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European Technical Assessment ETA 13/0153 – version 06 of 27/02/2017

General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: Kiwa Nederland B.V.	
Trade name of the construction product	NOFIRNO
Product family to which the construction product belongs	Product area code: 35 Fire Stopping and Sealing Product: penetration seals
Manufacturer	Beele Engineering B.V. Beunkdijk 11, 7122 NZ Aalten The Netherlands www.beele.com
Manufacturing plant	Vierde Broekdijk 12, 7122 JD Aalten The Netherlands
This European Technical Assessment contains	26 pages including 4 Annexes which form an integral part of this assessment.
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of	ETAG 026 part 2, edition 2011, used as European Assessment Document (EAD).
This ETA amends	ETA 13/0153, issued on 04/08/2016

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SPECIFIC PARTS OF THE EUROPEAN TECHNICAL ASSESSMENT

1. Technical description of the product

This European Technical Approval applies to a sealing system for fire safe wall and floor pipe and cable penetrations.

The sealing system consists of a combination of rubber filler sleeves, rubber cable insert sleeves and a sealant. The aperture between penetrating service(s) and penetration wall is filled with filler sleeves and on both sides the conduit opening is sealed with a 20 mm thick layer of sealant. The cables are placed in rubber cable sleeves.
The filler sleeves are available in six diameter sizes and in five lengths (see Annex A, table 1). Preferably sleeves 22/15 are used in the sealing of the penetrations. Alternatively, a combination of the sleeves 27/19 and 18/12 in the ratio of max 2:1 is allowed. The cable insert sleeves are available in 29 diameter sizes and in five lengths (see Annex A, table 2).

The material of the filler sleeves is a cured rubber compound. The colour of the compound is terracotta.

The sealant is delivered in standard 310 ml plastic cartridges. The material of the sealant is a room temperature curing sealant. For the polymer base two different types are used. The colour of the sealant is terracotta. The sealant is also available in blue, black and white.

2. Specification of the intended uses in accordance with the applicable European Assessment Document (hereinafter EAD): ETAG 026 part 2

The sealing system is intended to be used for the sealing of the penetration of a single metal pipe through a circular penetration in rigid walls or floors.
Rigid walls: The wall must have a minimum thickness of 150 mm and comprise concrete, aerated concrete or masonry, with a minimum dry density of 600 kg/m^3.
Rigid floors: The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum dry density of 600 kg/m^3.
The walls, floors and supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.

For pipe penetrations circular apertures are used. These can be drilled out of the concrete wall or floor. The sealing system can be applied in the drilled aperture or in a fire safe conduit pipe that is already available in the wall.
The sealing system can be applied for copper, CuNi and steel pipes with diameter 8 until 159 mm (depending on aperture diameter) in apertures with diameter 70 until 230 mm. For further details see Annex C.
In case of concrete, aerated concrete or masonry walls with a minimum wall thickness of 300 mm and a minimum dry density of 600 kg/m^3 the sealing system can be applied for steel pipes with diameter 8 until 219 mm in apertures with diameter 70 until 250 mm. For further details see Annex C.

The sealing system is also intended to be used for the sealing of the penetration of a single cable or of multi cables through apertures in rigid walls or floors.
Rigid walls: The wall must have a minimum thickness of 100 or 150 mm and comprise concrete, aerated concrete or masonry, with a minimum dry density of 600 kg/m^3.
Rigid floors: The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum dry density of 600 kg/m^3.
The walls, floors and supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
For further details see Annex D.

The provisions made in this European Technical Assessment are based on an assumed working life of the NOFIRNO sealing system of 25 years, provided that the conditions laid down in the manufacturers datasheet and instructions for the packaging/transport/storage/installation/use/repair are met. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

The real working life might be, in normal use conditions, considerable longer without major degradation affecting the Basic Requirements for construction works.

Durability and Serviceability
The use category of the sealing system is:
Category type X : intended for use at conditions exposed to weathering.
This includes use at external and internal conditions, temperatures below 0 °C, exposure to UV and exposure to rain.

Installation
The product shall be installed and used as described in this European Technical Assessment (for further details see Annex B of the ETA) as well as the ETA-holder's installation instructions.

Additional marking of the penetration seal shall be done in case of national requirements.

The indications of the manufacturer regarding transport and storage (minimum and maximum storage temperature, maximum duration of storage) have to be followed.

The penetration seals described in this European Technical Assessment are basically maintenance free under the conditions that the installation has been carried out properly according to the manufacturer's instructions. The fire resistance of the penetration seal shall not be negatively affected by future changes to buildings or building elements.

3. Performance of the product and references to the methods used for its assessment

Product type: Sealing kit	**Intended use: Penetration seal**	
Essential characteristic	**Method of verification**	**Performance**
	BWR 1 Mechanical resistance and stability	
	None	**Not relevant**
	BWR 2 Safety in case of fire	
Reaction to fire	EN 13501-1	Class E
Resistance to fire	EN 13501-2	See Annex C and D
	BWR 3 Hygiene, health and environment	
Air permeability (material property)	EN 1026:2000	No performance determined
Water permeability (material property)	ETAG 026-2, Annex C	No performance determined
Dangerous substances		Use categories: IA1, S/W3 The applicant has stated in a written declaration that the materials do not contain dangerous substances according to the European and national regulations of the Member States.
	BWR 4 Safety in use	
Mechanical resistance and stability	EOTA TR 001:2003	No performance determined
Resistance to impact/movement	EOTA TR 001:2003	No performance determined
Adhesion	EOTA TR 001:2003	No performance determined
	BWR 5 Protection against noise	
Airborne sound insulation	EN 10140-2/ EN ISO 717-1	No performance determined
	BWR 6 Energy economy and heat retention	
Thermal properties	EN 12664, EN 12667 or EN 12939	No performance determined
Water vapour permeability	EN ISO 12572 EN 12086	No performance determined
	General aspects relating to fitness for use	
Durability and serviceability	EOTA TR 024:2009, clause 3.1.11 & 3.1.12	Use category X
	BWR 7 Sustainable use of natural resources	
		No performance determined

According to the manufacturer's declaration the components of the NOFIRNO sealing system do not contain dangerous substances detailed in Council Directive 67/548/EEC and Regulation (EC) no 1272/2008 as well as EOTA TR 034 (General ER 3 Checklist for ETAGs/CUAPs/ETAs-Content and/or release of dangerous substances in products (kits), edition March 2012. A written declaration in this respect was submitted by the ETA-holder.

4. Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

According to the decision 1999/454/EC, amended by Decision 2001/596/EC of the European Commission the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table applies:

Product(s)	**Intended use(s)**	**Level(s) or class(es)** (resistance to fire)	**System** of assessment and verification of constancy of performance
Fire stopping and Fire Sealing Products	For fire compartmentation and/or fire protection or fire performance	Any	1

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be recorded in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall ensure that the product is in conformity with this European Technical Approval.

The manufacturer may only use constituent materials stated in the technical documentation of the European Technical Approval.

The factory production control shall be in accordance with the "Control Plan of February 8, 2013 which is part of the technical documentation of this European Technical Approval. The "Control Plan" is laid down in the context of the factory production control system operated by the manufacturer and deposited at Kiwa Nederland B.V.

The results of the factory production control shall be recorded and evaluated in accordance with the provisions of the "Control Plan".

Other tasks of the manufacturer

The manufacturer shall provide a technical data sheet and an installation instruction with the following minimum information:

(a) Technical data sheet:

- Field of application:
- Building elements for which the penetration sealing system is suitable, type and properties of the building elements like thickness, density, and – in case of lightweight construction – the construction elements.
- Services for which the penetration sealing system is suitable, type and properties of the services like material, diameter, thickness, etcetera. and, in case applicable, including insulation materials.
- Limits in size, minimum thickness etc. of the penetration sealing system.
- Construction of the penetration sealing system including the necessary components and additional products with clear indication whether they are generic or specific.

(b) Installation instruction:

- Steps to be followed.
- Procedures in case of retrofitting.
- Stipulations on maintenance, repair and replacement.

The manufacturer shall, on the basis of a contract, involve a body which is notified for the tasks referred to in section 3.1 in the field of rubber sealing plugs for fire safe pipe penetrations in order to allow the manufacturer to undertake the actions laid own in section 3.3. for this purpose, the "Control Plan" referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the notified body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European Technical Approval.

Tasks of the notified certification body

Due to the level of attestation of conformity system 1, the notified certification body involved by the manufacturer shall perform the:

− Initial type testing of the product,
− initial inspection of factory and of factory production control,
− continuous surveillance, assessment and approval of factory production control,
in accordance with the provisions laid down in the "Control Plan".

The notified certification body shall retain the essential points of its actions referred to above and state of results obtained and conclusions drawn in a written report.

The notified body involved by the manufacturer shall issue an EC certificate of conformity of the product stating the conformity with the provisions of this European Technical Approval.

In cases where the provisions of the European Technical Approval and its "Control Plan" are no longer fulfilled the notified certification body shall withdraw the certificate of conformity and inform Kiwa Nederland B.V. without delay.

Issued in Rijswijk (NL) on 27.02.2017

By Kiwa Nederland B.V.

