DOCUMENTATION

SPFR AA-050

With reference to the national code of building regulations of 27 June 2008 with the Norwegian building regulations of 1 July 2010 and belonging guidance, we document, on the basis of test certificates, evaluations and installation instructions, that this product meets the requirements of the Norwegian authorities as to the fire related qualities.

Building material: **FIRESAFE GPG MORTAR**
(The product is also marketed by GLAVA AS under the trade name GLAVA GPG Mortar)

Product responsible: **Firesafe as**
Box 6411 Etterstad, 0605 Oslo, Norway

The documentation is conditional on that the product is in accordance with the specifications given in the appendix and that the product is applied and used in accordance with regulations and all important details in this process follow precisely what is described in an installation manual, which is checked by SP Fire Research AS. Both the installation manual and the SP Fire Research AS Documentation shall follow the product or be available for the purchaser, user, inspector and the local authority. This document contains 22 pages.

The product shall be labelled with **SPFR AA-050**, trade name, product responsible and/or manufacturer together with a reference to the production for traceability. The labelling shall have good visibility.

Detailed product design and installation details are described in "Standard construction details for **FIRESAFE GPG MORTAR** linked to Documentation **SPFR AA-050**. The version of this document, filed at SP Fire Research AS, is a formal part of the approval.

The product must have one annual, external inspection related to the internal system for quality control. The inspection is adjusted to the type of product and other existing inspection arrangements. Details specified in a written agreement with SP Fire Research AS.

First issued: **1999-01-12.** A renewal will be based on a written application. Termination by the applicant shall be asked for in writing and with 6 months notice. SP Fire Research AS may withdraw this documentation when irregularities or misuse happens and written instructions are not respected.

Issued: 2015-03-26
Valid until: 2020-04-01

Are W. Brandt
Department Manager

Jan P. Stensaas
Project Manager Documentation

This document is an English version of the Norwegian documentation SPFR AA-050 dated 2015-03-26.

SP Fire Research AS

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Appendix 1 to Documentation SPFR AA-050 of 2015-03-26.

1. Owner of the Documentation

Firesafe as
Box 6411 Etterstad,
0605 Oslo, Norway
www.firesafe.no

2. Manufacturer

Firesafe AS, Norway.

3. Product Description

FIRESAFE GPG MORTAR (from now on abbreviated to GPG) is a powder which consists of gypsum, perlite and glass fibre. By addition of water a mortar is formed, which cures in a short time to a strong and fire resistant material. GPG is available in bags of 25 or 15 litres, and plastic buckets of 20, 10 or 5 litres.

4. Fields of Application

GPG sealant is used as a fire sealant for penetrations of cables, pipes (steel, copper, aluminium, plastic and composite pipes (Climatherm)) as well as cable conduits, joints and blank penetration seals in flexible and concrete walls and concrete floor, as well as floor drains in concrete floor.

5. Properties

Page 3 to 20 in the documentation shows the fire resistance class to the following penetration seals sealed with GPG:

The information in many of the tables is retrieved from tests with mixed penetration of cables, with or without cable ladder/rack, as well as metallic and plastic pipes.

FIRESAFE GPG MORTAR can be used in walls/ floors with a requirement for fire resistance class "EI" in TEK 10, which is met through accepted methods of use for this product.

Fig.1
Example of application of FIRESAFE GPG MORTAR.

6. Special Conditions for Use and Installation

GPG sealant shall be used according to installation details shown in "Standard Construction Details for the product" linked to SP Fire Research AS documentation SPFR AA-050 (Firesafe's user guide).

The cross-section area of multiple penetration objects must not exceed 60 % of the total area of the aperture.

7. Basis for the Documentation

Our documentation is based on the properties documented in the listed test and classification reports from PAVUS a.s. (Czech Republic):

Test reports according to NS-EN 1366-3:2009:

- Pr-12-2.150-En. dated 2013.03.07.
- Pr-12-2.149-En. dated 2013.03.07.
- Pr-12-2.148-En. dated 2013.03.08.
- Pr-12-2.147-En. dated 2013.03.07.
- Pr-13-2.144-En. dated 2014.03.05.
- Pr-13-2.143-En. dated 2014.03.05.
- Pr-14-2.085-En. dated 2014.09.11
- Pr-14-2.084-En. dated 2014.08.01.

Test report according to NS-EN 1366-3:2009 and NS-EN 1366-4:2006 +A1:2010:

- Pr-14-2.083-En. dated 2014.08.01.

Classification reports according to 13501-2:2007 + A1:2009:

- PK2-11-13-002-A-0 dated 2013.10.20
- PK2-11-13-003-A-0 dated 2013.10.21
- PK2-11-13-004-A-0 dated 2013.10.28
- PK2-11-13-005-A-1 dated 2014.07.04
- PK2-11-13-006-A-0 dated 2013.10.30
- PK2-12-14-001-E-0 dated 2014.09.19
- PK2-11-14-002-E-0 dated 2014.06.25
- PK2-11-14-003-E-0 dated 2014.06.25
- PK2-11-14-006-E-0 dated 2014.09.19
- PK2-11-14-007-E-0 dated 2014.09.19
- PK2-11-14-008-E-0 dated 2014.09.30

SP Fire Research AS Evaluation report according to NS 3919 no.:

- SPFR Evaluation Report 50100-03 2.ed. dated 2015.03.09.

8. Validity

The validity of this appendix is uniquely linked to page 1 of this document with the requirements, conditions and the time information presented there.

9. Technical Management

Project manager for this approval is Jan P. Stensaas, Discipline Manager Documentation,
SP Fire Research AS, Trondheim, Norway

Abbreviations

In the subsequent tables there are some abbreviations, which are defined below.

Pipe insulation, distribution (ref. NS-EN 1366-3: 2009, Table 1):

CS: Continued and Sustained. The insulation is continuous through the entire length of the pipe including the penetration.

LS: Local and Sustained. The insulation is continuous through the penetration, but it is interrupted a given distance from the wall on both sides of the wall.

LI: Local and Interrupted. Pipe Insulation is interrupted in the penetration and at a given distance from the wall on both sides.

Pipe end configuration in test (ref. NS-EN 1366-3: 2009, Table 2):

U/C: Uncapped/Capped, i.e. non-ventilated pipe systems, e.g. cold and hot water pipes.

U/U: Uncapped/Uncapped, i.e. open, ventilated pipe systems, e.g. waste water and rain water pipes.

C/C: Capped/Capped, i.e. non-ventilated pipe systems with permanent water pressure, e.g. sprinkle pipes.

C/U: Capped/Uncapped, i.e. supported by fire rated suspension system.

See page 20 for suggested pipe end configurations for different uses.

