from the wall and 2 × layers of Hilti Firestop Putty Bandage CFS-P BA must be wrapped around the individual cables/cable bundles on both sides of the wall.
- When minimum 155mm thick Dintel walls are used as the vertical separating element, 2 × layers of Hilti Firestop Putty Bandage CFS-P BA shall be provided next to the wall on either side of the wall. One layer of putty bandage shall also be laid over the bottom side of the cable tray. Furthermore, an additional single layer of Hilti Firestop Putty Bandage CFS-P BA shall be provided next to the 2 × layers of putty bandage placed adjacent to the wall, on either side, externally, such that the total length of the putty bandage is 200mm.

Seal Type 4 - Concrete Walls $\geq 100\text{mm}$

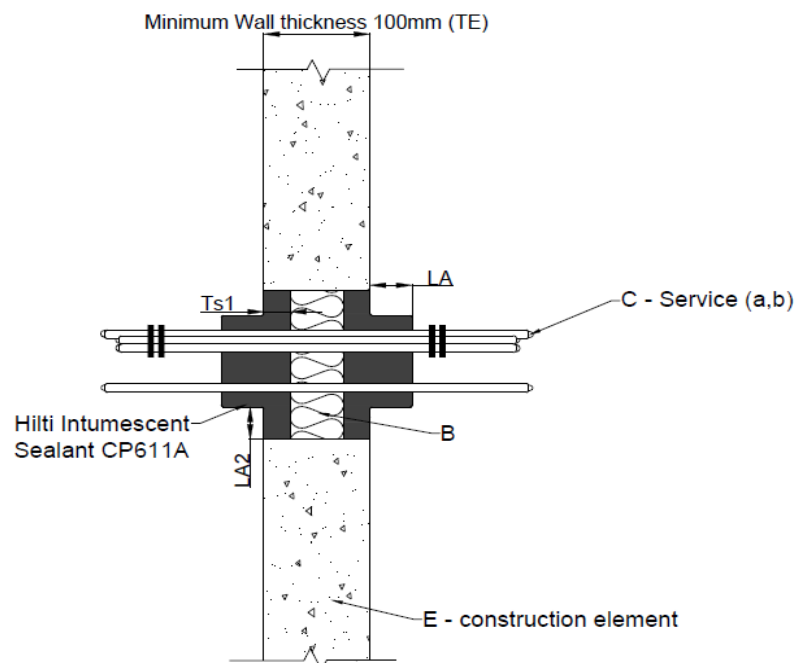


Figure 18a Side View of seal type 4, AS 1530.4:2014 D1 Standard Cable Sets. 100mm Concrete Wall, CP611a. Refer to table 14

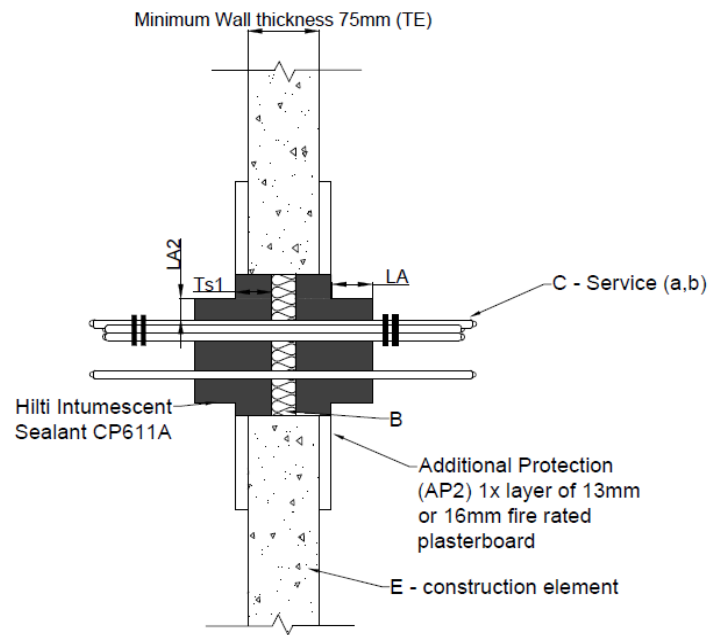
Seal Type 4 – Concrete Walls $\geq 75\text{mm}$ + AP2

Figure 18b Side View, seal type 4 AS 1530.4:2014 D1 Standard Cable Sets. 75mm Concrete wall + AP2. CP611a, refer to table 14

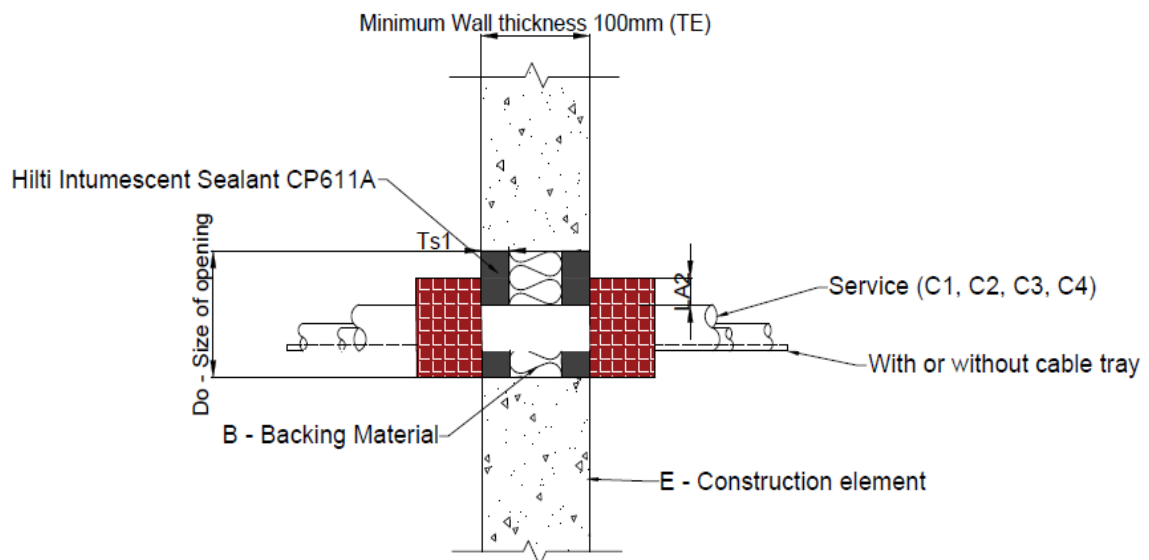
Seal Type 5 - Concrete Walls $\geq 100\text{mm}$ 

Figure 18c Side View, seal type 5, AS 1530.4:2014 D1 Standard Cable Sets. CP611a + CFS-P BA. Refer to table 14

Seal Type 5 – Concrete Walls $\geq 75\text{mm}$ + AP2

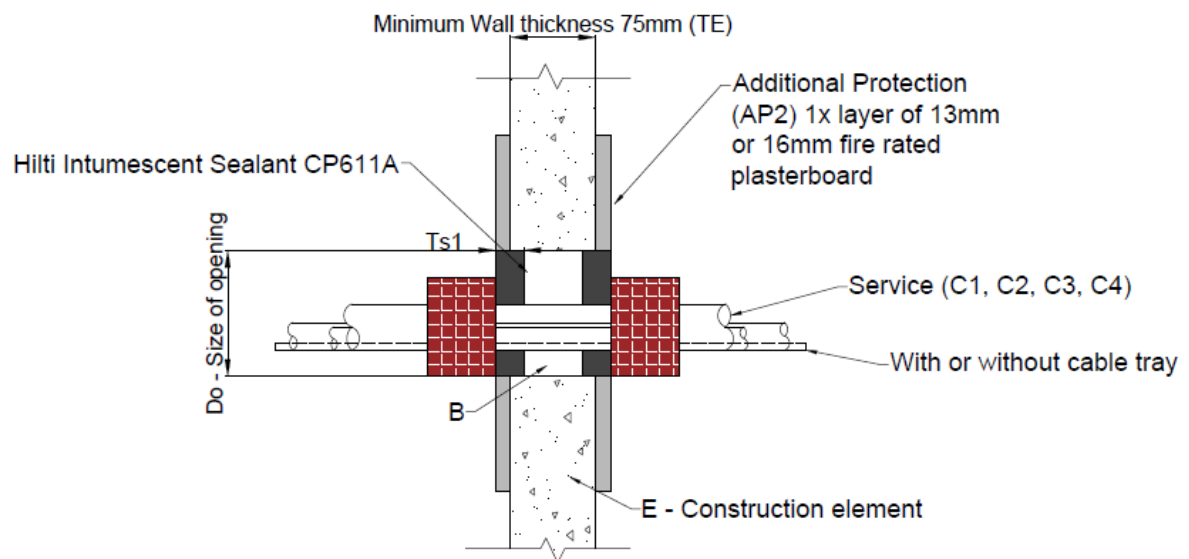


Figure 18d Side View, AS 1530.4:2014 D1 Standard Cable Sets. 75mm Concrete Wall + AP2 CP611A + CFS-P BA. Refer to table 14