Hans Naus, assessment engineer

Annex A

Table 1. Dimensions of filler sleeves

Sleeve type outer/inner diameter [mm]	Sleeve length [mm]	Wall thickness [mm]
10/4	60 – 110 – 140 – 160 – 210	3
15/8	60 – 110 – 140 – 160 – 210	3,5
18/12	60 – 110 – 140 – 160 – 210	3
20/12	60 – 110 – 140 – 160 – 210	4
22/15	60 – 110 – 140 – 160 – 210	3,5
27/19	60 – 110 – 140 – 160 – 210	4

Table 2. Dimensions of cable insert sleeves

Sleeve type outer/inner diameter [mm]	Sleeve length [mm]	Wall thickness [mm]
12/6	60-110-140-160-210	3
14/8	60-110-140-160-210	3
16/10	60-110-140-160-210	3
18/12	60-110-140-160-210	3
20/14	60-110-140-160-210	3
22/16	60-110-140-160-210	3
26/18	60-110-140-160-210	4
28/20	60-110-140-160-210	4
30/22	60-110-140-160-210	4
32/24	60-110-140-160-210	4
34/26	60-110-140-160-210	4
36/28	60-110-140-160-210	4
38/30	60-110-140-160-210	4
42/33	60-110-140-160-210	4,5
46/36	60-110-140-160-210	5
49/39	60-110-140-160-210	5
52/42	60-110-140-160-210	5
55/45	60-110-140-160-210	5
58/48	60-110-140-160-210	5
62/52	60-110-140-160-210	5
66/56	60-110-140-160-210	5
70/60	60-110-140-160-210	5
74/64	60-110-140-160-210	5
78/68	60-110-140-160-210	5
82/72	60-110-140-160-210	5
86/76	60-110-140-160-210	5
95/80	60-110-140-160-210	7,5
100/85	60-110-140-160-210	7,5
110/90	60-110-140-160-210	10

Annex B Installation procedure NOFIRNO SEALING system

- Remove any dirt, loose concrete or oil from the conduit opening
- Remove any sharp edges from the conduit opening
- Fill the aperture between penetrating services (pipe(s) or cable{s) and conduit opening wall with filler sleeves; preferably use sleeve size 22/15, alternatively, sleeves with sizes 27/19 and 18/12 in the ratio of max 2:1 are allowed. A small quantity of other filler sleeves sizes may be used in order to enable a tight fitting of the sealing system The length of the filler sleeves should be minimal 40 mm shorter than the length of the conduit opening and on both sides a free space of minimum 20 mm should be available. The whole set of filler sleeves should tightly fit to provide sufficient mechanical stability. Cables shall be covered with cable insert sleeves
- Apply a ≥ 20 mm thick layer of sealant at each side of the conduit opening. There should be an overfill
- Smooth the sealant surface with a cloth sprayed with water and press the overfill into the conduit opening to become a higher tightness of the sealant

The curing of the top layer needs a curing time of 0,5 to 1 hour; the complete curing of the sealant needs a curing time of several days

Installation principle of the sealing system in figures.

Figure 1: filling with filler sleeves

Figure 2: filler sleeves positioned

Figure 3: application of the sealant

Figure 4: finishing the sealant surface

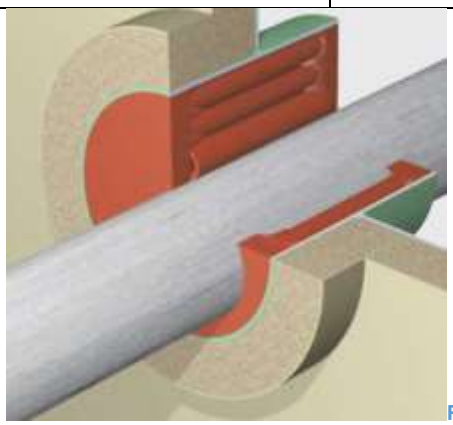


Figure 5: installed sealing system

Annex C Resistance to fire classification of NOFIRNO sealing system – Pipe penetrations

C 1. Rigid concrete, aerated concrete or masonry wall or floor, minimum dry density 600 kg/m^3, minimum thickness 150 mm

Services	Maximum aperture diameter	Insulation	Classification EN 13501-2: 2007+A1:2009 E= integrity I = insulation
Blank (No services)	600 mm	None	EI 240 [w)]/EI 120 [f)] E 240 [w)]/E 120 [f)]
Single steel pipes Outer diameter 8-89 mm, wall thickness 1,8-14,2 mm	70-160 mm	Rockwool Conlit U, density $_{min}$ = 180 kg/m^3 l_{min}=350 mm, d_{min}=30,5 mm [1)]	EI 120-C/U [2)] E 120-C/U [2)]
Single steel pipes Outer diameter 89-159 mm, wall thickness 4,5-14,2 mm	160-230 mm	Rockwool Conlit U, density $_{min}$ = 180 kg/m^3 l_{min}=850 mm, d_{min}=30,5 mm [1)]	EI 120-C/U [2)] E 120-C/U [2)]
Single steel, copper or CuNi pipes Outer diameter 8-89 mm, wall thickness 1,8-14,2 mm	70-160 mm	Rockwool Conlit U, density $_{min}$ = 180 kg/m^3 l_{min}=350 mm, d_{min}=30,5 mm [1)]	EI 120-C/U [2)] E 120-C/U [2)]
Single steel pipes Outer diameter 8-114 mm, wall thickness 3,3-14,2 mm	70-180 mm	Rockwool Conlit U, density $_{min}$ = 180 kg/m^3 l_{min}=350 mm, d_{min}=33 mm [1)]	EI 120-C/U [2)] E 120-C/U [2)]
Single steel, copper or CuNi pipes Outer diameter 8-108 mm, wall thickness 2,3-14,2 mm	70-180 mm	Rockwool Conlit U, density $_{min}$ = 180 kg/m^3 l_{min}=350 mm, d_{min}=36 mm [1)]	EI 120-C/U [2)] E 120-C/U [2)]
Single steel pipes Outer diameter 8-54 mm, wall thickness 1,4-14,2 mm	70-125 mm	Rockwool Conlit U, density $_{min}$ = 180 kg/m^3 l_{min}=350 mm, d_{min}=38 mm [1)]	EI 120-C/U [2)] E 120-C/U [2)]

[w)] wall; [f)] floor

[1)] or insulation with minimal equivalent dimensions, fire safety and insulation properties

[2)] standard heating curve according to EN 1363-1:2012

Notes for table C 1.

- For all services the aperture has to be completely filled, in this case NOFIRNO sleeves with length 110 mm and two 20 mm layers of NOFIRNO sealant.
- The test results cover pipes with a thermal conductivity lower than that tested, subject to the material having a melting point at least equal to that of the material tested or higher than the furnace temperature achieved at the required classification period.

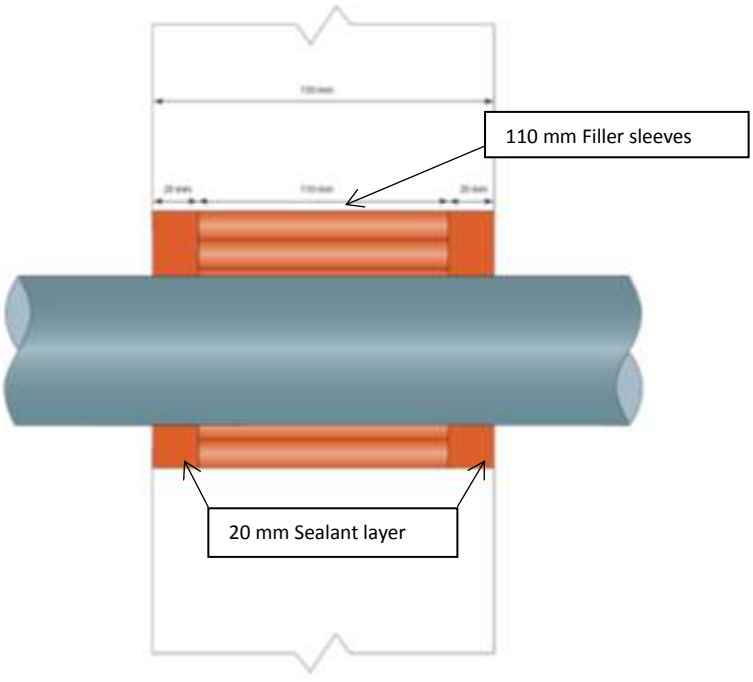


Figure 6: Principle of NOFIRNO sealing system with single pipe penetration in 150 mm wall or floor

C 2. Rigid concrete, aerated concrete or masonry wall, minimum dry density 600 kg/m³, minimum thickness 300 mm

Services	Maximum aperture diameter	Insulation	Classification EN 13501-2: 2007+A1:2009 E= integrity I = insulation
Blank (No services)	600 mm	None	EI 240 E 240
Single steel pipes Outer diameter 8-114 mm, wall thickness 1,8-3,6 mm	70-200 mm	None	EI 60-C/U [1]) E 120-C/U [1])