Fire protection products:

FS Wrap LX Firesafe Wrap LX Thickness per layer 2,5 mm, width 50 mm, installed on exposed side of pipe. Corresponds to GLAVA Wrap on Roll

FS-EX: Intumescent joint-filler around cable bundle on both sides of the wall/floor.
Width 15 mm x depth 20 mm.

Intumex L: Thickness per layer 2.5 mm, width 50 mm or 100 mm. Used in cable conduits.

GPG: FIRESAFE GPG MORTAR

TEK10: The Norwegian building regulations of 2010.07.01.

I. CABLE PENETRATION SEALS (Table I.1 – I.13)

CONCRETE FLOOR ≥ 150 mm:

Table I.1
Fire resistance class E 120/EI 120.
Large cable penetration seals ≤ 700 x 700 mm. Includes cables with all types of conductor material and cable insulation.

Cable group	Diameter (d) (mm)	Cable ladder or cable tray	Thickness of GPG (mm)	Additional protection, both sides
Small cables (A, B)	d ≤ 21	With and without	GPG 200 flush with the underside of the floor	-
Medium cables (C, E)	d ≤ 50			-
Large cables (D)	d ≤ 80			-
Cable bundle (small cables)	d ≤ 100			FS-EX
Cable bundle (F) Telecom.	d ≤ 100			FS-EX
Cable (G) uninsulated	d ≤ 24			-

Table I.2
Fire resistance class E 120/EI 120.
Small cable penetration seals ≤ 270 x 270 mm, Ø300 mm. Includes cables with all types of conductor material and cable insulation.

Cable group/ bundle	Diameter (d) (mm)	Cable ladder or cable tray	Thickness of GPG (mm)	Additional protection, both sides
Cable types (A,B,E,G)	d ≤ 50	Without	GPG 200 flush with the underside of the floor	
Cable types (C,D,F) bundles	d ≤ 195			FS-EX

Table I.3
Fire resistance class E 120/EI 120.
Small cable penetration seals ≤ 270 x 270 mm, Ø300 mm. (Rock wool 150 kg/m^3). Includes cables with all types of conductor material and cable insulation.

Cable group/ cable bundles	Diameter (d) (mm)	Cable ladder or cable tray	Thickness of GPG (mm)	Backing: Type, density, thickness (mm)
Cable bundle (small cables)	d ≤ 60	Without	GPG 100 flush with the top of the floor	Rock wool 150 kg/m^3, 50

Table I.4.
Fire resistance class E 120/EI 90.
Large cable penetration seals ≤ 700 x 700 mm. Includes cables with all types of conductor material and cable insulation.

Cable group	Diameter (d)	Cable ladder or cable tray	Thickness of GPG (mm)	Additional protection, both sides
Small cables (A, B)	d ≤ 21	Without	GPG 150 flush with the top of the floor	-
Medium cables (C, E)	d ≤ 50			-
Large cables (D)	d ≤ 80			-
Cable bundle (small cables)	d ≤ 100			FS-EX
Cable bundle (F) Telecom.	d ≤ 100			FS-EX
Cable (G) uninsulated	d ≤ 24			-

Table I.5
Fire resistance class E 120/EI 120.
Large cable penetration seals ≤ 600 x 600 mm.
Aluminium cables, Type AXQJ 0,6/1 kV. Insulation XLPE. Outer sheath PVC.

Cable group	Diameter (d) (mm)	Cable ladder or cable tray	Thickness of GPG (mm)	Backing: Type, density, thickness (mm)
All cables	28 ≤ d ≤ 50	Without	GPG 100 flush with the top of the floor	Rock wool 150 kg /m^3, 50

Table: I.6
Fire resistance class E 90/EI 90.
Large cable penetration seals ≤ 1800 x 900 mm.
Aluminium cables, Type AXQJ 0,6/1 kV. Insulation XLPE. Outer sheath PVC

Cable group	Diameter (d) (mm)	Cable ladder or cable tray	Thickness of GPG (mm)	Backing: Type, density, thickness (mm)
All cables	28 ≤ d ≤ 50	With	GPG 100 flush with the top of the floor	Rock wool 150 kg/m^3, 50

CONCRETE WALL ≥ 100 mm:

Table I.7
Fire resistance class E 90/EI 90.
Small cable penetration seals ≤ 270 x 270 mm, Ø300 mm. Includes cables with all types of conductor material and cable insulation.

Cable group	Diameter (d) (mm)	Cable ladder or cable tray	Thickness of GPG (mm)	Additional protection, both sides
Medium cables (C,E)	d ≤ 50	Without	GPG 100	FS-EX
Large cables (D)	d ≤ 80			

Table I.8
Fire resistance class E 90/EI 60.
Large cable penetration seals ≤ 700 x 700 mm. Includes cables with all types of conductor material and cable insulation.

Cable group	Diameter (d) (mm)	Cable ladder or cable tray (mm)	Thickness of GPG (mm)	Additional protection, both sides
Small cables (A, B)	d ≤ 21	With and without	GPG 100	-
Medium cables (C, E)	d ≤ 50			-
Large cables (D)	d ≤ 80			-
Cable bundle (small cables)	d ≤ 100			FS-EX
Cable bundle (F) Tele –Com.	d ≤ 100			FS-EX
Cable ((G) uninsulated	d ≤ 24			-
Medium cables (E)	d ≤ 50	Without	GPG 60	-

Table I.9
Fire resistance class E 90/EI 30.
Large cable penetration seals ≤ 700 x 700 mm (Rock wool 100 kg/m^3). Includes cables with all types of conductor material and cable insulation.

Cable group	Diameter (d) (mm)	Cable ladder or cable tray	Thickness of GPG (mm)	Backing: Type, density, thickness (mm)	Additional protection, both sides
Small cables (A, B)	d ≤ 21	Without	GPG 50	Rock wool 100 kg/m^3, 50	-
Medium cables (C, E)	d ≤ 50				-
Large cables (D)	d ≤ 80				-
Cable bundle (small cables)	d ≤ 100				FS-EX
Cable bundle (F) Tele -Com	d ≤ 100				FS-EX
Cable (G) uninsulated	d ≤ 24				-
Small cables (A, B)	d ≤ 21		GPG 60	-	-
Cable (G) uninsulated	d ≤ 24				-

FLEXIBLE AND CONCRETE WALL ≥ 100 mm:

Table I.10
Fire resistance class E 120/EI 120.
Small cable penetration seals ≤ 265 x 265 mm, Ø300 mm. Includes cables with all types of conductor material and cable insulation

Cable group	Diameter (d) (mm)	Cable ladder or cable tray	Thickness of GPG (mm)	Additional protection, both sides
Small cables (A, B)	d ≤ 21	Without	GPG 100 + 50 + 50 (50 mm casting on both sides)	-
Medium cables (C, E)	d ≤ 50			FS-EX
Large cables (D)	d ≤ 80			FS-EX
Cable bundle (small cables)	d ≤ 100			FS-EX
Cable bundle (F) Tele –Com.	d ≤ 100			FS-EX
Cable (G) uninsulated	d ≤ 24			-

Table I.11
Fire resistance class E 120/EI 90.
Large cable penetration seals ≤ 700 x 700 mm. Includes cables with all types of conductor material and cable insulation.