Seal Type 4 & 5 – AS 1530.4:2014 D1 Cable Set Front View

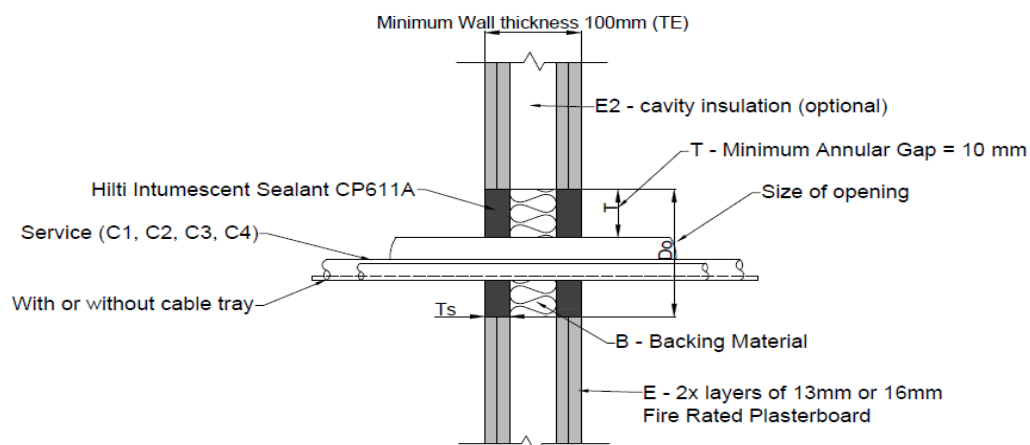


Figure 18e Front View, AS 1530.4:2014 D1 Standard Cable Sets. Refer to cable list below.

AS 1530.4:2014 D1 Cable Set	
C₁	1×Single Core PVC insulated, PVC sheathed for 0.6/1kV copper conductors complying with AS5000.1, 1×630mm ² (127×2.52mm conductors, insulation 2.4mm thick, OD41.4mm)
C₂	1×three-core plus earth PVC insulated, PVC sheathed for 0.6/1kV copper conductors complying with AS5000.1, 1×185mm ² (32×2.52mm conductors, insulation 2.4mm thick OD53.8mm)
C₃	3 × thee-core plus earth PVC insulated, PVC sheathed for 0.6/1kV copper conductors complying with AS5000.1, 3 × 6mm ² (7 × 1.04mm conductors, OD 16 mm)
C₄	8 × thee-core plus earth PVC insulated, PVC sheathed for 0.6/1kV copper conductors complying with AS5000.1, 8 × 16mm ² (7 × 1.04mm conductors, OD 20.4 mm)

- The stated cable sizes above outline the maximum number of each cable type and size that can be grouped together. Where multiple cable types exist on a cable tray, there should be a minimum spacing of 40mm between each cable group or bundle.

Table 14 AS 1530.4:2014 Standard D1 Cable sets in concrete walls configurations for seal type 4 & 5

Service (C)	Thickness / Depth of Sealant (T _s) mm	Minimum Annular Gap (T) mm	Backing Material (B)	Additional Sealing Requirements	Seal Type	FRL
PVC Insulated Power Cables with Cable Tray. (Standard D1 Cable Set, in accordance with AS 1530.4:2014 Appendix D)	25	10	Required	L _A = Not Required L _{A2} = Not Required	Seal Type 4 Figure 18a	-/120/60
	25+Depth of AP2				Seal Type 4 Figure 18b	
	25			L _A = 100mm L _{A2} = 2 × layers of Hilti CFS-B PA Putty Bandage wrapped around cables & cable tray (If Installed) For Dintel walls, an additional single layer of Hilti Firestop Putty Bandage CFS-P BA shall be provided next to the 2 × layers of putty bandage placed adjacent to the wall, on either side, externally, such that the total length of the putty bandage is 200mm.	Seal Type 5 Figure 18c	-/120/120
	25+Depth of AP2				Seal Type 5 Figure 18d	

- Backing material must be mineral wool / stone wool with a minimum density of 100kg/m³.

2 hr Rigid Walls

AS 1530.4 :2014 Standard D2 Cable Sets with Hilti Intumescent Sealant CP611a

Dintel walls at least 155mm thick and filled with normal weight concrete may be used as the wall separating element. No build up is required in this case. However, additional protection as specified below is required.

- Maximum size of opening, 150mm in diameter, 150mm x 150mm rectangular opening or equivalent surface area or 0.023m²
- When there is no cable tray sustained through the opening, the cables must be rigidly supported within 200mm from the wall and 2 × layers of Hilti Firestop Putty Bandage CFS-P BA must be wrapped around the individual cables/cable bundles on both sides of the wall.
- When minimum 155mm thick Dintel walls are used as the vertical separating element, 2 × layers of Hilti Firestop Putty Bandage CFS-P BA shall be provided next to the wall on either side of the wall. One layer of putty bandage shall also be laid over the bottom side of the cable tray. Furthermore, an additional single layer of Hilti Firestop Putty Bandage CFS-P BA shall be provided next to the 2 × layers of putty bandage placed adjacent to the wall, on either side, externally, such that the total length of the putty bandage is 200mm.

Minimum Wall thickness 100mm (TE)

Hilti Intumescent Sealant CP611A

T - Minimum Annular Gap = 10 mm

C - Service (a,b)

Do - Size of opening

With or without cable tray

B - Backing Material

E - Construction element

Minimum Wall thickness 100mm (TE)

Figure 19a Side View of seal type 4, AS 1530.4:2014 D2 Standard Cable Sets. 100mm Concrete Wall, CP611a.
Refer to table 15

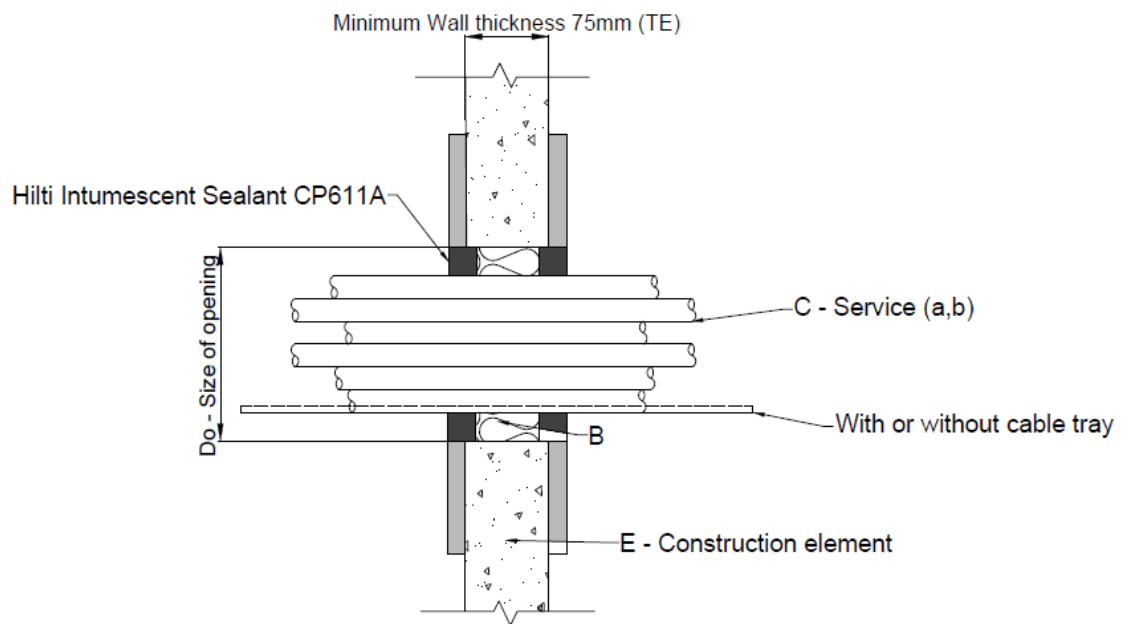
Seal Type 4 – Concrete Walls $\geq 75\text{mm}$ + AP2

Figure 19b Side View, seal type 4 AS 1530.4:2014 D2 Standard Cable Sets. 75mm Concrete Wall + AP2. CP611a. Refer to table 15

