

# KNAUF FIREWIN PASSIVE FIRE PROTECTION

Product and system catalogue



# FOR A FIRESAFE TOMORROW, WE ARE PREPARING TODAY.

The topic of fire protection in construction has always been important, but nowadays it is especially relevant. Fire safety measures in buildings varies from country to country, but the more developed a country is, the more regulations and standards it has in its legislation that require stricter fire protection for buildings. The task of Knauf specialists in all countries where we operate is to encourage everyone to think seriously about fire safety issues, as well as to pay full attention to fire safety issues in absolutely all construction projects and construction sites.

Knauf has always been active in the field of fire safety. It is natural that with the increasing urgency of fire protection, Knauf, as an experienced manufacturer of building materials, is expanding its range of fireproof products, training, and providing its customers with access to the highest quality specialists, guaranteeing full service, documentation and fast delivery of products. Today's customers require full system fire safety solutions that help save time and money, and come with full service and reliable expert support.

Thanks to many years of experience and serious market research, Knauf, as a leader in the construction industry, has created the "FireWin" project, which offers its customers a complete system of passive fire protection solutions.

Following the "One stop shop" business principle, Knauf provides a wide and interoperable range of products, as well as competent and experienced fire protection specialists.

This Knauf FireWin catalog will help you choose the most appropriate fire safety solutions for your projects and ensure the highest level of passive fire safety in buildings.

**Trust KNAUF, feel SAFE.**

Arturs Zeps,  
Knauf FireWin Project Leader

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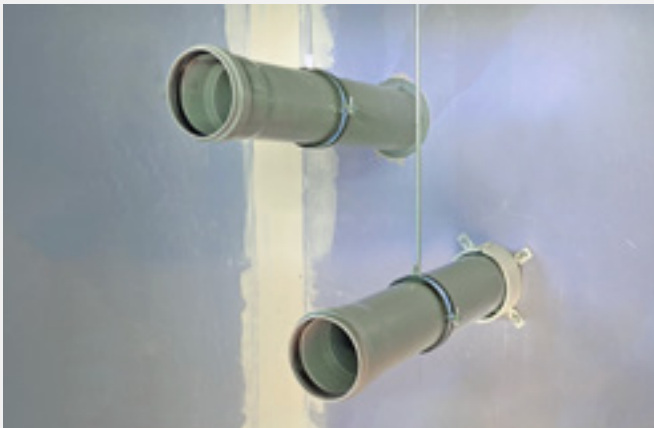
# KNAUF FIREWIN – NEW BRAND, RELIABLE FIRE PROTECTION

In 2016, a new passive fire protection product line Knauf FireWin joined the Knauf product family. This brand is specially designed for architects, builders, system designers and engineers. The cornerstones of FireWin's product quality: a nuanced understanding of customer needs, complex passive fire safety solutions and top-notch service.

**FireWin system products include the following fire protection products:**

- › Fire protection boards
- › Fire-retarding paints
- › Fire-retarding plasters
- › Fire protection collars
- › Fire protection foam
- › Fire protection silicone

All Knauf FireWin products are regularly tested and certified and meet the highest quality standards.



## › The promising and fire-proof start of Knauf FireWin

On March 9, 2016, the Knauf FireWin products experienced their Baltic premiere with a luxuriant event in Riga, and the unveiling was also held in the sunny South-eastern countries of Bulgaria, Serbia, Macedonia and Montenegro.



The atmosphere of the event in Riga was quite unique and particularly suitable for the theme of fire protection. The premises of the Knauf factory were decorated with spectacular decorations, fire installations and historical props of the Latvian Fire Brigade Museum. The guests were entertained by hot musical performances and fire shows. In addition, everyone had the opportunity to take pictures with the "fiery" FireWin ladies and for a moment even step into firefighter shoes.



Knauf FireWin Launch Event was attended by architects, designers and builders, as well as investors and representatives of the fire safety industry from Latvia, Lithuania, Estonia, Russia, Georgia and other European countries. Guests had the opportunity to listen to the presentation on fire safety products and get acquainted with them on the spot, to get FireWin technical literature and chat with fire safety specialists.

# BASICS OF FIRE PROTECTION

## Structural fire protection

Depending on the type, usage and purpose of rooms and premises, flammable substances are always present. It is therefore only possible to prevent the spread of fire by appropriately designing the components surrounding the endangered spaces and areas.

If one limits the term "fire protection" to preventive "structural fire protection", the following basic rules apply in relation to the planning and construction of buildings:

- › There is a low fire risk if as many non-combustible building materials as possible are used.
- › In the event of a fire, people in the building must be able to leave the building safely (e.g., through specially secured escape routes, etc.).

- › The spread and impact of the fire and thus the amount of damage should remain low, e.g., by means of suitable building distances and by selecting suitable constructions with the maximum possible fire resistance.

These requirements result in the need to test building materials and components using technical tests. One should understand the conditions and requirements of the applied practices in standardized test procedures.

This fire protection catalogue describes the results of the tests with Knauf products and their diverse application options in fire protection. The information on construction products, components and structures are based on standards EN 13501, European harmonized product standards, European technical assessments (ETA), classification reports or on expert opinions.

## › Concept of fire protection

### Provisional fire prevention

#### Structural fire protection

- Fire resistance of components (Fire-resistance class)
- Flammability of building materials
- (Building material class/Fire-behaviour)
- Fire compartments/cells
- Access routes for fighting the fire personnel

#### Plant /site technical fire protection

- Fire alarm systems
- Automatic fire extinguishing systems (sprinkler systems)
- Smoke and heat exhaust systems
- Fire protection equipment (wall hydrants)
- Safety power supply and emergency lighting

#### Organizational fire protection

- Provision of small fire extinguishing appliances (fire extinguishers)
- Staff training and education
- Identification of the escape routes and safety devices/equipment
- Creation of evacuation and escape route plans
- Establishment of a company fire-fighting brigade

### Defensive fire protection

#### Fire brigade/self-help arrangements

- Public fire departments
- Creation of a fire brigade plan
- Extinguishing water supply and retention
- Provision of spaces and areas for the fire brigade

## › Fire formation

Apart from explosions and nuclear fission processes, in which large amounts of energy are abruptly released, the following prerequisites must be met for a fire to form:

- › there must be a flammable substance;
- › there must be oxygen present;
- › the ignition temperature of the relevant substance must be reached.

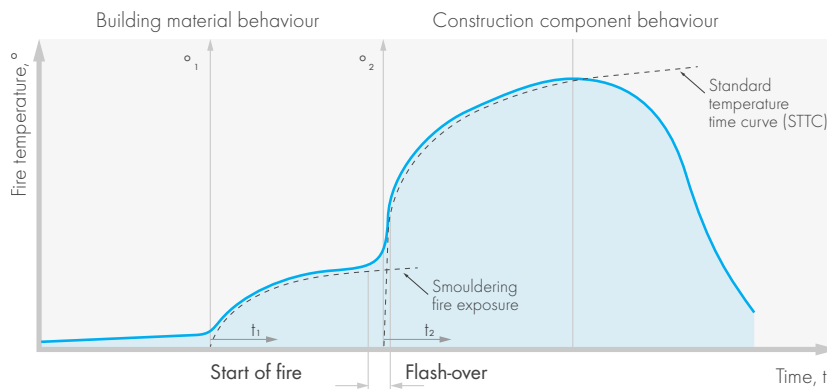


## Fire development

After the fire has developed, the energy released heats the room up to a certain temperature. After reaching the said temperature limit, all flammable substances in the room suddenly ignite (fire-jumping or flash-over). In the initial phase, until the "flash-over", the fire behaviour of the building materials and furnishings is of essential importance. It includes flammability, flame spread and potential contributions to the burning fire.

After the "flash-over", there becomes a "fully developed fire". In this phase, the fire resistance period of the room/premise containment and enclosing and load-bearing components, is of crucial importance in order to prevent the spread of fire and to maintain structural stability. The influence of the fire process is shown schematically in the course of the typical fire phases.

## > Fire phases and temperatures (scheme) as well as fire risks (examples)



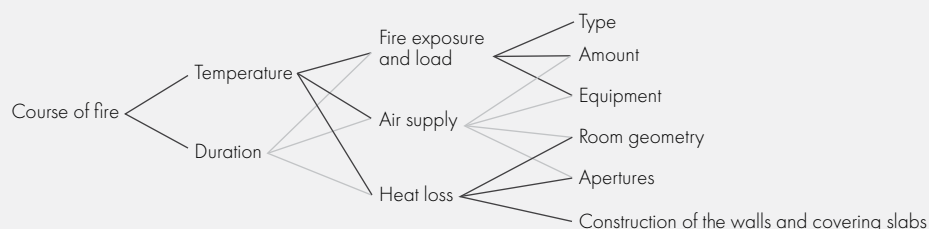
Fire phases	Initial/emerging fire		Fully-developed fire	
	Ignition phase	Smouldering phase	Warming phase	Cooling phase
Fire risks	Ignition sources Flammability	Flame spread Heat development	Fire spread due to component failure Loss of space, containment and load-bearing capacity	
Smoke, irritant effects, toxicity, corrosiveness				

## Course of fire

The persistence of a fire and its spread within a building is determined by the temperature as a function of time.

The type, quantity and arrangement of the fire loads, supply of the combustion air and the heat losses that can arise due to the heat absorption capacity of the limiting and containment components, through openings and through the room geometry,

are of influence here. The interaction of the individual factors is shown in the diagram below. The spread in the building essentially depends on the design of the room- containment components. These are walls, covering (inter-floor) slabs and ceilings, including the supporting structure as well as windows, doors and other openings.



## Behaviour of gypsum in fire

Gypsum building materials are inorganic and non-combustible. They belong to the classic fire protection group of building materials. The protective effect in the event of fire is mainly thanks to the content of about 20% bound crystallized water (a 1 m<sup>2</sup> gypsum plate in thickness of 15 mm contains ca. 3 l crystallized water). In the event of fire, the gypsum is dewatered, i. e., the crystallized water evaporates. The energy is consumed and, in addition, the progress of fire is delayed by the steam veil that forms between the fire and the gypsum.

For heating and evaporation or expulsion of the crystallized water, e. g., for a 15 mm thick gypsum board, consumption of the energy volume of approx. 8400 kJ ( $\approx$  2000 kcal) is required.

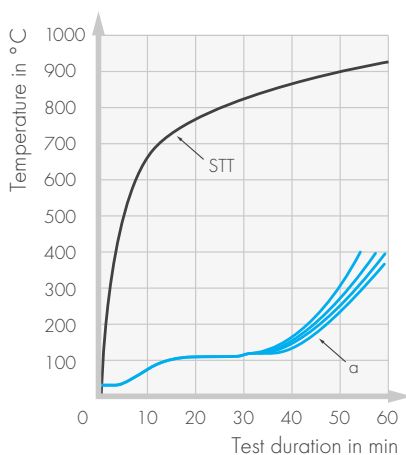
In addition to the fire protection effect of the crystallized water, the dewatered plaster layer acts as an additional insulator, since it has a lower thermal conductivity than non-dewatered gypsum.

The chronological sequence of the physical process described in the event of fire exposure is shown in the adjacent diagram by means of the temperature curve, where the fire exposure is portrayed as occurring according to the standard temperature time curve (STT), which is used to determine the fire resistance of components.

Knauf fire protection boards, GKF, also have core reinforcement with glass fibres that ensure structural integrity of the gypsum core.

The surface coating on both sides of Knauf Fireboard consists of a non-flammable glass fibre fleece material. Supplemented by a fibre-reinforced, high-tempered gypsum core, a special panel is created for the highest fire stresses.

Standard temperature time curve of fire exposure



STT - Standard temperature time curve of fire exposure

a - Course of the temperature increase on the side of a Knauf GKF board facing away from the fire with a thickness of 15mm

## Fire behaviours

The implementation of national to European standards and approvals began with the adoption of the European Construction Products Directive, which has now been transferred to the Construction Products Regulation/CPR. European standardization allows for a number of classifications regarding the fire behaviour of construction products and the fire resistance of components.

Particularly in the transitional period, i. e., in the phase in which the previous national and European classification concepts is equally valid side by side, particularly high demands are made in respect to planners and executors.

The concept of European fire protection standardization includes the areas of test standards, classification standards and rules for extended application.

According to European standardization, the fire behaviour of construction products (previously referred to as building material classes) is classified into

7 classes from A to F. In addition to the main classification criteria of flammability (namely, flame spread and the heat released), the parallel fire phenomena such as smoke development (smoke) and burning falling particles/droplets are determined and classified in 3 stages with categories such as s1, s2 and s3 (smoke development) or d0, d1 and d2 burning and falling particles/droplets.

## Evidence of fire behaviour

There are two ways of documenting evidence.

- If the harmonized European product standard applicable to the respective construction product contains a list for classifying fire behaviour without further testing (CWFT = classification without further testing), the construction product is classified directly according to EN 13501-1. A separate classification report in this case is not required.
- For construction products that are not included in a CWFT list, tests are required in accordance with the respective standards specified in Table No. 1. Then, based on the test results, a classification according to the standard EN 13501-1 with the associated classification report takes place.



**Table No. 1**

Standard	Content
EN ISO 1182	Reaction to fire tests for products - Non-combustibility test
EN ISO 1716	Reaction to fire tests for products - Determination of the gross heat of combustion (calorific value)
EN 13823	Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item
EN ISO 11925 -2	Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test
EN 13501-1	Fire classification of construction products and building elements - Part 1: Classification using

**Table No. 2**

Subclasses	
Smoke production	
s1	More stringent criteria than s2 are satisfied
s2	The total smoke production as well as the ratio of increase in smoke production are limited
s3	No limitation of smoke production required
Flaming droplets/ particles	
d0	No flaming droplets/ particles occurred
d1	No flaming droplets/ particles persisting longer than a given time occurred
d2	No limitation

**Table No. 3**

Building inspection requirements	Additional		European class in accordance with EN 13501-1 (Minimum requirement)
	Smoke production	Flaming droplets/ particles	
Non-combustible	-	-	A1
Limited combustibility	●	●	A2
Very limited contribution to fire	●	●	B
Limited contribution to fire	●	●	C
Medium contribution to fire	●	●	D
High contribution to fire	-	●	E
Easily flammable	-	-	F

## Fire resistance class

The European classification system for components / types is much more finely tuned compared to the previous national system and enables a multitude of classifications in various combinations. The classes consist of letters, and the fire resistance in minutes given together. The letters identify the respective performance criteria (Table No. 6).

Using the example of a load-bearing wall that has been tested according to EN 1365-1, the test results are assigned upon receipt.

Loadbearing capacity	104 min.
Integrity (E)	76 min.
Thermal insulation (I)	40 min.

The range of European classification is clearly evident as follows:

R 90	Loadbearing capacity
RE 60	Loadbearing capacity + integrity
REI 30	Loadbearing capacity + integrity + thermal insulation

The European classification of the fire resistance of construction components does not take the fire behaviour of the building materials into account. The fire behaviour of the building materials, for example according to EN 13501-1, is therefore additionally determined in order to meet the building inspection requirements.

**Table No. 4**

Standard	Content
EN 1363-1 to -3	Fire resistance tests
EN 1364-1 to -6	Fire resistance tests for non-loadbearing elements
EN 1365-1 to -6	Fire resistance tests for loadbearing elements
EN 1366-1 to -13	Fire resistance tests for service installations
EN 1634-1 to -3	Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware
EN 14135	Coverings - Determination of fire protection ability
EN 13381-1 to -10	Test methods for determining the contribution to the fire resistance of structural members

**Table No. 5**

Standard	Content
EN 13501-2	Classification using data from fire resistance tests, excluding ventilation services
EN 13501-3	Classification using data from fire resistance tests on products and elements used in building service
EN 13501-4	Classification using data from fire resistance tests on components of smoke control systems
EN 13501-5	Classification using data from external fire exposure to roofs tests
EN 13501-5	Classification using data from reaction to fire tests on power, control and communication cables

**Table No. 6**

Derivation of the short marking/sign	Criteria	Scope of application
R (Résistance)	Load capacity	Used to describe the fire resistance
E (Étanchéité)	Room containment	
I (Isolation)	Thermal insulation (under fire)	
W (Radiation)	Limitation of radiation passage	
M (Mechanical)	Mechanical impact on walls (impact stress)	
S <sub>200</sub> (Smoke <sub>max. leakage rate</sub> )	Limitation of smoke permeability (tightness, leak rate), meets the requirements both at ambient temperature and at 200°C	Smoke protection doors (as an additional requirement also for fire protection containment)
C (Closing)	Self-closing property (possibly with number of duty cycles) including permanent function	Smoke protection doors, fire protection containment/closures envelopes/closures for
P	Maintenance of energy supply and/or signal transmission	Electrical cable systems in general
K <sub>1</sub> , K <sub>2</sub>	Fire protection	Wall and covering slabs/ceilings (fire protection coverings)
I <sub>1</sub> , I <sub>2</sub>	Different thermal insulation criteria	Fire protection containment/closures (including containment/closures for conveyor sysy systems)
i→o i←o i↔o (in - out)	Direction of classified fire resistance	Non-load-bearing external walls, installation shafts/ducts, ventilation systems/flaps
a↔b (above-below)	Direction of classified fire resistance	Suspended ceilings
v <sub>o</sub> (vertical) h <sub>o</sub> (horizontal)	Classified for vertical/horizontal installation	Ventilation lines/flaps

### Classification of construction components

During the test, it is determined how long the building element preserves the tested performance when exposed to fire. Each performance has a number of criteria which determine when a building element loses that performance. Based on the test, the building element is assigned one of the following fire resistance classes: resistance to fire during 15, 20, 30, 45, 60, 90, 120, 180, 240 or 360 minutes.

### Loadbearing capacity

The loadbearing capacity is the ability of the construction element to withstand specified mechanical actions whilst being exposed to fire, at one or more sides, during a determined period of time, without loss of structural stability. The criteria applied to determine the loss of stability, vary according to the type of loadbearing element:

- for flexurally loaded elements, such as floors, roofs:

- a rate of deformation (rate of deflection);
- a limit state for the actual deformation (deflection).
- for axially loaded elements, such as columns, walls:
  - a rate of deformation (rate of contraction);
  - a limit state for the actual deformation (contraction).

### Integrity

Integrity is the ability of the construction element with a separating function to withstand exposure to fire on one side without fire propagation to the unexposed side as a consequence of flaming or the passage of hot gases. The integrity is evaluated on the basis of the following three aspects:

- cracks or openings exceeding the given dimensions;
- ignition of a cotton pad;
- sustained flaming on the unexposed side.

### Thermal insulation

Thermal insulation is the ability of the construction element to withstand exposure to fire on one side without fire propagation to the unexposed side as a consequence of heat transfer. Thermal insulation limits the heat transfer as a result of which neither the unexposed side nor adjacent materials will ignite.

### Limitation of radiation

The limitation of radiation is the ability of a construction element - when exposed to fire on one side - to reduce the probability of fire propagation as a consequence of a significant heat radiation, either through the element or from the unexposed surface to adjacent materials. The limitation of heat radiation is determined by the period of time for which the maximum value of radiation, measured as specified in the test standard, does not exceed the limit value of 15 kW/m<sup>2</sup>.

### Mechanical resistance

The mechanical action is the ability of a construction element to withstand an impact representing the effect caused by the structural failure of an other component. The element is subjected to a predefined impact shortly after it has been tested to determine its loadbearing capacity, integrity and/or thermal insulation. The element should resist the impact without prejudice to the R, E and/or I performance.

### Self closure

The self closure is the ability of an open door or window to close fully and to engage a fitted latching device, without human intervention so only by stored energy or by means of

electricity backed by a system of stored energy in case of power failure.

This applies to elements that are mostly closed and should close automatically when opened and to elements that are mostly open and should close automatically in case of fire.

### Smoke leakage

Smoke leakage is the ability of a construction element to reduce or eliminate the passage of hot/cold gases or smoke from one side of the element to the other.

### Soot fire resistance

Soot fire resistance is the ability of a chimney or related construction elements to withstand soot fire. This includes aspects of smoke leakage and thermal insulation.

### Fire protection

Fire protection is the ability of a wall or ceiling covering to provide protection against ignition, charring and other damage to the materials behind the coverings for a specified period of time. Coverings are the outer surfaces of construction elements such as walls, floors and roofings.

### Classification according to the extended field of application (EXAP):

A classification based on the extended field of application is not covered by the above-referenced standard EN 13501, but it is assigned according to the European standard EN 15524. The designation of the classification is nevertheless the same as specified in the classification standard.



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# PRODUCTS BOARDS



# KNAUF FIRE RESISTANT BOARD GFK



The Knauf fire-resistant board GFK is a cost-effective gypsum board GFK for basis systems in drywall construction.

Knauf fire-resistant board GFK is used in all fields of interior works as cost-effective cladding of drywall systems with enhanced fire protection.

In compliance with EN 520, the product is subject to initial type testing and continuous factory production control and is marked with the CE marking.

## Properties and added value:

- › Simple installation of cladding and sheet metal lining in a single step
- › Good coherence of structure when exposed to fire
- › Easy application
- › Non-combustible
- › Can be folded by mitring
- › Low expansion and shrinkage



TECHNICAL DATA			
Board thickness	mm	15 18	
Board type		GKF DF	DIN 18180 EN 520
Reaction to fire EN 13501-1		A2-s1,d0 (B)	EN 520
Water vapour diffusion resistance $\mu$		Dry: 10 Wet: 4	EN ISO 10456
Thermal conductivity $\lambda$	W/(m·K)	0.23	EN ISO 10456
Shrinkage and expansion	mm/m	per 1 % change in the relative air humidity: 0.005 – 0.008 per 1 Kelvin change of temperature: 0.013 – 0.02	
Density	kg/m <sup>3</sup>	≥ 800	DIN 18180
Board weight	kg/m <sup>2</sup>	Board thickness 15 mm: ≥ 12 Board thickness 18 mm: ≥ 14.4	DIN 18180
Characteristic compressive strength $f_{c,90,k}$ (for out of plane loads)	N/mm <sup>2</sup>	≥ 5.5	EN 1995-1-1/NA
Characteristic bending tensile strength $f_{m,k}$ (for out of plane loads)	N/mm <sup>2</sup>	Board thickness 15 mm Longitudinal direction: ≥ 5.4; Transverse direction: ≥ 1.8 Board thickness 18 mm Longitudinal direction: ≥ 4.2; Transverse direction: ≥ 1.5	EN 1995-1-1/NA
Average E modulus $E_{mean}$ (for out of plane loads)	N/mm <sup>2</sup>	Longitudinal direction: ≥ 2800 Transverse direction: ≥ 2200	EN 1995-1-1/NA
Flexural breaking load	N	Board thickness 15 mm Longitudinal direction: ≥ 735; Transverse direction: ≥ 250 Board thickness 18 mm Longitudinal direction: ≥ 880; Transverse direction: ≥ 300	DIN 18180
Max. limit for long term temperature exposure	°C	≤ 50	

### Product description

#### Board type

- DIN 18180: GKF
- EN 520: DF
- Colour of board liner: grey
- Rear side marking: red

### Application

Application should be done in accordance to the applicable standards and acc. to the relevant Knauf System Data Sheets for dry-wall systems.

### Technical data

#### Board format (in mm):

1250 x 2000

#### Edge types

- Long edges with paper lining: half-rounded tapered edge
- Front edges: Cut edges

### Order information

#### Board thickness 15 mm

- 2000x1250 mm  
Material no. 00002894
- 2500x1250 mm  
Material no. 00002895

#### Board thickness 18 mm

- 2000x1250 mm  
Material no. 00002897
- 2500x1250 mm  
Material no. 00002898

Customized lengths on request.

### Suitable for the following systems:

- Ceiling linings and suspended ceilings
- Attic linings
- Metal stud partitions
- Wood frame partitions
- Structural wood frame wall panels (load bearing)
- Installation shaft walls

### Dimension tolerances acc. to EN 520:

- Width: +0 / -4 mm
- Length: +0 / -5 mm
- Thickness at 15 mm: +0.5 / -0.5 mm
- Thickness at 18 mm: +0.7 / -0.7 mm
- Angularity: ≤ 2.5 mm per m board width

### Storage

Store boards on board pallets in a dry environment.

# KNAUF DIAMANT GKFI



The Diamant GKFI 12.5 / 15 is a special gypsum board for premium drywalling.

Diamant GKFI 12.5 / 15 are used in all fields of interior works as cladding of premium drywall systems with enhanced requirements for sound insulation and fire protection, and in case of special requirements on mechanical resistance and in rooms with moderate humidity. Rooms with moderate humidity are rooms with a constant relative air humidity of  $\leq 70\%$  (e.g. domestic bathrooms).

In compliance with EN 520, the product is subject to initial type testing and continuous factory production control and bears the CE marking.

## Properties and added value:

- > Universal application
- > Increased permissible wall heights due to high strength
- > High dowel load capacity
- > Robust surfaces
- > Impregnated for reduced water absorption
- > Good coherence of structure when exposed to fire
- > Flexurally ductile special gypsum core for high sound insulation
- > Easy application
- > Non-combustible
- > Bending possible (Diamant GKFI 12.5)

TECHNICAL DATA				
Board type Germany	Unit	Diamant GKFI 12.5	Diamant GKFI 15	Standard
Board type	-	GKFI	GKFI	DIN 18180
Board type European	-	DFH2IR	DFH2IR	EN 520
Reaction to fire EN 13501-1	Class	A2-s1, d0 (B)	A2-s1, d0 (B)	EN 520
Board weight (nominal)	kg/m <sup>2</sup>	approx. 12.8	approx. 15.5	-
Width dimensional tolerance	mm	+0 / -4	+0 / -4	EN 520
Length dimensional tolerance	mm	+0 / -5	+0 / -5	EN 520
Thickness dimensional tolerance	mm	+0.5 / -0.5	+0.5 / -0.5	EN 520
Angularity dimensional tolerance	mm per m board width	≤ 2.5	≤ 2.5	EN 520
Bending radius dry	mm	r ≥ 2750	-	-
Bending radius wet (Note extended residence time due to hydrophobic core)	mm	r ≥ 1000	-	-
Water vapour resistance factor μ	-	Dry: 10, Wet: 4	Dry: 10, Wet: 4	EN ISO 10456
Thermal conductivity λ	W/(m·K)	0.27	0.27	EN 12664
Shrinkage and expansion	mm/m	per 1 % change of relative air humidity: 0.005 – 0.008 per 1 Kelvin change of temperature: 0.013 – 0.02	per 1 % change of relative air humidity: 0.005 – 0.008 per 1 Kelvin change of temperature: 0.013 – 0.02	-
Total water absorption	%	≤ 10	≤ 10	EN 520
Density	kg/m <sup>3</sup>	≥ 1000	≥ 1000	-
Flexural breaking load	N	longitudinal direction: ≥ 725 transverse direction: ≥ 300	longitudinal direction: ≥ 870 transverse direction: ≥ 360	EN 520
Surface hardness (impact diameter)	mm Ø	≤ 15	≤ 15	EN 520
Max. limit for long term temperature exposure	°C	≤ 50	≤ 50	-

## Product range

Description	Width mm	Length mm	Thickness mm	Delivery weight kg/m <sup>2</sup>	Packaging unit	Material number	EAN
Diamant GKFI 12.5	1250	2000	12.5	~13	40 pieces / pallet 100 m <sup>2</sup> / pallet	00072184	4003982182364
	1250	2500	12.5	~13	40 pieces / pallet 125 m <sup>2</sup> / pallet	00009478	4003982182395
Diamant GKFI 15	1250	2000	15.0	~15.6	40 pieces / pallet 100 m <sup>2</sup> / pallet	00072188	4003982182388
	1250	2500	15.0	~ 15.6	40 pieces / pallet 125 m <sup>2</sup> / pallet	00072225	4003982182418

## Product description

### Board type

- DIN 18180: GKFI
- EN 520: DFH2IR
- Colour of board liner: blue
- Rear side marking: red

## Technical data

### Edge types

- Long edge types with paper lining:  
half-rounded tapered edge
- Front edge types: cut edges

## Suitable for the following systems:

- Ceiling linings and suspended ceilings
- Attic linings
- Metal stud partitions
- Timber stud partitions (non-load bearing)
- Installation shaft walls
- Room-in-room systems Knauf Cubo

## Application

Use Knauf Brio screws for fastening the boards to a timber or metal substructure. Fastening on timber is also possible with staples or nails. Application should be undertaken in accordance to the applicable standards and acc. to the relevant Knauf System Data Sheets for drywall systems.

## Storage

Store boards on board pallets in a dry environment.

# KNAUF DIAMANT X GKFI



## The Diamant X GKFI is a special gypsum board for optimum structural features in drywalling

The Diamant X GKFI is used as bracing cladding for premium structural wood frame wall panel constructions with enhanced requirements for sound insulation and fire protection, and in case of special requirements on mechanical resistance, and/or in rooms with moderately high humidity. Rooms with moderately high humidity are rooms with a constant relative air humidity of  $\leq 70\%$  (e.g. domestic bathrooms).

In addition, DIN EN 1995-1-1/NA allows the application in structural wood frame wall panels as bracing exterior cladding in the use category 2 (e.g. as substrate for an external thermal insulation composite system, see system data sheet W55.de Knauf Holztafelbau-Wände - Structural wood frame panel constructions) - German only. In compliance with EN 520 as well as ETA-13/0800, the product is subject to initial type testing and continuous factory production control and bears the CE marking.

## Properties and added value:

- › Highest coherence of structure when exposed to fire
- › Enhanced structural ratings acc. to ETA-13/0800
- › High dowel load capacity
- › Rating of the board load bearing capacity with two cladding layers per wall side possible
- › Impregnated for reduced water absorption
- › Robust surface
- › Good coherence of structure when exposed to fire
- › Flexurally ductile special gypsum core for high sound insulation
- › Low expansion and shrinkage when climate conditions change
- › Easy application
- › Non-combustible

TECHNICAL DATA					
Description	Unit	Diamant X GKFI 12.5	Diamant X GKFI 15	Diamant X GKFI 18	Standard
Board type Germany (raw board)	-	GKFI			DIN 18180
Board type European (raw board)	-	DEFH2IR			EN 520
Reaction to fire EN 13501-1	Class	A2-s1, d0 (B)			EN 14190
Width dimensional tolerance	mm	+0 / - 4			EN 520
Length dimensional tolerance	mm	+0 / -5			EN 520
Thickness dimensional tolerance	mm	+0.5 / - 0.5	+0.7 / - 0.7		EN 520
Angularity dimensional tolerance	mm	≤ 2.5			EN 520
Water vapour resistance factor $\mu$	-	Dry: 11 Wet: 10			EN ISO 12572
Thermal conductivity $\lambda$	W/(m·K)	0.27			EN 12664
Shrinkage and expansion	mm/m	per 1 % change in the relative air humidity: 0.005 – 0.008 per 1 Kelvin change of temperature: 0.013 – 0.02			EN ISO 12572
Density	kg/m <sup>3</sup>	≥ 1000			-
Total water absorption	%	≤ 10			EN 520
Board weight (nominal)	kg/m <sup>2</sup>	approx. 12.8	approx. 15.5	approx. 18.5	-
Surface hardness (impact diameter)	mm Ø	≤ 15			EN 520
Long term temperature exposure (max. limit)	°C	≤ 50			-

## Product range

Description	Type	Width mm	Length mm	Thickness mm	Packaging unit	Material number	EAN
Diamant X GKFI	12.5	1250	2750	12.9	40 pieces / pallet 137.5 m <sup>2</sup> / pallet	0045007	4003982311023
	15			12.9		00464399	4003982314888
	18			00614532		4003982430236	

Customized lengths dependent on the minimum order quantity on request

## Product description

### Board type

- DIN 18180: GKFI
- EN 520: DEFH2IR
- Colour of board liner: blue
- Rear side marking: red

### Storage

Store boards on board pallets in a dry environment.