Cable group	Diameter (d) (mm)	Cable ladder or cable tray	Thickness of GPG (mm)	Additional protection, both sides
Small cables (A, B)	d ≤ 21	With and without	GPG 100 + 50 + 50 (50 mm casting on both sides)	-
Medium cables (C, E)	d ≤ 50			-
Large cables (D)	d ≤ 80			-
Cable bundle (small cables)	d ≤ 100			FS-EX
Cable bundle (F) Tele -Com	d ≤ 100			FS-EX
Cable (G) uninsulated	d ≤ 24			-

Table I.12
Fire resistance class E 120/EI 60.
Large cable penetration seals ≤ 700 x 700 mm. Includes cables with all types of conductor material and cable insulation.

Cable group	Diameter (d) (mm)	Cable ladder or cable tray	Thickness of GPG (mm)	Additional protection, both sides
Small cables (A, B)	d ≤ 21	Without	GPG 100	-
Medium cables (C, E)	d ≤ 50			-
Large cables (D)	d ≤ 80			-
Cable bundle (small cables)	d ≤ 100			FS-EX
Cable bundle (F) Tele – Com.	d ≤ 100			FS-EX
Cable (G) uninsulated	d ≤ 24			-

Table I.13
Fire resistance class E 90/EI 60.
Aperture ≤ 1200 x 1200 mm
Aluminium cables, Type AXQJ 0,6/1 kV. Insulation XLPE. Outer sheath PVC

Cable group	Diameter (d) (mm)	Cable ladder or cable tray	Thickness of GPG (mm)	Backing: Type, density, thickness (mm)
Cables of aluminium	28 ≤ d ≤ 50	With and Without	GPG 40 on both sides	Rock wool 150 kg/m^3, 20 in the middle.

II. PIPE PENETRATIONS (Steel, copper, aluminium, plastic and composite pipes - Table II.1 – II.18)

CONCRETE FLOOR ≥ 150 mm.:

Table II.1
Fire resistance class E 120/EI 120.
Large pipe penetrations ≤ 1800 x 900 mm.

Pipe insulation: Type, density	Pipe insulation: Thickness, length (mm), distribution	Thickness of GPG flush with the upper side of floor (mm)	Backing: Type, density, thickness (mm)	Additional protection
Steel pipe: Diameter(D): 40 ≤ D ≤ 168.3 mm, Wall thickness (t): 2.0 ≤ t ≤ 14.2 mm. U/C				
Rock wool 100 kg/m^3	40, Fully insulated, CS	GPG 100	Rock wool 150 kg/m^3, 50	
Copper pipe and steel pipe: Diameter (D): 15 ≤ D ≤ 76 mm, Wall thickness (t): 1.0 ≤ t ≤ 14.2 mm				
Cellular rubber	12, Fully insulated, CS	Rock wool 150 kg/m^3, 50	GPG 100	1 lag FS Wrap LX*
Aluminium pipe PE-X: Diameter (D): 16 ≤ D ≤ 63 mm, Wall thickness (t): 2.25 ≤ t ≤ 4.5 mm. U/C				
Cellular rubber	12, Fully insulated, CS	GPG 100	Rock wool 150 kg/m^3, 50	1 lag FS Wrap LX*
Climatherm-faser OT SDR 11 pipe: Diameter =20 mm, Wall thickness t= 2.8 mm				
Uninsulated		GPG 100	Rock wool 150 kg/m^3, 50	2 lag FS Wrap LX*
Climatherm-faser OT SDR 11: Diameter (D): 20 < D ≤ 63 mm, Wall thickness (t): 2.8 ≤ t ≤ 5.8 mm. U/C				
Uninsulated		GPG 100	Rock wool 150 kg/m^3, 50	3 lag FS Wrap LX*
PEX plastic water pipe 2 x ≤ 32 mm. C/C				
Uninsulated		GPG 100		-
Electro conduit of plastic 2 x ≤ 32 mm. C/C				
Uninsulated		GPG 100		-

* Corresponds to GLAVA Wrap on Roll.

FS Wrap LX shall be installed on the pipe on the underside of the floor in the GPG sealant downward the rock wool.

Table: II.2
Brannklasse E 90/EI 90. Large pipe penetrations ≤ 1800 x 900 mm.

Type of plastic	Diameter / Wall thickness (mm)	Thickness of GPG (mm)	Backing: Type, density, thickness (mm)	Additional protection
Wavin Asto	Ø110 / 4.8	GPG 100 flush with the upper side of floor	Rock wool 150 kg/m^3, 50	6 layers of FS Wrap LX*, U/U
PE	Ø50 / 2			3 layers of FS Wrap, LX* U/U
PP	Ø160 / 5.5			6 layers of FS Wrap LX*, U/U
PP	Ø50 / 2			3 layers of FS Wrap LX*, U/U
PP Blue Power	Ø110 / 5			6 layers of FS Wrap LX*, U/U
PP Blue Power	Ø75 / 2.3			3 layers of FS Wrap LX*, U/U
PP Blue Power	Ø50 / 1.8			2 layers of FS Wrap LX*, U/U
PP Pipelife stilla	Ø160 / 5.4			4 layers of FS Wrap LX*, U/C
PP Pipelife stilla	Ø75 / 2.6			3 layers of FS Wrap LX*, U/C
PP Pipelife stilla	Ø50 / 1.8			2 layers of FS Wrap LX*, U/C

* Corresponds to GLAVA Wrap on Roll.

FS Wrap LX shall be installed on the pipe on the underside of the floor in the GPG sealant downward the rock wool.

Table II.3
Fire resistance class E 120/EI 120.
Large pipe penetrations ≤ 1000 x 1000 mm.

Pipe insulation: Type, density	Pipe insulation: thickness, length (mm), Distribution	Thickness of GPG (mm) flush with the upper side of floor	Backing: Type, density, thickness (mm)
Steel pipe*: Diameter (D): 40 ≤ D ≤ 42 mm, Wall thickness (t): 2.6 ≤ t ≤ 14.2 mm. U/C*			
Rock wool 85 kg/m^3	20, 1150, LS	GPG 50	Rock wool 150 kg/m^3, 50
ULTIMATE 80 kg/m^3	20, 1150, LS	GPG 50	Rock wool 150 kg/m^3, 50
Steel pipe*: Diameter (D): 42 ≤ D ≤ 219 mm, Wall thickness (t): 2.6 ≤ t ≤ 14.2 mm. U/C*			
Rock wool 85 kg/m^3	30, 1150, LS	GPG 50	Rock wool 150 kg/m^3, 50
ULTIMATE 80 kg/m^3	30, 1150, LS	GPG 50	Rock wool 150 kg/m^3, 50

Table II.4
Fire resistance class E 120/EI 120.
Penetration of single pipe.