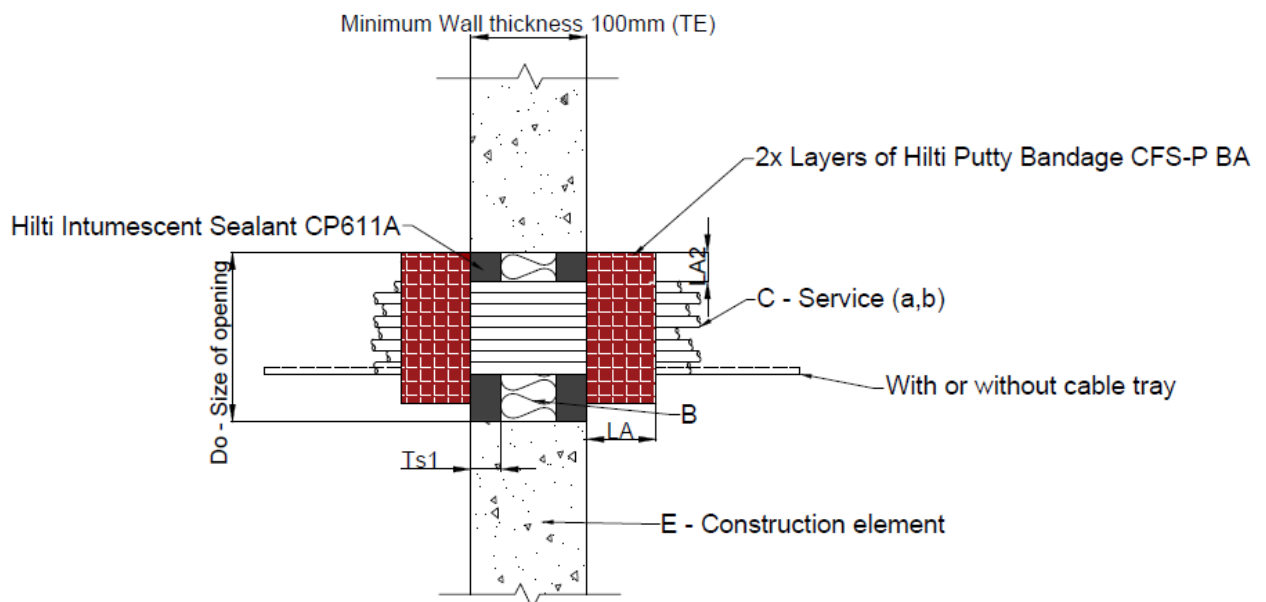
Seal Type 5 - Concrete Walls $\geq 100\text{mm}$ 

Figure 19c Side View, seal type 5, AS 1530.4:2014 D2 Standard Cable Sets. CP611a + CFS-P BA Refer to table 15

Seal Type 5 – Concrete Walls $\geq 75\text{mm}$ + AP2

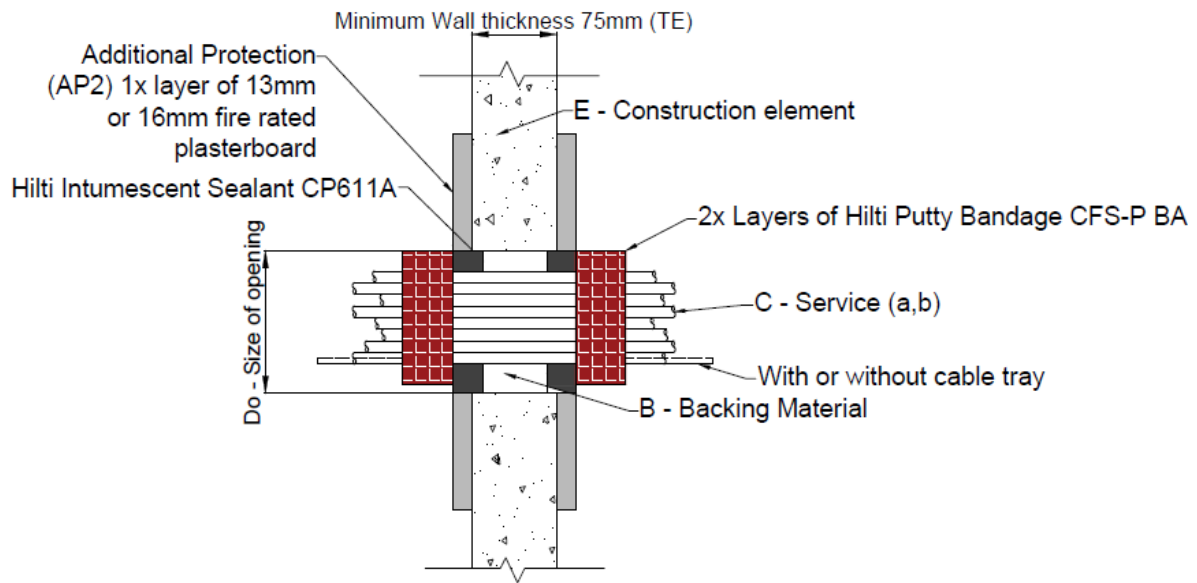


Figure 19d Side View, AS 1530.4:2014 D2 Standard Cable Sets. 75mm Concrete Wall + AP2 + CP611a + CFS-P BA refer to table 15

Seal Type 4 & 5 – AS 1530.4:2014 D2 Cable Set Front View

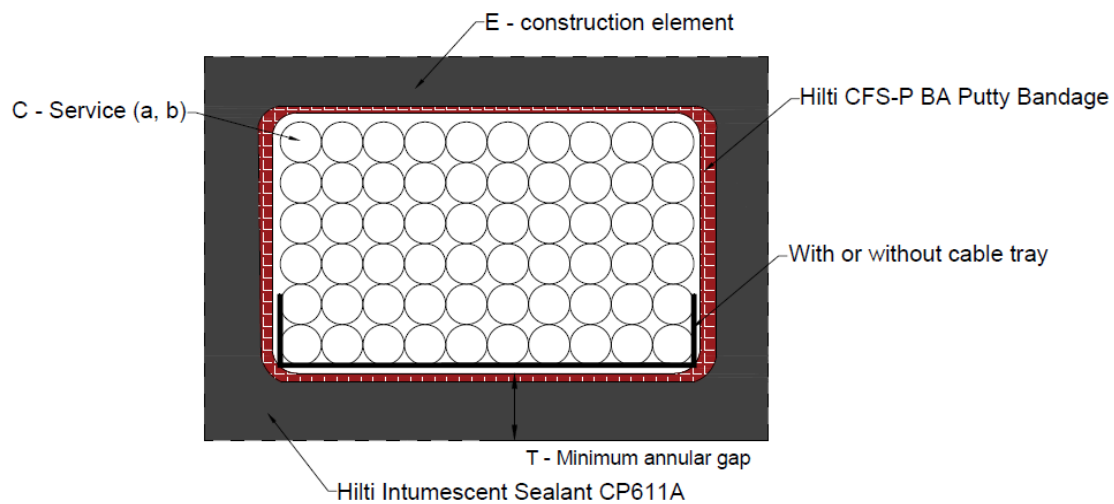


Figure 19e Front View, AS 1530.4:2014 D2 Standard Cable Sets. Refer to cable list below.

AS 1530.4 D2 Cable Set:

- a) Pack of 60 (10 × 6) 50 pair telecommunication cables
- b) 100 Wires, each wire, 0.5mm OD
- The stated cable sizes above outline the maximum number of each cable type and size that can be grouped together. Where multiple cable types exist on a cable tray, there should be a minimum spacing of 40mm between each cable group or bundle.

Table 15 AS 1530.4 :2014 Standard D2 Cable sets in concrete walls configurations for seal type 4 & 5

Service (C)	Thickness / Depth of Sealant (T _s , T _{s1}) mm	Backing Material (B)	Additional Sealing Requirements	Seal Type	FRL
PVC Insulated Power Cables with Cable Tray. (Standard D2 Cable Set, in accordance with AS 1530.4:2014 Appendix D)	25	Required	L _A = Not Required L _{A2} = Not Required (with or without cable tray)	Seal Type 4 Figures 19a	-/120/60
	25+Depth of AP2			Seal Type 4 Figures 19b	
	25		L _A = 100mm L _{A2} = 2 × layers of Hilti CFS-B PA Putty Bandage wrapped around cables & cable tray (If Installed) For Dintel walls, an additional single layer of Hilti Firestop Putty Bandage CFS-P BA shall be provided next to the 2 × layers of putty bandage placed adjacent to the wall, on either side, externally, such that the total length of the putty bandage is 200mm.	Seal Type 5 Figures 19c	-/120/120
	25+Depth of AP2			Seal Type 5 Figures 19d	

Backing material must be mineral wool / stone wool with a minimum density of 100kg/m³.

5.14 Steel Conduits $\leq 16\text{mm}$ in 120 min Rigid Walls

2 hr Rigid Walls

FRL 120/120/120 & FRL -/120/120

Steel Conduits $< 16\text{mm}$ Diameter with Hilti Intumescent Sealant CP611a

The bare wall must have a minimum thickness of 75mm and be comprised of concrete, aerated concrete, autoclaved aerated concrete, Hebel, Korok or hollow masonry with a minimum density of 510kg/m³.

Bare walls less than 100mm thick must have build up (AP2) such that the total seal thickness is 100mm.

Dintel walls at least 155mm thick and filled with normal weight concrete may be used as the wall separating element. No build up is required in this case.