[1]) standard heating curve according to EN 1363-1:2012

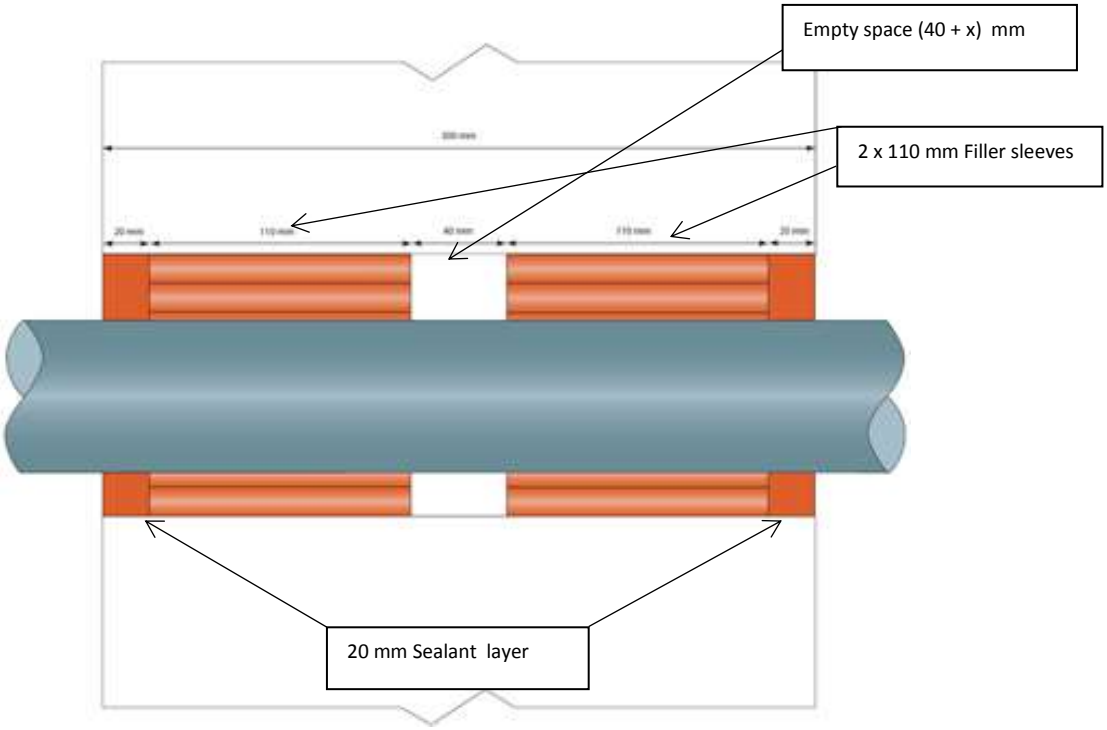


Figure 7: Principle of NOFIRNO sealing system with single pipe penetration in (300 + x) mm wall

C 3. Rigid concrete, aerated concrete or masonry wall, minimum dry density 600 kg/m³, minimum thickness 300 mm

Services	Maximum aperture diameter	Insulation	Classification EN 13501-2: 2007+A1:2009 E= integrity I = insulation
Blank (No services)	600 mm	None	EI 240 E 240
Single steel pipes Outer diameter 114-168 mm, wall thickness 3,6-4,5 mm	160-250 mm	None	EI 60-C/U [2)] E 120-C/U [2)]
Single steel pipes Outer diameter 168-219 mm, wall thickness 4,5-6,3 mm	250-300 mm	None	EI 60-C/U [2)] E 120-C/U [2)]
Single steel pipes Outer diameter 168 mm, wall thickness 10 mm	250 mm	H120 class mineral rock fibre, l_{min}=350 mm, d_{min}=150 mm [1)]	EI 180-C/U [3)] E 180-C/U [3)]

1) or insulation with minimal equivalent dimensions, fire safety and insulation properties

2) standard heating curve according to EN 1363-1:2012

3) hydrocarbon heating curve according to EN 1353-2:1999/C1:2001

Note for table C 3

- For all services the aperture has to be completely filled, in this case a combination of NOFIRNO sleeves adjusted to 260 mm length in total and two 20 mm layers of NOFIRNO sealant.

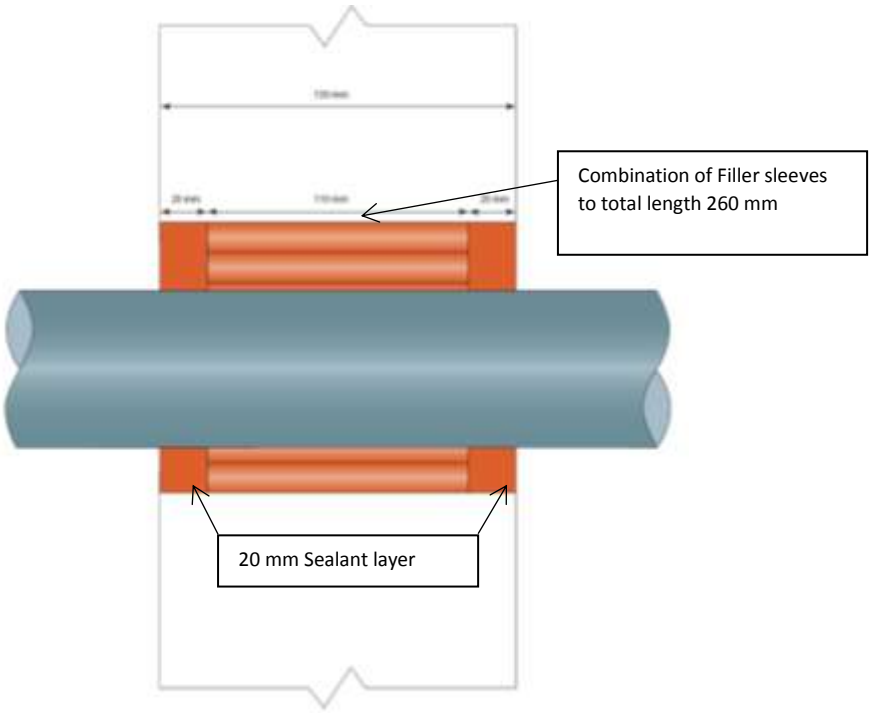


Figure 8: Principle of NOFIRNO sealing system with single pipe penetration in 300 mm wall

Annex D Resistance to fire classification of NOFIRNO sealing system – Cable penetrations

D 1. Rigid concrete, aerated concrete or masonry vertical wall, minimum dry density 600 kg/m³, minimum thickness 100 mm

Services for cable groups	Maximum aperture	Classification EN 13501-2: 2007+A1:2009 E= integrity I = insulation		
Blank (no services)	600 x 600 mm [1]	EI 240 E 240		
Sheathed cable groups Up to Ø21 mm		EI 90 E 240		
Sheathed cable groups Up to Ø50 mm		EI 60 E 240		
Telecommunication cable group Up to Ø21 mm [2]		EI 90 EI 120 [3] E 240		
Single cable for Telecommunication data	600 x 600 mm [3]	Ø5 mm [5] EI 240 E 240	Ø17 mm EI 120 E 240	Ø26 mm EI 90 E 240
Single cable sheathed Types A1, A2, A3 [4]		EI 240 E 240		
Single cable sheathed Type B [4]		EI 90 E 240		
Single cable sheathed Types C1, C2, C3, E [4]		EI 60 E 240		

[1] The cable penetration seals may be applied in an aperture of 600 x 600 mm or smaller provided that the total amount of cross sections of the cables does not exceed 60 % of the penetration area. Size increase of the seal is allowed up to 25 % in length or 25 % in width providing the total area is not increased by more than 25 %.

[2] The telecommunication cables up to Ø21 mm may be bundled to a maximum diameter of Ø100 mm, provided that only one telecommunication cable is placed per cable insert sleeve.

[3] Enlargement of the maximum aperture not permitted.