Pipe insulation: Type, density	Pipe insulation: Thickness, length (mm), Distribution	Thickness of GPG (mm) flush with the upper side of floor	Backing: Type, density, thickness (mm)
Steel pipe: Diameter(D): 40 ≤ D ≤ 42 mm, Wall thickness (t): 2.6 ≤ t ≤ 14.2 mm. U/C			
Rock wool 85 kg/m^3	20, 550, LS	GPG 50	Rock wool 40 kg/m^3, 50
ULTIMATE 80 kg/m^3	20, 550, LS	GPG 50	Rock wool 40 kg/m^3, 60
Glass wool 75 kg/m^3	40, 600, LI	GPG 50	Rock wool 40 kg/m^3, 100
Steel pipe: Diameter(D): 42 ≤ D ≤ 168.3 mm, Wall thickness (t): 4.5 ≤ t ≤ 14.2 mm. U/C			
Rock wool 85 kg/m^3	30, 550, LS	GPG 50	Rock wool 40 kg/m^3, 50
ULTIMATE 80 kg/m^3	30, 550, LS	GPG 50	Rock wool 40 kg/m^3, 60

Table II.5
Fire resistance class E 120/EI 90.
Penetration of single pipe.

Pipe insulation: Type, density	Pipe insulation: Thickness, length (mm), Distribution	Thickness of GPG (mm) flush with the upper side of floor	Backing: Type, density, thickness (mm)
Steel pipe: Diameter(D): 42 ≤ D ≤ 168.3 mm, Wall thickness (t): 4.5 ≤ t ≤ 14.2 mm. U/C			
Glass wool 75 kg/m^3	50, 600, LI	GPG 50	Rock wool 40 kg/m^3, 100
Steel pipe: Diameter D = 48 mm. Wall thickness 2.6 mm. C/C			
Uninsulated		GPG 100	Rock wool 150 kg/m^3, 50

CONCRETE WALL ≥ 100 mm:

Table II.6
Fire resistance class E 120/EI 120.
Large pipe penetrations ≤ 1000 x 1000 mm.

Pipe insulation: Type, density	Pipe insulation: Thickness, length (mm), Distribution	Thickness of GPG (mm)	Backing: Type, density, thickness (mm)
Steel pipe: Diameter(D): 40 ≤ D ≤ 42 mm, Wall thickness (t): 2.6 ≤ t ≤ 14.2 mm. U/C			
Rock wool 85 kg/m^3	20, 1150, LS	GPG 50	Rock wool 150 kg/m^3, 50

Table II.7
Fire resistance class E 120/EI 120.
Penetration of single pipe.

Pipe insulation: Type, density	Pipe insulation: Thickness, length (mm), Distribution	Thickness of GPG (mm)	Backing: Type, density, thickness (mm)
Steel pipe: Diameter(D): 40 ≤ D ≤ 42 mm, Wall thickness (t): 2.6 ≤ t ≤ 14.2 mm. U/C			
Rock wool 85 kg/m^3	20, 550, LS	GPG 50	Rock wool 60 kg/m^3, 50
Glass wool 75 kg/m^3	40, 600, LI	GPG 50	Rock wool 60 kg/m^3, 50
Steel pipe: Diameter(D): 42 ≥ D ≤ 168,3 mm, Wall thickness (t): 4.5 ≤ t ≤ 14.2 mm. U/C			
Rock wool 85 kg/m^3	30, 1150, LS	GPG 50	Rock wool 60 kg/m^3, 50

Table II.8
Fire resistance class E 120/EI 90.
Large pipe penetrations ≤ 1000 x 1000 mm.

Pipe insulation: Type, density	Pipe insulation: Thickness, length (mm), Distribution	Thickness of GPG (mm)	Backing: Type, density, thickness (mm)
Steel pipe: Diameter(D): 42 ≤ D ≤ 219 mm, Wall thickness (t): 3.2 ≤ t ≤ 14.2 mm. U/C			
Rock wool 85 kg/m^3	30, 1150, LS	GPG 50	Rock wool 150 kg/m^3, 50

Table II.9
Fire resistance class E 120/EI 90.
Penetration of single pipe.

Pipe insulation: Type, density	Pipe insulation: Thickness, length (mm), Distribution	Thickness of GPG(mm)	Backing: Type, density, thickness (mm)
Steel pipe: Diameter(D): 42 ≤ D ≤ 168.3 mm, Wall thickness (t): 4.5 ≤ t ≤ 14.2 mm. U/C			
Rock wool 85 kg/m^3	30, 550, LS	GPG 50	Rock wool 60 kg/m^3, 50

Table II.10
Fire resistance class E 120/EI 60.
Penetration of single pipe.

Pipe insulation: Type, density	Pipe insulation: Thickness, length (mm), Distribution	Thickness of GPG (mm)	Backing: Type, density, thickness (mm)
Steel pipe: Diameter(D): 42 ≤ D ≤ 168,3 mm, Wall thickness (t): 4.5 ≤ t ≤ 14.2 mm. U/C			
Glass wool 75 kg/m^3	50, 600, LI	GPG 50	Rock wool 60 kg/m^3, 50

Table II.11
Fire resistance class E 120/EI 30.
Penetration of single pipe.

Pipe insulation: Type, density	Pipe insulation: Thickness, length (mm), Distribution	Thickness of GPG (mm)	Backing: Type, density, thickness (mm)
Steel pipe: Diameter D = 48 mm. Wall thickness 2.6 mm. C/C			
Uninsulated	-	GPG 50	Rock wool 60 kg/m^3, 50

FLEXIBLE AND CONCRETE WALL ≥ 100 mm:

Table II.12
Fire resistance class E 120/EI 120.
Large pipe penetrations ≤ 1000 x 1000 mm.

Pipe insulation: Type, density	Pipe insulation: Thickness, length (mm), Distribution	Thickness of GPG on both sides (mm)	Backing: Type, density, thickness (mm)
Steel pipe: Diameter(D): 40 ≤ D ≤ 42 mm, Wall thickness (t): 2.6 ≤ t ≤ 14.2 mm. U/C			
Rock wool 85 kg/m^3	20, 1150, LS	GPG 40	Rock wool 150 kg/m^3, 20
ULTIMATE 80 kg/m^3	20, 1150, LS	GPG 40	Rock wool 150 kg/m^3, 20

Table II.13
Fire resistance class E 120/EI 120.
Penetration of single pipe .