## Application

Application should be undertaken in accordance to the applicable standards and acc. to the relevant Knauf system data sheets for drywall systems. Use Knauf Diamant screws XTN, staples or nails for fastening the gypsum boards to a wood frame structure. Observe the structural design rating.

## Technical data

### Board format (in mm):

1250 x 2750

### Edge types

- Long edges with paper lining: half-rounded tapered edge (HRAK)
- Front edges: cut square edge (SK)

# 1 KNAUF FIREBOARD



The Knauf Fireboard is a special gypsum board A1 for premium fire protection.

Knauf Fireboard gypsum boards are used in drywall systems that provide particularly optimized fire protection.

Knauf Fireboard in shipbuilding The Certification of Seamen's Accident Prevention and Insurance Association No. 107.052 enables Knauf Fireboard to be used as equipment for ships

## Properties and added value:

- > Highest coherence of structure when exposed to fire
- > Non-combustible
- > Low weight
- > Easy application
- > Low expansion and shrinkage when climate conditions change
- > Arc resistant

TECHNICAL DATA			
Board type		GM-F	EN 15283-1
Reaction to fire EN 13501-1:		A1	
Water vapour diffusion resistance $\mu$		Dry: 10 Wet: 4	EN ISO 10456
Thermal conductivity $\lambda$	W/(m·K)	0.23	EN ISO 10456
Shrinkage and expansion	mm/m	per 1 % change of relative air humidity: 0.005 - 0.008 per 1 Kelvin change of temperature: 0.013 - 0.02	
Density	kg/m <sup>3</sup>	≥ 780	
Board weight	kg/m <sup>2</sup>	Board thickness 12.5 mm: approx. 10.5 Board thickness 15 mm: approx. 12.0 Board thickness 20 mm: approx. 15.8 Board thickness 25 mm: approx. 20.0 Board thickness 30 mm: approx. 24.0	
Flexural breaking load	N	Board thickness 12.5 mm: Longitudinal direction: ≥ 538; Transverse direction: ≥ 210 Board thickness 15 mm: Longitudinal direction: ≥ 645; Transverse direction: ≥ 252 Board thickness 20 mm: Longitudinal direction: ≥ 860; Transverse direction: ≥ 336 Board thickness 25 mm: Longitudinal direction: 1.075; Transverse direction: ≥ 420 Board thickness 30 mm: Longitudinal direction: ≥ 1.290; Transverse direction: ≥ 504	EN 15283-1
Max. limit for long term temperature exposure	°C	≤ 50 (short-term ≤ 60)	
Arc behaviour number	LV	1.1.1.2	DIN VDE 0303-5

## Product description

### Board type

- Board type EN 15283-1: GM-F
- Colour of board liner fleece: bright grey
- Back side marking: red

### Storage

Store boards on wooden pallets in a dry environment.

## Order information

### Board thickness 12.5 mm

- 2000x1250 mm  
Material no. 00052457

### Board thickness 15 mm

- 2000x1250 mm  
Material no. 00002906

### Board thickness 20 mm

- 2000x1250 mm  
Material no. 00002908

### Board thickness 25 mm

- 2000x1250 mm  
Material no. 00002907

### Board thickness 30 mm

- 2000x1250 mm  
Material no. 00002909

Customized lengths on request.

## Application

Application should be acc. to the applicable standards and acc. to the Knauf System Data Sheets of the respective drywall system. For filling use Knauf Fireboard Filler acc. to Product Data Sheet K466.de. In addition to the joint filling, a skim coating of the entire board surface with Knauf Fireboard Filler is required for the direct application of coatings or linings. K751.de/engl./03.12/FB/D K751.de Knauf Fireboard Special gypsum board A1 for premium fire protection

## Disposal

### Waste code number (AVV code):

17 08 02  
17 09 04

## Suitable for the following systems:

- Ceiling linings and suspended ceilings
- Metal stud partitions
- Installation shaft walls
- Room-in-room systems Knauf Cubo
- Fire protection encasements of timber frames
- and steel constructions
- Cable and ventilation ducts
- Engineered fire protection

## Technical data

### Board format (in mm):

1250 x 2000

### Edge types

- Long edges with paper lining: VK
- Front edges: SK

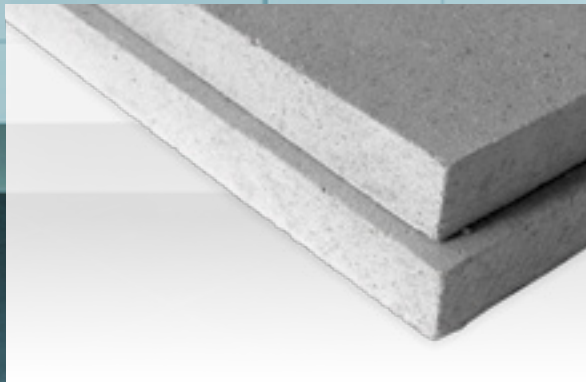
### Dimension tolerances acc. to EN 15283-1:

- Width: +0 / -4 mm
- Length: +0 / -5 mm
- Thickness at 12.5 / 15 mm: +0.7 / -0.7 mm
- Thickness for 20 mm: +0.8 / -0.8 mm
- Thickness for 25 mm: +1.0 / -1.0 mm
- Thickness for 30 mm: +1.2 / -1.2 mm
- Angularity: ≤ 2.5 mm per m board width

### Minimum bending radii (dry bending)

Board thickness in mm	Min. bending radius r in m
12.5	4
15	7
20	10
25	25
30	50

# KNAUF VIDIFIRE



The VidiFire A1 gypsum fibreboards are composed of high quality calcinated gypsum and organic and non-organic fibres.



### Special properties

- > Non-combustible, class A1
- > Versatile application
- > Robustness
- > Moisture resistance
- > Easy installation
- > High fire- and sound protection

### VidiFire A1 Board Data

Thickness:	21.5 / 15 mm
Width:	1200 / 1250 mm
Length:	2000 / 3000 mm

The VidiFire A1 boards are produced with differently shaped edges depending on the joint technique.

Edge shape:	SK	
	VTF	

The boards are produced with 4SK; 3SK/1VTF; 2SK/2VTF; 1SK/3VTF; and 4VTF edges

### Weight of the Boards

12.5 mm	17.5 kg/m <sup>2</sup>
15 mm	21 kg/m <sup>2</sup>



## Application

### Formatting

- > To cut the fibreboards score one side with a knife and snap the board along the score. Cut edge can be smoothed with bevel plane. Clean the dust before application at glued joint. Clean edges can be cut also with electric saw (dust absorber is recommended).
- > Screw spacing to be max. 250 mm. By horizontal application the screw spacing must be max. 150 mm for 10 mm thick boards, and 200 mm for 12.5 mm thick boards. Distance from board edge should be at least 15 mm.

### Fixing with screws

- > Align the VidiFire A1 fibreboard along the profiles and fix with fibreboard screws applying proper torque/rpm. For single layer cladding use screws 3.9x30 mm, for double layer cladding use screws 3.9x45 mm.

### Fixing with clamps

- > VidiFire A1 fibreboards can be fixed to timber structures through screws, nails or clamps with corrosion protection covering. Clamps can also be used for fastening of the second layer of boards to the first one or board to board to form a box-like cladding.

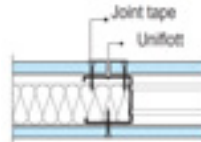
### Field of Application

- Fire protection of escape routes
- Claddings in public buildings
- Metal stud partitions
- Solutions for sound protection but also:
- Timber prefabricated houses – as cladding to the wall structures and for reinforcing of the building
- Drywall partitions in humid areas
- High partition walls (for more information see technical data sheet W36)

### Joint Technique

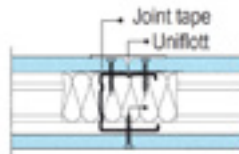
#### ■ Gap joint

Apply VidiFire A1 fibreboards with a gap of 5-7 mm between boards. Fill the gap with Uniflott. Apply some of the joint filler along the joint, so that the jointing tape would be embedded in to it. The joints of the first layer are only filled in case of multilayer claddings, while the joints of the final layer are also finely skimmed. Remove uneven spots with hand or pole sander. Cover the screw heads with Uniflott.



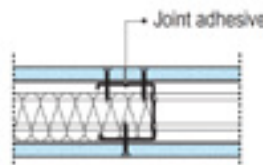
#### ■ VTF joint

Apply VidiFire A1 fibreboards pressed tightly to each other. Apply Uniflott in the beveled edge and embed joint tape into it. Sand after the joint filler has dried.



#### ■ Glued joint

Fix the VidiFire A1 board on the structure and apply joint adhesive on its edge. Press the next board tightly to the first one and fix with screws or clamps. The width of the joint should not exceed 1 mm. Remove the excessive adhesive with a spatula within an hour.



### Surface Treatment

#### Coats

Use a primer on VidiFire A1 boards before coating or painting them. Ensure that the primer and the coat or paint are compatible.

#### Plasters

Always use a primer before applying cementbased plasters on VidiFire A1 boards.

#### Ceramic Tiles

Tiling on the primed surface is applied with tile adhesive. Ensure that the primer and the adhesive are compatible. Use Knauf Flächendicht in the shower area.

#### Finishing

For a fine surface skim the VidiFire A1 boards with Knauf Fill & Finish Light or Knauf Readyfix Roll & Spray.

#### Recommendations

Before installation condition the boards to the ambient temperature and humidity. Fill the joints only when no changes in temperature or humidity are expected, which could cause expansion or contraction of the boards. Joints should be filled at a minimum temperature of +10°C (50°F).

Always apply paper joint tape in critical areas. Prime the VidiFire A1 surface before application of finishing material.

The primer and the coat or paint must be compatible.

### Safety

Knauf VidiFire A1 boards must be stored on a flat surface in a dry environment.

### Technical Data

Density	1250 ± 50 kg/m <sup>3</sup>
Thermal conductivity	$\lambda \leq 0.31$ W/mK
Water diffusion resistance coefficient	$\mu = 17$
Fire classification acc. to EN 13501 non-combustible	A1
Deviation in dimension	0.30 mm/m
Hardness (at 20°C and deviation in relative air moisture by 30%)	approx. 750 N
Bending strength	$f_{m, test} \geq 5.8$ N/mm <sup>2</sup>
Bending strength (after drying at temperature 40°C)	$f_{m, test} \geq 4.5$ N/mm <sup>2</sup>
Compressive strength	7.5 N/mm <sup>2</sup>
Tensile strength	2.3 N/mm <sup>2</sup>
E-modulus (bending)	$\geq 3800$ N/mm <sup>2</sup>



# PRODUCTS FIRESTOPPING



# KNAUF FPA ACRYLIC

2



Knauf Fire protection acrylic - FPA is a fire rated single component partly flexible acrylic mastic specially designed for fire sealing. The sealant expands when heated and produces an efficient seal against fire, smoke and gas.

## Storage

- › Store dry in the original packaging.
- › Storage temperature: between 10°C and 30°C
- › Storage stability: 18 months stored in unopened cartridges, see imprint on cartridge for expiry date
- › Knauf Fire protection acrylic FPA - 310 ml cartridge, article no. 651009
- › Knauf Fire protection acrylic FPA - 600 ml foil, article no. 651011

## Installation Instructions

- Before installing Knauf FPA Acrylic ensure that the surface of all service penetrations and surrounding construction is free from all loose contaminants, dust and grease.
- Where Knauf FPA Acrylic is to be installed against surfaces that cannot tolerate direct contact; appropriate surface preparation should be made (contact Knauf for guidance in these cases). For paints sensitive to sealing compounds, priming with a PVA primer is recommended.
- As Knauf FPA Acrylic is water based, in cases where corrosion protection is a problem; some metals may require a barrier between the sealant and the metal surface prior to this installation.
- When installing the sealant in gypsum boards, the exposed edges of the board can be wetted with water, or Knauf FPA Acrylic diluted with water to prime the surfaces helping adhesion and preventing excessive joint shrinkage.
- When installing Knauf FPA Acrylic in hollow floor slabs or boards, fire seals specified as single sided should be installed from the soffit side of the floor assuming there is sufficient thickness of concrete below the void to follow the installation guide. Where this is not the case, tubular voids should be filled with stone wool normally the same thickness as the depth of the floor slab. Alternatively, simply fire seal on both sides.
- When installing any backing material, cut this slightly oversize and insert into the gap ensuring a tight friction fit. Ensure correct depth is achieved.
- Fill the gap or joint with Knauf FPA Acrylic to the required depth. Refer to the drawings on following pages 4 to 22 for guidance on joint design/dimensions. If installation does not have to meet any specific fire specification, it is recommended that a width to depth ratio of 2:1 is utilized, with a minimum depth of 12mm of sealant.
- Apply the sealant generously to prevent air bubbles. Finish the bead with a moist spatula, pallet knife or brush.
- Knauf FPA Acrylic can be over-painted with most emulsion or alkyd (gloss) paints.

### Product description

Knauf Fire protection acrylic - FPA is a fire rated single component partly flexible acrylic mastic specially designed for fire sealing. The sealant expands when heated and produces an efficient seal against fire, smoke and gas.

Knauf Fire protection acrylic expands when it is subjected to fire and closes openings around penetrations when any combustible or low temperature melting materials have burnt away. FPA should be applied over suitable backing materials to ensure correct width to depth ratio and to reduce shrinkage of the joint during hardening.

### Scope of application

Knauf FPA is designed to prevent the spread of fire and smoke through joints and openings in fire rated walls and floors including openings formed around building service penetrations. It will also maintain the acoustic design performance in walls and floors.

Knauf FPA cures when it is subjected to atmospheric conditions, however it will retain a degree of elasticity for joint movement. Under fire exposure FPA creates a robust fire seal by the formation of a durable intumescent char.

Thermal activation takes place at about 180°C when the material will expand and prevent the passage of fire and smoke for up to 4 hours.

### Properties

- Classified for fire sealing all types of construction and building service penetrations
- Easy to apply and has a smooth surface finish
- Movement capability up to 12.5%
- 18 months storage life (under correct conditions)
- 30 years working life
- Fire resistance up to EI240
- ETA 21/0035 and ETA 21/0046
- EAD 350141-00-1106 and EAD 350141-00-1104

### Emission data (indoor air quality)

Compound	Emission rate after 3 days	Emission rate after 4 weeks
TVOC	83 µg/m <sup>3</sup>	< 5 µg/m <sup>3</sup>
TSVOC	n.d.	< 5 µg/m <sup>3</sup>
VOC w/o NIK	n.d.	< 5 µg/m <sup>3</sup>
R Value	n.d.	< 1
Formaldehyde	< 3 µg/m <sup>3</sup>	n.d.
Acetaldehyde	< 3 µg/m <sup>3</sup>	n.d.
Sum for+ace	< 0.002ppm	n.d.
Carcinogenic	(< 1 µg/m <sup>3</sup> )	(< 1 µg/m <sup>3</sup> )

n.d. or < means not detected

### Sound insulation

Description	Sound reduction
Single sided seal ≥12mm depth	62 dB
Double sided seal ≥12mm depth	> 62 dB

FPA has been tested at BM Trada (UKAS accredited); according to EN ISO 10140-2:2010. Usage of any backing material is optional, due to the tests being conducted with sealant only.

### Safety

Please observe the EC Safety Data Sheet.

# KNAUF FIRE PROTECTION PUTTY CORD

2



Knauf FP Putty Cord is an easy to apply fire rated putty supplied as a non-setting cord. The cord is hand workable, re-useable and re-serviceable due to its nonsetting properties.

The putty cord is designed to be easily fitted around service penetrations where the gap around the services is very small, or there is no gaps at all so a conventional fire rated sealant is impossible or difficult to fit due to the required depth and backing material.

The putty cords are fitted covering the gap around the services and do not need to fill the gap to the required depth. Fitting the putty cords will reinstate the fire rating of the partition and prevent the passage of smoke and flames in a fire, and sound and air movement during service life.

Knauf FP Putty Cords are supplied in strips with a round cross-section and are easy to fit with your thumbs; no tools are needed.

## Method of delivery

- Knauf FP Putty cord Ø15mm 5x20cm, article no. 651090

## Installation Instructions

1. Before installing Knauf FP Putty Cord ensure that the surface of all service penetrations and surrounding construction is wiped clean, dry, free from all loose contaminants, dust, oils and grease.
2. To aid adhesion to porous substrates take a thumb size piece of the putty cord and gently rub over the required installation mounting area (especially important in soffit applications).
3. Where Knauf FP Putty Cord is to be installed against surfaces that cannot tolerate direct contact; appropriate surface preparation should be made (contact Knauf for guidance in these cases). For paints sensitive to sealing compounds, priming with a PVA primer is recommended.
4. As Knauf FP Putty Cord is silicone based, in cases where corrosion protection is a problem; some metals may require a barrier between the putty and the metal surface prior to this installation.
5. When installing Knauf FP Putty Cord in hollow floor slabs or boards, fire seals should be installed from the soffit side of the floor assuming this product certification covers the application. Where this is not the case and only top-sided applications are approved, simply fire seal on both sides.
6. Place the Putty Cord around the services so that it seals the services to the wall or floor all the way round.
7. Press the Putty Cord into the wall or floor and services with your thumbs to form a fillet or V shape joint, ensuring good contact is made all the way round the services and the wall or floor.

### Product description

Penetration Seal Classified for use in flexible walls and rigid floors.

#### Storage

To be stored in temperatures between 5 °C and 30 °C.

### Scope of application

#### Putty Cords for fire sealing services

The putty cord is designed to be easily fitted around service penetrations where the gap around the services is very small, or there is no gaps at all so a conventional fire rated sealant is impossible or difficult to fit due to the required depth and backing material. The putty cords are fitted covering the gap around the services and do not need to fill the gap to the required depth.

### Properties

- Certified in many areas around the World, for instance in the EU, UK, UAE and Australia
- Installation is very simple and quick
- Unaffected by moisture; can be used in wet rooms
- Never hardens and ensures a tight fit
- Environment- and user friendly; contains no solvents
- Working life of at least 50 years
- ETA 18/0935
- EAD 350141-00-1104

### Emission data (indoor air quality)

Compound	Emission rate after 3 days	Emission rate after 4 weeks
TVOC	190 µg/m <sup>3</sup>	12 µg/m <sup>3</sup>
TSVOC	< 5 µg/m <sup>3</sup>	< 5 µg/m <sup>3</sup>
VOC w/o NIK	13 µg/m <sup>3</sup>	< 5 µg/m <sup>3</sup>
R Value	0.10	< 0.0099
Formaldehyde	< 3 µg/m <sup>3</sup>	< 3 µg/m <sup>3</sup>
Acetaldehyde	< 3 µg/m <sup>3</sup>	< 3 µg/m <sup>3</sup>
Carcinogenic	< 1 µg/m <sup>3</sup>	< 1 µg/m <sup>3</sup>

### Sound insulation

Description	Sound reduction
Putty Pads for sockets	Rw 67 dB

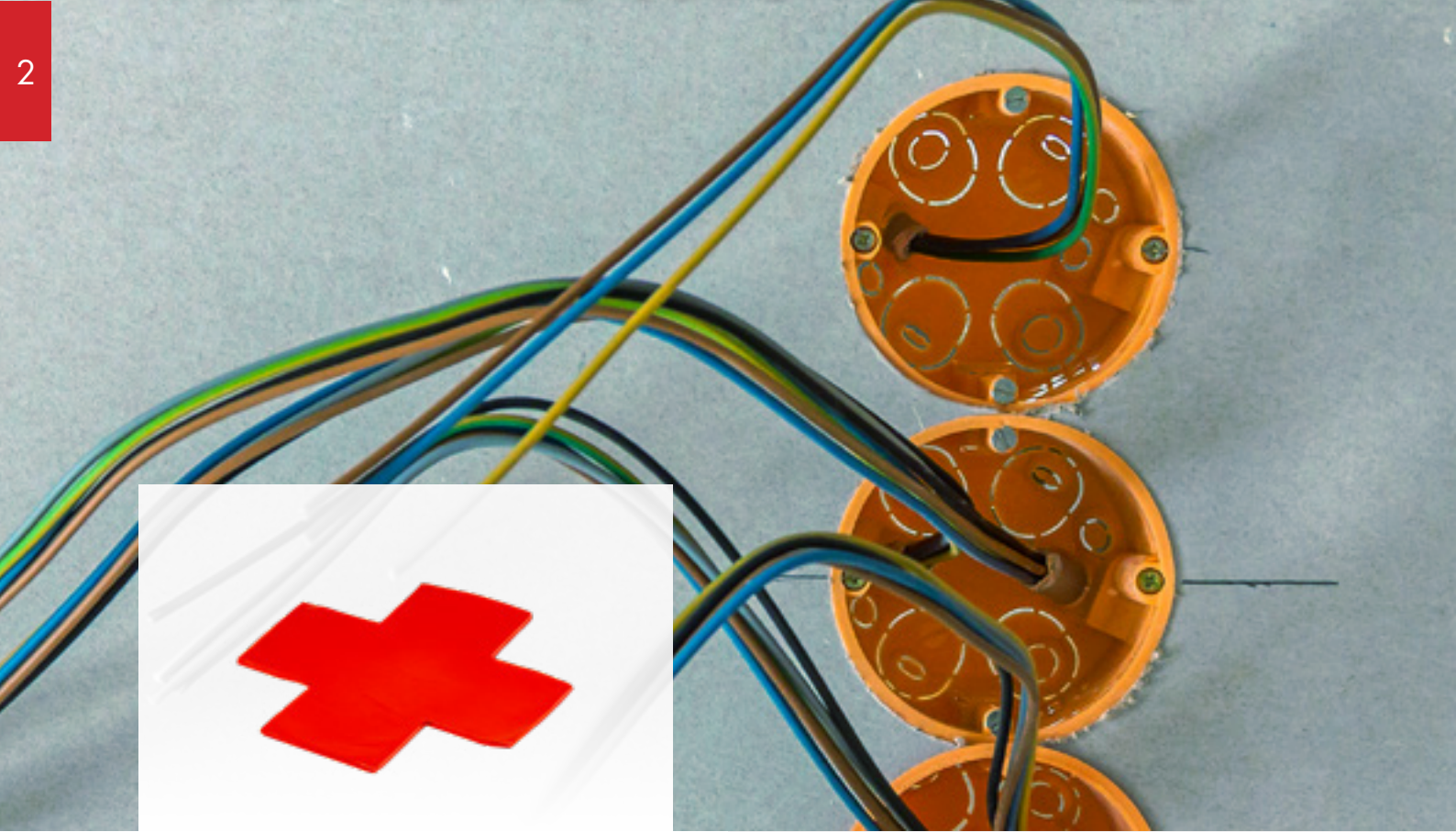
Knauf FP Putty has been tested at BRE (UKAS accredited); according to EN ISO 140-3:1995. Single number quantities were calculated in accordance with EN ISO 717-1:1997. The test report is available upon request.

### Safety

Please observe the EC Safety Data Sheet.

# KNAUF FIRE PROTECTION PUTTY PADS

2



Knauf FP Putty Pads are an easy to apply fire and sound rated sealant supplied as a non-setting putty. The pad is hand workable, re-useable and re-serviceable due to its non-setting properties.

When electrical sockets and switches are installed in dry lining partitions, the original fire rating of the partition is compromised. Fitting Knauf FP Putty Pads will reinstate the fire rating of the partition for up to two hours (depending on the partition fire rating) and prevent the passage of smoke and flames in a fire, and sound and air movement during service life, through the electrical socket, into the cavity.

Knauf FP Putty Pads are shaped for use on both single and double electrical sockets installations in dry lining walls. The pads are supplied in a cross shape for internal installation in a socket and in a rectangular shape for application on the rear of the socket.

## Method of delivery

- Knauf FP Putty pad CS 170x170mm, article no. 651197
- Knauf FP Putty pad CD 230x170mm, article no. 651198
- Knauf FP Putty pad SD 230x230mm, article no. 651203
- Knauf FP Putty pad RS 180x130mm, article no. 651206



## Installation Instructions

1. Wall boxes should be installed according to the Manufacturer's Instructions.
2. Before installing Knauf® FR Putty Pad ensure that the surfaces are clean and sound, free from dirt, grease and other contamination.
3. Remove the backing paper from one side of the pad.
4. Internal fitted: insert the pad into the socket back box so that the pad completely covers the back and sides. Make a slit to

allow the wires to pass through the pad. Trim off any excess material and proceed as normal installation. Back face fitted: place the pad over the socket back box so that the pad completely covers the back and overlaps onto the dry lining partition. It may or may not be necessary to make a slit in the pad for the wires depending on the installation.

5. Remove the last backing paper.

### Product description

Knauf FP Putty is an easy to apply fire and sound rated sealant supplied as a non-setting putty. The putty is hand workable, re-useable and re-serviceable due to its non-setting properties. The putty is manufactured and supplied in different shapes and forms for different applications.

#### Storage

To be stored in temperatures between 5 °C and 30 °C.

### Scope of application

#### Putty Pads for sockets

When electrical sockets and switches are installed in dry lining partitions, the original fire rating of the partition is compromised. Putty Pads will reinstate the fire rating of the partition for up to two hours preventing the passage of smoke and flames and sound and air movement through the electrical socket.

### Properties

- Supplied in different shapes and forms for multiple application areas
- Certified in many areas around the World, for instance in the EU, UK, UAE and Australia
- Installation is very simple and quick
- Unaffected by moisture; can be used in wet rooms
- Never hardens and ensures a tight fit
- Environment- and user friendly; contains no solvents
- Working life of at least 50 years
- ETA 18/0935
- EAD 350141-00-1104

### Emission data (indoor air quality)

Compound	Emission rate after 3 days	Emission rate after 4 weeks
TVOC	190 µg/m <sup>3</sup>	12 µg/m <sup>3</sup>
TSVOC	< 5 µg/m <sup>3</sup>	< 5 µg/m <sup>3</sup>
VOC w/o NIK	13 µg/m <sup>3</sup>	< 5 µg/m <sup>3</sup>
R Value	0.10	< 0.0099
Formaldehyde	< 3 µg/m <sup>3</sup>	< 3 µg/m <sup>3</sup>
Acetaldehyde	< 3 µg/m <sup>3</sup>	< 3 µg/m <sup>3</sup>
Carcinogenic	< 1 µg/m <sup>3</sup>	< 1 µg/m <sup>3</sup>

### Sound insulation

Description	Sound reduction
Putty Pads for sockets	Rw 67 dB

Knauf FP Putty has been tested at BRE (UKAS accredited); according to EN ISO 140-3:1995. Single number quantities were calculated in accordance with EN ISO 717 1:1997. The test report is available upon request.

### Safety

Please observe the EC Safety Data Sheet.

# KNAUF FIRE PROTECTION PUTTY PADS FOR WATER BOXES

2



Knauf FP Putty Pads are an easy to apply fire and sound rated sealant supplied as a non-setting pad. The pad is hand workable, reuseable and re-serviceable due to its non-setting properties.

When water supply boxes are installed in dry lining partitions, the original fire rating of the partition is compromised. Fitting Knauf FP Putty Pads will reinstate the fire rating of the partition for 90 minutes and prevent the passage of smoke and flames in a fire, and sound and air movement during service life, through the wall boxes into the cavity.

Knauf FP Putty Pads are shaped for use on both single and double wall box installations in dry lining walls. The pads are supplied in kits containing a rectangular and a circular shape that fits to the wall boxes.

## Method of delivery

- Knauf FP Putty pad for tap water boxes, article no. 651207

## Installation Instructions

1. The wall box surfaces must be clean and sound, free from dirt, grease and other contamination.
2. Remove the backing paper.
3. Place the rectangular pad over the plastic sleeve so that the pad completely covers the plastic.
4. Insert the circular pad into the bottom of the plastic sleeve.
5. After installing the wall boxes, make sure there are no gaps against the gypsum wall boards. If there are gaps please seal these with a gypsum filler.

### Product description

Penetration Seal Classified for use in flexible & solid walls and solid floors.

#### Storage

To be stored in temperatures between 5 °C and 30 °C.

### Scope of application

#### Putty Pads for water supply boxes

When tap water wall boxes are installed in dry lining partitions, the original fire rating of the partition is compromised. Fitting Putty Pads will reinstate the fire rating of the partition for 90 minutes preventing the passage of smoke and flames in a fire, and sound and air movement during service life, through the tap water wall boxes, into the cavity.

### Properties

- Supplied in different shapes and forms for multiple application areas
- Certified in many areas around the World, for instance in the EU, UK, UAE and Australia
- Installation is very simple and quick
- Unaffected by moisture; can be used in wet rooms
- Never hardens and ensures a tight fit
- Environment- and user friendly; contains no solvents
- Working life of at least 50 years
- ETA 18/0935
- EAD 350141-00-1104

### Emission data (indoor air quality)

Compound	Emission rate after 3 days	Emission rate after 4 weeks
TVOC	190 µg/m <sup>3</sup>	12 µg/m <sup>3</sup>
TSVOC	< 5 µg/m <sup>3</sup>	< 5 µg/m <sup>3</sup>
VOC w/o NIK	13 µg/m <sup>3</sup>	< 5 µg/m <sup>3</sup>
R Value	0.10	< 0.0099
Formaldehyde	< 3 µg/m <sup>3</sup>	< 3 µg/m <sup>3</sup>
Acetaldehyde	< 3 µg/m <sup>3</sup>	< 3 µg/m <sup>3</sup>
Carcinogenic	< 1 µg/m <sup>3</sup>	< 1 µg/m <sup>3</sup>

### Sound insulation

Description	Sound reduction
Putty Pads for sockets	Rw 67 dB

Knauf FP Putty has been tested at BRE (UKAS accredited); according to EN ISO 140-3:1995. Single number quantities were calculated in accordance with EN ISO 717 1:1997. The test report is available upon request.

### Safety

Please observe the EC Safety Data Sheet.