- Maximum size of opening, 150mm in diameter, 150mm x 150mm rectangular opening or equivalent surface area or 0.023m²

Seal Type 2 - Concrete Walls $\geq 100\text{mm}$

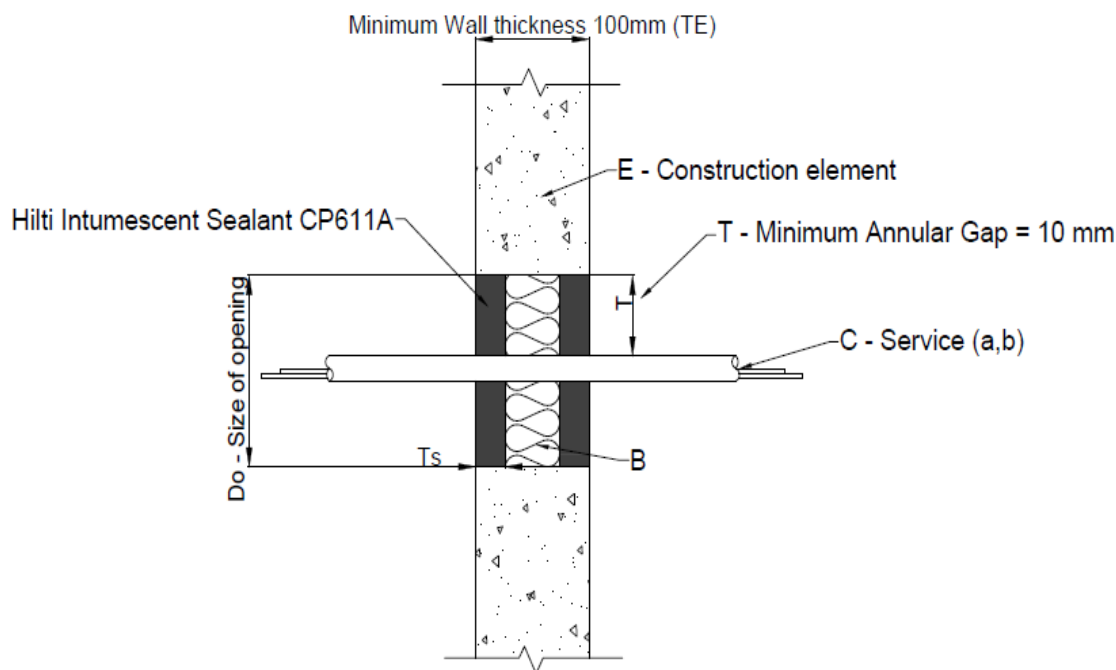


Figure 20a Side view, seal Type 2, 100mm concrete wall, CP611A Steel conduits $\leq 16\text{mm}$ OD refer to table 16

Minimum Wall thickness 75mm (TE)

Additional Protection (AP2) 1x layer of 13mm or 16mm fire rated plasterboard

Hilti Intumescent Sealant CP611A

2x Layers of Hilti Putty Bandage CFS-P BA

C - Service (a,b)

E - Construction element

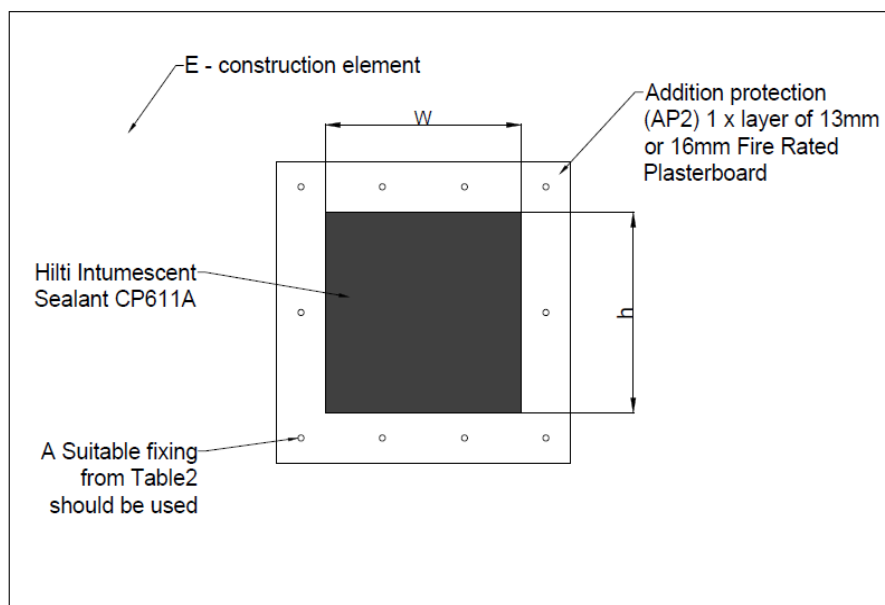
B

LA

LA2

Ts

Seal Type 6 – AP2



20200225-27912900 RIR1.6

Table 16 Steel conduits ≤ 16mm in diameter in concrete walls configurations for seal type 2 & 6

Service (C)	Thickness / Depth of Sealant (T _s) mm	Backing Material (B)	Additional Sealing Requirements	Seal Type	FRL
Single Steel conduits and tubes up to 16mm and 1.5mm (min) wall thickness with or without cables or optic fibre cables	25	Optional	L _A = Not Required L _{A2} = Not Required None	Seal Type 2 Figure 20a	-/120/90
	25+Depth of AP2	Required	L _A =10mm L _{A2} =100mm 2 × layers of Hilti CFS-B PA Putty Bandage wrapped around cables & cable tray (If Installed)	Seal Type 6 Figure 20b	-/120/120

Backing material must be mineral wool / stone wool with a minimum density of 100kg/m³.

5.15 uPVC Electrical conduits $\leq 40\text{mm}$ with Retrofit Fire Collar & CP611a Intumescent Sealant in 120 min Rigid Walls

2 hr Rigid Walls

FRL 120/120/120 & FRL -/120/120

Electrical Conduits Protected with Hilti Firestop Intumescent Sealant CP611a + Retrofit Fire Collar CFS-C P 50/1.5" (AP1)

The bare wall must have a minimum thickness of 75mm and be comprised of concrete, aerated concrete, autoclaved aerated concrete, Hebel, Korok or hollow masonry with a minimum density of 510kg/m^3 .

To improve the insulation rating, build up (AP2) shall be applied such that the total seal thickness is 128mm.

Dintel walls at least 155mm thick and filled with normal weight concrete may be used as the wall separating element. No build up is required in this case.

Front View – Seal Type 13 & 14

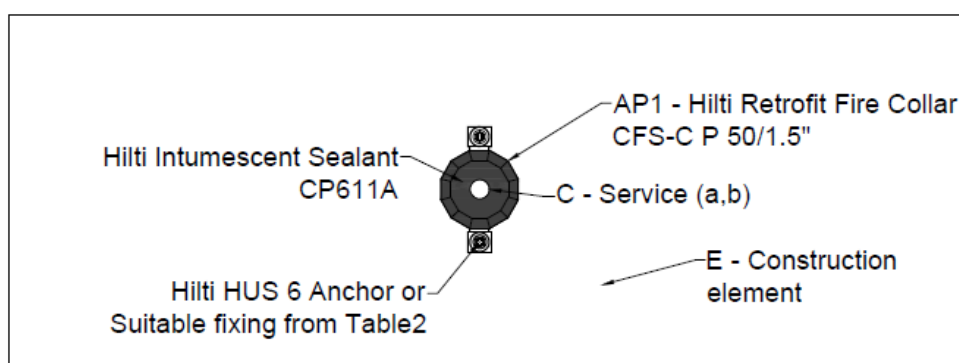


Figure 21a Front View, uPVC conduits $\leq 40\text{mm}$ OD. Refer table 17

Seal Type 13 - Concrete Walls $\geq 128\text{mm}$

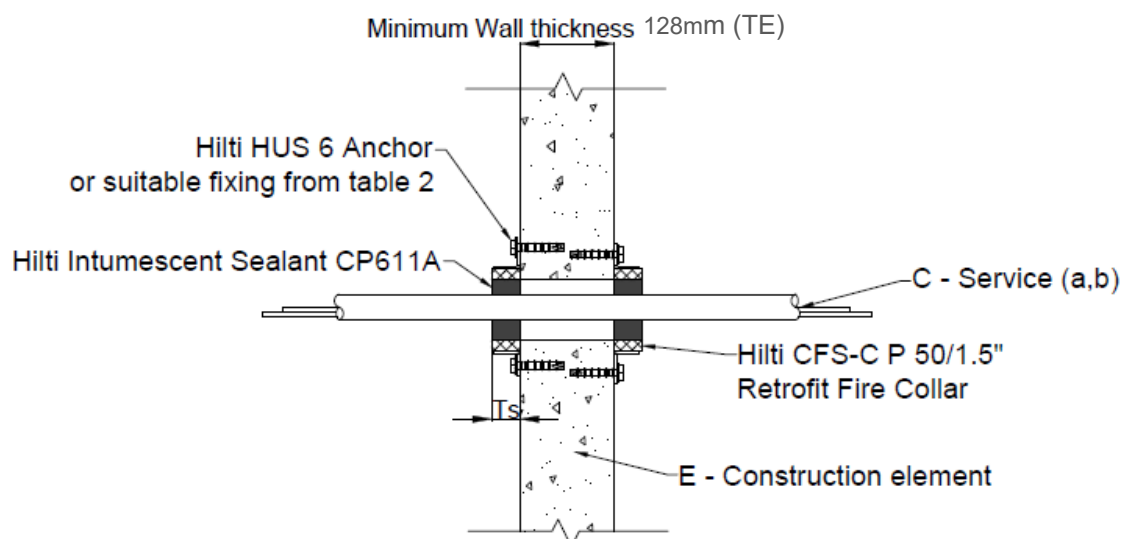


Figure 21b Side View, Seal Type 13, 75mm concrete wall, uPVC Conduits $\leq 40\text{mm}$ OD, CP611a + AP1. Refer to table 17