Pipe insulation: Type, density	Pipe insulation: Thickness, length (mm), Distribution	Thickness of GPG on both sides (mm)	Backing: Type, density, thickness (mm)
Steel pipe: Diameter(D): 40 ≥ D ≤ 42 mm, Wall thickness (t): 2.6 ≤ t ≤ 14.2 mm. U/C			
Rock wool 85 kg/m^3	20, 550, LS	GPG 30	Rock wool 40 kg/m^3, 40
Glass wool 75 kg/m^3	40, 600, LI	GPG 30	Rock wool 40 kg/m^3, 40
ULTIMATE 80 kg/m^3	20, 550, LS	GPG 30	Rock wool 40 kg/m^3, 40
Steel pipe: Diameter(D): 42 ≥ D ≤ 168,3 mm, Wall thickness (t): 4.5 ≤ t ≤ 14.2 mm. U/C			
ULTIMATE 80 kg/m^3	30, 1150, LS	GPG 30	Rock wool 40 kg/m^3, 40
PEX plastic water pipe 2 x 32 mm. Penetration Ø 120 mm, C/C			
Uninsulated	-	GPG 100	
Plastic electrical pipe 2 x 32 mm. Penetration Ø 120 mm, C/C			
Uninsulated	-	GPG 100	

Table II.14
Fire resistance class E 120/EI 90.
Large pipe penetrations ≤ 1000 x 1000 mm.

Pipe insulation: Type, density	Pipe insulation: Thickness length (mm), Distribution	Thickness of GPG on both sides (mm)	Backing: Type, density, thickness (mm)
Steel pipe: Diameter(D): 42 ≤ D ≤ 219 mm, Wall thickness (t): 4.5 ≤ t ≤ 14.2 mm. U/C			
Rock wool 85 kg/m^3	30, 1150, LS	GPG 40	Rock wool 150 kg/m^3, 20

Table II.15
Fire resistance class E 90/EI 90.
Large pipe penetrations or mixed penetration ≤ 1200 x 1200 mm.

Pipe insulation: Type, density	Pipe insulation: Thickness, length (mm). Distribution.	Thickness of GPG on both sides (mm)	Backing: Type, density, thickness (mm) and added protection
Steel pipe: Diameter(D): 40 ≥ D ≤ 168.3 mm, Wall thickness (t): 2.0 ≤ t ≤ 14.2 mm. U/C			
Rock wool 100 kg/m^3	40, Fully insulated, CS	GPG 40	Rock wool 150 kg/m^3, 20
Steel pipe: Diameter (D): 15 ≥ D ≤ 76 mm, Wall thickness (t): 1.0 ≤ t ≤ 14.2 mm. U/C			
Cellular rubber	12, Fully insulated, CS	GPG 40	Rock wool 150 kg/m^3, 20. 1 layer FS Wrap LX*
Copper pipe and steel pipe: Diameter (D): 15 ≤ D ≤ 76 mm, Wall thickness (t): 1.0 ≤ t ≤ 14.2 mm. U/C			
Cellular rubber	12, Fully insulated, CS	GPG 40	Rock wool 150 kg/m^3, 20. 1 layer FS Wrap LX*
Aluminium pipe PE-X: Diameter (D): 16 ≤ D ≤ 63 mm, Wall thickness (t): 2.25 ≤ t ≤ 4.5 mm. U/C			
Cellular rubber	12, Fully insulated, CS	GPG 40	Rock wool 150 kg/m^3, 20. 1 layer FS Wrap LX*
Climatherm-faser OT SDR 11 pipe: Diameter =20 mm Wall thickness t= 2.8 mm. U/C			
Uninsulated	-	GPG 40	Rock wool 150 kg/m^3, 20, 2 layers FS Wrap LX*
Climatherm-faser OT SDR 11: Diameter (D): 20 < D ≤ 63 mm, Wall thickness (t): 2.8 > t ≤ 5.8 mm. U/C			
Uninsulated	-	GPG 40	Rock wool 150 kg/m^3, 20. 3 layers FS Wrap LX*

* Corresponds to GLAVA Wrap on Roll.

Wrap: Firesafe Wrap LX installed on both sides of the wall.

Table II.16
Fire resistance class E 120/EI 60.
Large pipe penetrations ≤ 1000 x 1000 mm and penetration of single pipe.

Pipe insulation: Type, density	Pipe insulation: Thickness, length (mm), Distribution	Thickness of GPG on both sides (mm)	Backing: Type, density, thickness (mm)
Steel pipe: Diameter (D): 42 ≤ D ≤ 219 mm, Wall thickness (t): 3.2 ≤ t ≤ 14.2 mm. U/C			
Rock wool 85 kg/m^3	30, 1150, LS	GPG 40	Rock wool 150 kg/m^3 20,
ULTIMATE 80 kg/m^3	30, 1150, LS	GPG 40	Rock wool 150 kg/m^3 20,
Steel pipe: Diameter (D): 42 ≤ D ≤ 168.3 mm, Wall thickness (t): 4.5 ≤ t ≤ 14.2 mm. U/C			
Rock wool 85 kg/m^3	30, 550, LS	GPG 30	Rock wool 40 kg/m^3 40,
Glass wool 75 kg/m^3	50, 600, LI	GPG 30	Rock wool 40 kg/m^3 40,

Table: II.17
Fire resistance class E 90/EI 60.
Large pipe penetrations or mixed penetration ≤ 1200 x 1200 mm.

Plastic pipe type	Diameter, Wall thickness	Thickness of GPG on both sides of the wall (mm)	Backing: Type, density, thickness (mm)	Additional protection
PP Wavin Asto	110 / 4.8 mm	GPG 40	Rock wool 150 kg/m^3, 20	6 layers FS Wrap LX*, U/U
PE	Ø160 / 14 mm			6 layers FS Wrap LX*, U/U
PE	Ø50 / 2mm			3 layers FS Wrap LX*, U/U
PP	Ø160 / 5,5 mm			6 layers FS Wrap LX*, U/U
PP	Ø50 / 2 mm			3 layers FS Wrap LX*, U/U
PP Blue Power	Ø110 / 5 mm			6 layers FS Wrap LX*, U/U

* Corresponds to GLAVA Wrap on Roll.

FS Wrap LX shall be installed on the pipe on both sides of the wall.

Table II.18
Fire resistance class E 120/EI 45.
Penetration of single pipe .