# KNAUF FIRE PROTECTION POLYMER

2



Knauf Fire Protection Polymer is a high performance, professional quality, one part ready to use sealant and adhesive.

Based on an innovative new Inert Polymer Technology it is suitable for a wide variety of building trade applications including decorating, fire sealing, flooring, joinery, plumbing and tiling and out-performs conventional silicone, MSP, butyl and acrylic based products as a sealant and adhesive – the only sealant free from dangerous emissions.

## Method of delivery

- > Knauf Fire Protection Polymer - FPP 310 ml cartridge, article no. 651095

### Installation Instructions

1. All surfaces must be clean and sound, free from dirt, grease and other contaminants. The surfaces may be damp but not running wet. Use a wet brush to clean surfaces before application to remove loose material and to ensure good contact for adhesion. Primers are not usually required.
2. As Knauf FP Polymer contains some water, in cases where corrosion protection is a problem; some metals may require a barrier between the sealant and the metal surface prior to this installation.
3. When installing Knauf FP Polymer in hollow floor slabs or boards, tubular voids should be filled with stone wool normally the same thickness as the depth of the floor slab. Alternatively, simply fire seal on both sides.
4. Refer to the drawings on following pages 2 to 4, or the Technical Data Sheet on page 3 for guidance on joint design/ dimensions for fire sealing. If installation does not have to meet any specific fire specification, the depth of the joint should be at least half the width and not less than 6mm in order to obtain maximum performance as a sealant.
5. When installing any backing material, cut this slightly oversize and insert into the gap ensuring a tight friction fit. Ensure correct depth is achieved. The use of backing material is strongly recommended.
6. Cut nozzle to the desired angle and gun firmly into the joint to give a good solid fill. Strike off the sealant flush with the joint sides within ten minutes of application, before surface skinning occurs. The sealant will have medium shrinkage during cure and if a flush surface is required it is recommended to leave the sealant proud.
7. The sealant can be tooled to a smooth finish using a moist plastic stick or similar within 30 minutes of application. IPT Tooling designed for the optimum finish is recommended instead of soap and water as it forms a film between the stick and the sealant.
8. Do not spray the sealant with water or other fluids before skin formation (<30 min). Uncured sealant is soluble in water prior to skinning due to its environmentally friendly IPT chemistry that uses water instead of solvents.
9. Knauf FP Polymer can be over-painted.

#### Product description

Knauf Fire Protection Polymer - FPP is a fire and sound rated sealant designed for a number of special applications including high movement and sanitary seals, where normal fire rated acrylics cannot be used. The sealant produces an efficient seal against fire, smoke, gas and sound.

#### Storage

Store dry in the original packaging.

Storage temperature: between 5°C and 35°C

Storage stability: 24 months stored in un-opened cartridges, see imprint on cartridge for expiry date

#### Scope of application

Knauf Fire Protection Polymer - FPP is a high performance, professional quality, one part ready to use sealant and adhesive. It is suitable for a wide variety of building trade applications including decorating, flooring, joinery, plumbing and tiling and out-performs conventional silicone, MSP, butyl and acrylic based products as a sealant and adhesive.

Knauf Fire Protection Polymer - FPP maintains integrity of a joint in a fire situation giving a minimum 4 hours as long as the surrounding construction remains intact.

FPP eliminates the selection choices that need to be made with conventional sealants and adhesives, offering one solution for all internal building applications.

#### Properties

- Excellent adhesion to most common substrates
- Easy to apply and tool off
- 3D joint movement capability minimum 25%
- Fire rated up to 4 hours both integrity and insulation
- Low shrinkage
- 12 months storage time
- Only technology available that is VOC free
- Certified according to ETA 21/0995 and ETA 21/1006
- EAD 350141-00-1106
- EAD 350454-00-1104

#### Emission data (indoor air quality)

Compound	Emission rate after 3 days	Emission rate after 4 weeks
TVOC	7,7 µg/m <sup>3</sup>	< 5 µg/m <sup>3</sup>
TSVOC	n.d.	n.d. (<5 µg/m <sup>3</sup> )
VOC w/o NIK	n.d.	n.d. (< µg/m <sup>3</sup> )
R Value	< 1	< 1
Formaldehyde	< 3 µg/m <sup>3</sup>	< 3 µg/m <sup>3</sup>
Acetaldehyde	< 3 µg/m <sup>3</sup>	< 3 µg/m <sup>3</sup>
Sum for+ace	< 0.002 ppm	-
Carcinogenic	n.d. (<1 µg/m <sup>3</sup> )	n.d. (<1 µg/m <sup>3</sup> )

n.d. means not detected

#### Sound insulation

Description	Sound reduction
Single sided seal ≥12mm depth	62 dB
Double sided seal ≥12mm depth	> 62 dB

FPP has been tested at BM Trada (UKAS accredited); according to EN ISO 10140-2:2010.

Usage of any backing material is optional, due to the tests being conducted with sealant only.

#### Safety

Please observe the EC Safety Data Sheet.

# KNAUF FIRE PROTECTION GRAPHITE

2



Knauf Fire Protection Graphite is a high specification formulation designed to prevent the spread of fire, smoke and gases through openings in fire rated walls and floors. Knauf Fire Protection Graphite expands when it is subjected to fire and closes openings around penetrations when any combustible or low temperature melting materials have burnt away.

Knauf Fire Protection Graphite is designed to fire seal difficult services which traditional fire rated mastics do not achieve such as large plastic pipes.

Knauf Fire Protection Graphite can be used with a suitable filling material, i.e. stone wool or backing material in order to ensure correct width to depth ratio and to reduce the shrinking of the sealant during curing. Minimum depth and maximum width of the joints are included in the installation instructions. Thermal activation takes place at 150°C when the material will expand (intumesce) to prevent the passage of fire and smoke for periods up to 4 hours.

## Method of delivery

- › Knauf Fire Protection Graphite - FPG 310 ml cartridge, article no. 651094

**Installation Instructions**

1. Before installing Knauf Fire Protection Graphite ensure that the surface of all service penetrations and surrounding construction is free from all loose contaminants, dust and grease.
2. As Knauf Fire Protection Graphite is water based, in cases where corrosion protection is a problem; some metals may require a barrier between the sealant and the metal surface prior to this installation.
3. When installing any backing material, cut this slightly oversize and insert into the gap ensuring a tight friction fit. Ensure correct depth is achieved.
4. Fill the gap or joint with Knauf Fire Protection Graphite to the required depth. Refer to the drawings on following pages for guidance on joint design/dimensions.
5. Apply the sealant generously avoiding air bubbles. Finish the bead with a moist spatula or pallet knife. Avoid excessive tooling/smoothing as this may make the seal surface wet and soft.
6. Knauf Fire Protection Graphite can be over-painted with most emulsion or alkyd (gloss) paints.

**Product description**

Knauf Fire Protection Graphite - FPG is a fire rated single component partly flexible high pressure sealant specially designed for fire sealing. The sealant expands during heating and efficiently seals off against fire, smoke and gas.

**Storage**

Store dry in the original packaging.  
 Storage temperature: between 5°C and 30°C.  
 Storage stability: 12 months stored in un-opened cartridges, see imprint on cartridge for expiry date.

**Scope of application**

Knauf Fire Protection Graphite - FPG is a high specification formulation designed to prevent the spread of fire, smoke and gases through openings in fire rated walls and floors. It expands when it is subjected to fire and closes openings around penetrations when any combustible or low temperature melting materials have burnt away.

Knauf Fire Protection Graphite - FPG is designed to fire seal difficult services which traditional fire rated mastics do not achieve such as large plastic pipes.

Thermal activation takes place at 150°C when the material will expand and prevent the passage of fire and smoke for up to 4 hours.

**Properties**

- Classified in most constructions for plastic pipes and cables
- Easy to apply
- Movement capability up to 12.5%
- No priming necessary for application to most materials
- 30 years working life
- Minimum 12 months storage time
- High sound insulation
- Certified according to ETA 18/0922
- EAD 350454-00-1104

**Emission data (indoor air quality)**

Compound	Emission rate after 3 days	Emission rate after 4 weeks
TVOC	41 µg/m <sup>3</sup>	< 5 µg/m <sup>3</sup>
TSVOC	n.d.	< 5 µg/m <sup>3</sup>
VOC w/o NIK	n.d.	< 5 µg/m <sup>3</sup>
R Value	n.d.	< 1
Formaldehyde	< 3 µg/m <sup>3</sup>	n.d.
Acetaldehyde	< 3 µg/m <sup>3</sup>	n.d.
Sum for+ace	< 0.002 ppm	n.d.
Carcinogenic	(< 1 µg/m <sup>3</sup> )	n.d.

n.d. means not detected

**Sound insulation**

Description	Sound reduction
Single sided seal ≥ 25mm depth	Rw 53 dB
Double sided seal ≥ 25mm depth	Rw > 53 dB

FPG has been tested at BM Trada (UKAS accredited); according to EN ISO 10140-2:2010.

Usage of any backing material is optional, due to the tests being conducted with sealant only.

**Safety**

Please observe the EC Safety Data Sheet.

# KNAUF FIRECOLLAR

2



Knauf Firecollar are designed to maintain the fire resistance of fire rated walls and floors where these are breached by plastic pipes, and may be used in gypsum, masonry and concrete walls and floors.

Each pipe collar consists of a white coated circular steel shell that splits in two to fit around the service penetrations by means of a simple 'slide-lock' system. The steel shell contains a graphite based reactive material which reacts when exposed to heat closing the openings left by the softening plastic pipe in fire.

Minimum separations and limitations: Services can be sealed as specified in the detailed drawings. Services within the Knauf Firecollar systems do not require a minimum separation, only requiring sufficient to securely fit the collars onto the substrate. For larger apertures other than described in these installation instructions, Knauf FPC Panel or Knauf FP Mortar with Knauf Firewrap should be used.

Supporting constructions: Flexible walls must have a minimum thickness of 100 mm and comprise steel studs or timber studs\*) lined on both faces with minimum 2 layers of 12.5 mm thick boards. Rigid walls must have a minimum thickness of 100 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m<sup>3</sup>. Rigid floors must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m<sup>3</sup>. The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.



## Installation Instructions

- For sealing plastic pipes in floors, a single firecollar is installed on the underside of the floor and for flexible and solid walls, a firecollar is installed on both sides of the wall.
- Before fitting the firecollar ensure that any gaps between the pipe and the separating element are sealed as follows:
  - In gypsum walls, gaps between the pipe and the construction below 8mm must have a bead of Knauf FPA Acrylic to cover the opening, and for gaps 8mm or above, the seal must be plugged with 25mm deep Knauf FPA Acrylic.
  - In masonry/concrete walls, gaps between the pipe and the construction below 8mm must have a bead of Knauf FPA Acrylic to cover the opening, and for gaps 8mm or above, the seal must be plugged with 20mm deep Knauf FPA Acrylic on 20mm deep backing of stonewool.
  - In floors, gaps between the pipe and the construction below 10mm must have 20mm deep stonewool to plug the opening, and for gaps 10mm or above, the seal must be plugged with 10mm deep Knauf FPA Acrylic on 40mm deep backing of stonewool.
- Place a firecollar around the service penetration (pipe) and ensure that the fixing lugs are positioned tightly to the surface of the wall or the floor so that the anchors/fixings can be inserted fully.
- Where the surface is uneven, apply a sealing bead of Knauf FPA Acrylic between the wall/floor and the firecollar.
- Attach the firecollar with steel screws, anchors or fixings that are suitable for the substrate that the firecollar will be fitted to. For flexible walls use  $\geq \text{Ø}4$  mm gypsum-, wood screws or anchors with a length suitable for the number of boards that form the wall. For concrete/masonry walls and floors, use  $\geq \text{Ø}4 \times 50$ mm long masonry screws or expansion bolts.
- On site where the penetration size is greater than the pipe diameter and/or the pipe is in an angle an oversized collar can be used. Knauf Firecollars are tested 'oversize', i.e. the internal diameter of the firecollar can be larger than the pipe.

### Product description

Knauf Firecollar consists of a white coated circular steel shell that splits in two to fit around the service penetrations by means of a simple 'slide-lock' system.

The steel frame contains a graphite based swelling material that reacts to heat and fills the opening from the melting plastic through-penetration in case of a fire.

### Storage

Unlimited storage time when stored in temperatures between 5°C and 30°C.

### Scope of application

Knauf Firecollar are designed to maintain the fire resistance of fire rated walls and floors where these are breached by continuous plastic pipes, and may be used in gypsum, masonry and concrete walls and floors.

It may be fitted both on the outside of a wall or a floor.

Ø32mm	30mm	Ø32mm	50mm	Ø40mm	30mm
Ø40mm	50mm	Ø55mm	30mm	Ø55mm	50mm
Ø63mm	30mm	Ø63mm	50mm	Ø75mm	30mm
Ø75mm	50mm	Ø82mm	30mm	Ø82mm	50mm
Ø90mm	30mm	Ø90mm	50mm	Ø110mm	30mm
Ø110mm	50mm	Ø125mm	60mm	Ø140mm	60mm
Ø160mm	60mm				

### Properties

- Classified for fire sealing in all types of constructions
- Excellent sound insulation
- No emissions - environmentally and user friendly
- Simple to install using widely available standard screws
- Collars come in two different heights for different fire classifications to maximize cost efficiency
- Very high fire classifications up to 240 minutes for both integrity and insulation
- 30 years working life guarantee
- ETA 21/0070
- EAD 350141-00-1104

### Pipe end configurations

Intended use of pipe		Pipe end condition
Rainwater pipe, plastic	At roof	C/U
	Further below	C/C
Drainage or sewage pipe, plastic	At drainage	C/U
	Further below	C/C
Pipes in closed circuits (water, gas, vacuum systems, el. etc.)		C/C
Pipes with open ends and at least 50cm pipe on both sides		U/U

### Sound insulation

Description	Sound reduction
Collars installed as described in walls	58 dB RW

The sound insulation value is only valid for the collar/pipe and not for other elements in the building construction.

The sound insulation has been tested by the accredited laboratory Exova BM Trada in Great Britain according to EN ISO 10140-2. Test report is available upon request.

### Safety

Please observe the EC Safety Data Sheet.

# KNAUF FIREWRAP

2



Knauf Firewrap is designed to maintain the fire resistance of fire separating walls and floors when these are breached by plastic pipes or metal pipes with continuous combustible insulation, and may be used in gypsum, masonry or concrete walls and concrete floors.

Each pipe wrap consists of a graphite based reactive intumescent strip, which reacts to heat and closes the opening left by the softening plastic pipe or pipe insulation in a fire. The pipe wrap is installed completely around the pipes or insulation and secured with the self-adhesive tab. The annular space around the pipe wrap is sealed with Knauf FP Mortar or Knauf FPC Panel.

## Method of delivery

- › Knauf Firewrap 55mm, article no. 651077
- › Knauf Firewrap 82mm, article no. 651078
- › Knauf Firewrap 110mm, article no. 651079
- › Knauf Firewrap 125mm, article no. 651080
- › Knauf Firewrap 160mm, article no. 651084
- › Knauf Firewrap 200mm, article no. 651081
- › Knauf Firewrap 250mm, article no. 651082
- › Knauf Firewrap 315mm, article no. 651083
- › Knauf Firewrap Roll 50mmx25m, article no. 651085
- › Knauf Firewrap Roll 75mmx25m, article no. 651087
- › Knauf Firewrap Roll w/adh 50mmx25m, article no. 651088
- › Knauf Firewrap Roll w/adh 75mmx25m, article no. 651089

## Installation Instructions

1. Ensure the faces of the aperture opening are free of dust and any other contaminants. The faces may be moistened for better adhesion.
2. Fix a suitable pipe wrap around the service penetration and fasten with the tape as tightly as possible in order to prevent any excess opening between the pipe wrap and the service.
3. In floors, only one pipe wrap is required to be installed flush with the soffit so that the edge of the wrap is visible from the underside when back-filled. For walls it is normal to fit a wrap on both sides of the wall, again with the edge just visible. Please see detail drawings of installation methods on pages 4 to 9.
4. When installing pipe wraps in hollow floor slabs or boards, level the fire seal with the soffit side. Ensure there is sufficient thickness of concrete below the void for the depth of the fire seal. Where this is not the case, tubular voids should be filled with stone wool normally the same thickness as the depth of the floor slab.
5. Once the wrap is securely installed, fire seal the empty aperture surrounding the pipe wraps as follows:
 

Floors with Knauf FP Mortar: Install a cast shutter plate or board. Make sure that this achieves a very tight seal. Pour clean water into a suitable mixing vessel and pour enough mortar to obtain the required consistency. Pour or trowel the mortar onto the shutter making sure that it flows into all corners and around services. Apply a firm pressure to the mortar to eliminate any trapped air bubbles.

Walls with Knauf FPC Panel: Cut the required panels to suit the aperture dimensions and type and size of service penetrations. All exposed and cut edges of the panels can be sealed with Knauf FP Coating or Knauf FPA Acrylic prior to fitting which will act as an adhesive and ensure a smoke tight seal. All joints, gaps or imperfections in the installed seal must be sealed with Knauf FPA Acrylic on both sides.

### Product description

Knauf Firewrap consists of a graphite based reactive intumescent strip, which reacts to heat and closes the opening left by the softening plastic pipe or pipe insulation in a fire. The pipe wrap is installed completely around the pipes or insulation and secured with the self-adhesive tab.

#### Storage

Unlimited storage time when stored in temperatures between 5 °C and 30 °C.

### Scope of application

Knauf Firewrap is designed to maintain the fire resistance of fire separating walls and floors when these are breached by plastic pipes, conduits or metal pipes with continuous combustible insulation, and may be used in drywalls, masonry or concrete walls and concrete floors.

It may be used both for plastic pipes (PVC, PP, PE ABS and Alupex), bundles of plastic pipes with or without cables as well as cable bundles. The Firewrap is cast into the wall or the floor by fixing it round the through-penetration with the attached sticker. It may also be fitted in Knauf FPC Panel.

### Properties

- For plastic pipe sizes from smallest pipes available to Ø400 mm with a wide range of pipe wall thicknesses
- For metal pipes with continuous combustible pipe insulation
- For plastic pipes with cables (conduits)
- Firewraps come in two different types; ready made for most common diameters and in 25 metre rolls for all diameters
- Fire classifications up to 240 minutes for both integrity and insulation
- 30 years working life guarantee
- ETA 18/0927
- EAD 350141-00-1104

### Pipe end configurations

Intended use of pipe		Pipe end condition
Rainwater pipe	At roof	C/U 1)
	Further below	C/C 2)
Drainage or sewage pipe	At drainage	C/U 1)
	Further below	C/C 2)
Pipes in closed circuits (water, gas, vacuum systems, el. etc.)		C/C 2)
Pipes with open ends and at least 50cm pipe on both sides		U/U

<sup>1)</sup> U/U condition can also be used

<sup>2)</sup> U/C, C/U and U/U conditions can also be used

### Sound insulation

Description	Sound reduction
Firewraps installed in FPC Panel	55 dB RW
Firewraps installed in FP Mortar	64 dB RW

The sound insulation value is only valid for the fire seal and not for other elements in the building construction.

The sound insulation has been tested by the accredited laboratory Exova BM Trada in Great Britain according to EN ISO 10140-2. Test report is available upon request.

### Safety

Please observe the EC Safety Data Sheet.

# KNAUF FIRE PROTECTION SERVICE TRANSIT

2



Knauf FP Service Transit has been designed to maintain the fire resistance of walls and floors when these are breached by continuous cables and plastic pipes.

The Service Transit consists of a circular high temperature plastic tube containing a graphite based intumescent lining material which expands upon heating to seal spaces or voids around cables and pipes, thus preventing the passage of flames, smoke and gases. After installation of the Service Transit, cables and pipes can be retrofitted without having to install a new fire seal.

The Service Transit is available in three different lengths, 150mm, 250mm and 400mm and the selection of which to use depends on the thickness of the supporting construction and the required fire classification.

## Method of delivery

- > Ø40x150mm, article no. 651137
- > Ø63x150mm, article no. 651138
- > Ø90x150mm, article no. 651147
- > Ø110x150mm, article no. 651148
- > Ø40x250mm, article no. 651150
- > Ø63x250mm, article no. 651188
- > Ø90x250mm, article no. 651178
- > Ø110x250mm, article no. 651179
- > Ø40x400mm, article no. 651183
- > Ø63x400mm, article no. 651184
- > Ø90x400mm, article no. 651185
- > Ø110x400mm, article no. 651186

### Installation Instructions

1. Install the Service Transit centrally in the wall, floor or fire seal ensuring that the centre point of the transit is located mid-depth in the wall, floor or fire seal.
2. Friction fitted or cast installation:
  - Make sure there is a tight seal with no gaps around the Service Transit and that it is securely locked in position. If this is not the case, simply apply a bead of Knauf FPA Acrylic on both sides.
  - Installation with Knauf FPA Acrylic, Knauf FPC Panel or Knauf FP Mortar:
  - Follow the Technical Data Sheet and Installation Instructions supplied with the product selected together with installation instructions and detailed drawings in this document.
3. Before cables and/or plastic pipes are inserted through the Service Transit, remove the fibre plug from the middle of the Service Transit. After the insertion of services is completed, ensure that the fibre plug is refitted and positioned correctly around the services in the middle of the Service Transit, leaving no openings so a cold smoke barrier is achieved.
4. Make sure labels with retrofit instructions are placed near the Service Transit on both sides after installation, so future service installations are completed correctly by reinstating the fibre plug.

#### Product description

Knauf FP Service Transit consists of a circular high temperature plastic tube containing a graphite based intumescent lining material which expands upon heating to seal spaces or voids around cables and pipes, thus preventing the passage of flames, smoke and gases.

#### Storage

Store in temperatures between 5 °C and 30 °C

#### Scope of application

Knauf FP Service Transit has been designed to maintain the fire resistance of walls and floors when these are breached by continuous cables and plastic pipes.

After installation of the Service Transit, cables and pipes can be retrofitted without having to install a new fire seal.

The Service Transit is available in three different lengths, 150mm, 250mm and 400mm and the selection of which to use depends on the thickness of the supporting construction and the required fire classification.

#### Properties

- Safe, easy and quick to fire stop service penetrations
- Ideal for installations where it is likely that services will be inserted or replaced later on
- New patented fast expanding graphite material
- Very high fire classifications up to 240 minutes for both integrity and insulation
- Unlimited storage time (under correct conditions)
- 30 years working life guarantee
- ETA 18/0925
- EAD 350141-00-1104

#### Sizes and Intended Use

Size	Qty/Box	Intended Use
Ø40 x 150 mm	30	Drywalls or walls of masonry and concrete ≥ 75mm thick
Ø63 x 150 mm	25	
Ø90 x 150 mm	12	
Ø110 x 150 mm	9	
Ø40 x 250 mm	30	Drywalls or walls of masonry and concrete ≥ 100mm thick or concrete floors ≥ 150mm thick
Ø63 x 250 mm	25	
Ø90 x 250 mm	12	
Ø110 x 250 mm	9	
Ø40 x 400 mm	30	Drywalls or walls of masonry and concrete or concrete floors ≥ 250mm thick
Ø63 x 400 mm	25	
Ø90 x 400 mm	12	
Ø110 x 400 mm	9	

#### Sound insulation

Description	Sound reduction
Service Transits in all sizes	42 dB RW

The sound insulation value is only valid for the Service Transit and not for other elements in the building construction.

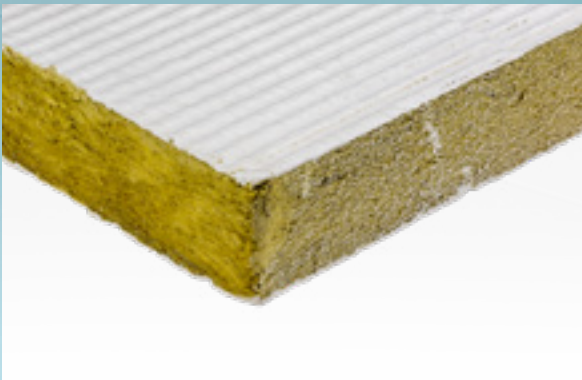
The sound insulation has been tested by the accredited laboratory Exova BM Trada in Great Britain according to EN ISO 10140-2. Test report is available upon request.

#### Safety

Please observe the EC Safety Data Sheet.

# KNAUF FPC PANEL

2



Knauf FPC Panel has been designed to maintain the fire resistance of separating walls and floors where they are breached by single or multiple building services. The panel consists of a stone wool core, sealed with Knauf FPC Coating on 1 or both faces.

Selection of the panel coated on 1 or both faces is determined by installation considerations and fire resistance requirements. When installed on site, Knauf FPC Panel should be used with Knauf FPA Acrylic for sealing around service penetrations and the adjacent separating construction.

## Method of delivery

- › Knauf FPC PANEL 50mm 1-S Ribbed, article no. 651132
- › Knauf FPC PANEL 50mm 2-S Ribbed, article no. 651130
- › Knauf FPC PANEL 60mm 2-S Ribbed, article no. 651123

## Installation Instructions

1. Before installing Knauf FPC Panel ensure that the surface of all service penetrations and surrounding construction is free from all loose contaminants, dust and grease.
2. Knauf FPC Coating and Knauf FPA Acrylic are water based, so in cases where corrosion protection is a problem, some metals may require a barrier between the seal and the surface prior to this installation.
3. Select the type and number of panels to meet the required fire classification using the drawings on this document.
4. When fitting panels into drywalls the coated side of the panel should be flush with the surface of the wall on both sides. In seals wider than 2400mm, uninterrupted separating studs will be required at 2400mm centers or less.
5. When fitting double layer 60mm thick panels in masonry or concrete constructions, the panels should be flush with the surface of the construction on both sides to maximize the fire resistance. If this is not possible, there should be an air gap of at least 30mm between the panels.
6. When fitting single layer panels in masonry or concrete constructions, the panel can be positioned to either side of the construction or anywhere in between.
7. When installing Knauf FPC Panel in hollow floor slabs or boards, fire seals specified as single layer panels should be installed from the soffit side of the floor assuming there is sufficient thickness of concrete below the void to follow the installation guide. Where this is not the case, tubular voids should be filled with stone wool normally the same thickness as the depth of the floor slab. Alternatively, simply fire seal on both sides.
8. Cut the required panel(s) to suit the aperture dimensions and type and size of service penetration(s). All exposed and cut edges of the panels can be sealed with Knauf FPC Coating or Knauf FPA Acrylic prior to fitting which will act as an adhesive and ensure a smoke tight seal.
9. All joints, gaps or imperfections in the installed seal must be filled with Knauf FPA Acrylic on both sides.
10. Knauf FPC Panel can be over-painted with most emulsion or alkyd (gloss) paints.

### Product description

Knauf FPC Panel consists of a high density stone wool core, over-coated with Knauf FPC. The top coating provides additional protection by significantly reducing the permeability of the stone wool core and prevents the passage of hot gases, thus reducing the temperature rise on the unexposed side and reducing heat conduction through the building services.

#### Storage

May be stored for a long period of time. To be stored in temperatures between 5 °C and 30 °C.

### Scope of application

Knauf FPC Panel is designed to prevent the spread of fire and smoke through openings in fire rated walls and floors where openings are formed to allow the installation of multiple building services. Knauf FPC Panel will also maintain the acoustic design performance in fire rated walls and floors.

Knauf FPC Panel is available with top coating on one or two sides, selected on the basis of installation considerations and fire resistance. On site, Knauf FPC Panel must be used together with Knauf FPA Acrylic for sealing around building services and the surrounding construction.

### Properties

- Classified for all types of constructions with or without building service penetrations
- Simple and very quick to install
- Permanently flexible - will accommodate movements during fire and smaller movements in the construction it has been fitted within
- Halogen free with added fungicides
- Fire resistance up to EI240
- ETA 18/0928
- EAD 350141-00-1104

### Emission data (indoor air quality)

Compound	Emission rate after 4 weeks
TVOC	0.20 mg/m <sup>2</sup> h
Formaldehyde	n.d.
Ammonia	n.d.
Carcinogenic	n.d.

n.d. means not detected

### Sound insulation

Description	Sound reduction
Single 50 or 60mm Knauf FPC Panel 2-S as linear seal	Rw 55 dB
Single 50 or 60mm Knauf FPC Panel 2-S as large seal	Rw 29 dB
Double 50 or 60mm Knauf FPC Panel 1-S or 2-S as large seal	Rw 52 dB
50 or 60mm Knauf FPC Panel 1-S or 2-S with 50mm cavity, large seal	Rw 53 dB

Knauf FPC Panel has been tested at BM Trada (UKAS accredited); according to EN ISO 10140-2:2010.

### Safety

Please observe the EC Safety Data Sheet.

# KNAUF FIRE PROTECTION COATING

2



Knauf Fire Protection Coating - FPC spray grade, is an ablative sealant coating designed to enhance, seal and fire protect mineral fibres.

Mineral fibres coated with Knauf Fire Protection Coating are designed to prevent the spread of fire and smoke through openings in fire rated walls and floors, also where openings are formed to allow the installation of multiple building services. The system will also maintain the acoustic design performance.

## Method of delivery

Knauf Fire Protection Coating - FPC Buckets of 8 litres, article no. 651039

## > Supporting Constructions

Flexible walls must have a minimum thickness of 100mm and comprise steel studs or timber studs\*) lined on both faces with minimum 2 layers of 12.5mm thick boards. Rigid walls must have a minimum thickness of 150mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m<sup>3</sup>. Rigid floors must have a minimum thickness of 150mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m<sup>3</sup>.

\*) Timber studs: no part of the penetration seal may be closer than 100mm to a stud, and minimum 100mm of insulation of class A1 or A2 according to EN 13501-1 must be provided within the cavity between the penetration seal and the stud.



## Installation Instructions

1. Before installing the stonewool core, please ensure that the surface of all surrounding constructions is free from all loose contaminants, dust and grease. The stonewool should be dry and sound, and any large loose pieces should be brushed off before spraying.
2. Knauf Fire Protection Coating is water based, so in cases where corrosion protection is a problem, some metals may require a barrier between the seal and the surface prior to this installation.
3. Select the type of stonewool core and friction fit into the seal according to the fire resistance table on page 1. To secure high density stonewool boards, please seal between the stonewool and the surface of all surrounding constructions on both sides with Knauf FPA Acrylic which will act as an adhesive.
4. When fitting stonewool boards into gypsum walls the side of the boards should be flush with the surface of the gypsum on both sides.
5. When fitting double layer stonewool boards in masonry or concrete constructions, the boards should be flush with the surface of the construction on both sides to maximize the fire resistance. If this is not possible, there should be an air gap of at least 30mm between the boards.
6. When fitting single layer stonewool in masonry or concrete constructions, it can be positioned to either side of the construction or anywhere in between.
7. When installing stonewool in hollow floor slabs, fire seals should be installed from the soffit side of the floor assuming there is sufficient thickness of concrete below the void. Where this is not the case, tubular voids should be filled with stone wool normally the same thickness as the depth of the floor slab.
8. Spray apply Knauf Fire Protection Coating to the stonewool according to the fire resistance table on page 1. Spraying pressures will depend on the type of pump and nozzle used approximately 1700 to 2300 psi using a 25 to 35 thou' tip. Apply the coating in smooth strokes and with the minimum of overspray to achieve an even film thickness and consistent drying across the stonewool.
9. The required wet film thickness (WFT) is usually achieved when the surface is to a satisfactory proper white finish when dry.
10. Overspray can increase drying times. Drying times will be dependent on film thickness, ambient temperature and humidity and may be reduced by using drying ovens and/or fans.
11. Knauf Fire Protection Coating can be over-painted with most emulsion or alkyd (gloss) paints.