Seal Type 14 - Concrete Walls $\geq 75\text{mm}$

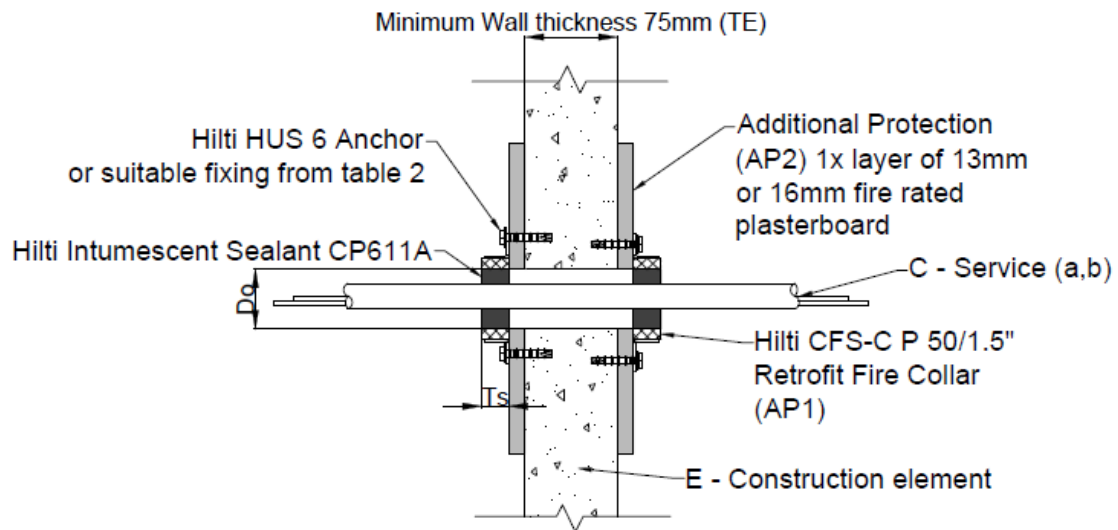


Figure 21c Side view, Seal Type 14, 75mm concrete wall, uPVC Conduits $\leq 40\text{mm}$ OD, CP611a + AP1 refer to table 17

Table 17 uPVC conduits 16-40mm in concrete walls configurations for seal type 13 & 14

Service (C)	Conduit Size (mm)	Fire Protection Method	Hole diameter	Concrete Walls $\geq 75\text{mm}$ (Seal Type 13)	Concrete Walls $\geq 128\text{mm}$ (Seal Type 14)
uPVC conduit with optic fibre, electrical cables or empty	16mm \times 1.75mm bundle up to three	Hilt Fire Collar CFS-C P 50/1.5\" + CP611a installed full depth of collar	Up to 50mm	-/120/60	-/120/120
	20mm \times 1.95mm bundle up to two				
	25mm \times 1.95mm				
	32mm \times 2.55mm				
	40mm \times 2.55mm				

5.16 Blank Seal in 120 min Solid Concrete Floors

2hr Solid Concrete Floor

FRL 120/120/120 & FRL -/120/120

Blank Opening with Hilti Intumescent Sealant CP611a

The Rigid Floor (E) must have a minimum thickness of 120mm and designed to achieve FRL 120/120/120 & FRL -/120/120 and comprise of aerated concrete or aerated autoclave concrete with a minimum density of 550kg/m³, $t_E \geq 120\text{mm}$

- Maximum size of opening, 150mm in diameter, 150mm × 150mm rectangular opening or equivalent surface area or 0.023m²

Side View – Seal Type 15

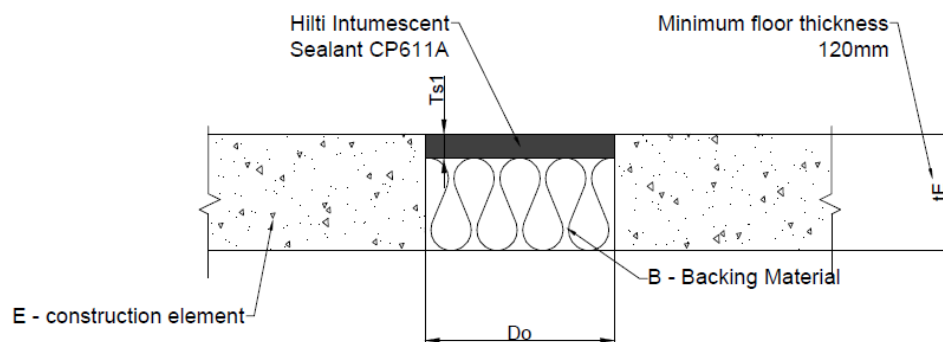


Figure 22 Side view, Blank seal in 120mm concrete floor. Refer to table 18

Table 18 Blank Seal details for seal type 15

Service Material (C)	Minimum Thickness of Slab T_E (mm)	Minimum Depth of backing Material (B) (mm)	Minimum Seal on Top Side of floor only (mm) (T_{s1})	Seal Type	FRL
Blank Opening	120mm	95mm	25mm	Seal Type (15) Figure 22	-/120/120
	150mm	125mm	25mm		-/120/120

Backing material must be mineral wool / stone wool with a minimum density of 100kg/m³.

5.17 Electrical Cables, Cable Bundles & Conduits in 120 min Solid Concrete Floors

2hr Solid Concrete Floor

FRL 120/120/120 & FRL -/120/120

Single Cables & Cable Bundles Hilti Intumescent Sealant CP611A

The Rigid Floor (E) must have a minimum thickness of 120mm and designed to achieve FRL 120/120/120 & FRL -/120/120 and comprise of aerated concrete or aerated autoclave concrete with a minimum density of 550kg/m³, $t_E \geq 120\text{mm}$

- Maximum size of opening, 150mm in diameter, 150mm × 150mm rectangular opening or equivalent surface area or 0.023m²

Side View – Seal Type 16

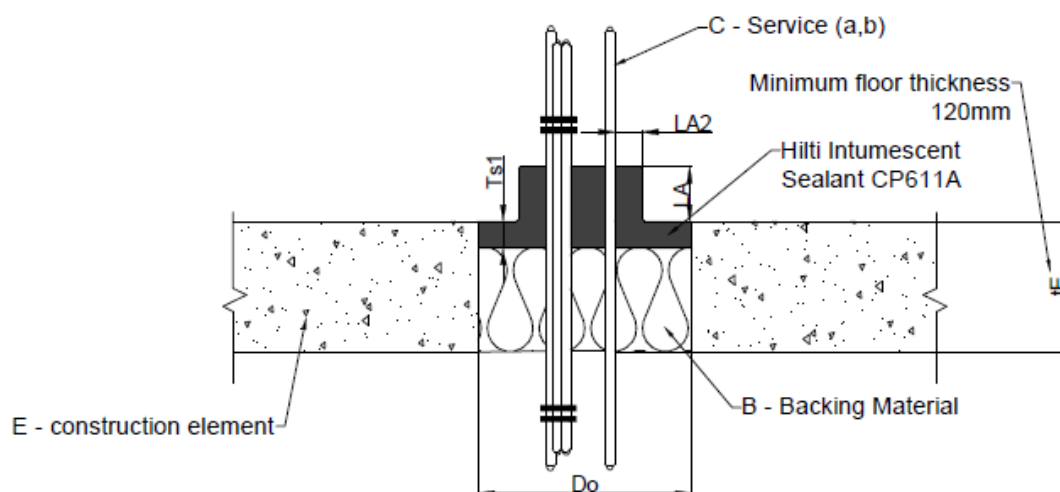


Figure 23a Side view, seal type 16, small cables $\leq 16\text{mm}$ and cable bundles $\leq 16\text{mm}$, in concrete floor $\geq 120\text{mm}$