Pipe insulation: Type, density	Pipe insulation: Thickness, length (mm), Distribution	Thickness of GPG on both sides of the wall (mm)	Backing: Type, density, thickness (mm)
Steel pipe: Diameter ≤ D = 48 mm. Wall thickness 2.6 mm. C/C			
Uninsulated	-	GPG 40	Rock wool 40 kg/m^3, 20

III. PENETRATION OF CABLE CONDUITS OF STEEL (Table III.1-III.9).

Circular: Length 330 mm, wall thickness 1.5 mm and diameter Ø 30, Ø 50 and Ø 70 mm.
Circular: Length 250 mm, wall thickness 2,0 mm and diameter Ø 90 mm
Square: Length 400 mm, wall thickness 1,0 mm, 65 x 65 and 95 x 95 mm.
Square: Length 250 mm, wall thickness 1,0 mm, 65 x 65 and 95 x 95 mm.
Square: Length 150 mm, wall thickness 1,0 mm, 65 x 65 and 95 x 95 mm.
(Conduits of 150 mm length shall not be used in fire partitions thicker 150 mm)

Insulation inside conduits:
Circular: Ø 30, 50, 70 mm. Rock wool 100 mm in the middle with Intumex L, 1 layer 2.5 x 50 mm on both sides.
Circular: Ø 90 mm. Intumex L 3 layer 2,5 x 100 mm in the middle with cellular rubber 20 mm on both sides.
Square: 65 x 65 mm: Intumex L 2 layer 2.5 x 100 mm, 95 x 95 mm: Intumex L 3 layers 2.5 x 100 mm.
Standard squares have Intumex L in the middle and capped in both ends by cellular rubber 20 mm.
Long squares have Intumex L near both ends with cellular rubber at the ends.

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Penetrations in cable conduits:
Cables: A1, Ø 14 mm, sheathed PVC/PVC, 5 x 1.5 mm^2, HD 603.3A.
A2, Ø 14 mm, sheathed ERP/PO, 5 x 1.5 mm^2, HD 22.4.
A3, Ø 14 mm, sheathed XLPE/EVA, 5 x 1.5 mm^2. HD 604.5
X, Ø 9 mm, Cu 5G 1.5 mm^2
F, Ø 6 mm, Telecommunication cable, FTP 24AWG 4P
Electro conduit pipe of plastic, P1, Ø 16 mm and P2, Ø 32 mm

CONCRETE FLOOR ≥ 150 mm:

Table III.1
Fire resistance class E 120/EI 120.
Aperture ≤ 270 x 270 mm
Circular / square cable conduits of length 330 / 250 mm.

Cable conduit type (d) (mm)	Penetration at site (mm)	Inside cable guidance	Thickness of GPG flush with the top of the floor (mm)	Backing: Type, density, thickness (mm)
Ø 30 mm	270 x 270	2 pcs. F	GPG 100	Rock wool 100 kg/m^3, 50
Ø 50 mm		5 pcs. F		
Ø 70 mm		10 pcs. F		
Ø 30 mm		1 pcs. A1, A2, X		
Ø 50 mm		1 pcs. A1, A2, X		
Ø 70 mm		1 pcs. A1, A2, X		
65 x 65 mm		1 pcs. A1, A2, X		
95 x 95 mm*		1 pcs. A1, A2, X		
65 x 65 mm*		5 pcs. F		
95 x 95 mm*		10 pcs. F		
Fire resistance 120 minutes. Can be used in case of demands for fire resistance class EI 120. Square cable conduits of length 150 mm. Circular cable conduits of length 250 mm				
65 x 65	270 x 270	1 pcs. A1, A2, X	GPG 100	Rock wool 100kg/m^3, 50
95 x 95		1 pcs. A1, A2, X		
65 x 65		5 pcs. F		
95 x 95		10 pcs. F		
Ø 90	270 x 270	as 95 x 95	GPG 100	Rock wool 100kg/m^3, 50

CONCRETE FLOOR = 300 mm:

Table III.2
Fire resistance 120 minutes. Can be used in case of demands for fire resistance class EI 120.
Square cable conduits of length 400 mm. Mounted with symmetrical protuberance.

Cable conduit type (d) (mm)	Penetration at site (mm)	Inside cable guidance	Thickness of GPG flush with the top of the floor (mm)	Backing: Type, density, thickness (mm)
65 x 65		1 pcs. A1, A2, X	GPG 100	Rock wool 100kg/m^3, 50
95 x 95		1 pcs. A1, A2, X		
65 x 65		5 pcs. F		
95 x 95		10 pcs. F		

CONCRETE WALL ≥ 100 mm:

Table III.3
Fire resistance class E 120/EI 60.
Aperture ≤ 400 x 400 mm.
Circular cable conduits of length 330 mm.

Cable conduit type (d) (mm)	Penetration at site (mm)	Inside the cable penetration	Thickness of GPG (mm)	Backing: Type, density, thickness (mm)
Ø 30 mm	400 x 400	1 pcs. A1, A2	GPG 50	Rock wool 150kg/m^3, 50
Ø 50 mm		1 pcs. A1, A2, A3		
Ø 70 mm		1 pcs. A1, A2, A3		
Ø 70 mm		None		

Table III.4
Fire resistance class E 120/EI 45.
Aperture ≤ 400 x 400 mm.
Square cable conduits of length 250 mm.

Cable conduit type (d) (mm)	Penetration at site (mm)	Inside the cable penetration	Thickness of GPG (mm)	Backing: Type, density, thickness (mm)
65 x 65 mm*	400 x 400	1 pcs. A1, A2, A3	GPG 50	Rock wool 150kg/m^3, 50
95 x 95 mm*		1 pcs. A1, A2, A3		
95 x 95 mm*		None		
Fire resistance 45 minutes Can be used in case of demands for fire resistance class EI 45. Square conduits of length 150 mm. Circular cable conduits of length 250 mm				
65 x 65	400 x 400	1 pcs. A1, A2, A3	GPG 50	Rock wool 150kg/m^3, 50
95 x 95		1 pcs. A1, A2, A3		
95 x 95		None		
Ø 90	400 x 400	as 95 x 95	GPG 50	Rock wool 150kg/m^3, 50

FLEXIBLE AND CONCRETE WALL ≥ 100 mm:

Table III.5
Fire resistance class E 120/EI 120.
Aperture ≤ 400 x 400 mm.
Circular cable conduits of length 330 mm.

Cable conduit type (d) (mm)	Penetration at site (mm)	Inside the cable penetration	Thickness of GPG (mm)	Backing: Type, density, thickness (mm)
Ø 30 mm	400 x 400	1 pcs. A1, A2	GPG 40 on both sides	Rock wool 150kg/m^3, 20
Ø 50 mm		1 pcs. A1, A2. A3		
Ø 70 mm		1 pcs. A1, A2. A3		
Ø 70 mm		None		

Table III.6
Fire resistance class E 120/EI 90.
Aperture ≤ 400 x 400 mm and simple cable conduit.
Square cable conduits of length 250 mm

Cable conduit type (mm)	Aperture (mm)	Inside the cable penetration	Thickness of GPG on both sides (mm)	Backing: Type, density, thickness (mm)
65 x 65*	400 x 400	1 pcs. A1, A2, A3	GPG 40	Rock wool 150kg/m^3, 20
95 x 95*		1 pcs. A1, A2, A3		
95 x 95*		None		
Circular aperture with a single cable conduit. Circular cable conduits of length 330 mm.				
Ø 70	Ø 110	15 pcs. F	GPG 30	Rock wool 60kg/m^3, 40
Ø 70	Ø 110	2 pcs. P1 and 1 pcs. P2		
Ø 50	Ø 90	1 pcs. A1, A2, A3		
Ø 30	Ø 70	1 pcs. A1, A2		

Table III.7
Fire resistance class E 120/EI 60.
Aperture small openings ≤ Ø165 with a single cable conduit.
Square cable conduits of length 250 mm.