## Product description

Knauf FP Coating is designed to be applied via spraying directly onto mineral fibres. The coating dries to give a sound, flexible white surface finish. During installation of mineral fibres, the cured sealant coating reduces de-lamination and increases surface stability for adhesive and fixing sealant application.

### Storage

Up to 12 months when stored in unopened containers under cool dry conditions. Avoid frost and extremes of temperature. Stored in temperatures between 5 °C and 30 °C

## Sizes and Intended Use

Size	Intended Use
TVOC	0.20 mg/m <sup>2</sup> h
Formaldehyde	n.d.
Ammonia	n.d.
Carcinogenic	n.d.

n.d. means not detected

FPC complies with the requirements of BREEAM according to the M1 Protocol for Chemical and Sensory Testing of Building Materials as published by RTS version 15.12.2004 which is the best possible environmental and indoor hygiene health protection mark for coatings. Tested by Eurofins Product Testing, report number 392-2014-00000407B.

## Scope of application

Knauf Fire Protection Coating - FPC is designed to be applied via spraying directly onto mineral fibres. The coating dries to give a sound, flexible white surface finish. During installation of mineral fibres, the cured sealant coating reduces de-lamination and increases surface stability for adhesive and fixing sealant application.

The ablative property of the coating resists flame spread and protects the mineral fibres against fire penetration by significantly reducing the permeability of the mineral fibre core and prevents the passage of hot gases, thus reducing the temperature rise on the unexposed side and reducing heat conduction through the building services.

## Sound insulation

Description	Sound reduction
Knauf Fire Protection Coating 1.0mm WFT on both sides of minimum 50 mm thick stone wool with density minimum 160 kg/m <sup>3</sup>	Rw 55 dB

FPC has been tested at BM Trada (UKAS accredited); according to EN ISO 10140-2:2010.

## Properties

- Simple and very quick to install
- Easy to retrofit additional building services after installation
- Permanently flexible - will accommodate movements during fire and smaller movements in the construction it has been fitted within
- Suitable for most surfaces, including concrete, bricks, masonry, steel, wood, gypsum, glass, plastics and most non-porous surfaces
- May be used in unlimited lengths in walls with heights up to 1200 mm and in floors with widths up to 120 mm
- Certified according to ETA xxxxx
- EAD xxxxx

## Safety

Wash the material from the skin while still wet. Material in contact with eyes should be washed out immediately with water.

Seek medical advice if discomfort persists. More detailed information can be found in the relevant Knauf Fire Protection Coating - FPC Safety Data Sheet.

# KNAUF FIRE PROTECTION MORTAR

2



Knauf Fire Protection Mortar is a dry white powder consisting of inorganic compounds and perlite. When mixed with water the compounds form a highly thermally insulating fire seal to prevent the spread of fire and smoke through openings in fire rated walls and floors, including openings formed to accommodate building service penetrations.

Knauf Fire Protection Mortar expands by up to 1% by hydraulic action during curing ensuring a very tight seal around service penetrations and the surrounding construction.

Knauf Fire Protection Mortar has a rapid setting time and is easy to sand or drill after cure. The compound dries to an off-white colour which may be painted if required.

## Method of delivery

- › Knauf Fire Protection Mortar - FPM Bags of 20 litres, article no. 651116

## Installation Instructions

1. Ensure the faces of the aperture opening are free of dust and any other contaminants. The faces may be moistened for better adhesion.
2. If the mortar seal is required to be load bearing, please see instructions in the Technical Data Sheet.
3. Bare metal pipes passing through the seal must be protected against corrosion using a suitable primer/protection system.
4. When sealing drywalls the mortar should be flush with the surface of the wall on both sides.
5. When sealing masonry or concrete constructions, the seal can be positioned to either side of the construction or anywhere in between.
6. When installing Knauf Fire Protection Mortar in hollow floor slabs or boards, level the fire seal with the soffit side. Ensure there is sufficient thickness of concrete below the void for the depth of mortar. Where this is not the case, tubular voids should be filled with stone wool normally the same thickness as the depth of the floor slab. Alternatively, simply fire seal on both sides.
7. Install a stone wool shutter board where is necessary to achieve the required thickness of mortar (see the drawings on pages 2-19). Make sure that this achieves a very tight seal – any small openings should be sealed with Knauf FPA Acrylic.
8. Pour clean water into a suitable mixing vessel and add the mortar to obtain the required consistency. Mix steadily at low speed and ensure that any lumps of powder are fully dispersed. Always add the mortar to the water, do not reverse this mixing process. For different mix ratios and drying times, please refer to the Technical Data Sheet.
9. Once the desired consistency is achieved pour or trowel the mortar onto the shutter board making sure that it flows into all corners and around services. Apply a firm pressure to the mortar to eliminate any trapped air bubbles. Build up to the required depth.

### Product description

Knauf Fire Protection Mortar - FPM is a dry white powder consisting of inorganic compounds and perlite.

When mixed with water, the compounds form a highly thermally insulating fire sealing compound to prevent the spread of fire and smoke through openings in fire rated walls and floors, including openings formed around building service penetrations.

#### Storage

No particular limit for unopened bags in dry places with storage temperatures between 5 °C and 30 °C.

### Scope of application

Knauf Fire Protection Mortar - FPM expands approx. 1% by hydraulic action during curing ensuring a very tight seal around the service penetrations and the surrounding opening apertures. It will also maintain the acoustic design performance in walls and floors.

Knauf Fire Protection Mortar - FPM is easy to sand or drill. The compound dries to an off-white colour which may be painted.

Knauf Fire Protection Mortar is fully set within 1 hour, and will prevent the passage of fire and smoke for up to 4 hours.

### Properties

- Classified in walls and floors of concrete, brick, gypsum etc
- Suitable for cables, bundled cables, cable racks, cable trays, steel, copper, alupex, plastic pipes and air ventilation ducts
- High degree of mechanical resistance; the seal is load bearing without reinforcement
- Nearly unlimited storage time
- No priming necessary prior to application in most building material substrates however metal services in contact with the seal must be corrosion protected
- Certified according to ETA 18/0929
- EAD 350454-00-1104

### Emission data (indoor air quality)

Compound	Emission rate after 3 days	Emission rate after 4 weeks
TVOC	12 µg/m <sup>3</sup>	< 5 µg/m <sup>3</sup>
TSVOC	n.d.	< 5 µg/m <sup>3</sup>
VOC w/o NIK	n.d.	< 5 µg/m <sup>3</sup>
R Value	n.d.	< 1
Formaldehyde	7.1 µg/m <sup>3</sup>	n.d.
Acetaldehyde	< 3 µg/m <sup>3</sup>	n.d.
Sum for+ace	< 0.006 ppm	n.d.
Carcinogenic	< 1 µg/m <sup>3</sup>	< 1 µg/m <sup>3</sup>

n.d. means not detected

### Sound insulation

Description	Sound reduction
Single sided cast ≥ 50 mm on stone wool board	64 dB
Single sided cast ≥ 100 mm without board	64 dB
Double sided cast ≥ 25 mm on stone wool board	64 dB
Double sided cast ≥ 50 mm without board	64 dB

FPM has been tested at BM Trada (UKAS accredited); according to EN ISO 10140-2:2010.

### Safety

Please observe the EC Safety Data Sheet.

# KNAUF FIRE PROTECTION GRAPHITE PLATE

2



Knauf FPG plate is a preformed self-adhesive intumescent plate, used to reinstate the fire resistance performance of flexible wall constructions when punctured with plastic wall boxes.

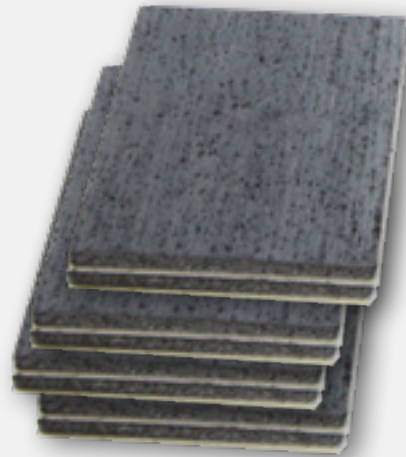
It is used where the walls have been provided with apertures for the penetration of conduits and cables into socket boxes, on one or both sides of the wall.

## Method of delivery

- Knauf FPG plate 45x45mm (EL), article no. 651210
- Knauf FPG plate Ø59mm (EL), article no. 651212

## Installation Instructions

1. Wall boxes should be installed according to the Manufacturer's Instructions.
2. The aperture around the wall box should be as tightly fitting as possible and any gaps filled with plaster filler.
3. Before installing Knauf FPG plate ensure that the surfaces are clean and sound, free from dirt, grease and other contamination.
4. Remove the backing paper from the back of the pad.
5. Fit into place inside at the base of the socket box.
6. The pad must not obstruct cable entry.



2

### Product description

#### Storage

May be stored for a long period of time. To be stored in temperatures between 5 °C and 30 °C.

### Scope of application

Knauf FPG plate immediately reacts to fire through the heat and automatically expands and fills up the box, preventing fire from passing through.

Knauf FPG plate will reinstate the fire resistance performance of flexible wall constructions for up to 120 minutes. It also prevents the passage of fire through the electrical conduits between socket boxes.

### Properties

- Wall boxes can be fitted back to back
- Up to 120 minutes of both integrity and insulation resistance
- Quick and easy to install
- Can be used on insulated and uninsulated walls
- Tested with a wide range of cables and conduits interconnected between boxes
- Tested with empty conduits between boxes for future cable transits
- ETA 18/0926
- EAD 350141-00-1104



# KNAUF FIRE PROTECTION FOAM

2



The fire protection foam is particularly well-suited for fast and flexible closure of small and medium-sized through penetration firestop systems. A packaging unit with six cartridges of Knauf Fire protection foam - FPF, twelve mixing nozzles, six pairs of gloves, as well as one roll of duct tape, is delivered. The duct tape is outstandingly suited as form work for Knauf Fire protection foam - FPF. Through use of the new cordless DynamicMax dispensing gun multiple cartridges can be quickly and conveniently processed in succession.

The end of the reaction, the permanently elastic structure of the penetration seal enables easy retroactive-installation. Retroactive installations can simply be poked through the existing foam. Gaps that occur due to removal of cables or pipes can easily be refilled with the Knauf Fire protection foam - FPF.

## Benefits:

- > Easy to use
- > Single-product solution
- > Optimal processing

**Installation Instructions**

1. Read the Safety Data Sheet before use and use the recommended personal protective equipment.
2. Remove all loose debris, any contaminants such as grease and oil from the surfaces to be sealed.
3. Moisture is necessary to ensure a fast and even curing of the foam. Spray surfaces with water to moisten them when foam is applied (a spray bottle for plants can be used). This is especially important in warm and dry areas.
4. The tin must be shaken well 15-20 times before use. Attach the gun to the tin but do not overtighten or activate the release valve.
5. The tin should be turned upside down for foam application so that the gun is under the tin.
6. Depending on the joint orientation and size, best results will be obtained by building up multiple layers from the bottom, thus allowing each individual layer to part cure. Do not attempt to insert excessive wet foam as rapid expansion will cause wasteful overspill of curing foam in the joint and may apply pressure to soft materials and push them out of position. Foam extrusion can be controlled by depressing the trigger on the gun more or less or reducing the pressure on the valve.
7. Once the gap or joint is completely filled, excessive overspill should be removed by cutting with a knife or similar.
8. After sealing the foam should be covered by a substrate resistant to mechanical damage and UV-radiation.

**Product description**

Knauf FP Foam is a fire classified construction foam that has particularly good acoustic properties. Knauf FP Foam is designed to maintain the fire resistance in walls by filling linear gaps in concrete and masonry walls.

**Storage**

Store tightly, in original packaging, in a well-ventilated space. Store at 5 - 30 °C. Protect from frost.

**Method of delivery**

Knauf FP Foam cans of 750ml, article no. 651136

**Scope of application**

Knauf FP Foam satisfies the fire resistance requirement of 240 minutes at a depth of 20 cm, and is suited for quick and inexpensive sealing between concrete elements, Leca and similar where top finish is not required. The sound resistance classification is 58dB at a depth of 10 cm, which may solve some problems in the construction industry. Knauf FP Foam also has excellent thermal properties (0.0354 W/mK).

**Properties**

- Sealing for window fittings
- Sealing for door fittings
- Filling free spaces, cracks, gaps and pipe penetrations
- Sealing roof, wall and floor joints
- Thermal insulation
- Acoustic insulation
- Certified according to ETA 21/0994
- EAD 350141-00-1106

**Fire Classification**

SEALING MASONRY OR CONCRETE WALLS ≥ 150MM		
Jointtype Maxwidth	Installation Min seal depth	Classification
Horizontal joint ≤ 20mm	Single sided ≥ 150mm 1)	EI 180-H-X-F-W 20
Horizontal joint ≤ 20mm	Single sided ≥ 150mm 1)	EI 240-H-X-F-W 20
Vertical joint ≤ 20mm	Single sided ≥ 150mm 1)	EI 60-V-X-F-W 20
Vertical joint ≤ 20mm	Single sided ≥ 150mm 1)	EI 240-V-X-F-W 20

- 1) Knauf FP Foam should be covered or painted on both sides.
- 2) Knauf FP Foam must be covered on both sides with ≥ 5mm Knauf Fire Protection Polymer - FPP.

**Sound insulation**

Description	Sound reduction
Single sided seal ≥ 50mm depth & ≤ 30mm width	61 dB RW

Same or higher sound reduction will be achieved with greater depth, double sided or with backing material. The sound insulation value is only valid for the foam and not for other elements in the building construction. The sound insulation has been tested by the accredited laboratory BM Trada in Great Britain according to EN ISO 10140-2. Test report is available upon request.

**Safety**

Please observe the EC Safety Data Sheet.

# KNAUF FIRE PROTECTION FOAM

2



Knauf Fire protection foam - FPF is 2-component polyurethane foam stored in a cartridge, with halogen-free fire safety additives, intumescent.

## Method of delivery

- › Knauf Fire protection foam FPF - 380 ml cartridge, article no. 586216
- › Knauf Fire protection foam FPF - 380 ml - SET (including: 6 x FPF 380 ml / 12 x mixing nozzles / 6 x pair of gloves / 1 x duct tape) article no. 586217
- › Knauf Fire protection foam FPF starter KIT – one pcs of FPF 380 ml cartridge + pistol article no. 586170



TECHNICAL DETAILS	
Approval	ETA-11/0206 and ETA-10/0431
Classification of the reaction to fire in accordance with DIN EN 13501-1	Class E
Expansion ratio in the event of fire	1.6x to 4.5x Tested on samples at 450°C for 25 minutes with superimposed load. The expansion ratio is a laboratory characteristic value. The expansion ratio in installed status depends on the existing boundary conditions.
Bulk density (material has completely reacted)	$\rho \geq 215 \text{ kg/m}^3$
Color	Red-brown
Testing the fire protection properties under environmental influences	Use category Z1 (use in indoor areas with high humidity and temperatures $\geq 0 \text{ }^\circ\text{C}$ )
Work interruption	Approx. 50 seconds (at 22 °C material temperature and ambient temperature)
Foam yield	Up to 2.1 litres (at 22 °C material temperature and ambient temperature)
Cutability	After approx. 90 seconds (at 22 °C material temperature and ambient temperature)
Air permeability	$Q_{600} < 0.08 \text{ m}^3/(\text{h} \cdot \text{m}^2)$ (at 600 Pa differential pressure, with a measuring accuracy of 0.01 m <sup>3</sup> /h, no air permeability was measurable) Test standard: EN 1026 (test specimen dimensions 350 x 350 x 200 [mm], tested without penetrating elements)
Resistance to static differential pressure	No visible changes up to the maximum test pressure of the test device ( $P_{\text{max}} = 10,000 \text{ Pa}$ ). Test standard: in accordance with EN 12211 (test specimen dimensions 350 x 350 x 200 [mm], tested without penetrating elements)
Thermal conductivity	$\lambda = 0.088 \text{ W}/(\text{m} \cdot \text{K})$ . Test standard: DIN EN 12667
Airborne sound insulation	$D_{n,e,w} (C; C_{tr}) = 66 (-1; -6) \text{ dB}$ Test standard: EN ISO 717-1 (test specimen dimensions 360 x 360 x 200 [mm], tested without penetrating elements)
Continuous contact or ambient temperature	$\leq 80 \text{ }^\circ\text{C}$

### Storage

Store dry in the original packaging.  
Storage temperature: + 5°C to + 30°C  
Storage stability: 12 months at 23°C/50% relative air humidity, see imprint on cartridge for expiry date

### Influence of coating materials and chemicals

The following paints and occasional, brief influence of chemicals do not cause any changes in the technical fire safety properties:

**Coating materials:** Dispersion paint, alkyd resin paint, polyurethane acrylic lacquer, epoxy resin lacquer, silicone

**Solvent/oil:** Trichloroethylene, xylene, acetone, white spirit, butyl acetate, butanol

**Gaseous chemicals:** Ammonia

**Note:** Environmental conditions with high humidity levels and/or some coating materials and chemicals can cause minor lightening of the color or changes in color.

### Scope of application

Knauf Fire protection foam - FPF can be used as a sealing system for cables, cable trays, combustible and non-combustible pipes in walls and floors. Knauf Fire protection foam FPF is particularly characterized by its easy processing. It can be used as a mixed penetration seal (EI 90), as well as a pure cable penetration seal (EI 120).

The optimal match between the beginning of the reaction and hardening enables sufficiently long work interruptions for the user, as well as fast work progress. Thanks to the high viscosity, the user does not have to deal with foam running out of the penetration seal. After hardening, the permanently elastic structure of the penetration seal enables easy retroactive-installation.

### Contact with metals and plastics

The surface consistency of aluminum, stainless steel, galvanized steel and plastics made of polyethylene and polyvinyl chloride is not affected in a negative way upon contact with Knauf Fire protection foam FPF.

### Properties

- Easy, fast and clean application
- Single-product solution
- Low air leakage through penetration
- Low thermal conductivity
- High airborne sound insulation
- Fire resistance up to EI120
- Certified according to ETAG 026-2

### Safety

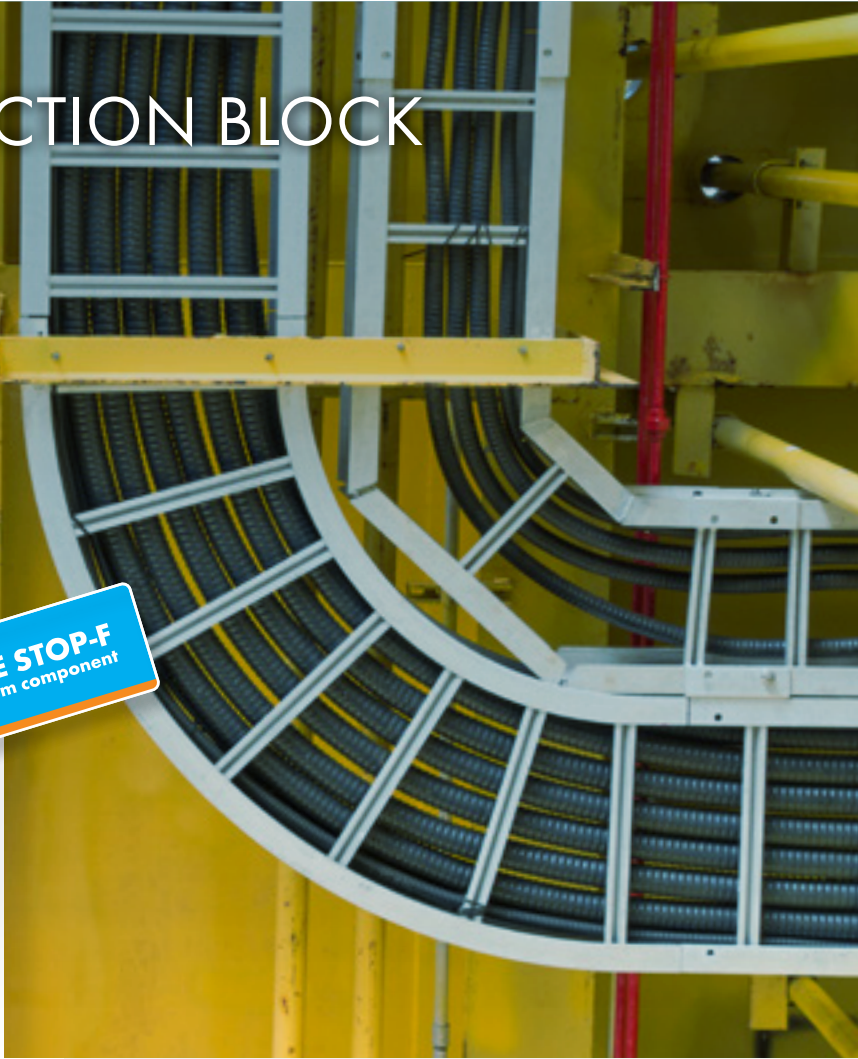
Please observe the EC Safety Data Sheet.

# KNAUF FIRE PROTECTION BLOCK

2



**FIRE STOP-F**  
system component



Knauf Fire protection block - FPB is a soft, flexible moulded foam part that is used in the Knauf Firestop system - F, and as a filling block for free areas without penetrating installations in the Knauf Fire protection foam FPF.

## Method of delivery

- › Knauf Fire protection Block FPB - 1 (1 pcs), article no. 586162
- › Knauf Fire protection Block FPB - 4 (4 pcs), article no. 586522

TECHNICAL DETAILS	
Approval	ETA-11/0206 and ETA-10/0431
Classification of the reaction to fire in accordance with DIN EN 13501-1	Class E
Color	Red-brown
Bulk density	$\rho = 240 \text{ kg/m}^3$ to $300 \text{ kg/m}^3$
Dimensions	144 mm x 60 mm x 200 mm (B x H x L)
Testing the fire protection properties under environmental influences	Use category Z1 (use in indoor areas with high humidity and temperatures $\geq 0 \text{ }^\circ\text{C}$ )
Air permeability	Q600 = $6.61 \text{ m}^3/(\text{h} \cdot \text{m}^2)$ (at 600 Pa differential pressure) Test standard: EN 1026 (test specimen dimensions 355 x 550 x 200 [mm], tested without penetrating elements)
Resistance to static differential pressure	Pmax = 3700 Pa Test standard: in accordance with EN 12211 (test specimen dimensions 355 x 550 x 200 [mm], tested without penetrating elements)
Thermal conductivity	$\lambda = 0.103 \text{ W}/(\text{m} \cdot \text{K})$ Test standard: DIN EN 12667
Airborne sound insulation	Dn,e,w (C;Ctr) = 68 (- 4; - 11) dB Test standard: EN ISO 717-1 (test specimen dimensions 360 x 360 x 200 [mm], tested without penetrating elements)
Surface Resistivity	$R_s = 2 \times 10^9 \Omega$ Test standard: BGR 132:2003 (2.6), DIN IEC 60167
Microbial metabolic potential	Inert, fungistatic or bacteriostatic Test standard: DIN EN ISO 846
Continuous contact or ambient temperature	$\leq 80 \text{ }^\circ\text{C}$

### Storage

Store dry in the original packaging.  
Storage temperature: + 5°C to + 30°C

### Scope of application

Knauf Fire protection block - FPB can be used as mixed penetration seal to EI 120 for rigid walls, rigid floors and flexible walls. Through penetration firestop system for electrical cables, telecommunication cables and optical fibre cables, conduits, as well as flammable and non-flammable pipes.

### Properties

- Easy, fast and clean application
- Low air leakage through penetration
- Low thermal conductivity
- High airborne sound insulation
- Fire resistance up to EI 120
- Certified according to ETAG 026-2

### Influence of coating materials and chemicals

The following paints and occasional, brief influence of chemicals do not cause any changes in the technical fire safety properties:

**Coating materials:** Dispersion paint, alkyd resin paint, polyurethane acrylic lacquer, epoxy resin lacquer, silicone

Solvent/oil: Trichloroethylene, xylene, acetone, white spirit, butyl acetate, butanol

**Gaseous chemicals:** Ammonia

**Note:** Environmental conditions with high humidity levels and/or some coating materials and chemicals can cause minor lightening of the color or changes in color.

### Contact with metals and plastics

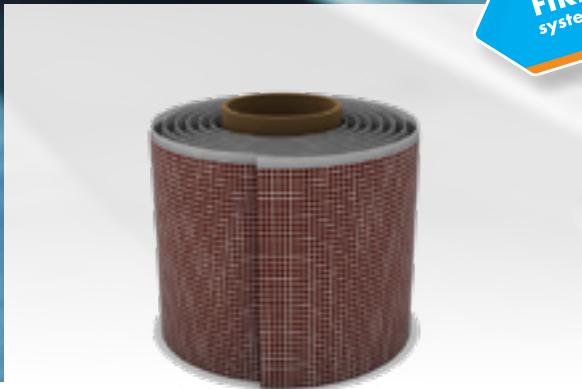
The surface consistency of aluminum, stainless steel, galvanized steel and plastics made of polyethylene and polyvinyl chloride is not affected in a negative way upon contact with Knauf Fire protection block FPB.

### Safety

Please observe the EC Safety Data Sheet.

# KNAUF FIRE PROTECTION WRAP

2



**FIRE STOP-F**  
system component



Knauf Fire protection wrap - FPW is a non-shrinking, solvent-free, self-adhesive, plastic butyl sealing tape that is intumescent in the event of fire. It is used as a cable wrap for fire resistance class EI 120 in the Knauf Firestop system - F.

## Method of delivery

- › Knauf Fire protection Wrap – FPW (5000 x 150 x 3 [mm]) incl. 40 steel clips, article no. 586157

TECHNICAL DETAILS	
Approval	ETA-11/0206
Classification of the reaction to fire in accordance with DIN EN 13501-1	Class E
Color	Red-brown
Dimensions	5000 x 150 x 3 [mm], delivery in roll form
Application temperature	5 °C to 30 °C
Bulk density	$\rho = 1215 \text{ kg/m}^3$ to $1485 \text{ kg/m}^3$
Expansion ratio	6.0x to 9.0x Tested on samples at 450°C for 25 minutes with superimposed load. The expansion ratio is a laboratory characteristic value. The expansion ratio in installed status depends on the existing boundary conditions.
Continuous contact or ambient temperature	< 60 °C
Testing the fire protection properties under environmental influences	Use category Z1 (use in indoor areas with high humidity and temperatures $\geq 0 \text{ °C}$ )

### Storage

5°C to 30°C (store rolls standing, in dry area protected against dust)

### Scope of application

Knauf Fire protection Wrap – FPW can be used for sheathing cables and cable trays in cable and mixed penetration seals.

### Properties

- Rubber-like
- Non-shrinking
- Self-adhesive
- Can be plastically formed

### Influence of coating materials and chemicals

The following paints and occasional, brief influence of chemicals do not cause any changes in the technical fire safety properties:

**Coating materials:** Dispersion paint, alkyd resin paint, polyurethane acrylic lacquer, epoxy resin lacquer, silicone

Solvent/oil: Trichloroethylene, xylene, acetone, white spirit, butyl acetate, butanol

Gaseous chemicals: Ammonia

**Note:** Environmental conditions with high humidity levels and/or some coating materials and chemicals can cause minor lightening of the color or changes in color.

### Contact with metals and plastics

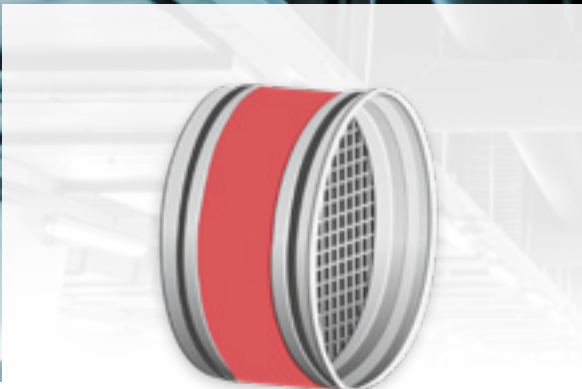
The surface consistency of aluminum, stainless steel, galvanized steel and plastics made of polyethylene and polyvinyl chloride is not affected in a negative way upon contact with Knauf Fire protection wrap FPW.

### Safety

Please observe the EC Safety Data Sheet.

# KNAUF FIRE PROTECTION DAMPER

2



Knauf FP Damper is used to fire proof ventilation ducts where they penetrate fire rated constructions such as fire compartments and fire walls, preventing the passage of fire and smoke both surrounding and inside the ventilation duct.

The product consist of a steel casing containing horizontal steel blades treated with a technically advanced heat expanding graphite which closes off the whole damper in a fire. The aperture surrounding the dampers are fire sealed with Knauf FPC Panel in walls and Knauf FPM – fire protection mortar in floors.

The damper can be installed in the fire seal and the ventilation ducting attached or the damper can be connected to the ducting and then fire sealed.

The aperture where the ducts pass through can include one or multiple ventilation ducts. One can also pass through other technical services such as cables, cable trays and pipes within the same aperture.

## Method of delivery

- › Knauf FP Damper Ø63mm, article no. 651215
- › Knauf FP Damper Ø80mm, article no. 651216
- › Knauf FP Damper Ø100mm, article no. 651224
- › Knauf FP Damper Ø125mm, article no. 651223
- › Knauf FP Damper Ø160mm, article no. 651222
- › Knauf FP Damper Ø200mm, article no. 651221
- › Knauf FP Damper Ø250mm, article no. 651220
- › Knauf FP Damper Ø315mm, article no. 651219
- › Knauf FP Damper Ø400mm, article no. 651218
- › Knauf FP Damper Ø500mm, article no. 651217
- › Knauf FP Damper Ø630mm, article no. 651225
- › Knauf FP Damper Ø800mm, article no. 651227
- › Knauf FP Damper Ø1000mm, article no. 651226
- › Knauf FP Damper Ø1250mm, article no. 651214

### Installation Instructions in flexible walls

1. Before installing Knauf FPC Panel ensure that the surface of all service penetrations and surrounding construction is free from all loose contaminants, dust and grease.
2. Knauf FP Coating and Knauf FPA Acrylic are water based, so in cases where corrosion protection is a problem, some metals may require a barrier between the seal and the surface prior to this installation.
3. Use the product Knauf FPC Panel 1-S 50mm with two boards in the aperture. The coated side of the board should be flush with the surface of the wall on both sides.
4. When fire sealing shaft walls consisting of gypsum only on one side, subject to authority approval, install Knauf FPC Panel on the exposed side only.
5. Cut the required board(s) to suit the aperture dimensions and type and size of service penetration(s). All exposed and cut edges of the board can be sealed with Knauf FP Coating or Knauf FPA Acrylic prior to fitting which will act as an adhesive and ensure a smoke tight seal.
6. Cut a hole for the damper and glue the damper into the boards with Knauf FPA Acrylic or Knauf FP Coating.
7. All joints, gaps or imperfections in the installed seal must be filled with Knauf FPA Acrylic on both sides.
8. Connect the ventilation ducts to the damper.
9. Insulate the duct towards the fire seal on both sides with 30mm thick stone wool mat in lengths given in the table on page 1. If the duct is ending in the wall then insulate on one side only.
10. Knauf FPC Panel can be over-painted with most emulsion or alkyd (gloss) paints.