Side View – Seal Type 17

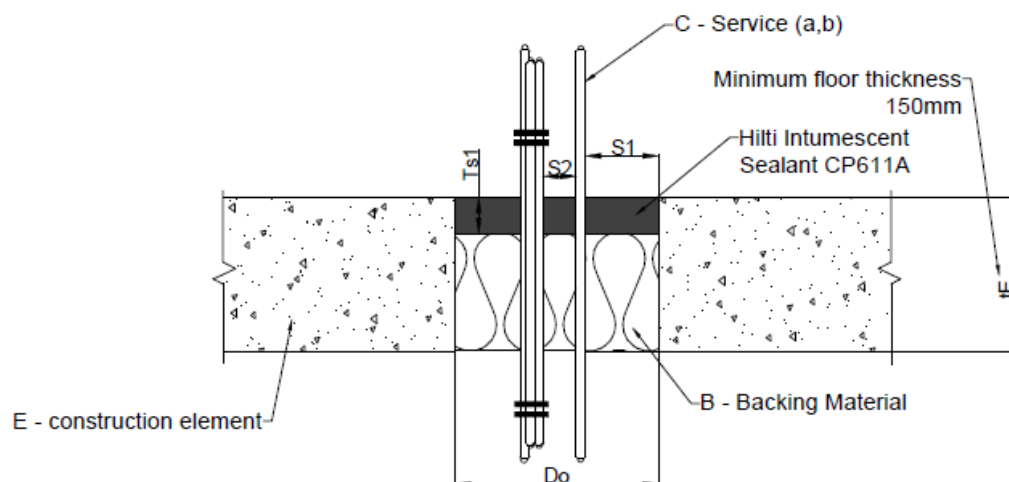


Figure 23b Side View, seal type 17, small cables $\leq 16\text{mm}$ and cable bundles $\leq 16\text{mm}$ in concrete floor $\geq 150\text{mm}$

Table 19 Single Cables ≤ 16mm Dia & Small Cables in Bundles ≤ 20mm Dia. details for seal type 16 & 17

Service Material (C)	Minimum Thickness of Slab (T _E) mm	Minimum Depth of backing Material (B) mm	Minimum Seal on Top Side of floor only mm (T _{S1})	Additional Protection	Seal Type	FRL
Single Cables ≤16mm Dia	120mm	95mm	25mm	L _{A2} = 10mm L _A = 30mm	Seal Type 16 Figure 23a	-/120/120
	150mm	125mm		-	Seal Type 17 Figure 23b	-/120/120
Small Cables in Bundles ≤ 20mm Dia	120mm	95mm		L _{A2} = 10mm L _A = 30mm	Seal Type 16 Figure 23a	-/120/120
	150mm	125mm		-	Seal Type 17 Figure 23b	-/120/120

Backing material must be mineral wool / stone wool with a minimum density of 100kg/m³.

5.18 AS 1530.4 D1 Standard Cable Sets 120 min Solid Concrete Floors

2hr Solid Concrete Floor

FRL 120/120/120 & FRL -/120/120

AS 1530.4:2014 Standard D1 Cable Set with Hilti Intumescent Sealant CP611A

The Rigid Floor (E) must have a minimum thickness of 120mm and designed to achieve FRL 120/120/120 & FRL -/120/120 and comprise of aerated concrete or aerated autoclave concrete with a minimum density of 550kg/m³, $t_E \geq 120\text{mm}$

- Maximum size of opening, 150mm in diameter, 150mm × 150mm rectangular opening or equivalent surface area or 0.023m²
- When there is no cable tray sustained through the opening, the cables must be rigidly supported within 200mm from either side of the floor. And the additional sealant requirements is applied around the individual cables/cable bundles on the top sides of the floor.

Side View – Seal Type 16

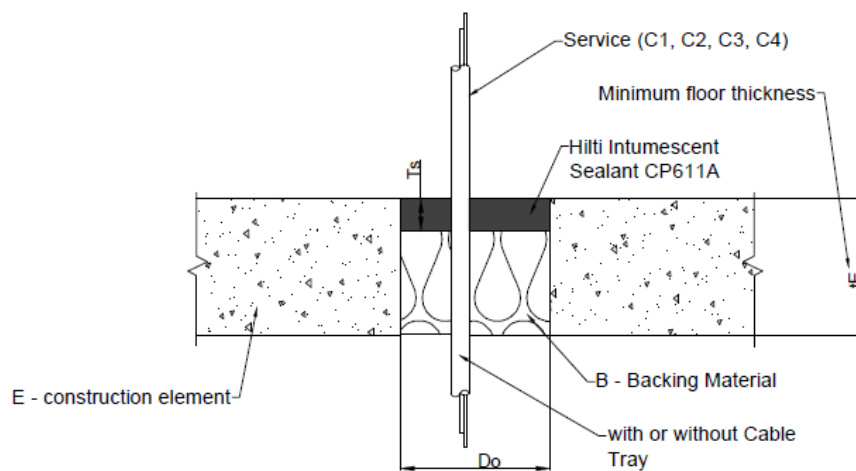


Figure 24a Side View, seal type 16, small cables $\leq 16\text{mm}$ and cable bundles $\leq 16\text{mm}$, in concrete floor $\geq 120\text{mm}$

Side View – Seal Type 17

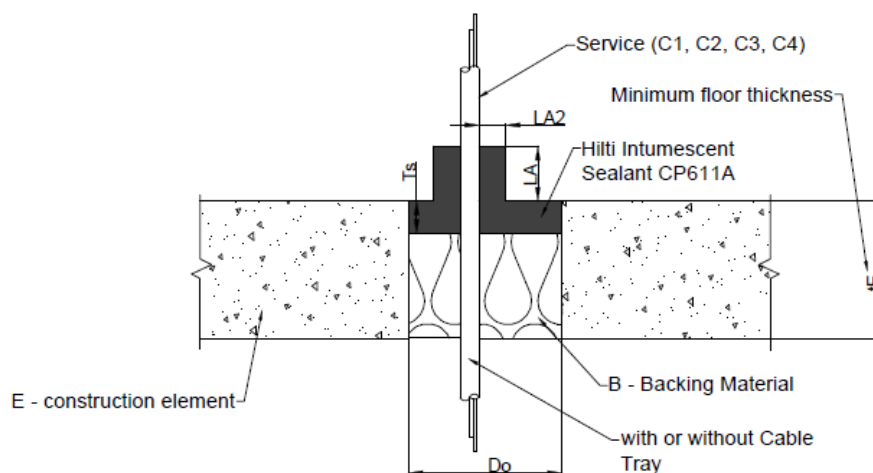


Figure 24b Side View, seal type 17, small cables $\leq 16\text{mm}$ and cable bundles $\leq 16\text{mm}$, in concrete floor $\geq 150\text{mm}$

Seal Type 16 & 17- AS 1530.4:2014 D1 Cable Set Front View

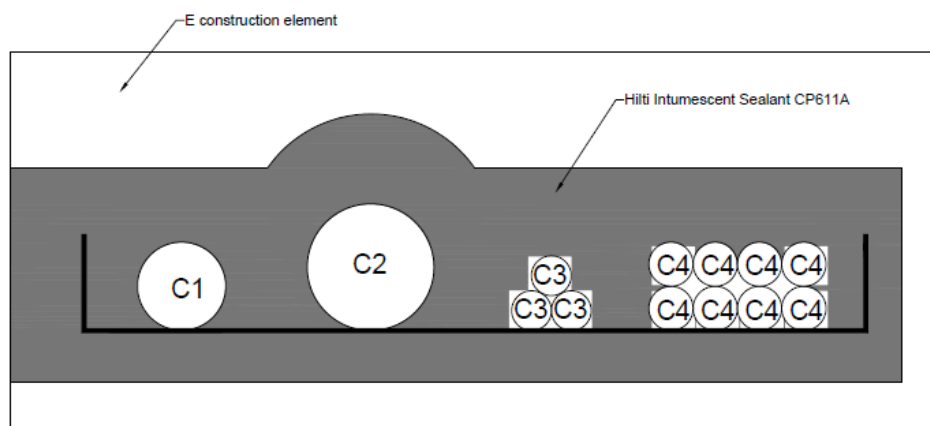


Figure 24c Front View, AS 1530.4:2014 D1 Standard Cable Sets. Refer to cable list below

AS 1530.4:2014 D1 Cable Set	
C ₁	1×Single Core PVC insulated, PVC sheathed for 0.6/1kV copper conductors complying with AS5000.1, 1×630mm ² (127×2.52mm conductors, insulation 2.4mm thick, OD41.4mm)
C ₂	1×three-core plus earth PVC insulated, PVC sheathed for 0.6/1kV copper conductors complying with AS5000.1, 1×185mm ² (32×2.52mm conductors, insulation 2.4mm thick OD53.8mm)
C ₃	3 × thee-core plus earth PVC insulated, PVC sheathed for 0.6/1kV copper conductors complying with AS5000.1, 3 × 6mm ² (7 × 1.04mm conductors, OD 16 mm)
C ₄	8 × thee-core plus earth PVC insulated, PVC sheathed for 0.6/1kV copper conductors complying with AS5000.1, 8 × 16mm ² (7 × 1.04mm conductors, OD 20.4 mm)

- The stated cable sizes above outline the maximum number of each cable type and size that can be grouped together. Where multiple cable types exist on a cable tray, there should be a minimum spacing of 40mm between each cable group or bundle.