Cable conduit type (d) (mm)	Aperture (mm)	Inside the cable penetration	Thickness of GPG on both sides (mm)	Backing: Type, density, thickness (mm)
65 x 65	Ø 120	1 pcs. A1, A2, A3	GPG 30	Rock wool 60kg/m^3, 40
95 x 95	Ø 165	1 pcs. A1, A2, A3	GPG 30	Rock wool 60kg/m^3, 40
Fire resistance 60 minutes. Can be used in case of demands for fire resistance class EI 60. Square cable conduits of length 150 mm. Circular cable conduits of length 250 mm				
65 x 65	Ø 120	1 pcs. A1, A2, A3	GPG 30	Rock wool 60kg/m^3, 40
95 x 95	Ø 165	1 pcs. A1, A2, A3	GPG 30	Rock wool 60kg/m^3, 40
Ø 90	Ø 165	1 pcs. A1, A2, A3	GPG 30	Rock wool 60kg/m^3, 40
Fire resistance 60 minutes, can be used in case of demand for EI 60 Square conduits with length 150 mm in a large aperture (400 x 400 mm) Circular cable conduits of length 250 mm				
65 x 65	400 x 400	1 stk. A1, A2, A3	GPG 40	Steinull 60kg/m^3, 20
95 x 95		1 stk. A1, A2, A3		
95 x 95		Ingen		
Ø 90	400 x 400	as 95 x 95	GPG 40	Steinull 60kg/m^3, 20

FLEXIBLE AND CONCRETE WALL from 250 to 300 mm:

Table III.8
Fire resistance 90 minutes. Can be used in case of demands for fire resistance class EI 90.
Square cable conduits of length 400 mm. Mounted with symmetrical protuberance.

Cable conduit type (mm)	Aperture (mm)	Inside the cable penetration	Thickness of GPG on both sides (mm)	Backing: Type, density, thickness (mm)
65 x 65	400 x 400	1 pcs. A1, A2, X	GPG 40	Rock wool 150kg/m^3, 20 both sides
95 x 95		1 pcs. A1, A2, X		
65 x 65		5 pcs. F		
95 x 95		10 pcs. F		

Table III.9
Fire resistance 60 minutes. Can be used in case of demands for fire resistance class EI 60.
Circular aperture with only one cable conduit
Square cable conduits of length 400 mm. Mounted with symmetrical protuberance.

Cable conduit type (mm)	Aperture (mm)	Inside the cable penetration	Thickness of GPG on both sides (mm)	Backing: Type, density, thickness (mm)
65 x 65	Ø 120	1 pcs. A1, A2, X	GPG 30	Rock wool 60kg/m^3, 40 both sides
95 x 95	Ø 165	1 pcs. A1, A2, X		
65 x 65	Ø 120	5 pcs. F		
95 x 95	Ø 165	10 pcs. F		

IV. FLOOR DRAIN (Table IV.1 – IV.4)

Product variations:

KS: PURUS Joti KS (cast iron) Ø 215 mm
KR: PURUS Joti KR (stainless steel) Ø 190 mm
K: PURUS Joti K (plastic PP) Ø 215 mm
P: Pipelife PILI (plastic PP) Ø 215 mm
R: PURUS Joti Balder R (stainless steel) Ø 200 mm
RN: PURUS Joti BalderB75 R Nood Ø 200 mm

CONCRETE FLOOR ≥ 150 mm:

Table IV.1
Fire resistance class E 120/EI 120.
Aperture Ø 270 mm.

Type of drain	Drain: type, diameter, wall thickness (mm)	Casting on the top of the floor (mm)	Cover on the underside of the floor (mm)	Thickness of GPG (mm)	Additional protection (mm)
P	Plastic pipe Ø110, 2.6	No	Gypsum board 12.5	GPG 150	FS Wrap LX* 2 x 2.5
K	Plastic pipe Ø75, 2.6	No	Gypsum board 12.5	GPG 150	FS Collar Ø90 x 30
K	Plastic pipe Ø75, 2.3	Concrete 25	Gypsum board 12.5	GPG 150	FS Wrap LX* 2 x 2.5

* Corresponds to GLAVA Wrap on Roll.

Table IV.2
Fire resistance class E 90/EI 90.
Aperture Ø 270 mm.

Type of drain	Drain: type, diameter, (mm)	Casting on the top of the floor (mm)	Cover on the underside of the floor (mm)	Thickness of GPG flush with the top of the floor (mm)	Additional protection (mm)
KS	Cast iron Ø75	No	-	GPG 180	-
KR	Cast iron Ø75	No	-	GPG 200	-
KR	Cast iron Ø75	Concrete 25	Gypsum board 12.5	GPG 150	-

Table IV.3
Fire resistance class E 120/EI 60.
Aperture Ø 270 mm.

Type of drain	Drain: type, diameter, (mm)	Casting on the top of the floor (mm)	Cover on the underside of the floor (mm)	Thickness of GPG (mm)	Additional protection. (mm)
R	Cast iron Ø75	Concrete 25	Gypsum board 12.5	GPG 150	-
RN	Cast iron Ø75	Concrete 25	Gypsum board 12.5	GPG 150	-

Table IV.4
Fire resistance class E 60/EI 60.
Aperture Ø 270 mm.

Type of drain	Drain: type, diameter, (mm)	Casting on the top of the floor (mm)	Cover on the underside of the floor (mm)	Thickness of GPG (mm)	Additional protection. (mm)
KR	Cast iron Ø75	Concrete 25	Gypsum board 12.5	GPG 150	Elevation ring
KS	Cast iron Ø75	Concrete 25	Gypsum board 12.5	GPG 150	-

V. BLANK PENETRATIONS (Table V.1 – V.5)

GPG mortar is always applied flush with floor or wall.

CONCRETE FLOOR ≥ 150 mm:

Table V.1
Fire resistance class E 120/EI 120. Concrete floor ≥ 150 mm.

Max. dimension (mm)	Thickness of GPG flush with the top of the floor (mm)	Backing: Type, density, thickness (mm)
600 x 600	GPG 30	Rock wool 150kg/m^3, 50
600 x 600	GPG 50	Rock wool 150kg/m^3, 20
600 x 600	GPG 80	Rock wool 150kg/m^3, 20

CONCRETE WALL ≥ 100 mm:

Table V.2
Fire resistance class E 120/EI 60.