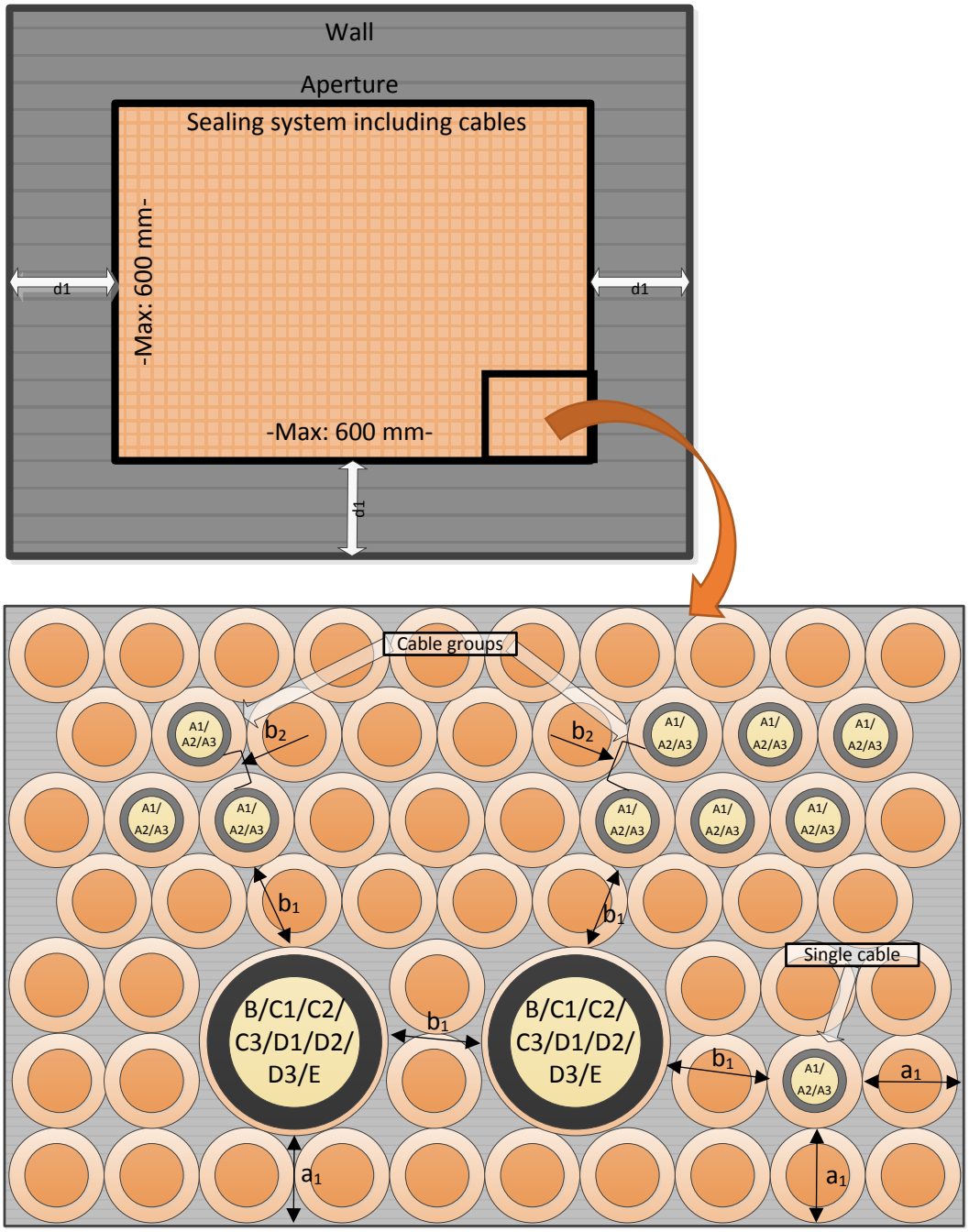
[4] Types according to Table A1 of EN 1366-3:2009.

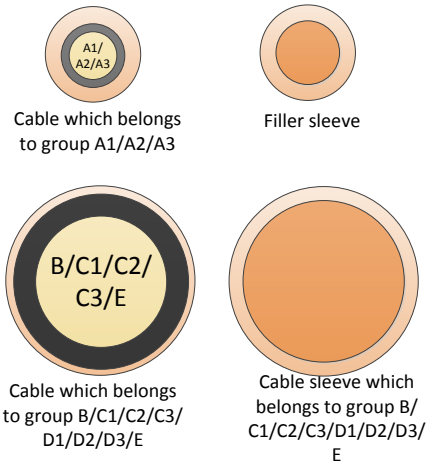
[5] Multiple telecommunication data cables Ø5 mm may be placed in one filler sleeve.

General conditions applicable for cable penetrations of table D 1

For all services the aperture has to be completely filled, a combination of NOFIRNO sleeves adjusted to minimum 60 mm length in total and two 20 mm layers of NOFIRNO sealant. In all cases no insulation is applied. The classifications are valid in both directions for cable penetrations seals in a vertical wall and cables passing through perpendicular to the wall. A distance d1 of minimum 200 mm from the edges of the aperture shall be taken into account to a different wall, floor or transfer to another type of wall. Multiple sheathed and telecommunication cables are allowed per seal in any number or combination. The minimum distance a1 from the cable to the aperture edge is 25 mm. Placing the cables in a filler sleeve or cable insert sleeve is mandatory; only one cable per filler sleeve and/or cable sleeve is allowed, except for multiple telecommunication data cables Ø5 mm. When placed in a filler sleeve the distance b2 between the cables shall be minimum 8 mm. When placed in a cable insert sleeve placing of a filler sleeve between the cable insert sleeves is mandatory and the distance b1 between the cables shall be minimum 30 mm. The maximum distance to the first support of the cables is 250 mm on both sides of the wall from the position were the cable emerges from the penetration seal.

Figure 9 and related table. Principle for walls, thickness minimum 100 mm.





ID	Description	Length [mm]
a_1	Distance from cable to aperture edge	≥ 25
b_1	Distance from cable (in group B/C1/C2/C3) to cable (in group A1/A2/A3/B/C1/C2/C3) within an aperture	≥ 30
b_2	Distance from cable (in group A1/A2/A3/) to cable (in group A1/A2/A3/) within an aperture	≥ 8
c_1	Distance between two apertures	≥ 200
d_1	Distance from aperture to a different wall, floor or transfer to another type of wall	≥ 200
Cables, according to EN 1366-3 Table A.1		
A1/A2/A3	In a filler sleeve	
B/C1/C2/C3/ D1/D2/D3/E	In a cable sleeve dimensions depending on the cable itself	

D 2. Rigid concrete, aerated concrete or masonry vertical wall, minimum dry density 600 kg/m³, minimum thickness 150 mm

Services for cable groups	Maximum aperture	Classification EN 13501-2: 2007+A1:2009 E= integrity I = insulation		
Blank (no services)	600 x 600 mm [1]	EI 240 E 240		
Telecommunication cable group Up to Ø21 mm [2]		EI 180 EI 240 [3] E 240		
Sheathed cable groups Up to Ø21 mm		EI 240 E 240		
Sheathed cable groups Up to Ø50 mm		EI 60 EI 90 [3] E 240		
Sheathed cable groups Up to Ø80 mm		EI 90 [3] E 240		
Single cable for Telecommunication Data cable	600 x 600 mm [3]	Ø5 [5] mm EI 240 E 240	Ø17 mm EI 240 E 240	Ø26 mm EI 240 E 240
Single cable sheathed Types A1, A2, A3, B [4]		EI 240 E 240		
Single cable sheathed Type C1 [4]		EI 90 E 240		
Single cable sheathed Type C2 [4]		EI 120 E 240		
Single cable sheathed Type C3 [4]		EI 90 E240		
Single cable sheathed Type E [4]		EI 180 E 240		
Single cable sheathed Type D1, D3 [4]		EI 120 E 240		
Single cable sheathed Type D2 [4]		EI 180 E 240		

1) The cable penetration seals may be applied in an aperture of 600 x 600 mm or smaller provided that the total amount of cross sections of the cables does not exceed 60 % of the penetration area. Size increase of the seal is allowed up to 25 % in length or 25 % in width providing the total area is not increased by more than 25 %.

2) The telecommunication cables up to Ø21 mm may be bundled to a maximum diameter of Ø100 mm, provided that only one telecommunication cable is placed per cable insert sleeve.

3) Enlargement of the maximum aperture not permitted.

4) Types according to Table A1 of EN 1366-3:2009.

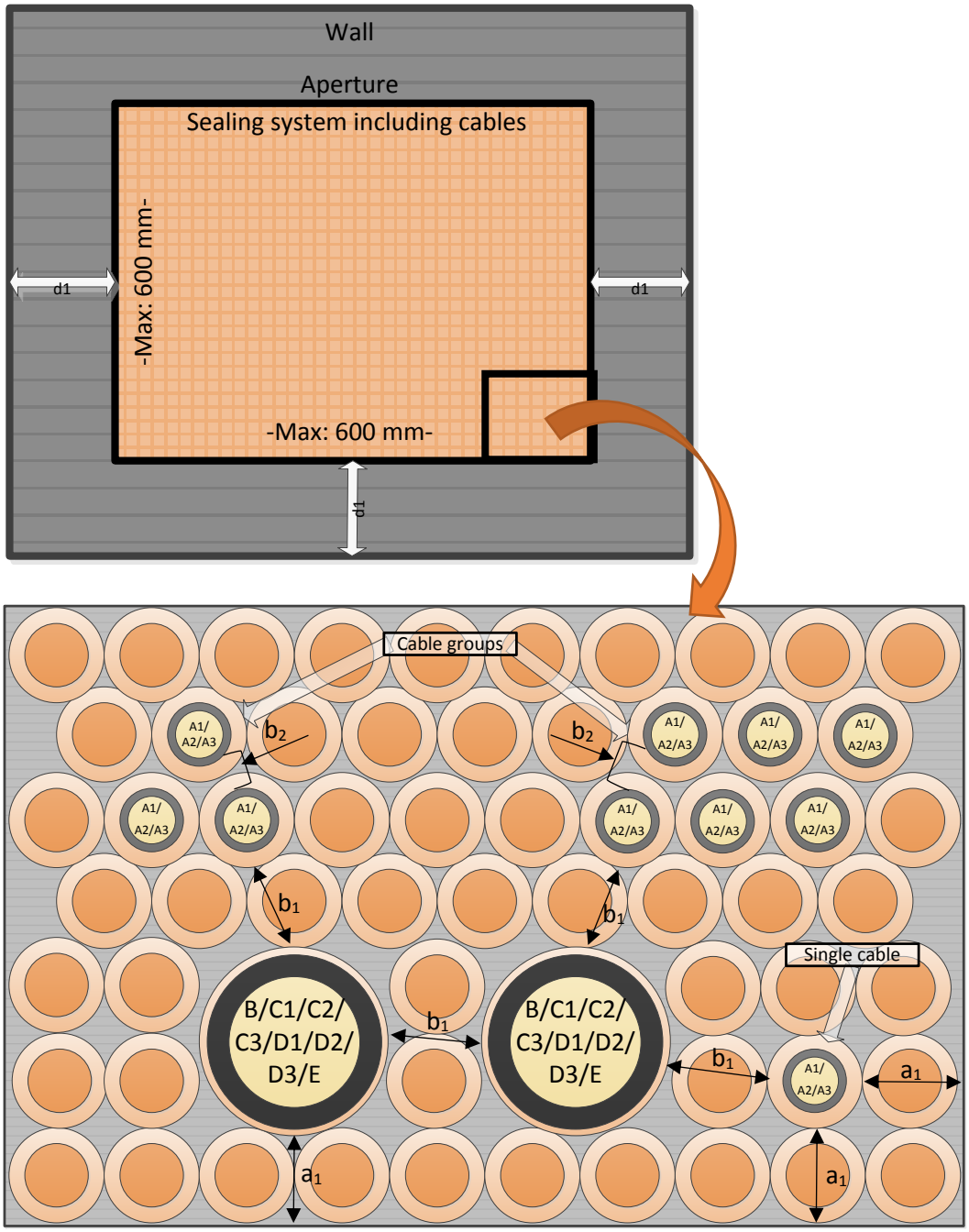
5) Multiple telecommunication data cables Ø5 mm may be placed in one filler sleeve.