Table 20 AS 1530.4:2014 Standard D1 Cable set in concrete floors details for seal type 16 & 17

Service Material (C)	Minimum Thickness of Slab (t _e)mm	Minimum Depth of backing Material (B) mm	Minimum Seal on Top Side of floor only mm (t _s)	Additional Protection	Seal Type	FRL
PVC Insulated Power Cables with Cable Tray. (Standard D1 Cable Set, in accordance with AS 1530.4:2014 Appendix D)	120mm	95mm	25mm	L _{A2} ≥ 10mm L _A ≥ 30mm	Seal Type 16 Figure 24b	-/120/90
	120mm	95mm		L _{A2} ≥ 10mm L _A ≥ 130mm	Seal Type 16 Figure 24b	-/120/120
	150mm	125mm		-	Seal Type 17 Figure 24a	-/120/90
	150mm	125mm		L _{A2} = 10mm L _A = 100mm	Seal Type 16 Figure 24b	-/120/120

5.19 AS 1530.4 D2 Standard Cable sets 120min Solid Concrete Floors

2hr Solid Concrete Floor

FRL 120/120/120 & FRL -/120/120

AS 1530.4:2014 Standard D2 Cable Set with Hilti Intumescent Sealant CP611a

The Rigid Floor (E) must have a minimum thickness of 120mm and designed to achieve FRL 120/120/120 & FRL -/120/120 and comprise of aerated concrete or aerated autoclave concrete with a minimum density of 550kg/m³, $t_E \geq 120\text{mm}$

- Maximum size of opening, 150mm in diameter, 150mm × 150mm rectangular opening or equivalent surface area or 0.023m²
- When there is no cable tray sustained through the opening, the cables must be rigidly supported within 200mm from either side of the floor. And the additional sealant requirements is applied around the individual cables/cable bundles on the top sides of the floor.

Side View – Seal Type 16

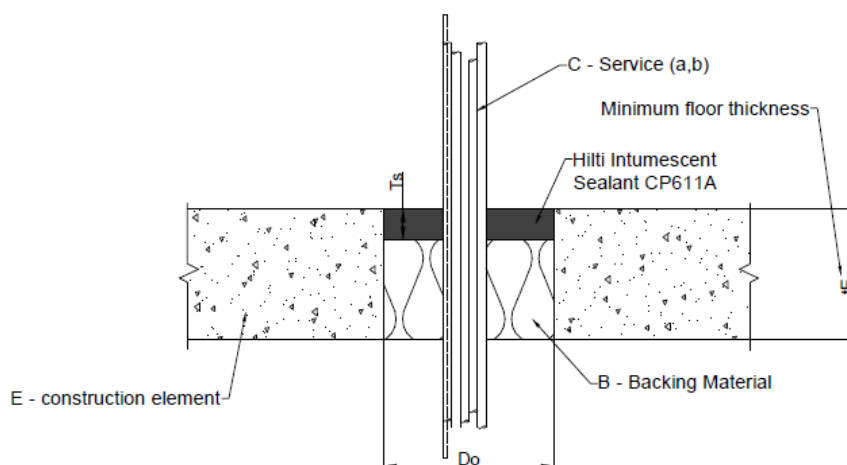


Figure 25a Side View, seal type 16, AS 1530.4:2014 Standard D1 Cable set in concrete floor

Side View – Seal Type 17

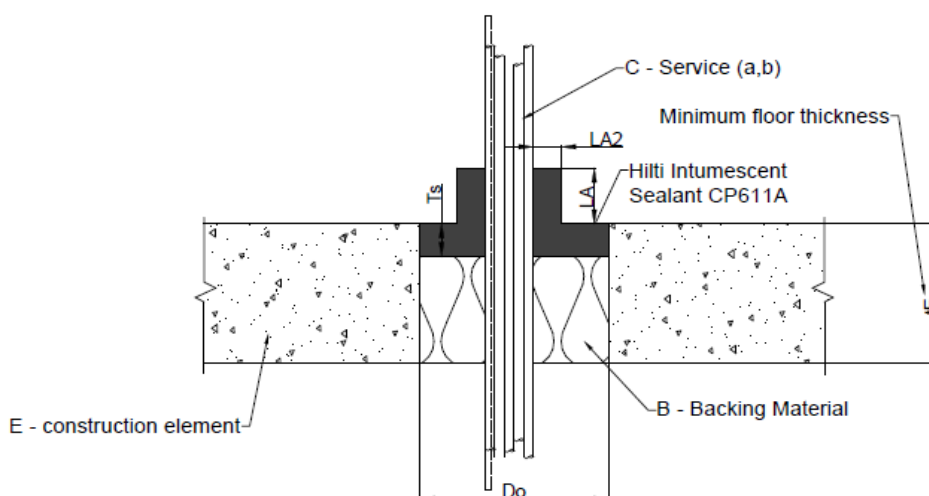


Figure 25b Side View, seal type 17 AS 1530.4 :2014 Standard D1 Cable Set in concrete floor

Seal Type 16 & 18- AS 1530.4:2014 D2 Cable Set Front View

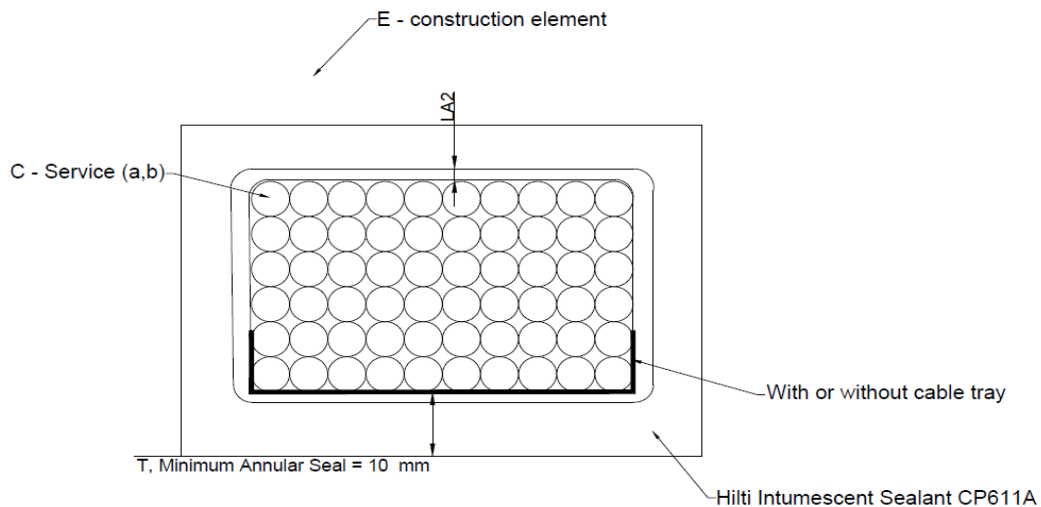


Figure 25c Front View, AS 1530.4:2014 D2 Standard Cable Sets. Refer to cable list below.

AS 1530.4 D2 Cable Set:

- a) Pack of 60 (10 × 6) 50 pair telecommunication cables
 - b) 100 Wires, each wire, 0.5mm OD
- The stated cable sizes above outline the maximum number of each cable type and size that can be grouped together. Where multiple cable types exist on a cable tray, there should be a minimum spacing of 40mm between each cable group or bundle.

Table 21 AS 1530.4 :2014 Standard D2 Cable set in concrete floors details for seal type 16 & 17

Service Material (C)	Minimum Thickness of Slab (T_E) mm	Minimum Depth of backing Material (B)	Minimum Seal on Top Side of floor only mm (T_s)	Additional Protection	Seal Type	FRL
PVC Insulated Power Cables with Cable Tray. (Standard D2 Cable Set, in accordance with AS 1530.4:2014 Appendix D)	120mm	95mm	25mm	$L_{A2} \geq 10\text{mm}$ $L_A \geq 30\text{mm}$	Seal Type 16 Figure 25b	-/120/90
	120mm	95mm		$L_{A2} \geq 10\text{mm}$ $L_A \geq 130\text{mm}$	Seal Type 16 Figure 25b	-/120/120
	150mm	125mm		-	Seal Type 17 Figure 25a	-/120/90
	150mm	125mm		$L_{A2} = 10\text{mm}$ $L_A = 100\text{mm}$	Seal Type 16 Figure 25b	-/120/120

Backing material must be mineral wool / stone wool with a minimum density of 100kg/m³

5.20 Steel or uPVC & Tubes Conduits $\leq 16\text{mm}$ in 120 min Plasterboard Solid Concrete Floors

2hr Solid Concrete Floor

FRL 120/120/120 & FRL -/120/120

Steel & uPVC Conduits or tubes $\leq 16\text{mm}$ OD with Hilti Intumescent Sealant CP611a

The Rigid Floor (E) must have a minimum thickness of 120mm and designed to achieve FRL 120/120/120 & FRL -/120/120 and comprise of aerated concrete or aerated autoclave concrete with a minimum density of 550kg/m^3 , $t_E \geq 120\text{mm}$