### Installation Instructions in rigid walls

1. Before installing Knauf FPC Panel ensure that the surface of all service penetrations and surrounding construction is free from all loose contaminants, dust and grease.
2. Knauf FP Coating and Knauf FPA Acrylic are water based, so in cases where corrosion protection is a problem, some metals may require a barrier between the seal and the surface prior to this installation.
3. Use the product Knauf FPC Panel 1-S 50mm with two boards in the aperture. The coated side of the board should be flush with the surface of the wall on both sides, but not at such distance so the ends of the damper is covered.
4. Cut the required board(s) to suit the aperture dimensions and type and size of service penetration(s). All exposed and cut edges of the board can be sealed with Knauf FP Coating or Knauf FPA Acrylic prior to fitting which will act as an adhesive and ensure a smoke tight seal.
5. Cut a hole for the damper and glue the damper into the boards with Knauf FPA Acrylic or Knauf FP Coating.
6. All joints, gaps or imperfections in the installed seal must be filled with Knauf FPA Acrylic on both sides.
7. Connect the ventilation ducts to the damper.
8. Insulate the duct towards the fire seal on both sides with 30mm thick stone wool mat in lengths given in the table on page 1. If the duct is ending in the wall then insulate on one side only.
9. Knauf FPC Panel can be over-painted with most emulsion or alkyd (gloss) paints.

### Installation Instructions in rigid floors

1. Ensure the faces of the aperture opening are free of dust and any other contaminants. The faces may be moistened for better adhesion.
2. Bare metal pipes or similar passing through the seal must be protected against corrosion using a suitable primer/protection system.
3. Install the damper in the aperture with a temporary support, for instance with the shutter board.
4. Install a stone wool shutter board or another type of shutter to achieve the required 100mm thickness of mortar. Make sure that this achieves a very tight seal – any small openings should be sealed with Knauf FPA Acrylic.
5. Pour clean water into a suitable mixing vessel and pour enough mortar to obtain the required consistency. Mix well to avoid lumps. Always add the mortar to the water, do not reverse this mixing process. For different mix ratios and drying times, please refer to the mortar's Technical Data Sheet.
6. Once the desired consistency is achieved pour or trowel the mortar onto the shutter board making sure that it flows into all corners and around services. Apply a firm pressure to the mortar to eliminate any trapped air bubbles. Build up to the required depth of 100mm.
7. Connect the ventilation ducts to the damper.
8. Insulate the duct towards the fire seal on the top side with 30mm thick stone wool mat in lengths given in the table below:

2

FIRE RESISTANCE		
Construction	Description	Classification
Flexible and rigid walls with thickness $\geq 100\text{mm}$	$\leq \varnothing 400\text{mm}$ FP Damper/duct with $\geq 200\text{mm}$ stone wool mat on both sides	EI 120 (E 120)
	$\leq \varnothing 1250\text{mm}$ FP Damper/duct with $\geq 500\text{mm}$ stone wool mat on both sides	EI 60 (E 90)
	$\leq 600\text{mm}$ high x $1000\text{mm}$ wide FP Damper/duct with $\geq 500\text{mm}$ stone wool mat on both sides	EI 120 (E 120)
	$\leq 1200\text{mm}$ high x $1700\text{mm}$ wide FP Damper/duct with $\geq 500\text{mm}$ stone wool mat on both sides	EI 90 (E 90)
Rigid floors with thickness $\geq 150\text{mm}$	$\leq \varnothing 400\text{mm}$ FP Damper/duct with $\geq 150\text{mm}$ stone wool mat on top side	EI 120 (E 180)
	$\leq \varnothing 1000\text{mm}$ FP Damper/duct with $\geq 500\text{mm}$ stone wool mat on top side	EI 90 (E 90)
	$\leq 600 \times 1000\text{mm}$ FP Damper/ duct with $\geq 500\text{mm}$ stone wool mat on top side	EI 60 (E 90)
	$\leq 1000 \times 1000\text{mm}$ FP Damper/ duct with $\geq 500\text{mm}$ stone wool mat on top side	EI 90 (E 90)

### Properties

- Maintenance free and no electrical connections necessary.
- The same damper can be installed in both walls and floors.
- It seals against penetration of fire and smoke both surrounding and inside the ventilation duct.
- Closes in the area where the fire is located but not elsewhere so the ventilation system can be used to extract smoke from areas that are not on fire.
- Keeps the temperature in the duct network lower than  $120^\circ\text{C}$  and will therefore protect fans and sensitive units in the system.
- Service life of more than 50 years; the damper will last the same life cycle as the ventilation system.

### Scope of application

Knauf FP Damper is used to fire proof ventilation ducts where they penetrate fire rated constructions such as fire compartments and fire walls, preventing the passage of fire and smoke both surrounding and inside the ventilation duct.

The damper can be installed in the fire seal and the ventilation ducting attached or the damper can be connected to the ducting and then fire sealed.

The aperture where the ducts pass through can include one or multiple ventilation ducts. One can also pass through other technical services such as cables, cable trays and pipes within the same aperture.

### Sound insulation

Description	Sound reduction
Knauf FPC Panel	55 dB RW
Knauf FPM – fire protection mortar	64 dB RW

The sound insulation values are valid for the fire seal only and not any other components in the construction, as for instance the ventilation ducts.

This system has been tested at BM Trada (UKAS accredited); according to EN ISO 10140-2:2010.

### Loadbearing Properties in Floors

Test in 1500x1000mm frame	Results
Soft body impact, serviceability	500 Nm
Soft body impact, safety in use	700 Nm
Hard body impact, serviceability	6 Nm
Hard body impact, safety in use	10 Nm
Concentrated load to ETAG 26-2	15 kN

### Storage

To be stored in temperatures between  $5^\circ\text{C}$  and  $30^\circ\text{C}$ .

### Safety

Please observe the EC Safety Data Sheet.



### › Dust Formation and General Maintenance

Tests conducted on Knauf FP Damper to determine dust formation inside the damper has shown that dust does not collect inside the damper, and no more than in any other components in the ventilation system. The dust has a tendency to be blown through the dampers as long as the ventilation system is in constant operation and installed in normal indoor environments (Z2).

It is recommended that the ventilation system is designed and cleaned according to local regulations and building codes to provide access for inspections and cleaning, along with the frequency of these cleaning routines. Knauf FP Damper can easily be cleaned using a vacuum cleaner if this should be needed. Ducts from kitchens and similar, where there is the risk of grease and high humidity, must be fitted with grease filters or similar that are cleaned at fixed frequencies.

### › Minimum Distances and Limitations

The maximum size of an aperture is 1200 x 2400mm in floors and 1500mm height x 2400mm width or 1200mm height x unlimited width in walls. An aperture can include several services, and they may also include a combination, e.g. cables, cable trays and pipes.

The minimum permitted separation between adjacent seals/apertures is 200 mm. Services should be a minimum of 25 mm from seal edges. Services within the system Knauf fire seal do not require a minimum separation, except when pipes where combustible pipe insulation penetrates the seal and plastic pipe penetrations which should be a minimum of 30 mm from other services in the aperture. There must be sufficient distance between two ventilation ducts so that the fire seal can be constructed as stated in the installation instructions.

### › Supporting Constructions

Flexible walls must have a minimum thickness of 100mm and comprise steel studs or timber studs\*) lined on both faces with minimum 2 layers of 12.5mm thick boards.

Rigid walls must have a minimum thickness of 100mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m<sup>3</sup>.

Rigid floors must have a minimum thickness of 150mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m<sup>3</sup>.

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.

\*) Timber studs: no part of the penetration seal may be closer than 100mm to a stud, and minimum 100mm of insulation of class A1 or A2 according to EN 13501-1 must be provided within the cavity between the penetration seal and the stud.

### › Casing Leakage Classification

Knauf FP Dampers are fitted with high quality gaskets in circular ducts, and are tested according to EN 1751 to the highest possible class C for all sizes. Testing was conducted at BRE's accredited laboratory and test reports can be provided upon request.

Case leakage classification for rectangular dampers is dependent on which locking mechanism is chosen, and the classification will be the same as the classification of the locking mechanism used. Knauf can deliver dampers with most common types of locking mechanisms that are available in the marketplace.



# PRODUCTS FIRE PROTECTIVE



# KNAUF FIREPAINT STEEL

3



Knauf Firepaint Steel is a one component, solventborne, physically drying intumescent coating for passive fire protection of structural steel against cellulosic fires. It is suitable for in-shop and onsite applications. Knauf Firepaint Steel received European Technical Approval.

## Application

### Spray application

During application it is recommended to put the steel sections on support trestles such that the area of contact is minimum. Best practice is "sharp" contact. This minimises the area of damages and therefore limits the to-be-repaired surfaces after the applications. With Knauf Firepaint products applied in one/few coat(s) at low dry film thicknesses, it is of special importance that a continuous, pinhole-free paint film is obtained at application of each coat. An application technique which will ensure good film formation on all faces of the profiles must be adopted. It is very

important to use nozzles of the correct, not too big, size and to have a proper, uniform distance of the spray gun to the surface; 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas application of a stripe coat will therefore be good painting practice. The finished coating must appear as a homogeneous film with a smooth surface; irregularities such as dust, dry spray, abrasives, should be remedied.

### Brush and roller application

Application with hand tools, brush or roller is possible but it results in a more uneven paint film by these methods compared to airless spray paints and many additional coats may be necessary to obtain the specified dry film thickness.

Application by hand tools, brush, or roller is generally only recommended for small areas, repairs and touch-up; although, repairs can often be made easily by putty knife or plastering trowel.

## Application conditions

Knauf Firepaint Steel can be applied on steel temperatures between +5°C and + 50°C. The surface temperature must always be 3°C above dew point and the maximum relative humidity should not exceed 85% during the application. The area where Knauf Firepaint Steel is applied must be well ventilated and proper air circulation shall be secured for optimal drying.

For applications under warm conditions special attention shall be given to avoid solvent entrapment due to application of high dry film thicknesses per coat. For optimum drying in these conditions it is generally recommended to apply several thinner coats to obtain the specified dry film thickness (e.g. apply 2 coats of 750 µm each instead of 1500µm in a single coat). For applications outdoors at warm conditions, direct sunlight exposure

can be avoided to prevent skinning of the paint that will result in longer overall drying times due to solvent entrapment; if direct sunlight cannot be avoided a lower DFT per coat may be beneficial for the drying time of the complete coating system. It is recommended that the products in all situations are protected from condensation and water during application and drying.

Knauf Firepaint Steel are relatively high viscosity materials and normally they are supplied showing a false body effect. Prior to application the material has to be stirred shortly in order to homogenise the material and break the false body effect to ensure good flow during the application. Excessive stirring should be avoided as this may cause increased solvent evaporation.

## Storage

Knauf Firepaint Steel shall be stored in dry, shaded areas. The recommended storage conditions are between 5°C and 40°C. The shelf life may vary depending on the storage conditions. At 25°C it is 12 months from date of manufacture. The shelf life may be reduced if the products are stored outside Knauf's recommended storage conditions. The products must be re-inspected before use in case the shelf life is exceeded.

## Application equipment

Recommended airless spray equipment:  
(Airless spray data are indicative and subject to adjustment)

Pump ratio: min. 45:1

Nozzle size: .017" - .023"

Nozzle pressure: 200 bar/2800 psi

Fan angle: 30-50°.

After finishing the application, clean the equipment immediately with Knauf Firepaint Finish Thinner AL. It is recommended to remove the gun filter.

Note: Increasing spray hose diameter may ease paint flow, thereby improving the spray fan. If longer hoses are necessary, it may be necessary to raise the pump ratio to 60:1 maintaining the high output capacity of the pump.

## Scope of application

Knauf Firepaint Steel is used as reactive coating system to fire protect beams and columns made of structural steel to achieve a fire resistance duration in accordance with EN 13501-2.

The product is approved on the basis of Approval testing in accordance with EN 13381-8:2010 and ETAG 018.

Knauf Firepaint Steel is intended to fire protect various sizes of open sections (H and I) and square and circular hollow columns for up to a fire resistance classification, in the design temperatures range of 350°C to 750°C.

Knauf Firepaint Steel is intended for the following applications:

- As intumescent fire protection for internal and external structural steel. Suitable for open beams and columns and hollow sections
- As a repair and touch-up coating for damaged areas of freshly applied Knauf Firepaint Steel.
- Applied in up to 1500 µm dry film thickness per coat (equivalent to 2000 µm wet film thickness).
- As intumescent fire protection for internal and external structural steel beams and columns (acc. to ETA):
  - open H- or I-sections - up to R 240
  - circular hollow sections - up to R 240
  - rectangular hollow sections - up to R 300

## Properties

- Easy application
- Easy to work with
- Cost effective - high volume solids and quick drying
- Off-site and on-site application by airless spray
- Suitable for indoor and outdoor use
- Matt white finish
- Wide range of primers and topcoats

## Safety

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult Knauf Safety Data Sheets and follow all local or national safety regulations.

**Knauf Firepaint Steel for professional use only.**

## Thinning

Thinning of Knauf Firepaint Steel is normally not required. Only for areas where low DFTs (<225µm DFT, 300µm WFT) is to be applied 5% (vol) thinner can be used. Use Knauf Firepaint finish thinner AL.

When thinned down, the sag resistance of the coating is reduced so 1500µm DFT for Knauf Firepaint Steel cannot be achieved anymore.

# KNAUF FIREPAINT PRIMER K1

3



Knauf Firepaint Primer K1 is a very quick-drying anticorrosive primer/finish pigmented with zinc phosphate as anticorrosive inhibiting pigment.

Knauf Firepaint Primer is used as a single/double coat anticorrosive primer (or finish - to put directly) for steel structures, general steel work and a multitude of applications for heavy and light steel industry, where quick drying properties are required. It is for general use, in exterior and interior steel surfaces. Suitable for protection of steel in mild to medium atmospheric corrosive environments.

## Application

### Carbon steel

Cleaning and degreasing. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. When the surface is dry, perform abrasive blasting to minimum Sa 2½ according to ISO 8501-1. In case oxidation has occurred between blasting and appli-

cation of the primer, then the surface should be reblasted and primed. Under restrictions St3 steel can be accepted. Degrease and high pressure water wash the substrate, prior to the St3 cleaning. Special care shall be taken to avoid polishing of the surface.

Power tools such as chipping hammers, needle guns and power rotary wire brushes will provide acceptable roughness for proper adhesion of the primer. It is not acceptable that any mill scale is present on the cleaned surface. For steel prepared to St3, use primer Knauf Firepaint primer K1. Afterwards apply Knauf Firepaint Steel and the possible topcoat as per the normal instructions. The St3 preparation is generally only recommended for repair of small areas.

<b>Shade nos/Colours</b> 11150*/ Grey	<b>Finish</b> Flat	<b>Volume solids, %</b> 49 ± 1
<b>Theoretical spreading rate</b> 7 m <sup>2</sup> /l - 70 micron	<b>Flash point</b> 25 °C	<b>Specific gravity</b> 1,4 kg/litre
<b>Dry to touch</b> 15 minutes (proper ventilation is required)	<b>Dry to handle</b> 1 hour (proper ventilation is required)	<b>VOC content</b> 442 g/l

Primer	Reactive coating	Topcoat
<b>Primer for carbon steel surfaces:                      Knauf Firepaint Primer K1</b>	Knauf Firepaint Steel	External use (including internal use and semi-exposed conditions; internal use with high humidity conditions and internal use)
		Knauf Firepaint Finish

# KNAUF FIREPAINT PRIMER K2

3



Knauf Firepaint Primer K2 is a two-component epoxy paint. It cures to a flexible, well adhering coating with good abrasion and impact resistance. Contains zinc phosphate.

As a primer for on hot dipped galvanized surfaces, aluminium and stainless steel in moderately corrosive environments.

Knauf Firepaint Primer K2 is also suited when roughening of the surface is not possible.

## Application

### Galvanised steel

Cleaning and degreasing. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. When surface is dry, perform either light abrasive sweep blasting to a uniform rough surface or roughen the surface by mechanical means. Afterwards, apply one coat

of primer Knauf Firepaint Primer K2 at maximum DFT of 100 micron.

After priming and before application of Knauf Firepaint Steel, remove oil and grease etc. with suitable detergent. Salt and other contaminants shall be removed by (high pressure) fresh water cleaning. Leave the surface drying for sufficient time to ensure full evaporation of water, prior to application of Knauf Firepaint Steel. Knauf must be consulted in all cases of doubt about the suitability for overcoating of the primer. Cases where Knauf should be consulted include (but not limited to): surface contamination, damages and defects, unknown primer preapplied, non-approved primer and exceeded dry film thickness of primer.



<b>Shade nos/Colours</b> 11630/ Off-white	<b>Finish</b> Flat	<b>Volume solids, %</b> 55 ± 1
<b>Theoretical spreading rate</b> 11 m <sup>2</sup> /l - 50 micron	<b>Flash point</b> 30 °C	<b>Specific gravity</b> 1,5 kg/litre
<b>Dry to touch</b> 3 approx. hours 20°C	<b>Dry to handle</b> 7 days 20°C	<b>VOC content</b> 389 g/l

Primer	Reactive coating	Topcoat
<b>Primer for galvanized surfaces:                      Knauf Firepaint Primer K2</b>	Knauf Firepaint Steel	Internal use and semi-exposed conditions (including internal use with high humidity conditions and internal use)
		Without topcoat or with the topcoats external use approved



# KNAUF FIREPAINT FINISH

3



Knauf Firepaint Finish is a finishing coat based on acrylic resin and nonchlorinated plasticizer for optimum gloss and colour retention. Physically drying. Resistant to salt water, splashes of aliphatic hydrocarbons and animal and vegetable oils.

Knauf Firepaint Finish is used as an interior and exterior finishing coat in Knauf Firepaint systems in moderately to severely corrosive environment.

<p><b>Shade nos/Colours</b></p> <p>10000/ White</p>	<p><b>Finish</b></p> <p>Glossy</p>	<p><b>Volume solids, %</b></p> <p>32 ± 1</p>
<p><b>Theoretical spreading rate</b></p> <p>9,1 m<sup>2</sup>/l - 50 micron</p>	<p><b>Flash point</b></p> <p>25 °C</p>	<p><b>Specific gravity</b></p> <p>1,1 kg/litre</p>
<p><b>Dry to touch</b></p> <p>1 approx. hour 20°C</p>	<p><b>Dry to handle</b></p> <p>3-4 hours 20°C</p>	<p><b>VOC content</b></p> <p>597 g/l</p>



# KNAUF VERMIPLASTER

3



Knauf FP Vermiplaster has been developed specially for fire protection of buildings in interiors. Its task is to protect the load bearing coated construction elements in the event of a fire so that their function is maintained until the fire has been extinguished or building evacuated.

Knauf FP Vermiplaster consists of gypsum as a binder in combination with a special mix of lightweight aggregates and additives to ensure good machine application.

Knauf FP Vermiplaster has been granted the European Technical Approval ETA-11/0229.

### Application

- Reinforced-concrete ceiling / wall thickness must be  $\geq 60$  mm.
- Reinforced-concrete beam width must be  $\geq 80$  mm.
- Application of Knauf Vermiplaster® in accordance with Knauf technical guides (System brochure P91.lv Knauf Fire resistant plaster).
- Concrete density from  $2000 \text{ kg/m}^3$  to  $2600 \text{ kg/m}^3$ .
- If the thickness of the protective plaster layer is  $\geq 36$  mm, the plaster must be additionally reinforced with steel mesh, hole size not exceeding  $15 \times 15$  mm.

#### Treatment temperature/conditions

Do not apply plaster and primer in rooms with ambient temperature below  $55^\circ\text{C}$ . Freshly applied plaster must be protected from direct sunlight, frost, rain and wind until it is completely dry.

### Drying

Good ventilation is essential in order to ensure quick drying. If mastic asphalt floor is formed at the construction site after applying Vermiplaster®, suitable ventilation is required to avoid the deformation of the drying plaster due to temperature.

**Drying time:** depending on temperature, humidity level and ventilation it takes about 14 days for a 10 mm layer of plaster to dry. Drying time may be longer in adverse weather conditions (humidity).

### Field of application

- Steel columns and beams acc. to DIN EN 1993-1-2
- Concrete beams and supports acc. to DIN EN 1992-1-2
- Concrete ceilings and walls acc. to DIN EN 1992-1-2
- Trapezoid sheet metal with concrete acc. to DIN EN 1994-1-2

### Treatment

#### Base

The base must be clean, dry, free of dust and grease. The remaining old, peeling paint must be removed. In places where the paint may not be removed, make sure it does not interfere with the application of plaster. Prime the concrete surface with a suitable primer (Knauf Betokontakt).

Check the binding ability of the load-bearing element before each application of Knauf VERMI- PLASTER®.

#### Vermiplaster thickness

- Minimal thickness 6 mm
- Maximal thickness when applying single layer: 22 mm
- Maximal thickness when applying two layers: 40 mm
- Maximal thickness when applying three layers: 60 mm
- Maximal thickness when applying four layers: 80 mm

### Properties

- Easy machine application
- Notably higher yield than comparable products
- Gypsum based
- For interior use
- Colour white

### Safety

Knauf Vermiplaster® carbon fibre laminate (CFRP) tape's fire protection classification report PAVUS, a. s. No. PKO 16 065.

Plaster quality is monitored by the notified body and the factory production control. Production is certified in accordance with standard EN ISO 9001 and EN ISO 14001.



# SYSTEMS

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# SYSTEMS BOARDS



# BOARD OVERVIEW

KNAUF PRODUCT	Dimension	
	Thickness mm	Width mm
Fireboard	12,5	1250
	15	1250
	20	1250
	25	1250
	30	1250
Feuerschutzplatte Knauf Piano	12,5	1250
Feuerschutzplatte	15	1250
	18	1250
Massivbauplatte	20/25	625
Diamant	12,5/15	1250
	18	625
Diamant X	12,5/15	1250
	18	1250
Silentboard	12,5	625
Safeboard	12,5+0,4	625
Diamant Steel	12,5+0,4	1250
Strahlenschutzplatte GKF mit Bleiblech	12,5	625
Bauplatte	12,5	1250
Vidiwall 1 Mann	10/12,5	1000
Brio-Element (Fertigteilestrich)	18	600
	23	600
GIFAfloor FHB für Hohlbodensystem	25	600
	28	600
	32	600
	38	600
	38	600
Brio 18 WF Verbundelement (Fertigteilestrich)	28	600
Brio 18 MW Verbundelement (Fertigteilestrich)	28	600
Brio 23 WF Verbundelement (Fertigteilestrich)	33	600
Brio 18 EPS Verbundelement (Fertigteilestrich)	38	600

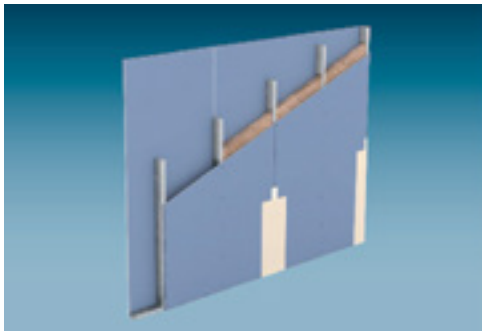
Classification				Reaction to fire
DIN	EN			
-	-	GM-F	EN 15283-1	A1
GKF(I)	8180	DF(H2)	EN 520	A2-s1,d0
		DF(H2)		
		DF		
		DF(H2)		
		DFH2IR		
		DEFH2IR		
		DFR		
		DF		
		g	EN 14190	
		g		
GKB(I)	DIN 18180	A/H2	EN 520	A2-s1,d0t
-	-	GF-IW2-C1	EN 15283-2	A2-s1,d0
-	-	GF-W1		A2-s1,d0
-	-	GF-W1DIR1		A1
-	-			A1
-	-	h	EN 14190	E
-	-			A2-s1,d0
-	-			E
-	-			E

# KNAUF METAL STUD WALLS

4

Knauf metal stud walls consist of a metal substructure as simple or double stud wall and a single layer or multilayer planking on both sides. The stud frame is connected all around with the adjacent components. In the cavity walls can be built in insulation materials.

## SINGLE LAYER W111



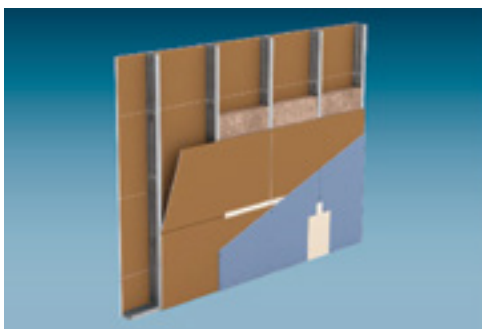
The metal stud wall system W111.de consists of a single stud frame and it is planked with a layer of plasterboard on each side.

- › Wall height until 10,65 m
- › Rated airborne sound insulation until 60,9 dB
- › Fire resistance class until F90

System variant with CW70 and 15 mm diamond planking single layer construction with:

- › Console loads until 0,7 kN/m
- › Ceramic coverings without reducing the stand spacing
- › Mechanically equivalent in comparison with a 2-layer system with standard plates
- › Common finished wall thickness of 100mm

## 2 LAYER PLANKING W112



The metal stud wall system W112.de consists of a single stud frame and it is planked with two layers of plasterboard on each side.

- › Wall height until 12,00 m
- › Rated airborne sound insulation until 70,4 dB
- › Fire resistance class until F90

### 3 LAYER PLANKING W113



The metal stud wall system W113.de consists of a single stud frame and it is planked with three layers of plasterboard on each side.

- › Wall height until 12,00 m
- › Rated airborne sound insulation until 71,6 dB
- › Fire resistance class until F90

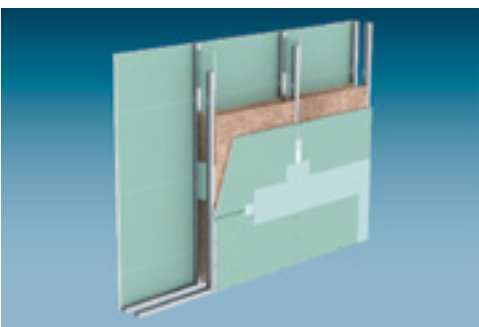
### DOUBLE STUD FRAME DECOUPLED W115



The metal stud wall system W115.de consists of a decoupled double stud frame and it is planked with two layers of plasterboard on each side. The system W115.de is preferred for the application of dividing walls.

- › Wall height until 9,70 m
- › Rated airborne sound insulation until 74,4 dB
- › Fire resistance class until F90

### DOUBLE STUD FRAME LASHED OUT W116



The metal stud walls system W116.de consists of a spaced, lashed out double frame structure and it is planked with respectively one or two layers of plasterboard on each side.

The system W116.de is preferred for the application of installation walls.

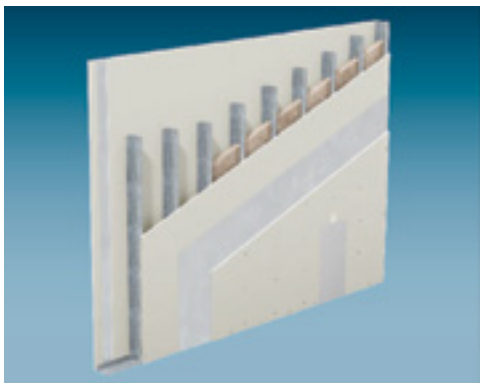
- › Wall height until 8,00 m
- › Rated airborne sound insulation until 63,5 dB
- › Fire resistance class until F90

# KNAUF FIRE WALLS



Drywall partitions with stud frames made of sheet metal profiles and cladding on both sides made of gypsum boards and sheet metal inserts. Metal stud partition systems are erected using a combination of cladding with gypsum boards and sheet metal inserts assuring fire wall quality. Knauf Fire Walls are fire-resistant walls that retain their structural stability when exposed to a fire and remain effective as a room enclosure, as they offer particularly high resistance to falling components.

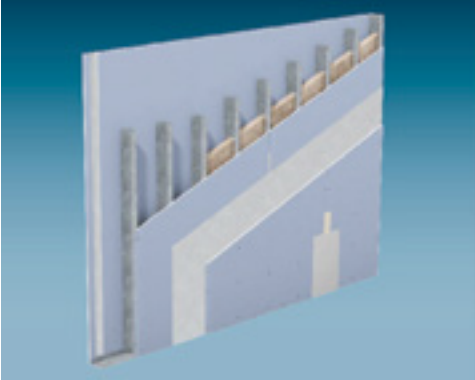
## FIRE WALL EI 90-M W131



The cost-effective Fire Wall System W131.de is clad with two or three layers of gypsum boards as well as a sheet metal layer on each side, and in addition to EI 90 fire resistance compatibility and impact stress resistance (-M) that withstands falling components, it also fulfils the following additional requirements:

- > Reaction to fire non-combustible
- > Robustness
- > Sound insulation
- > Slim design

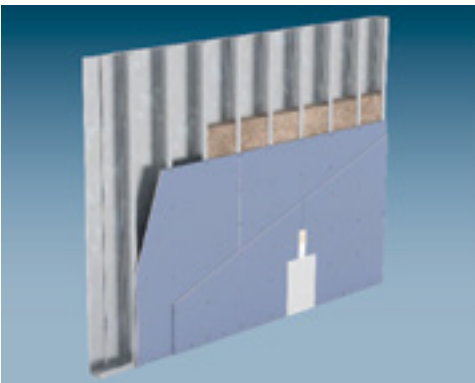
### METAL STUD PARTITION EI 60-M W135



The cost-effective Metal Stud Partition System W135.de is clad with two layers of gypsum boards as well as a sheet metal layer on each side, and in addition to EI 60 fire resistance compatibility and impact stress resistance (analogue to M classification) that withstands falling components, it also fulfils the following additional requirements:

- > Reaction to fire non-combustible
- > Robustness
- > Sound insulation
- > Slim design

### FIRE WALL EI 90-M W131



The cost-effective Fire Wall System W131.de is clad with two layers of Diamant Steel GKFI gypsum boards on each side, and in addition to EI 90 fire resistance compatibility and impact stress resistance (-M) that withstands falling components, it also fulfils the following additional requirements:

- > Reaction to fire non-combustible
- > Robustness
- > Sound insulation
- > Slim design

**Note:** The Diamant Steel GKFI is a 12.5 mm hard gypsum board with a 0.4 mm sheet metal lamination.

Drywall partitions with stud frames made of sheet metal profiles and cladding on both sides made of Diamant Steel GKFI gypsum boards. Metal stud partition systems are erected using cladding made of gypsum boards with sheet metal lamination assuring fire wall quality. Knauf Fire Walls are fire-resistant walls that retain their structural stability when exposed to a fire and remain effective as a room enclosure, as they offer particularly high resistance to falling components.