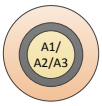
General conditions applicable for cable penetrations of table D 2

For all services the aperture has to be completely filled, a combination of NOFIRNO sleeves adjusted to minimum 110 mm length in total and two 20 mm layers of NOFIRNO sealant. In all cases no insulation is applied. The classifications are valid in both directions for cable penetrations seals in a vertical wall and cables passing through perpendicular to the wall. A distance d1 of minimum 200 mm from the edges of the aperture shall be taken into account to a different wall, floor or transfer to another type of wall. Multiple sheathed and telecommunication cables are allowed per seal in any number or combination. The minimum distance a1 from the cable to the aperture edge is 25 mm. Placing the cables in a filler sleeve or cable insert sleeve is mandatory; only one cable per filler sleeve and/or cable sleeve is allowed. When placed in a filler sleeve the distance b2 between the cables shall be minimum 8 mm. When placed in a cable insert sleeve placing of a filler sleeve between the cable insert sleeves is mandatory and the distance b1 between the cables shall be minimum 30 mm. The maximum distance to the first support of the cables is 250 mm on both sides of the wall from the position were the cable emerges from the penetration seal.

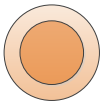
See figure 10 and related table on page 16.

Figure 10 and related table. Principle for walls, thickness minimum 150 mm up to 260 mm.

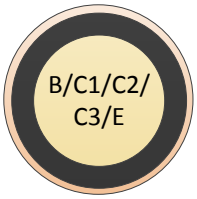




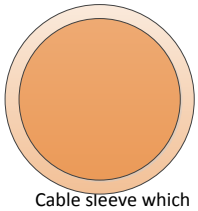
Cable which belongs to group A1/A2/A3



Filler sleeve



Cable which belongs to group B/C1/C2/C3/ D1/D2/D3/E



Cable sleeve which belongs to group B/ C1/C2/C3/D1/D2/D3/ E

ID	Description	Length [mm]
a_1	Distance from cable to aperture edge	≥ 25
b_1	Distance from cable (in group B/C1/C2/C3) to cable (in group A1/A2/A3/B/C1/C2/C3) within an aperture	≥ 30
b_2	Distance from cable (in group A1/A2/A3/) to cable (in group A1/A2/A3/) within an aperture	≥ 8
c_1	Distance between two apertures	≥ 200
d_1	Distance from aperture to a different wall, floor or transfer to another type of wall	≥ 200
Cables, according to EN 1366-3 Table A.1		
A1/A2/A3	In a filler sleeve	
B/C1/C2/C3/ D1/D2/D3/E	In a cable sleeve dimensions depending on the cable itself	

D 3. Rigid concrete, aerated concrete or masonry vertical wall, minimum dry density 600 kg/m³, minimum thickness 200 mm

Services for cable groups	Maximum aperture L x W	Classification EN 13501-2: 2007+A1:2009 E= integrity I = insulation		
Blank (no services)	L x 300 mm [6] or 600 x 600 mm [1]	EI 240 E 240		
Telecommunication cable group Up to Ø21 mm [2]	600 x 600 mm [1]	EI 180 EI 240 [3] E 240		
Sheathed cable groups Up to Ø21 mm		EI 240 E 240		
Sheathed cable groups Up to Ø50 mm		EI 60 EI 90 [3] E 240		
Sheathed cable groups Up to Ø80 mm		EI 90 [3] E 240		
Single cable for Telecommunication Data cable	600 x 600 mm [3]	Ø5 [5] mm EI 240 E 240	Ø17 mm EI 240 E 240	Ø26 mm EI 240 E 240
Single cable sheathed Types A1, A2, A3, B [4]		EI 240 E 240		
Single cable sheathed Type C1 [4]		EI 90 E 240		
Single cable sheathed Type C2 [4]		EI 120 E 240		
Single cable sheathed Type C3 [4]		EI 90 E240		
Single cable sheathed Type E [4]		EI 180 E 240		
Single cable sheathed Type D1 [4]		EI 120 E 240		
Single cable sheathed Type D2, D3 [4]		EI 180 E 240		

[1] The cable penetration seals may be applied in an aperture of 600 x 600 mm or smaller provided that the total amount of cross sections of the cables does not exceed 60 % of the penetration area. Size increase of the seal is allowed up to 25 % in length or 25 % in width providing the total area is not increased by more than 25 %.

[2] The telecommunication cables up to Ø21 mm may be bundled to a maximum diameter of Ø100 mm, provided that only one telecommunication cable is placed per cable insert sleeve.

[3] Enlargement of the maximum aperture not permitted.

[4] Types according to Table A1 of EN 1366-3:2009.

[5] Multiple telecommunication data cables Ø5 mm may be placed in one filler sleeve.

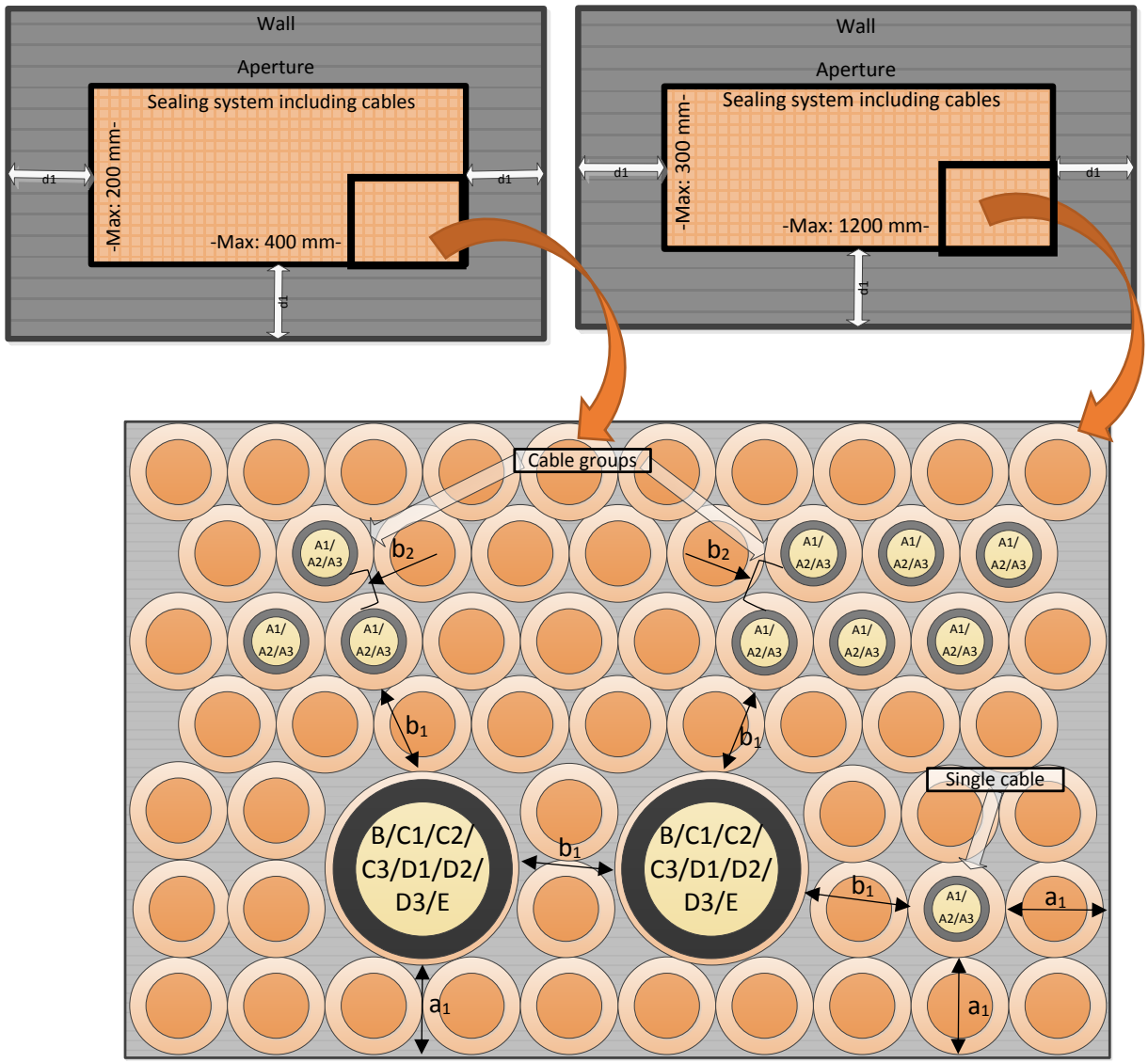
[6] No limit to length L.