Max. dimension (mm)	Thickness of GPG (mm)	Backing: Type, density, thickness (mm)
400 x 400	GPG 30	Rock wool 150kg/m^3, 20

Table V.3
Fire resistance class E 60/EI 30.

Max. dimension (mm)	Thickness of GPG (mm)	Backing: Type, density, thickness (mm)
400 x 400	GPG 20	Rock wool 150kg/m^3, 20

FLEXIBLE AND CONCRETE WALL ≥ 100 mm:

Table V.4
Fire resistance class E 120/EI 120.

Max. dimension (mm)	Thickness of GPG on both sides of the wall (mm)	Backing: Type, density, thickness (mm)
400 x 400	GPG 30	Rock wool 150kg/m^3, 2 x 20
400 x 400	GPG 20	Rock wool 150kg/m^3, 2 x 20
400 x 400	GPG 15	Rock wool 150kg/m^3, 2 x 20

Table V.5
Fire resistance class E 90/EI 90.

Max. dimension (mm)	Thickness of GPG on both sides of the wall (mm)	Backing: Type, density, thickness (mm)
400 x 400	GPG 10	Rock wool 150 kg/m^3, 2 x 20

VI. JOINTS (Table VI.1 – VI.2)

Klassifiseringsbetegnelser for joints (NS-EN 13501-2: 2007+A1:2009, Table 2):

H – joint in horizontal fire partition

V – joint in vertical fire partition, vertical joint

T – joint in vertical fire partition, horizontal joint

X – joint without flexibility, no movement

M – manufactured joint

F – joint carried out at field

B – both manufactured and field

W aa-bb – joint widths range in mm

CONCRETE WALL ≥ 100 mm:

Table VI.1
Fire resistance class: E 120/EI 90 – T – X – F – W5-75.
Horizontal joint.

Dimension (mm)	Thickness of GPG (mm)	Backing type, density, thickness (mm)
5 - 75	GPG 30	Rock wool 60 kg/m^3, 20

FLEXIBLE AND CONCRETE WALL ≥ 100 mm:

Table VI.2
Fire resistance class: E 120/EI 120 – T – X – F – W5-75.
Horizontal joint.

Dimension (mm)	Thickness of GPG (mm) on both sides of the wall	Backing type, density, thickness (mm)
5 - 75	GPG 20	Rock wool 60 kg/m^3, 2 x 20

Appendix 2 to Documentation SPFR AA-050 of 2015--03-26.

Suggested pipe end configurations for different uses *(from European Standard EN 1366- 3:2009 «Fire resistance tests for service installations – Part 3: Penetration seals», CEN February 2009. ANNEX H, Section H4.2.2).*

Different intended uses of pipes can lead to the need for different requirements for the pipe end configuration within a test. In a fire situation the conditions the pipe and sealing system are exposed to depend on whether both or either ends of the pipe are sealed in practice. The pressure conditions and flow of hot gases will be different in a pipe which is ventilated to the atmosphere when compared to a pipe which is closed.

It is important to ensure that sealing system have been tested with appropriate pipe and conditions. The following table outlines some examples of intended uses where the pipe end conditions can be defined. However, in the case where a national regulation is in conflict with the content of Table 1 the regulation should be followed. Not all applications are defined and consideration of whether a system is pressurised, ventilated or non-ventilated is the basis for deciding pipe-end condition. When considering which pipe-end condition to test it is appropriate to consider the intended use.

Table 1
Plastic pipe end configuration versus intended use.

Intended use of pipe		Pipe-end condition	
		Inside the furnace	Outside the furnace
Rainwater pipe (U/U)		Uncapped	Uncapped
Sewage pipe	Ventilated (U/U)	Uncapped	Uncapped
	Non-ventilated (U/C)	Uncapped	Capped
Gas, drinking water, heating water pipe (U/C)		Uncapped	Capped

Metal pipes would normally be capped inside the furnace as they would not be expected to result in an open end situation in a fire scenario due to their high melting point. However, this depends on the supporting system staying in place. If this is a possibility, consideration can be given to an open ended scenario as shown in Table 2.

Table 2
Metal pipe end configuration versus intended use.

Use of pipe	Pipe-end condition	
	Inside the furnace	Outside the furnace
Supported by fire rated* suspension system (C/U)	Capped	Uncapped
Supported by non-fire rated suspension system. (U/C)	Uncapped	Capped
Waste disposal shafts made from pipes (U/C)	Uncapped	Capped
* Shown by test or calculation (e.g. Eurocodes).		

Appendix 3 to Documentation SPFR AA-050 of 2015-03-26

Direct field of application for the results[1] (selection)

The results are only applicable to the orientation in which the penetration seals were tested, i.e. in a wall or floor.

Cables

Classifications based on tested standard types of cables, cover all types of cable commonly used in Europe, maximum diameter as specified in the tables and with commonly used insulation/sheathing materials.

Tests of aluminum cables give valid classification for tested cable types only.

Classifications where the support passes through the seal are applicable when the support does not. The reverse of this situation does not apply.
Classifications are not valid when the lid on cable tray/trunking passes through the penetration seal.
The position of the cables has no restrictions as to the distance between cables or to the opening edges.

Metal pipes

Classifications given in the tables are only valid for the pipe dimensions as given.
Classifications for a given pipe material cover pipe materials with a thermal conductivity equal to or lower than the tested, and a melting point equal to or greater than the tested material, alternatively greater than the furnace temperature during the required test period.

Classifications for copper pipes cover steel pipes, not vice versa.
Classifications for multiple penetration seals cover single penetration seals of the same type.
Classifications for single penetration seals do not cover multiple penetration seals of the same type.
Classifications for pipe end configuration U/C cover all pipe end situations.
Classifications for pipe end configuration C/C cover only this situation.
Classifications for insulated pipes do not cover non-insulated pipes.
Classifications for non-insulated pipes cover the integrity criterion of pipes with interrupted insulation, LI or CI.
The thickness, length and density of the insulation must be at least as specified in the tables.
Classifications for pipes with glass wool insulation cover pipes with stone wool insulation, not vice versa.
Classifications cover all angles between the pipe and the supporting construction from 90° to 45°

Plastic pipes

Classifications cover only the pipe materials and dimensions given in the tables.
Classifications cover only the pipe insulation material and thickness given in the tables.
Classifications for multiple penetration seals cover single pipe of tested type, not vice versa.
Classifications for sustained insulation cover interrupted insulation, LI or CI, not vice versa.
Classifications for pipe end configuration U/U cover all pipe end situations.
Classifications for pipe end configuration U/C cover pipe end configurations U/U and C/U.

[1] The rules for direct application of the test result are from NS-EN 1366-3:2009.