- Maximum size of opening, 150mm in diameter, 150mm \times 150mm rectangular opening or equivalent surface area or 0.023m^2

Side View – Seal Type 18

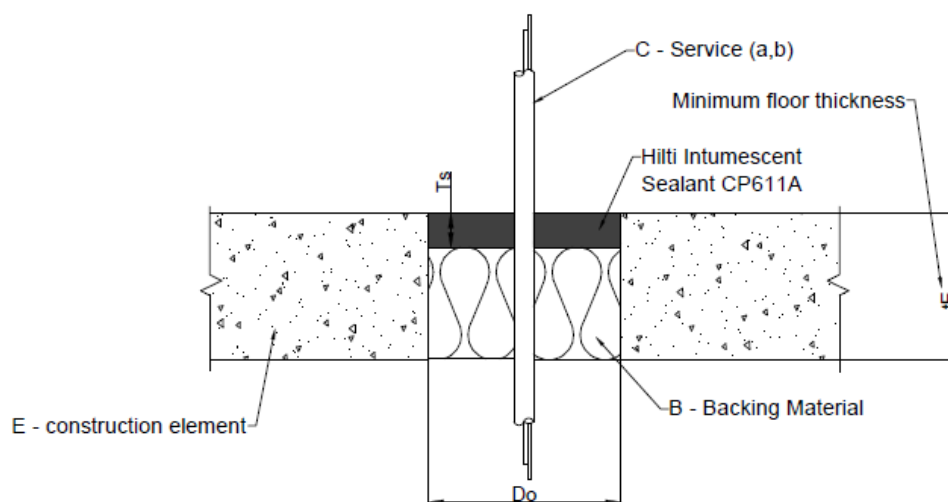


Figure 26a Side View, seal type 18, Steel and uPVC Conduits or tubes $\leq 16\text{mm}$ OD in concrete floor, CP611a

Side View – Seal Type 19

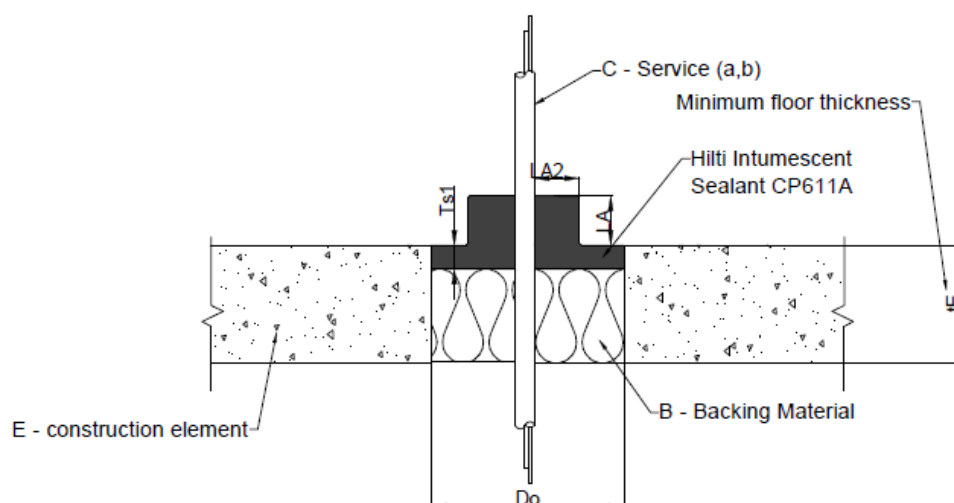


Figure 26b Side View, seal type 19, Steel & uPVC Conduits or tubes $\leq 16\text{mm}$ OD in concrete floor, CP611a + additional protection

Table 22 Steel & uPVC Conduits or tubes $\leq 16\text{mm}$ OD in concrete floors details for seal type 18 & 19

Service Material (C)	Minimum Thickness of Slab mm	Backing Material (B)	Minimum Seal on Top Side of floor only mm (t_s)	Additional Protection	Seal Type	FRL
Single PVC Conduits or Tubes & Single Steel Conduits or tubes $\leq 16\text{mm}$ and 1.5mm wall thickness, with or without cables or Optic fibre	120mm	Optional	25mm	$L_{A2} \geq 10\text{mm}$ $L_A \geq 30\text{mm}$	Seal Type 19 Figure 26b	-/120/90
	120mm			$L_{A2} \geq 10\text{mm}$ $L_A \geq 80\text{mm}$	Seal Type 19 Figure 26b	-/120/120
	150mm			-	Seal Type 18 Figure 26a	-/120/90
	150mm			$L_{A2} \geq 10\text{mm}$ $L_A \geq 50\text{mm}$	Seal Type 19 Figure 26b	-/120/120

Backing material must be mineral wool / stone wool with a minimum density of 100kg/m^3

5.21 uPVC Electrical Conduits 16mm-32mm in 120 min Solid Concrete Floors

2hr Solid Concrete Floor

FRL 120/120/120 & FRL -/120/120

uPVC Conduits $16 \leq \text{Dia.} \leq 32\text{mm}$ with Hilti Intumescent Sealant CP611a

The Rigid Floor (E) must have a minimum thickness of 120mm and designed to achieve FRL 120/120/120 & FRL -/120/120 and comprise of aerated concrete and aerated autoclave concrete with a minimum density of 550kg/m^3 , $t_E \geq 120\text{mm}$

- Maximum size of opening, 150mm in diameter, 150mm × 150mm rectangular opening or equivalent surface area or 0.023m^2

Side View – Seal Type 20

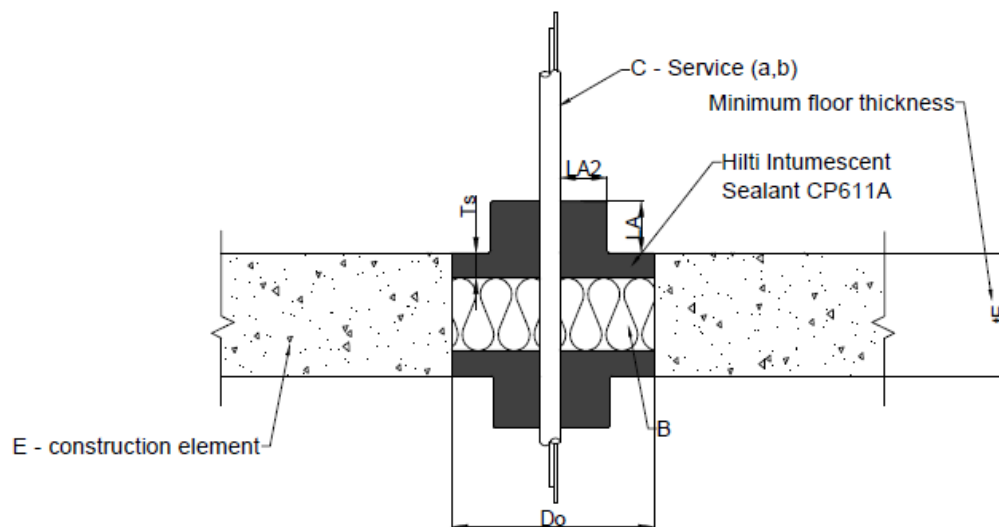


Figure 27 – Side View, seal type 20, uPVC Conduits $16 \leq \text{Dia.} \leq 32\text{mm}$, in concrete floors

Table 23 uPVC Conduits $16\text{mm} \leq \text{Dia.} \leq 32\text{mm}$ concrete floors details for seal type 20

Service Material (C)	Minimum Thickness of Slab mm	Backing Material (B)	Minimum Seal on Top Side of floor only mm (t_s)	Additional Protection	Seal Type	FRL
Single PVC Conduits $16 \leq \text{Dia.} \leq 32\text{mm}$, wall thickness 1-3mm with or without cables or optic fiber cables	120mm	Required	25mm	$L_{A2} \geq 10\text{mm}$ $L_A \geq 80\text{mm}$	Seal Type 20 Figure 27	-/120/120
	150mm			$L_{A2} \geq 10\text{mm}$ $L_A \geq 50\text{mm}$		

Backing material must be mineral wool / stone wool with a minimum density of 100kg/m^3

6. Direct field of application

This assessment applies to penetrations in walls exposed to fire from either side and floors exposed to fire from underside only.

7. Requirements

This report details the methods of construction, test conditions and assessed results that would have been expected had the specific elements of construction described herein been tested in accordance with AS 1530.4:2014.

All services shall be supported in the manner in which they are assessed as described in section. Any further variations with respect to size, constructional details, loads, stresses, edge or end conditions, other than those identified in this report, may invalidate the conclusions drawn in this report.

It is required that the supporting construction be otherwise tested or assessed to achieve the required FRL of the penetration seal and up to -/120/120 in accordance with AS 1530.4:2014.

8. Validity

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

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

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

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

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

9. Authority

9.1 Applicant undertakings and conditions of use

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

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

9.2 General conditions of use

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