# KNAUF SHAFT WALLS

4



Knauf shaft walls are metal stud walls planked on one side with fire resistance class for fire related and possibly soundproofing room closures of installation shafts. The fire protection is guaranteed from inside ( fire in the shaft, protection against spreading on the surrounding rooms) as well as from outside (protection of the installations as well as fire transmission to other floors).

Knauf shaft walls consist of a metal substructure and a one or two-layer planking screwed on one side. The substructure is connected all around with the adjacent components. In the substructure, depending on the system, can be built in insulation materials for fire protection and/or soundproofing and heat protection.



## SHAFT WALLS – FREE SPANNING W628

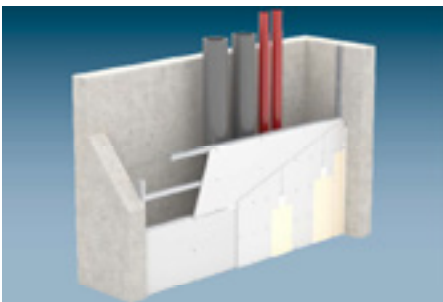


The shaft wall system W628A.de is inserted up to a shaft width of 2 meters without a substructure. A slim design marks this shaft wall system. For fire protection reasons an additional insulation is not necessary.

- › Edge connections with angled profiles
- › Free spanning horizontal planking
- › Wall height until 15,00 m
- › Sound reduction index until 36 dB

**F90**

## SHAFT WALL WITH BOLT WORK W630

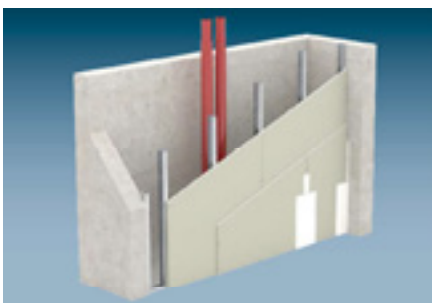


The shaft wall system W630.de is inserted with a bolt work up to a shaft width of 5 meters. For fire protection reasons an additional insulation is not necessary.

- › Horizontal bolt work, metal profile CW
- › Lateral edge connections with UW profiles, upper and lower edge connection with CW profiles
- › Ball impact protection on request
- › Insulation layer optional
- › Horizontal planking (solid panels in the first position horizontal and in the second position vertical)
- › Wall height until 15,00 m
- › Sound reduction index until 44 dB

**F30 F90**

## SHAFT WALL WITH SIMPLE PROFILE STUD FRAME W628

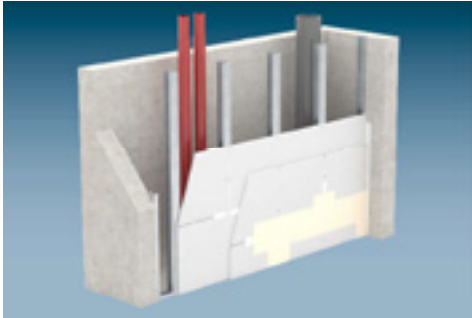


The shaft wall system W628.de is inserted with a single stud frame and a simple profile. For fire protection reasons an additional insulation is not necessary.

- › Metal stand CW
- › Lateral edge connections with CW profiles, upper and lower edge connection with UW profiles
- › Ball impact protection on request
- › Insulation layer optional
- › Vertical planking by fire protection plate Knauf Piano / Knauf fire protection plate / Fireboard / Diamond, horizontal planking by solid panels / Silentboard
- › Wall height until 7,00 m
- › Sound reduction index until 46,8 dB

**F30 F60 F90**

**SHAFT WALL WITH DOUBLE PROFILE STUD FRAME  
W629**

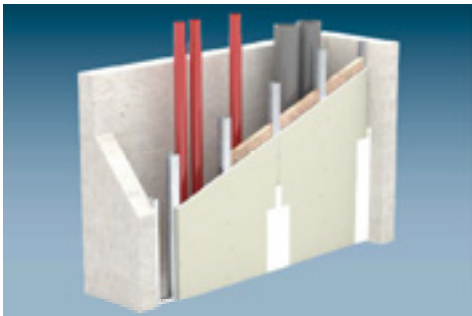


The shaft wall system W629.de is inserted with a single stud frame and a double profile. This enables particularly slim solutions.

- > Metal stand CW with double profile
- > Lateral edge connections with CW profiles, upper and lower edge connection with UW profiles
- > Ball impact protection on request
- > Insulation layer optional
- > Insulation layer optional depending on the system variant
- > Vertical planking by fire protection plate Knauf Piano / Knauf fire protection plate / Fireboard / Diamond, horizontal planking by solid panels / Silentboard
- > Wall height until 7,00 m
- > Sound reduction index until 46,8 dB

**F30 F60 F90**

**FIREBOARD SHAFT WALL WITH A  
DOUBLE PROFILE STUD FRAME  
K251**

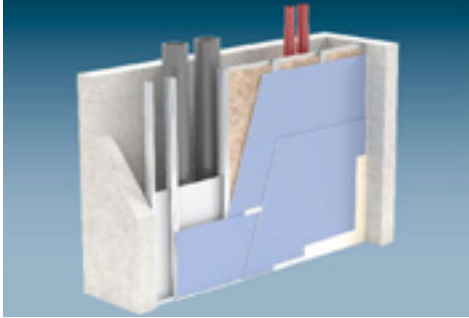


The shaft wall system K251 is characterized by high quality fire protection properties with fire behavior A1, non-flammable and a single layer planking with Knauf fireboard.

- > Metal stand CW as double profile with/without Fireboard covering strips on the shaft side
- > Lateral edge connections with CW profiles, upper and lower edge connection with UW profiles
- > Ball impact protection on request
- > Insulation layer optional
- > Vertical planking
- > Wall height until 5,00 m
- > Sound reduction index until 41,8 dB

**F90**

## SHAFT WALL WITH DOUBLE PROFILE STUD FRAME W635



The shaft wall system W635.de is designed as a slim system with additional panel positions adjusted on the shaft side especially for soundproofing requirements.

- › Metal stand UW as a double profile with position set on the shaft side 12,5 mm fire protection plate Knauf Piano
- › Edge connections all around with UW profiles
- › Ball impact protection on request
- › Insulation layer necessary
- › Horizontal planking
- › Wall height until 5,00 m
- › Sound reduction index until 54 dB

**F90**

4



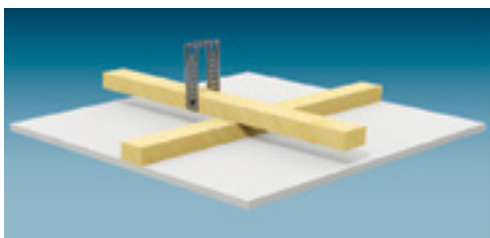
# KNAUF BOARD CEILING

4



Knauf ceiling systems consist of a suspended or directly anchored grid that is clad using gypsum boards. The numerous requirements from the applications are covered by a large and diverse range of options.

## WOOD FRAME D111



- › Knauf boards are fixed with screws to a wood frame made of carrying timber battens and furring timber battens (double batten frame) or just simple furring timber battens (single batten frame).
- › The grid is fastened using suspenders or is anchored directly to the basic ceiling using suitable fasteners.



## METAL GRID D112

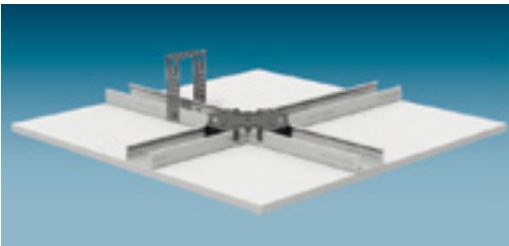


- › Knauf boards are fixed with screws to a metal grid made of carrying and furring channels (double layer profile) or just furring channels (single layer profile) made of sheet metal profiles CD 60/27 or hat-shaped channels.
- › Anchoring of the CD channels is undertaken with suspenders on the basic ceiling; hat-shaped channels are anchored directly onto the basic ceiling.



4

## FLUSH METAL GRID D113



- › Knauf boards are fixed with screws to a metal grid of flush carrying and furring channels made of sheet metal profiles CD 60/27.
- › Anchoring of the grid is undertaken with suspenders on the basic ceiling.
- › Low construction heights can be implemented using this system.
- › Furthermore, the application of a necessary full surface insulation layer is easy to apply if required.

## LARGE-SPAN METAL GRID D116



- › Knauf boards are fixed with screws to a metal grid of carrying channels UA 50 and furring channels CD 60/27.
- › Anchoring of the grid is undertaken with suspenders on the basic ceiling.
- › This system facilitates particularly large suspender spacings, e.g. for equipment installations in the plenum or with larger spacings between beams.

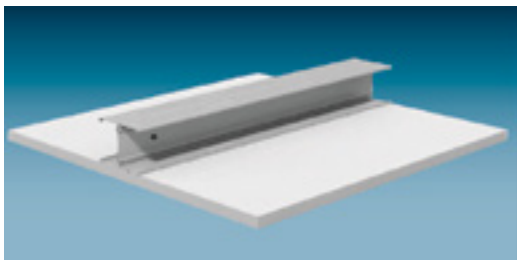
# KNAUF FREE-SPANNING CEILINGS

4



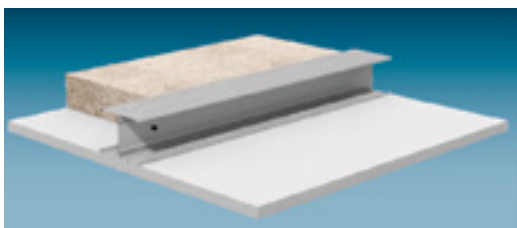
Knauf ceiling systems consist of a suspended or directly anchored grid that is clad using gypsum boards. The numerous requirements from the applications are covered by a large and diverse range of options.

## WITHOUT FIRE RESISTANCE D131



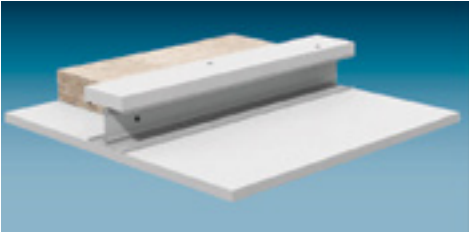
- › Knauf boards are fixed with screws to a metal grid of free-spanning furring channels made of single or double CW or UA profiles. The furring channels are anchored only to the flanking walls. An sound insulation effective insulation layer can be laid between the furring channels (upon the cladding).
- › Depending on the system variants selected, room widths (span widths) up to 6.00 m are possible.

## FIRE RESISTANCE F30 SOLELY FROM BELOW D131



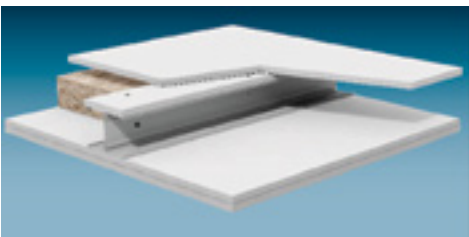
- › Knauf boards are fixed with screws to a metal grid of free-spanning furring channels made of double CW or UA profiles. The furring channels are anchored only to the flanking walls. A system variant dependent effective fire resistance and/or sound insulation layer is laid between the furring channels (upon the cladding).
- › Depending on the system variants selected, room widths (span widths) up to 5.45 m are possible.

### FIRE RESISTANCE F30 SOLELY FROM BELOW AND FROM ABOVE D131



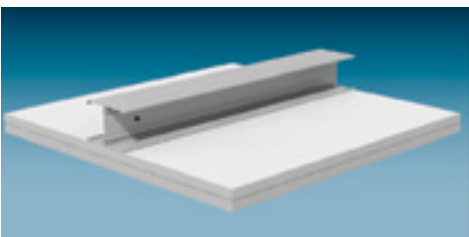
- › Knauf boards are fixed with screws to a metal grid of free-spanning furring channels made of single or double CW or UA profiles with additional covering strips. The furring channels are anchored only to the flanking walls. A fire resistance and sound insulation effective insulation layer is laid between the furring channels (upon the cladding).
- › Depending on the system variants selected, room widths (span widths) up to 4.80 m are possible.

### FIRE RESISTANCE F60 SOLELY FROM BELOW AND FROM ABOVE D131



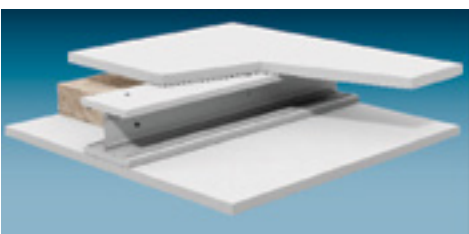
- › Knauf boards are fixed with screws to a metal grid of free-spanning furring channels made of single or double CW or UA profiles with additional covering strips. The furring channels are anchored only to the flanking walls. A top side covering layer made of gypsum boards is obligatory for fire resistance reasons. A fire resistance and sound insulation effective insulation layer is laid between the furring channels (upon the cladding).
- › Depending on the system variants selected, room widths (span widths) up to 4.20 m are possible.

### A1 | FIRE RESISTANCE F90 SOLELY FROM BELOW K219



- › Knauf Fireboards are fixed with screws to a metal grid of free-spanning furring channels made of double CW or UA profiles. The furring channels are anchored only to the flanking walls. A system variant dependent effective sound insulation layer is laid between the furring channels (upon the cladding).
- › Depending on the system variants selected, room widths (span widths) up to 4.95 m are possible.

### A1 | FIRE RESISTANCE F90 SOLELY FROM BELOW AND FROM ABOVE K219



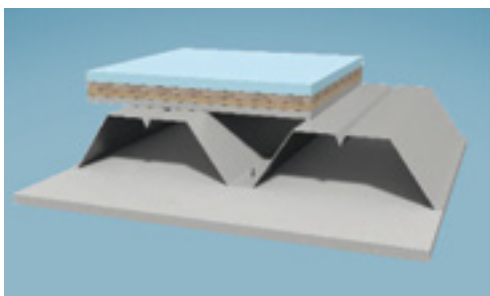
- › Knauf Fireboards are fixed with screws to a metal grid of free-spanning furring channels made of double CW or UA profiles with additional covering strips. The furring channels are anchored only to the flanking walls. A top side covering layer made of Fireboard is obligatory for fire resistance reasons. A fire resistance and sound insulation effective insulation layer is laid between the furring channels (upon the cladding).
- › Depending on the system variants selected, room widths (span widths) up to 4.35 m are possible.

# KNAUF TRAPEZOIDAL SHEET SYSTEM

4

Knauf trapezoidal sheet systems are secured to the roof/ceiling either directly or to a substructure from support profiles or basic profiles.

## TRAPEZOIDAL SHEET – CEILING K217 Direct cover

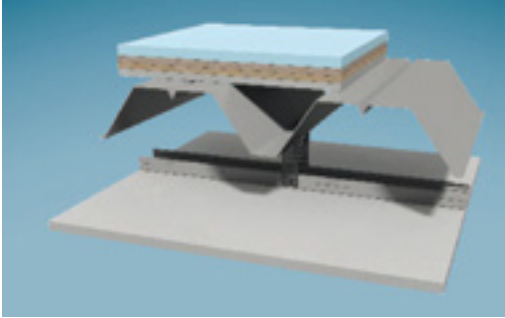


- › Knauf plates are secured as a direct cover directly onto the trapezoidal sheet.
- › Above the trapezoidal sheet is necessary an insulation layer or a floor structure classified according to fire protection.

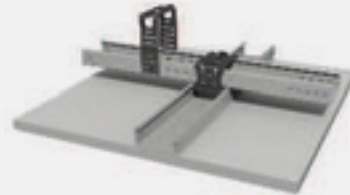


## TRAPEZOIDAL SHEET – CEILING K217

With metal substructure



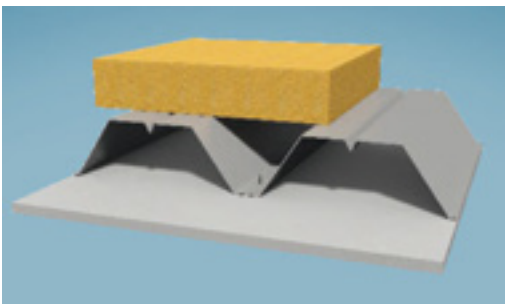
- › Knauf plates are screwed onto a metal substructure from support or basic profiles (double profile rest) or only support profiles ( simple profile rest) from steel sheet profiles CD 60/27. The attachment of the substructure is done through trailers on the trapezoidal sheet.
- › Above the trapezoidal sheet is necessary an insulation layer or a floor structure classified according to fire protection.



4

## TRAPEZOIDAL SHEET – ROOF K217

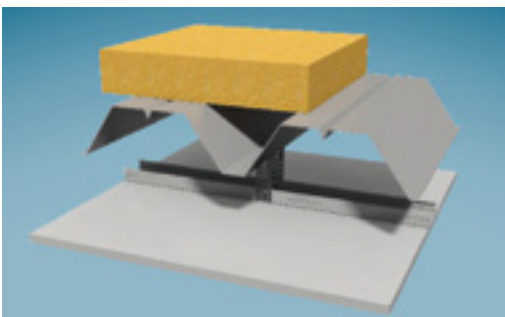
Direct cover



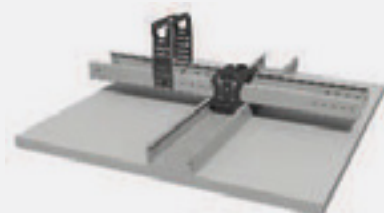
- › Knauf plates are secured as a direct cover directly onto the trapezoidal sheet.
- › Above the trapezoidal sheet is necessary an insulation layer or a concrete cover.

## TRAPEZOIDAL SHEET – ROOF K217

With metal substructure



- › Knauf plates are screwed onto a metal substructure from support or basic profiles (double profile rest) or only support profiles ( simple profile rest) from steel sheet profiles CD 60/27. The attachment of the substructure is done through trailers on the trapezoidal sheet.
- › Above the trapezoidal sheet is necessary an insulation layer or a concrete cover.



# KNAUF WOODEN STUD WALLS



Knauf wooden stud walls are non-load bearing walls consisting of a wooden substructure as a single or double stud frame and Knauf board cladding on each side.

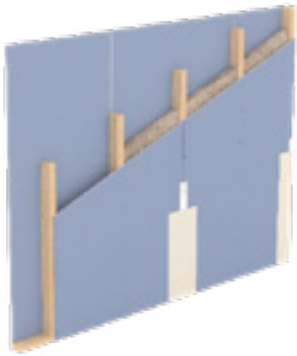
The stud frame is connected all around with adjacent components. The wall cavity can according to building regulations be filled with insulation materials or used for electrical or sanitary installations. The quality of the cladding and the thickness of the panels determines the fire protection and sound proofing properties.

The dimensions of the stud frame affect the wall system in terms of height.

Knauf truss wall cladding, consists of double-sided cladding made from Fireboard or solid building boards, for the strengthening of existing truss walls with brickwork, aerated concrete or lightweight concrete, reinforced concrete or clay within the cavity.

Existing truss walls are usually load bearing or stabilizing parts of the building.

### NON-LOAD BEARING WOODEN STUD WALL / SINGLE - LAYER CLADDING W121



- › The wooden stud wall system W121.de has a single stud structure and is covered with a layer of Gypsum.

4

### NON-LOAD BEARING WOODEN STUD WALL / TWO - LAYER CLADDING W122



- › The wooden stud wall system W122.de has a single stud structure and is clad with two layers of plasterboard.

### NON - LOAD BEARING WOODEN DOUBLE STUD WALL / SINGLE- LAYER CLADDING W124



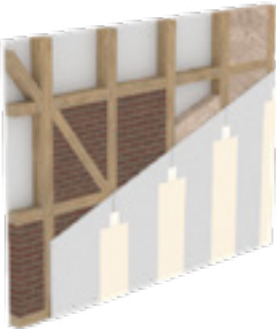
- › The wooden stud wall system W124.de has a double framework and is clad with a layer of plasterboard.

**NON – LOAD BEARING WOODEN  
DOUBLE STUD WALL / TWO – LAYER  
CLADDING  
W125**



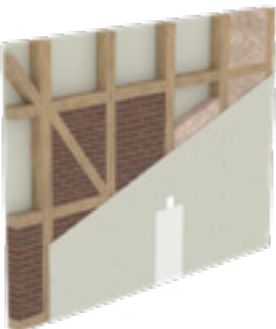
- › The wooden stud wall system W125.de has a double framework and is clad with two layers of plasterboard.
- › The system W125.de is used for the application of partition walls.

**WOODEN TRUSS WALL CLADDING  
W128**



- › The system W128.de, single-layer 25 mm solid panel boards on each side, strengthens truss walls to F90 quality.

**WOODEN TRUSS WALL FIREBOARD  
CLADDING  
W241**



- › The system W241.de, single-layer 20 mm Fireboard cladding on each side strengthens truss walls to F90 quality.



# KNAUF WOODEN PANEL-WALLS



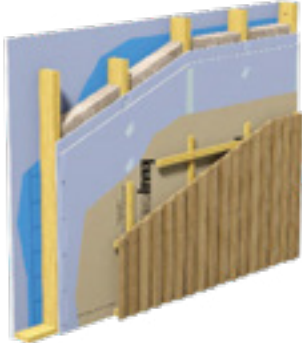
Knauf wooden panel-walls consist of a wooden substructure with a single frame and a two-side planking from Knauf boards or wood-based material boards.

Depending on the sound insulation requirements it is possible to insert a planking decoupled on one side, however this cannot be drawn into the stiffening.

In the wall cavity can be built in installations (i.e. electrical cables, empty pipes, irrigation and drainage pipes) or insulation materials in case of increased sound or thermal protection requirements.

In alternative the wall can be complemented with installations at the level of a non-effective fire protection or to improve the soundproofing.

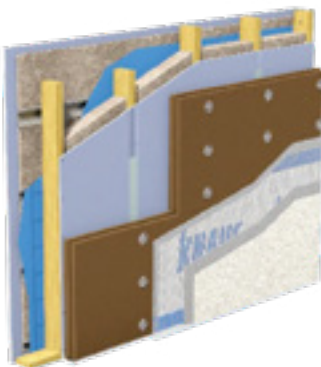
### WOODEN PANEL - EXTERIOR WALL W551



- › The wooden panel exterior wall w551.de system is planked with plasterboard on both sides. It is necessary to add an effective external weather protection, for instance WDVS. The quality of the planking determines the load capacity as well as the fire protection and soundproofing properties.
- › Sound reduction index: until 62dB

**F30** **F60** **F90**

### WOODEN PANEL – EXTERIOR WALL WITH DECOUPLED PLANKING W552



- › The wooden panel exterior wall w552.de system is planked with plasterboard on both sides. The inner side board is decoupled with an additional substructure level. It is necessary to add an effective external weather protection, for instance WDVS. The quality of the planking determines the load capacity as well as the fire protection and soundproofing properties.
- › Sound reduction index: until 66dB

**F30** **F60** **F90**

### WOODEN PANEL – BUILDING END WALL W553



- › The wooden panel building end wall w553.de system is planked with plasterboard on both sides. The quality of the planking determines the load capacity as well as the fire protection and soundproofing properties.
- › Building end walls are walls that have to suffice to direct and particular requirements in terms of sound and fire protection.
- › Sound reduction index: until 77dB

Fire protection from outside

**F90**

From inside

**F30**

### WOODEN PANEL – BUILDING END WALL WITH DECOUPLED PLANKING W554



- > The wooden panel building end wall w554.de system is planked with plasterboard on both sides. The inner side board is decoupled with an additional substructure level. The quality of the planking determines the load capacity as well as the fire protection and soundproofing properties.
- > Building end walls are walls that have to suffice to direct and particular requirements in terms of sound and fire protection.
- > Sound reduction index: until 72dB

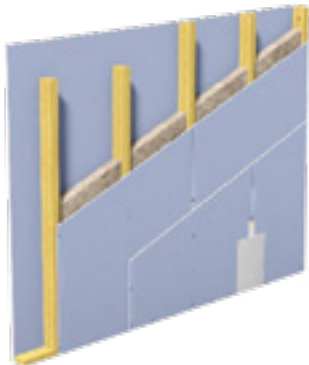
Fire protection from outside

**F90**

From inside

**F30**

### WOODEN PANEL – INSIDE WALL W555



- > The wooden panel inside wall w555.de system is planked with plasterboard on both sides directly on the wooden stand. The quality of the planking determines the load capacity as well as the fire protection and soundproofing properties.
- > Inside walls can be inserted space-enclosing or non-space-enclosing (with free walls end). The differences in terms of fire protection must be considered.
- > Sound reduction index: until 60.6dB

Fire protection space-enclosing

**F30**

**F60**

**F90**

Non-space-enclosing

**F30**

**F60**



## WOODEN PANEL - INSIDE WALL WITH DECOUPLED PLANKING W556



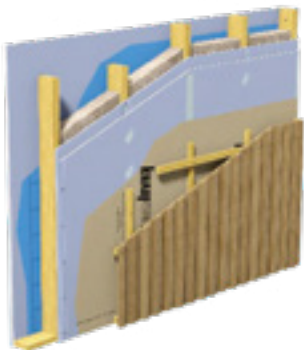
- › The wooden panel inside wall W556.de is planked with plaster-board on both sides and reinforced on one side with an additional substructure level. The quality of the planking determines the load-bearing capacity as well as sound proofing and fire protection properties.
- › The system W556.de is preferred for the application on dividing walls.
- › Sound reduction index: until 71dB

**F30** **F60** **F90**

# KNAUF WOOD BEAM CEILING SYSTEMS

Knauf wood beam ceiling systems are ceiling covers (directly attached) and lower ceilings (suspended \ self-supporting) that are evaluated in connection with the wooden beam ceiling above and possibly the floor construction with regard to their fire and sound insulation quality.

## DIRECT COVER D150



- > The wooden panel inside wall w555.de system is planked with plasterboard on both sides directly on the wooden stand. The quality of the planking determines the load capacity as well as the fire protection and soundproofing properties.
- > Inside walls can be inserted space-enclosing or non-space-enclosing (with free wall's end). The differences in terms of fire protection must be considered.
- > Sound reduction index: until 60.6dB

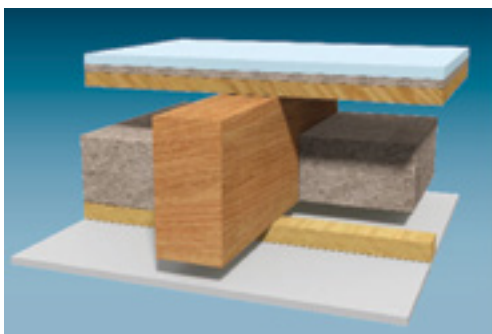
Fire protection space-enclosing

**F30** **F60**

Non-space-enclosing

**F30** **F60**

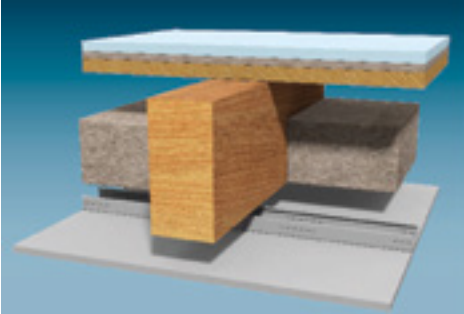
## WOODEN SUBSTRUCTURE D151



- > D151 The wooden panel inside wall w556.de system is planked with plasterboard on both sides with an additional substructure level on one side. The quality of the planking determines the load capacity as well as the fire protection and soundproofing properties.
- > The system w556.de is preferred for the application of dividing walls.
- > Sound reduction index: until 71dB

**F30** **F60** **F90**

### METAL SUBSTRUCTURE CD PROFILE D152

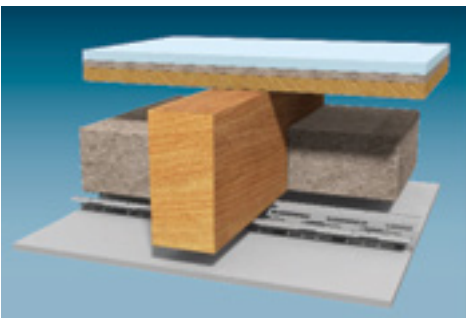


- > The wooden panel exterior wall w551.de system is planked with plasterboard on both sides. It is necessary to add an effective external weather protection, for instance WDVS. The quality of the planking determines the load capacity as well as the fire protection and soundproofing properties.
- > Sound reduction index: until 62dB

**F30** **F60** **F90**

4

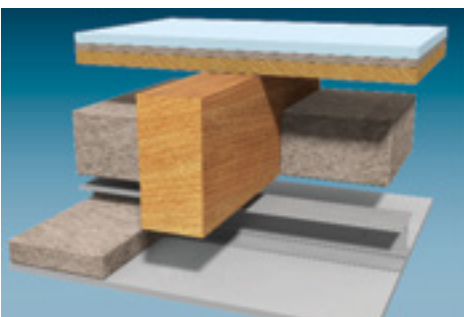
### METAL SUBSTRUCTURE SPRING RAIL \ HAT PROFILE D153



- > The wooden panel exterior wall w552.de system is planked with plasterboard on both sides. The inner side board is decoupled with an additional substructure level. It is necessary to add an effective external weather protection, for instance WDVS. The quality of the planking determines the load capacity as well as the fire protection and soundproofing properties.
- > Sound reduction index: until 66dB

**F30** **F60** **F90**

### METAL SUBSTRUCTURE CW \ UA – SELF SUPPORTING D131/K219



- > The wooden panel building end wall w553.de system is planked with plasterboard on both sides. The quality of the planking determines the load capacity as well as the fire protection and soundproofing properties.
- > Building end walls are walls that have to suffice to direct and particular requirements in terms of sound and fire protection.
- > Sound reduction index: until 77dB

Fire protection from outside

**F90**

From inside

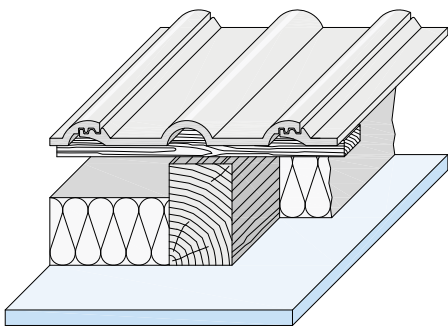
**F30**

# KNAUF ATTIC SYSTEMS



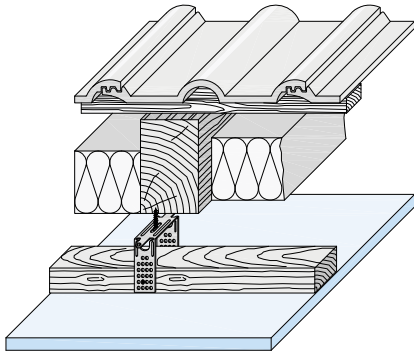
Knauf attic lining is used when the attic is converted for use. In conjunction with roof insulation, functions such as fire resistance, sound insulation and thermal insulation are implemented. Creation of an installation level for wiring and pipes is also possible.