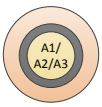
General conditions applicable for cable penetrations of table D 3

For all services the aperture has to be completely filled, a combination of NOFIRNO sleeves adjusted to minimum 160 mm length in total and two 20 mm layers of NOFIRNO sealant. In all cases no insulation is applied. The classifications are valid in both directions for cable penetrations seals in a vertical wall and cables passing through perpendicular to the wall. A distance d1 of minimum 200 mm from the edges of the aperture shall be taken into account to a different wall, floor or transfer to another type of wall. Multiple sheathed and telecommunication cables are allowed per seal in any number or combination. The minimum distance a1 from the cable to the aperture edge is 25 mm. Placing the cables in a filler sleeve or cable insert sleeve is mandatory; only one cable per filler sleeve and/or cable sleeve is allowed. When placed in a filler sleeve the distance b2 between the cables shall be minimum 8 mm. When placed in a cable insert sleeve placing of a filler sleeve between the cable insert sleeves is mandatory and the distance b1 between the cables shall be minimum 30 mm. The maximum distance to the first support of the cables is 250 mm on both sides of the wall from the position were the cable emerges from the penetration seal.

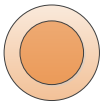
See figure 12 on page 20 for principle of the sealing system with cable penetrations in vertical walls with thickness of minimum 100 mm up to 260 mm and figure 13 for principle of NOFIRNO sealing system with cable penetrations in vertical walls with thickness of minimum 260 mm.

Figure 11 and related table. Principle for walls, thickness minimum 200 mm.

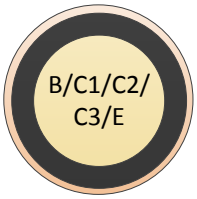




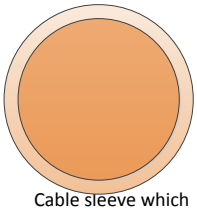
Cable which belongs to group A1/A2/A3



Filler sleeve



Cable which belongs to group B/C1/C2/C3/ D1/D2/D3/E



Cable sleeve which belongs to group B/ C1/C2/C3/D1/D2/D3/ E

ID	Description	Length [mm]
a_1	Distance from cable to aperture edge	≥ 25
b_1	Distance from cable (in group B/C1/C2/C3) to cable (in group A1/A2/A3/B/C1/C2/C3) within an aperture	≥ 30
b_2	Distance from cable (in group A1/A2/A3/) to cable (in group A1/A2/A3/) within an aperture	≥ 8
c_1	Distance between two apertures	≥ 200
d_1	Distance from aperture to a different wall, floor or transfer to another type of wall	≥ 200
Cables, according to EN 1366-3 Table A.1		
A1/A2/A3	In a filler sleeve	
B/C1/C2/C3/ D1/D2/D3/E	In a cable sleeve dimensions depending on the cable itself	

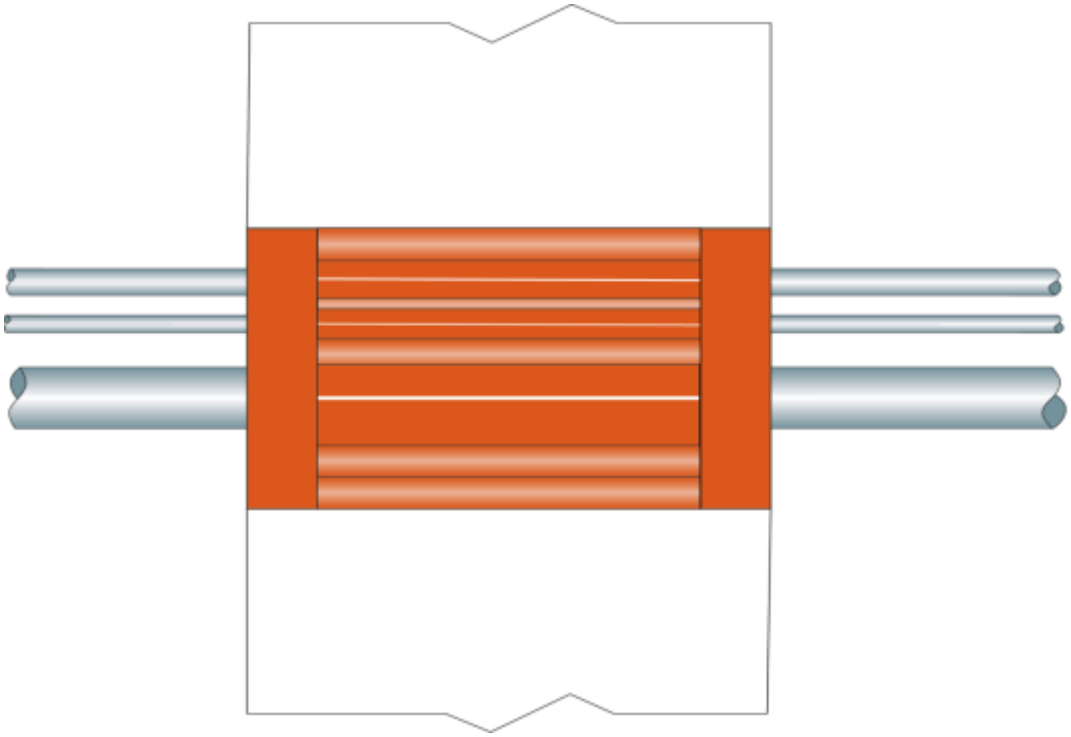


Figure 12. Principle of NOFIRNO sealing system with cable penetrations in vertical walls with thickness of minimum 100 mm up to 260 mm. The penetrations shall be completely filled.

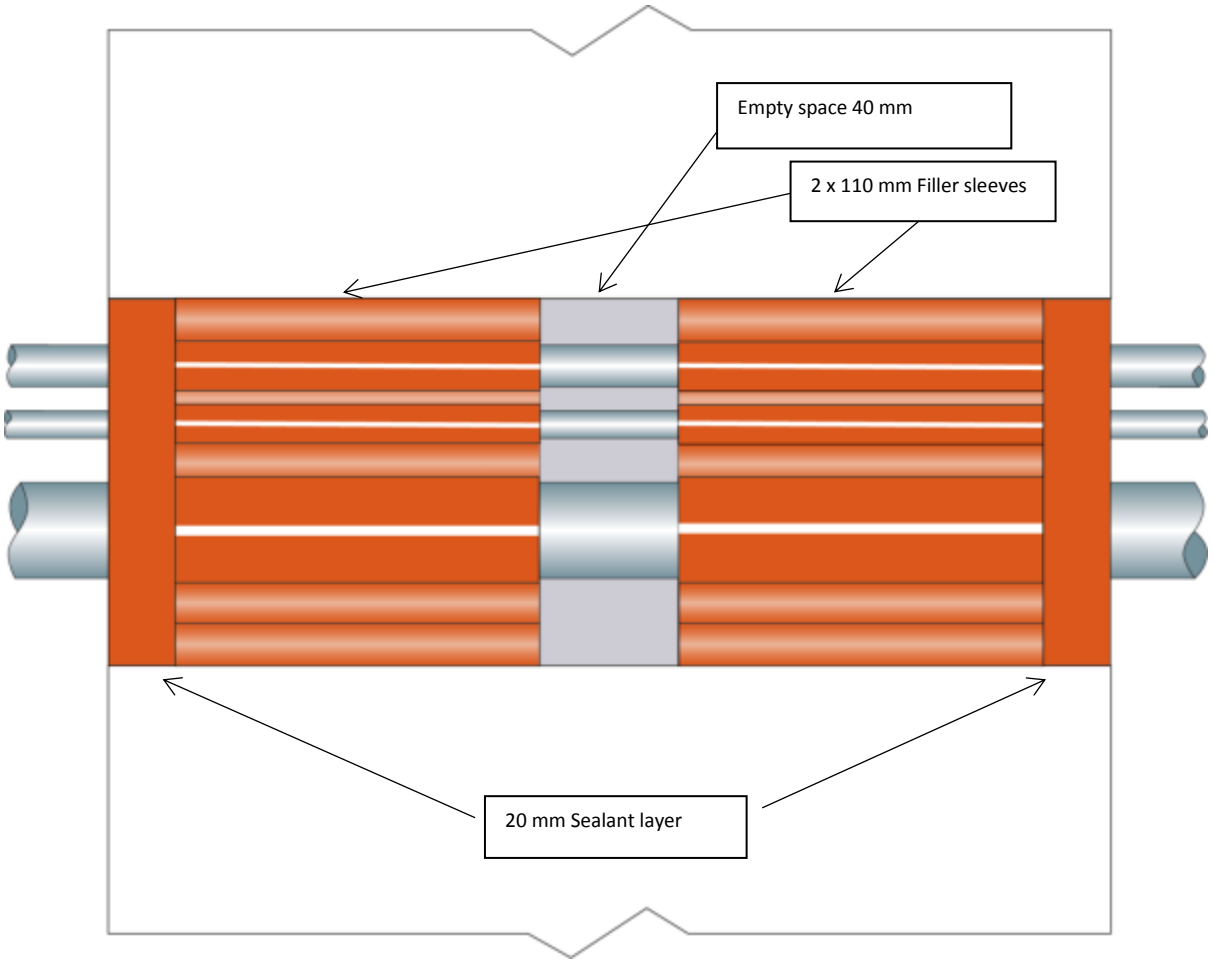


Figure 13. Principle of NOFIRNO sealing system with cable penetrations in vertical walls with thickness of minimum 260 mm. In the centre of the penetration an empty space may be present. The figure shows as an example a cable penetration in a 300 mm wall.