## WITHOUT GRID ( DIRECT LINING) D610

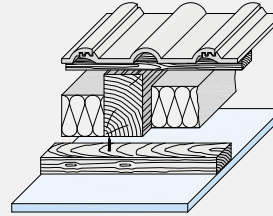


- › The cladding is attached directly to the rafters / collar beams using drywall screws.

## WOOD FRAME D611

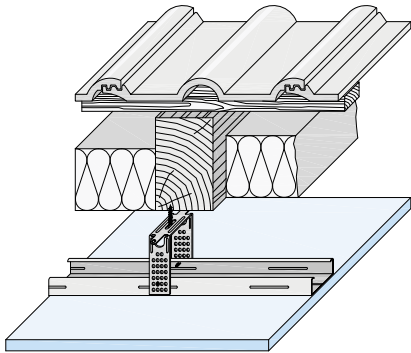


- The cladding is attached on a wooden frame made of timber battens as a furring timber batten. The frame is either connected directly with Knauf drywall screws or with Universal Brackets to the rafters / collar beams.

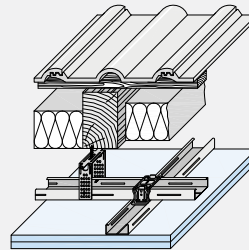


4

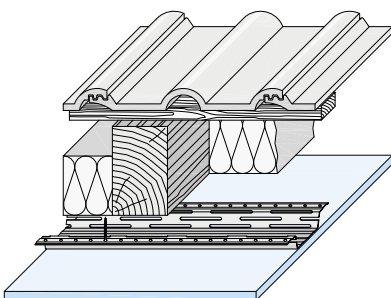
## METAL GRID WITH CD CHANNELS D612



- The cladding is attached to an frame made of sheet metal profiles as a furring channel or as carrying and furring channels. The frame is connected with the anchoring clip, adjusting clip or Universal Bracket to the rafters / collar beams.



## METAL GRID WITH RESILIENT CHANNELS D613



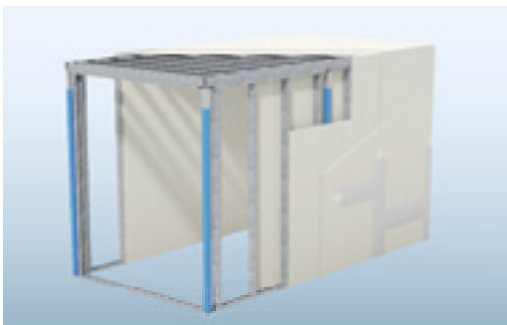
- The cladding is attached to a frame made of Resilient Channels, that are themselves connected directly to the rafters / collar beams using Knauf drywall screws.

# KNAUF CUBO ROOM-IN-ROOM SYSTEMS

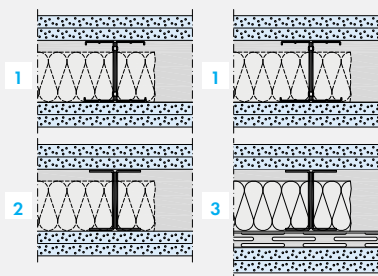
4

The variable floor plan Knauf Cubo Room-in-Room System complies both with the high standards of stability and fire safety.

## CUBO BASIS K375

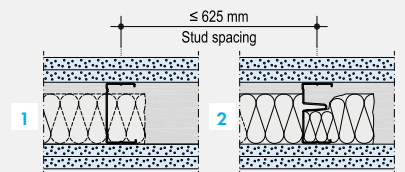


### > Ceiling Cubo Basis K375



	Grid	Cladding
1	CW double profile 100/125/150	Double-sided
2	UA double profile 100/125/150	
3	UA double profile 100/125/150 + Resilient Channel	

### > Wall Cubo Basis K375

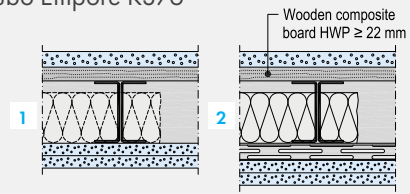


	Grid	Cladding
1	Profile CW 75/100	Double-sided
2	Profile MW 75/100	

**CUBO EMPORE  
K376**

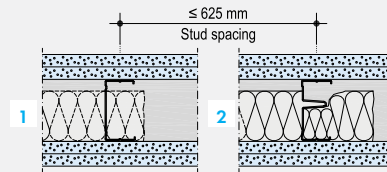


> Ceiling Cubo Empore K376



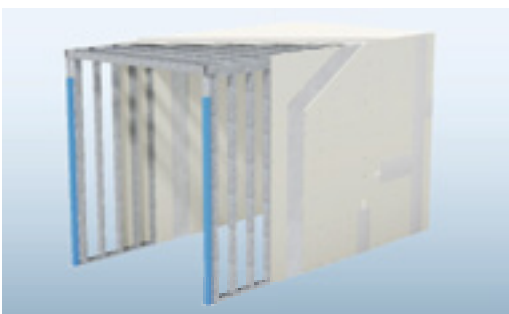
	Grid	Cladding
1	UA double profile 100/125/150	Double-sided + Supporting layer Wooden composite board HWP on top
2	UA double profile 100/125/150 + Resilient Channel	

> Wall Cubo Empore K376

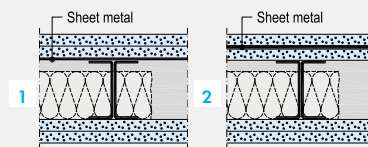


	Grid	Cladding
1	Profile CW 75/100	Double-sided
2	Profile MW 75/100	

**CUBO ESCAPE TUNNEL  
K377**

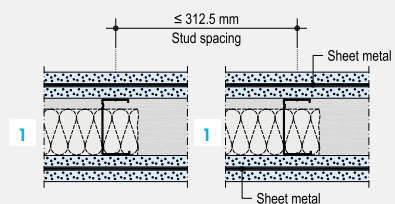


> Ceiling Cubo Escape Tunnel K377



	Grid	Cladding
1	UA double profile 100/125/150	Double-sided, sheet metal under- neath the cladding layers of the ceiling top
2	UA double profile 100/125/150	Double-sided, sheet metal between the cladding layers of the ceiling top

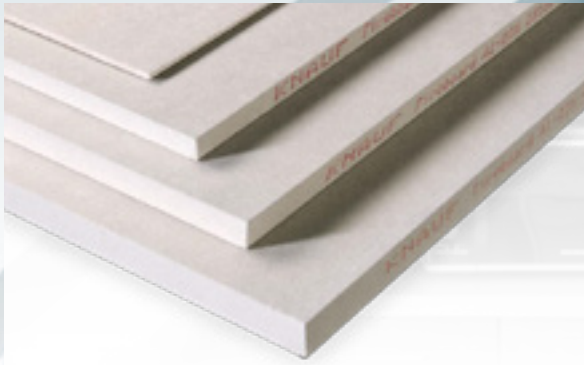
> Wall Cubo Escape Tunnel K377



	Grid	Cladding
1	Profile CW 75/100	Double-sided, sheet metal between the cladding layers

# KNAUF FIREBOARD COLUMN AND BEAM ENCASEMENTS

4



The Knauf fire-resistant board GKF is a cost-effective gypsum board GKF for basis systems in drywall construction.

Knauf fire-resistant board GKF is used in all fields of interior works as cost-effective cladding of drywall systems with enhanced fire protection.

In compliance with EN 520, the product is subject to initial type testing and continuous factory production control and is marked with the CE marking.

## Properties and added value:

- › Simple installation of cladding and sheet metal lining in a single step
- › Good coherence of structure when exposed to fire
- › Easy application
- › Non-combustible
- › Can be folded by mitring
- › Low expansion and shrinkage



**STEEL BEAMS AND STEEL COLUMNS WITH ENCASEMENT MADE OF FIREBOARD**

**K25**



- › Cost-effective solution with Fireboard cladding without grid
- › Valid for open I, T, U and L-shaped roller profiles or for profiles of compound sections with parallel flange
- › In case of single-layer cladding encasement, back with Fireboard strips of thickness  $t$  min. 25 mm, width  $\geq 150$  mm on the board joint. In case of 15 mm cladding encasement thickness, Fireboard strips with  $t$  of min 20 mm is sufficient.
- › Staple all cladding layers with steel staples acc. to DIN 18182 or alt. EN 14566 (e.g. Haubold or Poppers-Senco) with steel wire diameter  $\geq 1.34$  mm with backing made of Fireboard strips as well as in the face side in the corner

**WOODEN COLUMNS AND WOODEN BEAMS WITH ENCASEMENT MADE OF FIREBOARD**

**K254/K255**

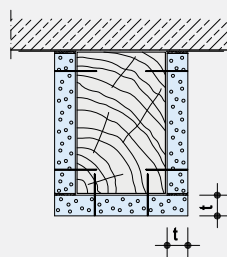


- › The encasement of the beams made of wood using Fireboard is undertaken by surface stapling with steel staples. Encasement of wooden columns with Fireboard is undertaken by front side stapling of the cladding. Individual details for application can be found in system data sheet Knauf Fireboard Column and Beam Encasements K25.de.

› **Fireboard Wooden Beam Encasements K254**

Stapled Fireboard  
Wooden beams

- Width x height  $\geq 100 \times 160$  mm



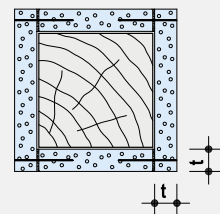
Minimum thickness of Fireboard in dependence on the fire resistance class

<b>F30</b>	<b>F60</b>	<b>F90</b>
15	15	25

› **Fireboard Wooden Column Encasements K255**

Stapled Fireboard  
Solid wood column

- Rectangular cross-section  $\geq 120 \times 120$  mm
- Compressive stress for load class combination fire:  $c,0,d \leq 3,5$  N/mm<sup>2</sup>
- Aspect ratio:  $\leq 87$
- Sorting class: S10/C24



Minimum thickness of Fireboard in dependence on the fire resistance class

<b>F30</b>	<b>F60</b>	<b>F90</b>
15	15	25



# SYSTEMS FIRE STOPPING



# PRODUCT & SYSTEM OVERVIEW

- 1) Rigid wall constructions with wall thickness of minimum 120 mm
- 2) Rigid wall constructions with wall thickness of minimum 100 mm
- 3) With FPM Mortar
- 4) With FPC Panel
- 5) With Firewrap
- 6) System FIRESTOP-F
- 7) Rigid wall constructions with wall thickness of minimum 75 mm

		Rigid wall minimum thickness	Blank seal	Electric cables			Without insulation
				Single	Bundle	Cable tray	
RIGID WALL	Knauf FPA Acrylic	75 mm	150x150 mm	≤ Ø21 mm	≤ Ø100 mm		
		100 mm	300x300 mm	≤ Ø80 mm	≤ Ø100 mm		≤ Ø22 mm
	Knauf FP Putty	100 mm	Ø15 mm	≤ Ø80 mm	≤ Ø50 mm		≤ Ø12 mm
	Knauf FPG Graphite	150 mm		≤ Ø20 mm	≤ Ø100 mm	150 x 25 mm	
	Knauf Firecollar	120 mm	≤ Ø160 mm	≤ Ø80 mm	≤ Ø160 mm		
	Knauf Firewrap	150 mm					
		100 mm					
	Knauf FP Service Transit	75 mm		≤ Ø14 mm	≤ Ø100 mm		
	Knauf FPC panel	100 mm	2400x1200 mm	≤ Ø80 mm	≤ Ø100 mm	yes	≤ Ø6 mm
	Knauf FPM Mortar	150 mm	2400x1200 mm	≤ Ø80 mm	≤ Ø100 mm	yes	
100 mm		2400x1200 mm	≤ Ø80 mm	≤ Ø100 mm	yes		
Knauf FPF Foam <sup>6)</sup>	100 mm	450x500 mm	≤ Ø80 mm	≤ Ø100 mm	yes	≤ Ø28 mm	
RIGID FLOOR	Knauf FPA Acrylic	150 mm	300x300 mm	≤ Ø80 mm	≤ Ø100 mm		≤ Ø54 mm
	Knauf FP Putty	150 mm	Ø15 mm	≤ Ø80 mm	≤ Ø75 mm		≤ Ø12 mm
	Knauf FPP Polymer	150 mm					≤ Ø15 mm
	Knauf FPG Graphite	150 mm					
	Knauf Firecollar	150 mm	≤ Ø160 mm	≤ Ø21 mm	≤ Ø160 mm		
	Knauf Firewrap	150 mm					
	Knauf FP Service Transit	150 mm		≤ Ø14 mm	≤ Ø100 mm		
	Knauf FPC panel	150 mm	1200x2400 mm	≤ Ø80 mm	≤ Ø100 mm	yes	
	Knauf FPC Mortar	150 mm	2400x1200 mm	≤ Ø80 mm	≤ Ø100 mm	yes	≤ Ø54 mm
	Knauf FPF Foam <sup>4)</sup>	150 mm	450x450 mm	≤ Ø80 mm	≤ Ø100 mm	yes	≤ Ø28 mm
FLEXIBLE WALL	Knauf FPA Acrylic	75 mm	150x150 mm	≤ Ø21 mm	≤ Ø100 mm		
		100 mm	300x300 mm	≤ Ø80 mm	≤ Ø100 mm		≤ Ø22 mm
	Knauf FP Putty	100 mm	Ø15 mm	≤ Ø80 mm	≤ Ø50 mm		≤ Ø12 mm
	Knauf FPG Polymer	100 mm					≤ Ø16 mm
	Knauf Graphite	100 mm					
	Knauf Firecollar	120 mm	Ø160 mm	≤ Ø80 mm	≤ Ø160 mm		
	Knauf Firewrap	100 mm					
	Knauf FP Service Transit	75 mm		≤ Ø14 mm	≤ Ø100 mm		
	Knauf FPC panel	75 mm		≤ Ø80 mm	≤ Ø100 mm	yes	
		100 mm	2400x1200 mm	≤ Ø80 mm	≤ Ø100 mm	yes	≤ Ø6 mm
	Knauf FPM Mortar	100 mm	2400x1200 mm	≤ Ø80 mm	≤ Ø100 mm	yes	
	Knauf FPM plate	75 mm					
Knauf FPF Foam <sup>5)</sup>	94 mm	450x500 mm	≤ Ø80 mm	≤ Ø100 mm	yes	≤ Ø28 mm	

Copper pipes		Composite pipes			Mild or stainless steel pipes			Combustible pipes	Conduits	Pipe in pipe		Electric socket box
With stone wool insulation	With elastomeric insulation	Without insulation	With stone wool insulation	With elastomeric insulation	Without insulation	With stone wool insulation	With elastomeric insulation			Single	Bundle	
					≤ Ø22 mm	≤ Ø324 mm		≤ Ø32 mm				
≤ Ø54 mm	≤ Ø54 mm	Ø20 mm ≤ Ø75 mm <sup>1)</sup>	≤ Ø75 mm	Ø75 mm	≤ Ø30 mm	≤ Ø324 mm	≤ Ø165 mm	≤ Ø32 mm	≤ Ø40 mm	≤ Ø54 mm		
≤ Ø54 mm		Ø20 mm ≤ Ø75 mm <sup>1)</sup>	≤ Ø75 mm		≤ Ø30 mm	≤ Ø324 mm						
								≤ Ø160 mm <sup>2)</sup>				
	≤ Ø54 mm							≤ Ø315 mm <sup>2)</sup>		≤ Ø25 mm	≤ Ø55 mm	
	≤ Ø54 mm <sup>3),4)</sup>		≤ Ø75 mm <sup>3)</sup>	≤ Ø75 mm <sup>3),4)</sup>			≤ Ø324 mm <sup>3)</sup> ≤ Ø165 mm <sup>4)</sup>	≤ Ø315 mm <sup>3)</sup> ≤ Ø400 mm <sup>4)</sup>		≤ Ø54 mm <sup>4)</sup>		
	≤ Ø54 mm <sup>3),4)</sup>		≤ Ø75 mm <sup>3)</sup>	≤ Ø75 mm <sup>3),4)</sup>			≤ Ø165 mm <sup>3)</sup> ≤ Ø324 mm <sup>4)</sup>	≤ Ø315 mm <sup>4)</sup>		≤ Ø54 mm <sup>4)</sup>		
≤ Ø54 mm	≤ Ø54 mm <sup>5)</sup>	≤ Ø20 mm	≤ Ø75 mm	≤ Ø75 mm <sup>5)</sup>	≤ Ø22 mm <sup>7)</sup> ≤ Ø114 mm	≤ Ø324 mm	≤ Ø325 mm <sup>5)</sup>	≤ Ø315 mm <sup>5)</sup>	≤ Ø16 mm			
≤ Ø54 mm	≤ Ø54 mm <sup>5)</sup>		≤ Ø75 mm	≤ Ø75 mm		≤ Ø219 mm	≤ Ø165 mm <sup>5)</sup>	≤ Ø32 mm ≤ Ø315 mm <sup>5)</sup>	≤ Ø16 mm			
≤ Ø54 mm	≤ Ø54 mm <sup>5)</sup>		≤ Ø75 mm	≤ Ø75 mm <sup>5)</sup>		≤ Ø219 mm	≤ Ø165 mm <sup>5)</sup>	≤ Ø32 mm	≤ Ø16 mm			
≤ Ø54 mm	≤ Ø88,9 mm	≤ Ø100 mm	≤ Ø100 mm	≤ Ø100 mm	≤ Ø28 mm	≤ Ø54 mm	≤ Ø88,9 mm	≤ Ø50 mm	≤ Ø16 mm	≤ Ø50 mm		
≤ Ø54 mm	≤ Ø54 mm	≤ Ø75 mm	≤ Ø75 mm	≤ Ø75 mm	≤ Ø16 mm	≤ Ø324 mm	≤ Ø165 mm	≤ Ø75 mm		≤ Ø15 mm		
≤ Ø54 mm		≤ Ø75 mm	≤ Ø75 mm		≤ Ø30 mm	≤ Ø324 mm						
		≤ Ø20 mm			≤ Ø16 mm			≤ Ø32 mm <sup>1)</sup>				
	≤ Ø54 mm							≤ Ø324 mm	≤ Ø160 mm			
	≤ Ø54 mm							≤ Ø400 mm				
	≤ Ø54 mm <sup>1),2)</sup>			≤ Ø75 mm <sup>1),2)</sup>			≤ Ø324 mm <sup>1)</sup> ≤ Ø165 mm <sup>2)</sup>	≤ Ø315 mm <sup>1)</sup> ≤ Ø110 mm <sup>2)</sup>	≤ Ø110 mm <sup>1)</sup>	≤ Ø54 mm <sup>4)</sup>		
≤ Ø54 mm	≤ Ø54 mm <sup>3)</sup>		≤ Ø75 mm	≤ Ø75 mm <sup>3)</sup>		≤ Ø219 mm	≤ Ø165 mm <sup>3)</sup>	≤ Ø110 mm <sup>3)</sup>	≤ Ø16 mm			
≤ Ø54 mm	≤ Ø54 mm <sup>3)</sup>	≤ Ø75 mm	≤ Ø75 mm	≤ Ø75 mm <sup>3)</sup>		≤ Ø324 mm	≤ Ø324 mm <sup>3)</sup>	≤ Ø160 mm <sup>3)</sup>	≤ Ø110 mm <sup>3)</sup>			
≤ Ø54 mm	≤ Ø88,9 mm				≤ Ø28 mm	≤ Ø54 mm	≤ Ø88,9 mm	≤ Ø50 mm	≤ Ø16 mm			
					≤ Ø22 mm	≤ Ø324 mm		≤ Ø32 mm				
≤ Ø54 mm	≤ Ø54 mm	Ø20 mm ≤ Ø75 mm <sup>1)</sup>	≤ Ø75 mm	Ø75 mm	≤ Ø22 mm	≤ Ø324 mm	≤ Ø165 mm	≤ Ø32 mm	≤ Ø40 mm	≤ Ø54 mm		
≤ Ø54 mm		Ø20 mm ≤ Ø75 mm <sup>1)</sup>	≤ Ø75 mm		≤ Ø30 mm	≤ Ø324 mm						Yes
		≤ Ø20 mm			≤ Ø22 mm			≤ Ø32 mm				
	≤ Ø54 mm							≤ Ø160 mm				
	≤ Ø54 mm							≤ Ø315 mm		≤ Ø25 mm	≤ Ø55 mm	
	≤ Ø54 mm <sup>2),3)</sup>		≤ Ø75 mm <sup>2)</sup>	≤ Ø75 mm <sup>2),3)</sup>			≤ Ø165 mm <sup>3)</sup> ≤ Ø324 mm <sup>3)</sup>	≤ Ø324 mm <sup>3)</sup>		≤ Ø54 mm <sup>3)</sup>		
					≤ Ø22 mm	≤ Ø324 mm						
≤ Ø54 mm	≤ Ø54 mm <sup>4)</sup>	≤ Ø20 mm	≤ Ø75 mm	≤ Ø75 mm <sup>4)</sup>	≤ Ø114 mm	≤ Ø324 mm	≤ Ø165 mm <sup>4)</sup>	≤ Ø32 mm ≤ Ø315 mm <sup>4)</sup>	≤ Ø16 mm			
≤ Ø54 mm	≤ Ø54 mm <sup>4)</sup>		≤ Ø75 mm	≤ Ø75 mm <sup>4)</sup>		≤ Ø219 mm	≤ Ø165 mm <sup>5)</sup>	≤ Ø32 mm	≤ Ø16 mm			
												Yes
≤ Ø54 mm	≤ Ø88,9 mm				≤ Ø28 mm	≤ Ø54 mm	≤ Ø88,9 mm	≤ Ø50 mm	≤ Ø16 mm			

# KNAUF FPA ACRYLIC

5



The intended use of system Knauf FPA Acrylic is to reinstate the fire resistance performance of flexible wall constructions, rigid wall constructions and rigid floor constructions where they are penetrated by various metal pipe services with and without combustible insulation, plastic pipes, composite pipes and electrical cables.

The system Knauf FPA Acrylic may be used to provide a penetration seal with specific single insulated metal pipes, uninsulated metal pipes, plastic pipes, composite pipes and with specific electrical cables, single or in a bundle.

Apertures in the separating element shall be maximum 300 x 300 mm or 100 x 1000 mm. The annular space/ gap around the services shall be infilled with mineral fibre insulation backing material and Knauf FPA Acrylic sealant. Blank seals up to 300 x 300 mm are permitted. Pipes shall be supported at maximum 350 mm away from both faces of the wall constructions and from the upper face of floor constructions.

**Application purposes:**

- > Flexible walls
- > Rigid walls
- > Rigid floors

The specific elements of construction that the system Knauf FPA Acrylic may be used to provide a penetration seal in, are as follows:

**Flexible walls:**

The wall must have a minimum thickness of 75 mm and comprise steel studs or timber studs\* lined on both faces with minimum 1 layers of 12.5 mm thick boards.

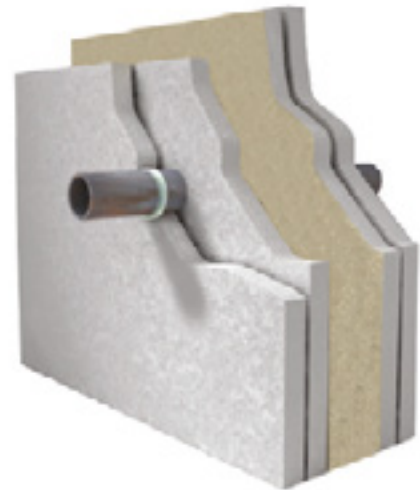
**Rigid walls:**

The wall must have a minimum thickness of 75 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m<sup>3</sup>.

**Rigid floors:**

The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m<sup>3</sup>.

\* no part of the penetration seal may be closer than 100 mm to a stud, the cavity must be closed between the penetration seal and the stud, and minimum 100 mm of insulation of class A1 or A2



5

## Installation Instructions

1. Before installing Knauf FPA Acrylic ensure that the surface of all service penetrations and surrounding construction is free from all loose contaminants, dust and grease.
2. Where Knauf FPA Acrylic is to be installed against surfaces that cannot tolerate direct contact; appropriate surface preparation should be made (contact Knauf for guidance in these cases). For paints sensitive to sealing compounds, priming with a PVA primer is recommended.
3. As Knauf FPA Acrylic is water based, in cases where corrosion protection is a problem; some metals may require a barrier between the sealant and the metal surface prior to this installation.
4. When installing the sealant in gypsum boards, the exposed edges of the board can be wetted with water, or Knauf FPA Acrylic diluted with water to prime the surfaces helping adhesion and preventing excessive joint shrinkage.
5. When installing Knauf FPA Acrylic in hollow floor slabs or boards, fire seals specified as single sided should be installed from the soffit side of the floor assuming there is sufficient thickness of concrete below the void to follow the installation guide. Where this is not the case, tubular voids should be filled with stone wool normally the same thickness as the depth of the floor slab. Alternatively, simply fire seal on both sides.
6. When installing any backing material, cut this slightly oversize and insert into the gap ensuring a tight friction fit. Ensure correct depth is achieved.
7. Fill the gap or joint with Knauf FPA Acrylic to the required depth. Refer to the drawings on following pages 4 to 22 for guidance on joint design/dimensions. If installation does not have to meet any specific fire specification, it is recommended that a width to depth ratio of 2:1 is utilized, with a minimum depth of 12mm of sealant.
8. Apply the sealant generously to prevent air bubbles. Finish the bead with a moist spatula, pallet knife or brush.
9. Knauf FPA Acrylic can be over-painted with most emulsion or alkyd (gloss) paints.

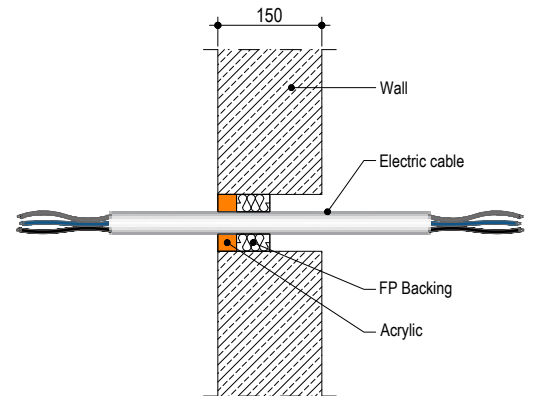
# PENETRATION SEALS | RIGID WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 150 MM

## > Single side penetration seal with cables

Penetration Seal: Cables (single) fitted at any position within the aperture, with Knauf FPA Acrylic to either side of the wall (or at any position in between), backed with 'FP Backing'. Minimum separation between cables and the edge of the seal of 7 mm.

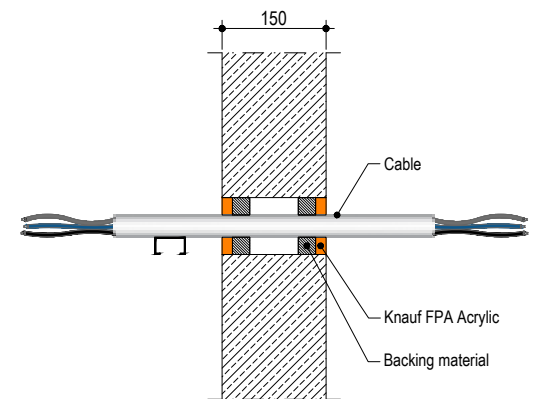
Services	Sealant depth	Backing	Maximum seal size	Classification
Single electrical cables up to 21 mm Ø	25 mm	48 mm deep FP Backing	87 mm Ø	E 240, EI 90
Blank seals	25 mm	48 mm FP Backing insulation	300 x 300mm	E 240, EI 60
Electric cables up to 21 mm diameter, single.				
Blank seals			35 x 35 mm / 36 mm Ø	E 240, EI 120
Electric cables up to 21 mm diameter, single.				



## > Double side penetration seal with cables

Penetration Seal: Cables fitted with Knauf FPA Acrylic to both sides of the wall, backed with stone wool or mineral fibre insulation. Maximum seal size of 300 x 300 mm and minimum separation between cables and the edge of the seal of 10 mm.

Services	Sealant depth	Backing	Maximum seal size	Classification
Blank seals	15 mm	25 mm Stone wool 35 kg/m <sup>3</sup>	None	EI 240
Electric cables up to 21 mm diameter, single or in a bundle				E 240, EI 120
Electric cables 22-80 mm diameter, single or in a bundle				E 120, EI 60
Blank seals	25 mm	48 mm FP Backing	None	EI 240
Electric cables up to 80 mm diameter, single or in a bundle				EI 240, EI 60
Cables up to 21 mm diameter, single or in a bundle up to 100 mm diameter				EI 240

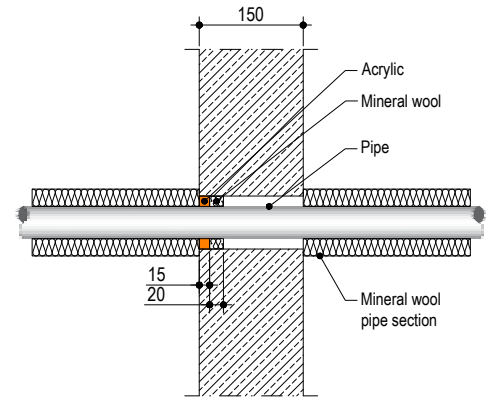




### › Single side penetration seal with metallic (and composite) pipes

Penetration Seal: LI (Local Interrupted) of minimum length stated below or CI (Continuous Interrupted) insulated metallic and composite pipes (single) fitted at any position within the aperture, with 15 mm deep Knauf FPA Acrylic to either side of the wall (or at any position between), backed with 20 mm deep 40 kg/m<sup>3</sup> stone wool insulation.