D 4. Rigid concrete, aerated concrete or masonry horizontal floor, minimum dry density 600 kg/m^3, minimum thickness 150 mm

Services for cable groups	Maximum aperture	Classification EN 13501-2: 2007+A1:2009 E= integrity I = insulation		
Blank (no services)	400 x 200 mm [5]	EI 240 E 240		
Blank (no services)	1200 x 300 mm [1]	EI 120 E 120		
Telecommunication cable group Up to Ø21 mm [2]		EI 120 E 120		
Sheathed cable groups Up to Ø21 mm		EI 120 E 120		
Sheathed cable groups Up to Ø50 mm		EI 90 E 120		
Sheathed cable groups Up to Ø80 mm		EI 90 E 120		
Single cable for Telecommunication Data cable		Ø5 [4] mm EI 120 E 120	Ø17 mm EI 120 E 120	Ø26 mm EI 120 E 120
Single cable sheathed Types A1, A2, A3, B, C2, E [3]		EI 120 E 120		
Single cable sheathed Type C1 [3]		EI 90 E 120		
Single cable sheathed Type C3 [3]		EI 120 E 120		
Single cable sheathed Types D1, D3 [3]	1200 x 300 mm [1]	EI 120 E 120		
Single cable sheathed Types D1, D3 [3]	400 x 200 mm [5]	EI 120 E 240		
Single cable sheathed Types D2 [3]	1200 x 300 mm [1]	EI 120 E 120		
Single cable sheathed Types D2 [3]	400 x 200 mm [5]	EI 180 E 240		

[1] The cable penetration seals may be applied in an aperture of 1200 x 300 mm or smaller provided that the total amount of cross sections of the cables does not exceed 60 % of the penetration area. It is allowed to apply any length of the seal as long as the perimeter length to seal area ratio is not smaller than 8,3 m^{-1}.

[2] The telecommunication cables up to Ø21 mm may be bundled to a maximum diameter of Ø100 mm, provided that only one telecommunication cable is placed per cable insert sleeve.

[3] Types according to Table A1 of EN 1366-3:2009.

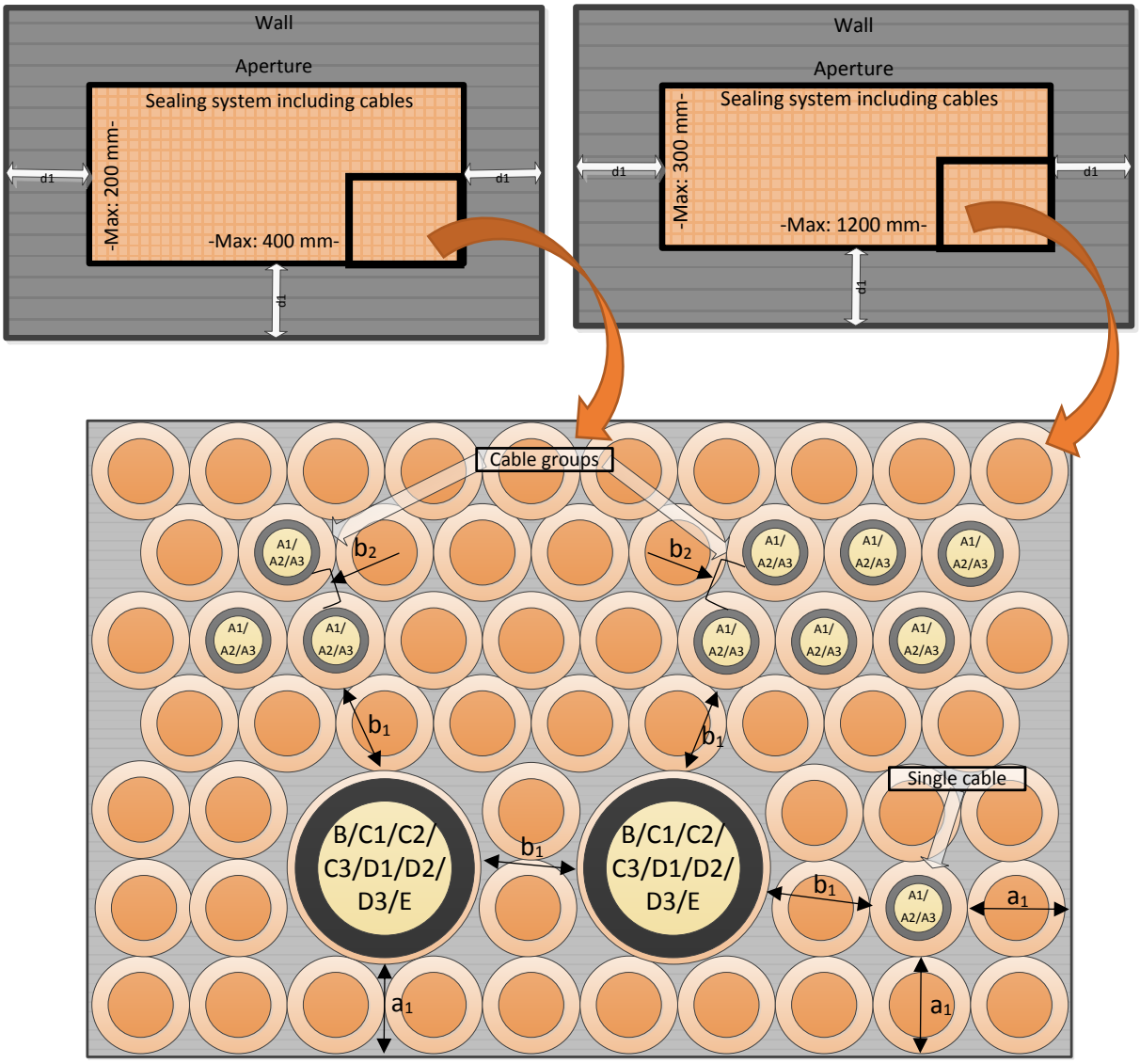
[4] Multiple telecommunication data cables Ø5 mm may be placed in one filler sleeve.

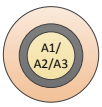
[5] The cable penetration seals may be applied in an aperture of 400 x 200 mm or smaller provided that the total amount of cross sections of the cables does not exceed 60 % of the penetration area. Size increase of the seal is allowed up to 25 % in length or 25 % in width providing the total area is not increased by more than 25 %.

General conditions applicable for cable penetrations of table D 4

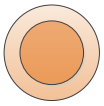
For all services the aperture has to be completely filled, a combination of NOFIRNO sleeves adjusted to minimum 110 mm length in total and two 20 mm layers of NOFIRNO sealant. In all cases no insulation is applied. The classifications are valid from below for cable penetrations seals in a horizontal floor and cables passing through perpendicular to the floor. A distance d1 of minimum 200 mm from the edges of the aperture shall be taken into account to a different wall, floor or transfer to another type of wall. Multiple sheathed and telecommunication cables are allowed per seal in any number or combination. The minimum distance a1 from the cable to the aperture edge is 25 mm. Placing the cables in a filler sleeve or cable insert sleeve is mandatory; only one cable per filler sleeve and/or cable sleeve is allowed. When placed in a filler sleeve the distance b2 between the cables shall be minimum 8 mm. When placed in a cable insert sleeve placing of a filler sleeve between the cable insert sleeves is mandatory and the distance b1 between the cables shall be minimum 30 mm. The maximum distance to the first support of the cables is 400 mm above the floor from the position were the cable emerges from the penetration seal.

Figure 14 and related table. Principle for floors, thickness minimum 150 mm.

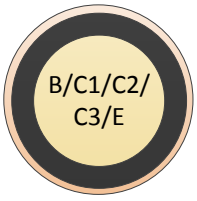




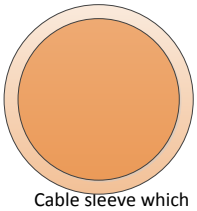
Cable which belongs to group A1/A2/A3



Filler sleeve



Cable which belongs to group B/C1/C2/C3/ D1/D2/D3/E



Cable sleeve which belongs to group B/ C1/C2/C3/D1/D2/D3/ E

ID	Description	Length [mm]
a_1	Distance from cable to aperture edge	≥ 25
b_1	Distance from cable (in group B/C1/C2/C3) to cable (in group A1/A2/A3/B/C1/C2/C3) within an aperture	≥ 30
b_2	Distance from cable (in group A1/A2/A3/) to cable (in group A1/A2/A3/) within an aperture	≥ 8
c_1	Distance between two apertures	≥ 200
d_1	Distance from aperture to a different wall, floor or transfer to another type of wall	≥ 200
Cables, according to EN 1366-3 Table A.1		
A1/A2/A3	In a filler sleeve	
B/C1/C2/C3/ D1/D2/D3/E	In a cable sleeve dimensions depending on the cable itself	

D 5. Rigid concrete, aerated concrete or masonry horizontal floor, minimum dry density 600 kg/m^3, minimum thickness 200 mm

Services for cable groups	Maximum aperture L x W	Classification EN 13501-2: 2007+A1:2009 E= integrity I = insulation		
Blank (no services)	L x 300 mm [6] or 600 x 600 mm [1]	EI 240 E 240		
Blank (no services)	1200 x 300 mm [1]	EI 120 E 120		
Sheathed cable groups Up to Ø21 mm		EI 120 E 120		
Sheathed cable groups Up to Ø50 mm		EI 90 E 120		
Telecommunication cable group Up to Ø21 mm [2]		EI 120 E 120		
Sheathed cable groups Up to Ø80 mm		EI 90 E 120		
Single cable for Telecommunication Data cable		Ø5 [4] mm EI 120 E 120	Ø17 mm EI 120 E 120	Ø26 mm EI 120 E 120
Single cable sheathed Types A1, A2, A3, B, C2, E [3]		EI 120 E 120		
Single cable sheathed Type C1 [3]		EI 90 E 120		
Single cable sheathed Type C3 [3]		EI 120 E 120		
Single cable sheathed Types D1 [3]	1200 x 300 mm [1]	EI 120 E 120		
Single cable sheathed Types D1 [3]	400 x 200 mm [5]	EI 120 E 240		
Single cable sheathed Types D2, D3 [3]	1200 x 300 mm [1]	EI 120 E 120		
Single cable sheathed Types D2, D3 [3]	400 x 200 mm [5]	EI 180 E 240		

[1] The cable penetration seals may be applied in an aperture of 1200 x 300 mm or smaller provided that the total amount of cross sections of the cables does not exceed 60 % of the penetration area. It is allowed to apply any length of the seal as long as the perimeter length to seal area ratio is not smaller than 8,3 m-1.

[2] The telecommunication cables up to Ø21 mm may be bundled to a maximum diameter of Ø100 mm, provided that only one telecommunication cable is placed per cable insert sleeve.

[3] Types according to Table A1 of EN 1366-3:2009.

[4] Multiple telecommunication data cables Ø5 mm may be placed in one filler sleeve.

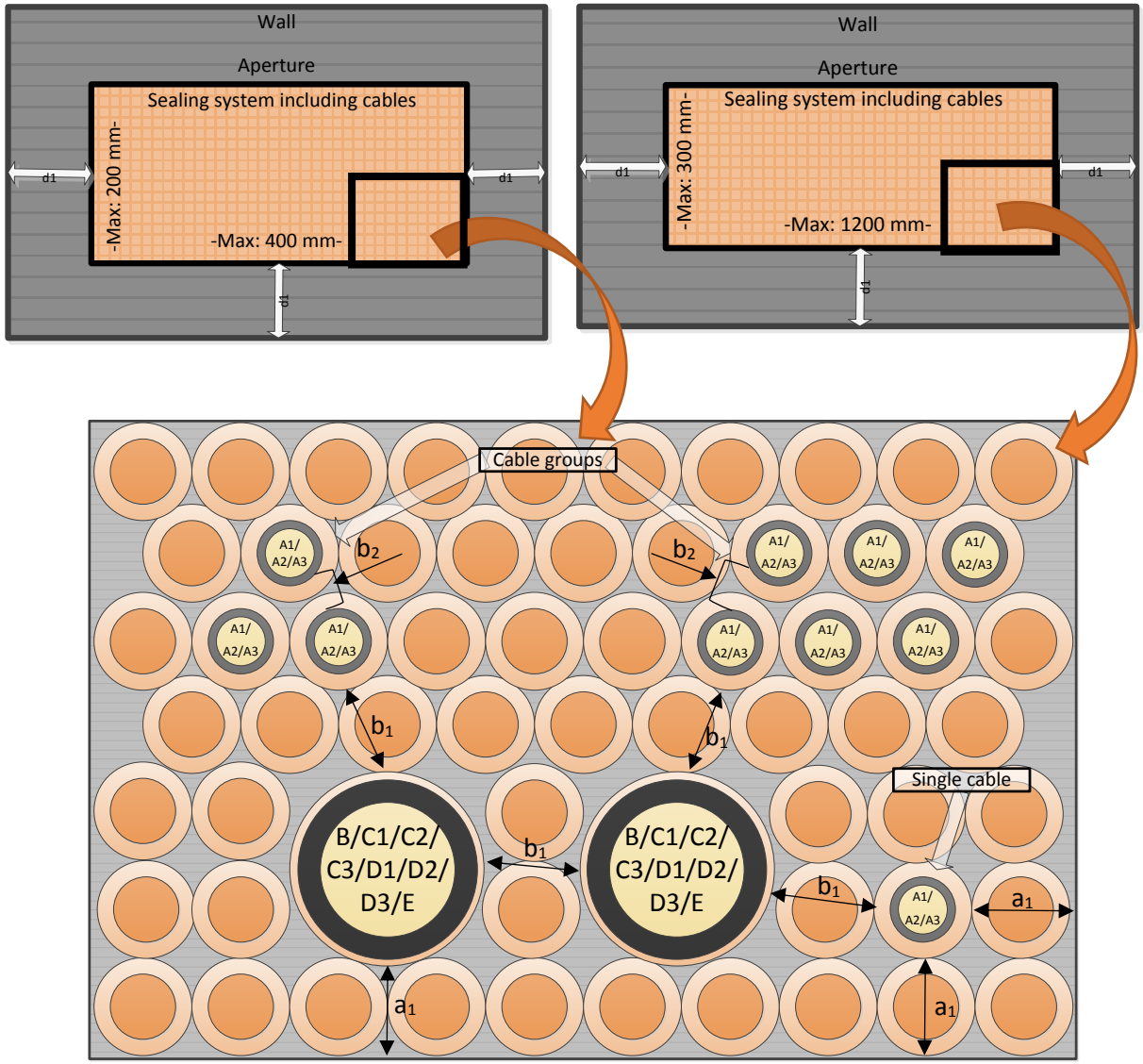
[5] The cable penetration seals may be applied in an aperture of 400 x 200 mm or smaller provided that the total amount of cross sections of the cables does not exceed 60 % of the penetration area. Size increase of the seal is allowed up to 25 % in length or 25 % in width providing the total area is not increased by more than 25 %.

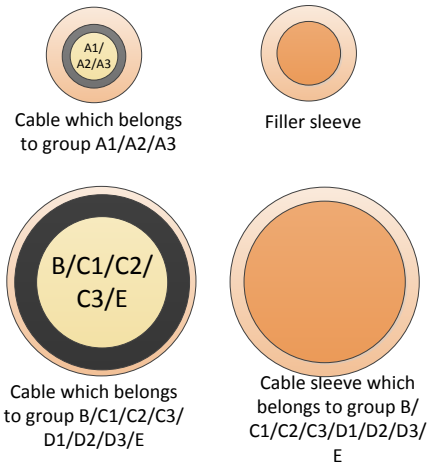
[6] No limit to length L.

General conditions applicable for cable penetrations of table D 5

For all services the aperture has to be completely filled, a combination of NOFIRNO sleeves adjusted to minimum 160 mm length in total and two 20 mm layers of NOFIRNO sealant. Up to a wall thickness of 260 mm the complete penetration shall be filled with sleeves. From a minimum wall thickness of 260 mm an empty space is allowed in the middle of the penetration as indicated in figure 10. At a wall thickness of 260 mm the empty space is 0 mm, at a wall thickness of 260 + x mm the empty space is x mm. In all cases no insulation is applied. The classifications are valid from below for cable penetrations seals in a horizontal floor and cables passing through perpendicular to the floor. A distance d1 of minimum 200 mm from the edges of the aperture shall be taken into account to a different wall, floor or transfer to another type of wall. Multiple sheathed and telecommunication cables are allowed per seal in any number or combination. The minimum distance a1 from the cable to the aperture edge is 25 mm. Placing the cables in a filler sleeve or cable insert sleeve is mandatory; only one cable per filler sleeve and/or cable sleeve is allowed. When placed in a filler sleeve the distance b2 between the cables shall be minimum 8 mm. When placed in a cable insert sleeve placing of a filler sleeve between the cable insert sleeves is mandatory and the distance b1 between the cables shall be minimum 30 mm. The maximum distance to the first support of the cables is 400 mm above the floor from the position were the cable emerges from the penetration seal.

Figure 15 and related table. Principle for floors, thickness minimum 200 mm.





ID	Description	Length [mm]
a_1	Distance from cable to aperture edge	≥ 25
b_1	Distance from cable (in group B/C1/C2/C3) to cable (in group A1/A2/A3/B/C1/C2/C3) within an aperture	≥ 30
b_2	Distance from cable (in group A1/A2/A3/) to cable (in group A1/A2/A3/) within an aperture	≥ 8
c_1	Distance between two apertures	≥ 200
d_1	Distance from aperture to a different wall, floor or transfer to another type of wall	≥ 200
Cables, according to EN 1366-3 Table A.1		
A1/A2/A3	In a filler sleeve	
B/C1/C2/C3/ D1/D2/D3/E	In a cable sleeve dimensions depending on the cable itself	