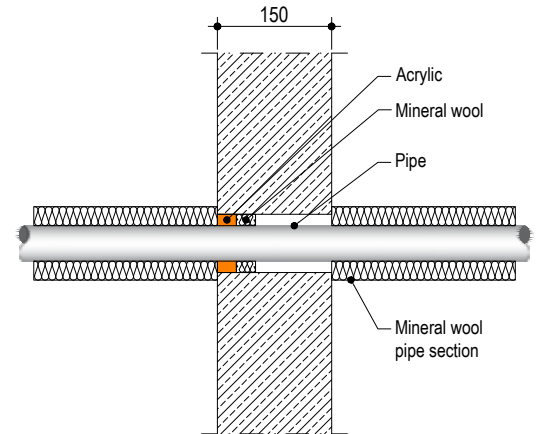
Services	Seal width around pipe	Insulation (minimum)	Classification
Copper pipe up to 54 mm diameter/0.9-14.2 mm wall	8-9 mm	1000 mm length 20 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, EI 180 C/U
Copper pipe up to 12 mm diameter/0.9-5 mm wall	8 mm		EI 240 C/U
Alupex composite pipe 75 mm diameter/7.5 mm wall	30 mm	25 mm FP Backing insulation, 600 mm long (min.)	EI 120 C/U
Mild or stainless steel pipe			
40 mm diameter/ 1.5-14.2 mm wall	6-18 mm	1000 mm length of 20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 240 C/U
40 mm diameter/ 1.5-14.2 mm wall			
50 mm diameter/ 1.7-14.2 mm wall			
60 mm diameter/ 1.9-14.2 mm wall			
75 mm diameter/ 2.2-14.2 mm wall			
90 mm diameter/ 2.5-14.2 mm wall			
100 mm diameter/ 2.7-14.2 mm wall		1000 mm length of 30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 180 C/U, EI 90 C/U
115 mm diameter/ 3-14.2 mm wall			
140 mm diameter/ 3.5-14.2 mm wall			
165 mm diameter/ 3.9-14.2 mm wall			
180 mm diameter/ 4.2-14.2 mm wall			
200 mm diameter/ 4.6-14.2 mm wall			
219 mm diameter/ 5.0-14.2 mm wall			



› **Single side penetration seal with metallic (and composite) pipes**

Penetration Seal: LI (Local Interrupted) of minimum length stated below or CI (Continuous Interrupted) insulated metallic and composite pipes (single) fitted at any position within the aperture, with 25 mm deep Knauf FPA Acrylic to either side of the wall (or at any position between), backed with 25 mm deep 40 kg/m<sup>3</sup> stone wool insulation.

Services	Maximum Seal size	Insulation (minimum)	Classification
Copper pipe up to 54 mm diameter/0.9-14.2 mm wall	300 x 300 mm	1000 mm length 20 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, EI 60 C/U
Alupex composite pipe 75 mm diameter/7.5 mm wall		25 mm FP Backing insulation, 600 mm long (min.)	
Mild or stainless steel pipe			
40 mm diameter/ 1.5-14.2 mm wall	300 x 300 mm	1000 mm length of 20 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, EI 60 C/U
40 mm diameter/ 1.5-14.2 mm wall			
50 mm diameter/ 1.7-14.2 mm wall			
60 mm diameter/ 1.9-14.2 mm wall			
75 mm diameter/ 2.2-14.2 mm wall			
90 mm diameter/ 2.5-14.2 mm wall		1000 mm length of 30 mm Stone wool insulation 80 kg/m <sup>3</sup>	
100 mm diameter/ 2.7-14.2 mm wall			
115 mm diameter/ 3-14.2 mm wall			
140 mm diameter/ 3.5-14.2 mm wall			
165 mm diameter/ 3.9-14.2 mm wall			
180 mm diameter/ 4.2-14.2 mm wall			
200 mm diameter/ 4.6-14.2 mm wall			
219 mm diameter/ 5.0-14.2 mm wall			

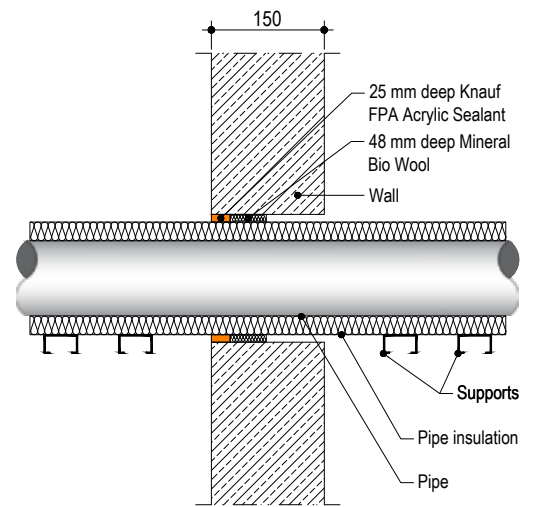


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### › Single side penetration seal with metallic pipes

**Penetration Seal:** CS (Continuous Sustained) insulated metallic (single), with 25 mm deep Knauf FPA Acrylic to either side of the wall (or at any position between), backed with 48 mm deep FP Backing insulation. Minimum annular space 10 mm and minimum separation between penetrations seals of 30 mm. Maximum seal size 300 x 300 mm or 504 mm Ø.

Mild or stainless steel pipe	Insulation	Classification
40 mm diameter/1-14.2 mm wall	20 mm thick stone, mineral wool min. 80 kg/m <sup>3</sup>	EI 240 C/U
40 mm diameter/1-14.2 mm wall		
50 mm diameter/1.2-14.2 mm wall		
60 mm diameter/1.4-14.2 mm wall		
75 mm diameter/1.6-14.2 mm wall		
90 mm diameter/1.9-14.2 mm wall		
100 mm diameter/2.1-14.2 mm wall		
115 mm diameter/2.4-14.2 mm wall		
140 mm diameter/2.9-14.2 mm wall		
165 mm diameter/ 3.4-14.2 mm wall		
180 mm diameter/ 3.6-14.2 mm wall		
200 mm diameter/ 4.0-14.2 mm wall		
219 mm diameter/ 4.3-14.2 mm wall		
219 mm diameter/ 4.3-14.2 mm wall		
250 mm diameter/ 5.0-14.2 mm wall		
300 mm diameter/ 5.9-14.2 mm wall		
324 mm diameter/ 6.35-14.2 mm wall		
	30-80 mm thick stone, mineral wool min. 80 kg/m <sup>3</sup>	EI 180 C/U

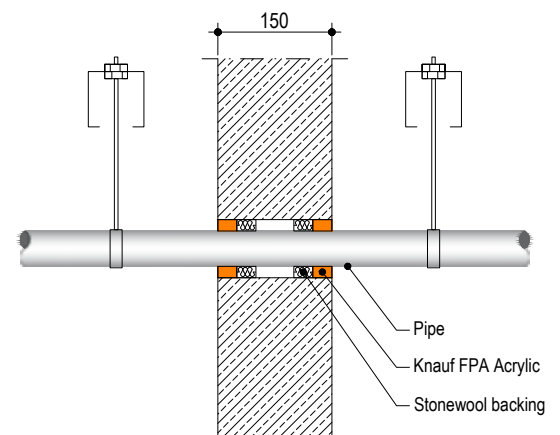


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### › Double side penetration seal with plastic pipes

**Penetration Seal:** Plastic pipes (single) fitted at any position within the aperture, with 25 mm Knauf FPA Acrylic to both sides of the wall, backed with 25 mm deep stone wool insulation 35 kg/m<sup>3</sup>. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). Maximum seal size 300 x 300 mm / 300 mm Ø.

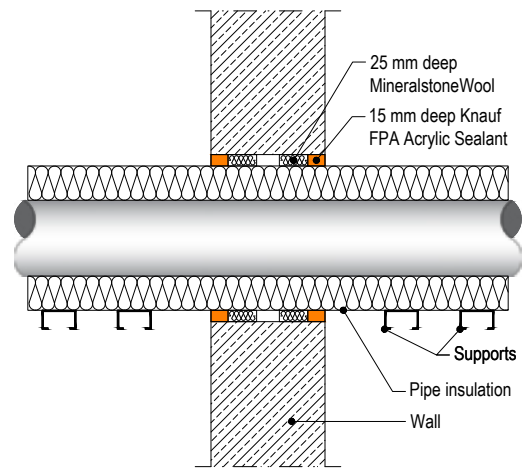
Pipe material	Size	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1	6-32 mm diameter/ 1.0-2.4 mm wall	EI 240 U/C
PP pipe according to EN 1451-1 or DIN 8077/8078	32 mm diameter/ 2.0-4.4 mm wall	EI 180 C/U
	12-32 mm diameter/ 1.8-4.4 mm wall	EI 240 C/U
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1	20-32 mm diameter/ 2.0 mm wall	EI 240 C/U
	20-32 mm diameter/2.0-4.4 mm wall	EI 120 C/U



› **Double side penetration seal with metallic pipes**

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with 15 mm Knauf FPA Acrylic to both sides of the wall, backed with 25 mm deep stone wool insulation 35 kg/m<sup>3</sup>. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). Maximum seal size 300 x 300 mm / 504 mm Ø.

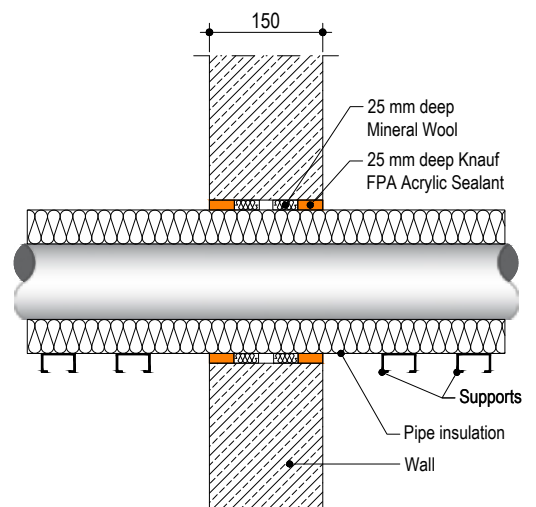
Mild or stainless steel pipe	Insulation	Classification
40 mm diameter/ 1-14.2 mm wall	20 mm thick stone, mineral wool min. 80 kg/m <sup>3</sup>	EI 240 C/U
40 mm diameter/ 1-14.2 mm wall		
50 mm diameter/ 1.2-14.2 mm wall		
60 mm diameter/ 1.4-14.2 mm wall		
75 mm diameter/ 1.6-14.2 mm wall		
90 mm diameter/ 1.9-14.2 mm wall		
100 mm diameter/ 2.1-14.2 mm wall		
115 mm diameter/ 2.4-14.2 mm wall		
140 mm diameter/ 2.9-14.2 mm wall		
165 mm diameter/ 3.4-14.2 mm wall		
180 mm diameter/ 3.6-14.2 mm wall		
200 mm diameter/ 4.0-14.2 mm wall		
219 mm diameter/ 4.3-14.2 mm wall		
250 mm diameter/ 5.0-14.2 mm wall		
300 mm diameter/ 5.9-14.2 mm wall		
324 mm diameter/ 6.35-14.2 mm wall		



› **Double side penetration seal with metallic pipes with combustible insulation**

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with 25 mm Knauf FPA Acrylic to both sides of the wall, backed with 25 mm deep stone wool insulation 35 kg/m<sup>3</sup>. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). Maximum seal size 300 x 300 mm / 300 mm Ø.

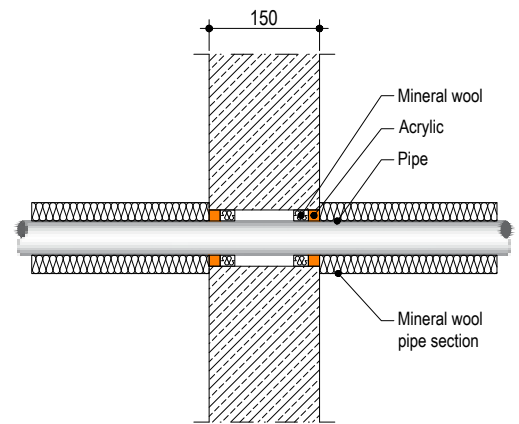
Mild or stainless steel pipe	Insulation	Classification
22 mm diameter/ 2-11 mm wall	13 mm thick Elastomeric insulation minimum class B-s3,d0	E 240 C/U, EI 180 C/U
22-114 mm diameter/ 2-14.2 mm wall	13-25 mm thick Elastomeric insulation minimum class B-s3,d0	E 120 C/U, EI 90 C/U
22-114 mm diameter/ 2-14.2 mm wall	25-50 mm thick Elastomeric insulation minimum class B-s3,d0	EI 60 C/U



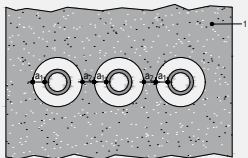
› **Double side penetration seal with metallic pipes**

Penetration Seal: 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 15 mm deep Knauf FPA Acrylic to both sides of the wall, backed with 20 or 30 mm deep 40 kg/m<sup>3</sup> stone wool insulation.

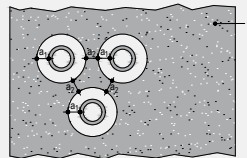
Services	Maximum seal size	Insulation (minimum)	Maximum seal size
Mild or stainless steel pipe			
40 mm diameter/1.5-14.2 mm wall	300 x 300 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 240 C/U
40 mm diameter/1.5-14.2 mm wall			
50 mm diameter/1.7-14.2 mm wall			
60 mm diameter/1.9-14.2 mm wall			
75 mm diameter/2.2-14.2 mm wall			
90 mm diameter/2.5-14.2 mm wall			
100 mm diameter/2.7-14.2 mm wall		30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240, EI 120 C/U
115 mm diameter/3-14.2 mm wall			
140 mm diameter/3.5-14.2 mm wall			
165 mm diameter/ 3.9-14.2 mm wall			
180 mm diameter/ 4.2-14.2 mm wall			
200 mm diameter/ 4.6-14.2 mm wall			
219 mm diameter/ 5.0-14.2 mm wall			



Configuration 1



Configuration 2



- Key
- 1 Supporting construction
  - a1 Pipe / top edge of seal separation
  - a2 Pipe / side edge of seal separation
  - a3 Pipe / pipe separation

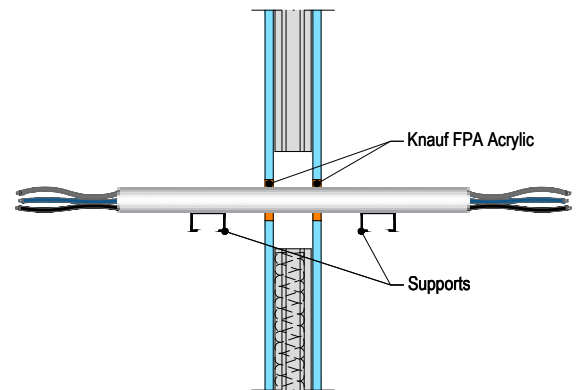
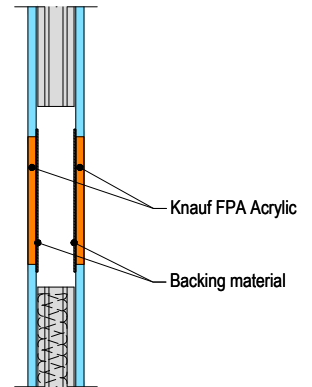
# PENETRATION SEALS | FLEXIBLE WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 75 MM

## › Double side penetration seal with cables

Penetration Seal: Cables (single or bundles up to 100 mm Ø) and pipes fitted at any position within the aperture, with Knauf FPA Acrylic to both sides of the wall. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2), maximum seal size 150 x 150 mm / 344 mm diameter (when incorporating a pipe of seal diameter -20 mm).

Services	Sealant depth	Backing	Classification
None (blank)	12.5 mm	Any material	EI 60
Cables up to 21 mm Ø, single		None	E 60, EI 45
Cables up to 21 mm Ø, in bundles up to 100 mm Ø			E 45, EI 30
Mild or stainless steel pipe			
4 mm diameter/0.7-2.0 mm wall	12.5 mm	None	E 60 C/U, EI 45 C/U
5-22 mm diameter/0.7-11 mm wall			E 60 C/U, EI 30 C/U
Mild or stainless steel pipe with 80 kg/m <sup>3</sup> density stone wool insulation Continuous Sustained (CS)			
40 mm diameter/1-14.2 mm wall, 20 mm insulation	12.5 mm	None	E 60 C/U, EI 45 C/U
40-324 mm diameter/ 1.0-14.2 mm wall, 30 mm insulation			
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1			
6-32 mm Ø/1.0-1.8 mm wall, with bundle of cables up to 21 mm diameter	12.5 mm	None	E 60 U/C, EI 45 U/C
PP pipe according to EN 1451-1			
20 mm Ø/2.3 mm wall	12.5 mm	None	EI 45 U/C
21-32 mm Ø/2.3-4.4 mm wall			EI 30 U/C
21-32 mm Ø/2.3-4.4 mm wall, with bundle of cables up to 21 mm diameter			E 45 U/C, EI 30 U/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
20 mm Ø/2.0 mm wall	12.5 mm	None	EI 45 U/C
21-32 mm Ø/2.0-3.0 mm wall			EI 30 U/C
21-32 mm Ø/2.0-3.0 mm wall, with bundle of cables up to 21 mm diameter			E 45 U/C, EI 30 U/C



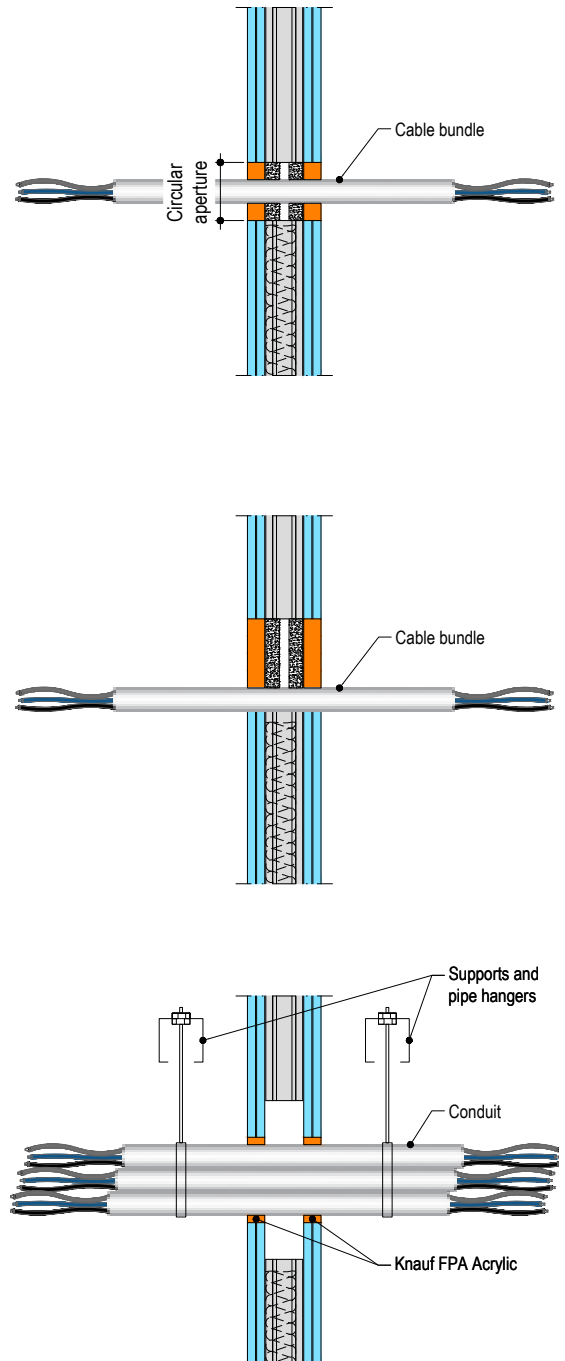
WITH WALL THICKNESS OF MINIMUM 100 MM

### › Double side penetration seal with cables

**Penetration Seal:** Cables (single or bundles up to 100 mm Ø) and conduits fitted at any position within the aperture, with Knauf FPA Acrylic to both sides of the wall.

Services	Sealant depth	Backing	Maximum aperture	Classification
None (blank)	12.5 mm	Stone wool 20 mm deep 35-140 kg/m <sup>3</sup>	300 x 300 mm*	EI 120
Cables up to 21 mm Ø, single or in bundles up to 50 mm Ø	12.5 mm	Stone wool 12.5 mm deep min. 33 kg/m <sup>3</sup>		E 120, EI 90
Electrical cables up to 21 mm Ø, single or in bundles up to 100 mm Ø	25 mm	Stone wool 20 mm deep min. 40 kg/m <sup>3</sup>		EI 120
Electrical cables up to 80 mm Ø, single or in bundles up to 100 mm Ø		25 mm FP Backing		E 120, EI 60
Single 'E cable' - 1 x 185 mm <sup>2</sup> core HD603.3 electrical cable with PVC insulation, PVC sheath and 23-27 mm diameter	12.5 mm	Stone wool 20 mm deep min. 140 kg/m <sup>3</sup>		E 120, EI 60
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1, PVC-C according to EN 1566-1				
Maximum diameter 40 mm, wall thickness 1.0-1.9 mm for PVC pipes, fully or partially filled conduits with cables up to 21 mm diameter	25 mm	-	30 mm	EI 120 U/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1				
Maximum diameter 40 mm, wall thickness 2.0-3.0 mm for PE pipes, fully or partially filled conduits with cables up to 21 mm diameter	25 mm	-	30 mm	EI 90 U/C
PP pipe according to EN 1852-1: 2009 or DIN 8077/8078				
Maximum diameter 40 mm, wall thickness 1.8-2.2 mm for PP pipes, fully or partially filled conduits with cables up to 21 mm diameter	25 mm	-	30 mm	EI 90 U/C

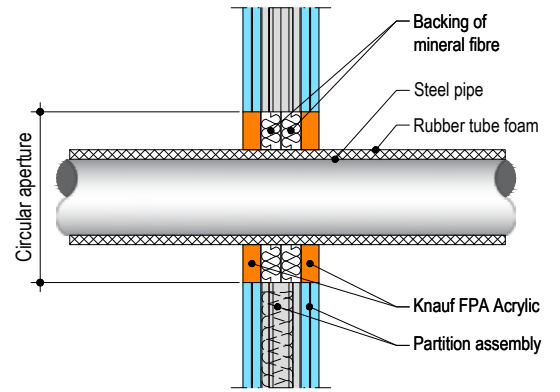
\* Or 30 mm wide x 3000 mm high for cables up to 21 mm Ø



› **Double side penetration seal with metallic pipes**

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with Knauf FPA Acrylic to both sides of the wall, backed with stone wool insulation or 'FP Backing', 300 x 300 mm maximum seal size.

Services	Sealant depth	Backing	Insulation	Classification
Mild or stainless steel pipe				
22 mm diameter/ 3-10 mm wall	25 mm	Stone wool 25 mm deep 35 kg/m <sup>3</sup>	-	EI 120 C/C
Maximum 165 mm diameter/ wall*	12.5 mm	12.5 mm stone wool 33 kg/m <sup>3</sup>	9 mm Elastomeric insulation minimum class D-s3, d0	E 90 C/U EI 45 C/U
			13 -25 mm Elastomeric insulation minimum class D-s3, d0	EI 60 C/U
40 mm diameter/ 1-14.2 mm wall*	12.5 mm	20 mm Stone wool 40 kg/m <sup>3</sup>	13 -19 mm Elastomeric insulation minimum class B-s3,d0	EI 120 C/C
40 mm diameter/ 1-14.2 mm wall	25 mm	25 mm FP Backing		
50 mm diameter/ 1.3-14.2 mm wall				
60 mm diameter/ 1.6-14.2 mm wall				
75 mm diameter/ 2-14.2 mm wall				
90 mm diameter/ 2.4-14.2 mm wall				
100 mm diameter/ 2.7-14.2 mm wall				
115 mm diameter/ 3.1-14.2 mm wall				
140 mm diameter/ 3.8-14.2 mm wall				
165 mm diameter/ 4.5-14.2 mm wall				
Copper or steel pipe				
12 mm diameter/ 1-6 mm wall	25 mm	25 mm FP Backing	9 mm Elastomeric insulation minimum class B-s3,d0	EI 120 C/C
12-54 mm diameter/ 1-14.2 mm wall			9-13 mm Elastomeric insulation minimum class B-s3,d0	E 120 C/C, EI 60 C/C
12-54 mm diameter/ 1-14.2 mm wall			13-25 mm Elastomeric insulation minimum class B-s3,d0	EI 60 C/C



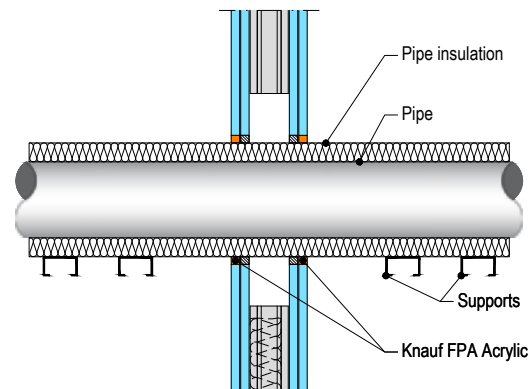


Services	Sealant depth	Backing	Insulation	Classification
Alupex Composite Pipe				
16 mm diameter/ wall*	12.5 mm	12.5 mm stone wool 33 kg/m <sup>3</sup>	9 mm Elastomeric insulation minimum class D-s3, d0	E 120 C/C EI 90 C/C
Maximum 75 mm diameter/ wall*			13-24 mm Elastomeric insulation minimum class D-s3, d0	E 90 C/C EI 60 C/C
			25 mm Elastomeric insulation minimum class D-s3, d0	EI 90 C/C
			9 mm Elastomeric insulation minimum class B-s3, d0	EI 120 C/C
16 mm diameter/ 2.25 mm wall	25 mm	25 mm FP Backing	9-25 mm Elastomeric insulation minimum class B-s3, d0	EI 60 C/C
16 mm diameter/ 2.25 mm wall				
20 mm diameter/ 2.5 mm wall				
26 mm diameter/ 3 mm wall				
32 mm diameter/ 3 mm wall				
40 mm diameter/ 3.5 mm wall				
50 mm diameter/ 4 mm wall				
63 mm diameter/ 4.5 mm wall				
75 mm diameter/ 4.7 mm wall				
Mild or stainless steel pipe				
16 mm diameter/ wall*	25 mm	-	15 mm thick phenolic insulation	EI 90 C/U
Maximum 273 mm/ wall*			25 mm thick phenolic insulation	E 90 C/U, EI 60 C/U
			26-100 mm thick phenolic insulation	EI 60 C/U

\* Typical pipe diameters according to ETA21/0097

### › Double side penetration seal with metallic pipes

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with 12.5 mm Knauf FPA Acrylic to both sides of the wall, backed with 12.5 mm deep stone wool insulation 35 kg/m<sup>3</sup>. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). Maximum seal size 300 x 300 mm/ 504 mm Ø.

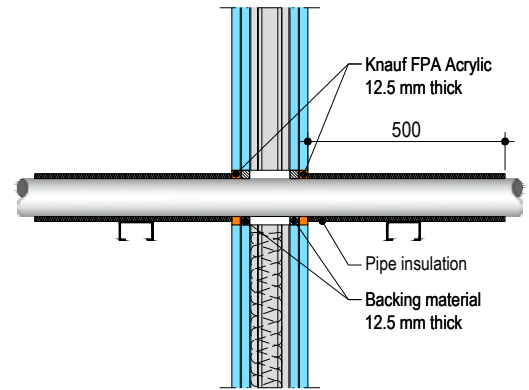


Mild or stainless steel pipe	Insulation	Classification
40 mm diameter/1-14.2 mm wall	20 mm thick stone, mineral wool min. 80 kg/m <sup>3</sup>	E 120 C/U EI 90 C/U
40 mm diameter/1-14.2 mm wall		
50 mm diameter/1.2-14.2 mm wall		
60 mm diameter/1.4-14.2 mm wall		
75 mm diameter/1.6-14.2 mm wall		
90 mm diameter/1.9-14.2 mm wall		
100 mm diameter/2.1-14.2 mm wall		
115 mm diameter/2.4-14.2 mm wall		
140 mm diameter/2.9-14.2 mm wall		
165 mm diameter/ 3.4-14.2 mm wall		
180 mm diameter/ 3.6-14.2 mm wall		
200 mm diameter/ 4.0-14.2 mm wall		
219 mm diameter/ 4.3-14.2 mm wall		
250 mm diameter/ 5.0-14.2 mm wall		
300 mm diameter/ 5.9-14.2 mm wall		
324 mm diameter/ 6.35-14.2 mm wall		
<b>PEX pipe in pipe system</b>	<b>Insulation</b>	<b>Classification</b>
15 mm diameter x 2.5 mm wall inner/ 25mm diameter outer	None	EI 120 C/C
<b>Alupex pipe</b>	<b>Insulation</b>	<b>Classification</b>
16-20 mm diameter/2.0 mm wall	None	EI 120 C/C
16-75 mm diameter/2.25-4.6 mm	20-50 mm thick glass wool or stone, mineral wool min. 75 kg/m <sup>3</sup>	EI 120 C/C
<b>Mild or Stainless Steel pipe</b>	<b>Insulation</b>	<b>Classification</b>
4 mm diameter/1.0-2.0 mm wall	None	EI 90 C/C
5-30 mm diameter/1.0-14.2 mm wall		
30 mm diameter/2.0-14.2 mm wall		EI 120 C/U
<b>Copper or Steel pipe</b>	<b>Insulation</b>	<b>Classification</b>
6-12 mm diameter/0.7-6.0 mm wall	None	E 90 C/C, EI 60 C/C
13-22 mm diameter/0.7-11 mm wall		
12-54 mm diameter/0.9-1.2 mm wall		E 120 C/C, EI 60 C/C

### › Double side penetration seal with composite pipes

**Penetration Seal:** CI (Continuous Interrupted) or CS (Continuous Sustained) insulated composite pipes (single) fitted at any position within the aperture, with Knauf FPA Acrylic to both sides of the wall, minimum 10 mm seal width around service, maximum seal size 300 x 300 mm, backed with stonewool.

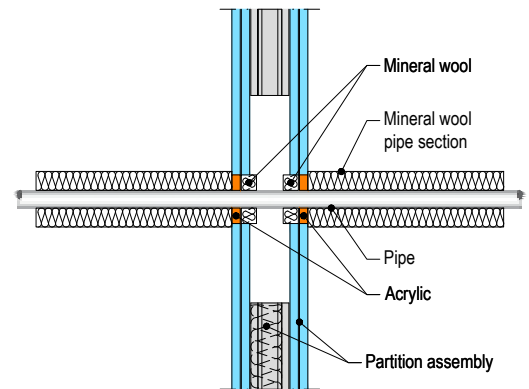
Services	Sealant depth	Backing	Insulation (minimums)	Classification
Alupex Composite Pipe				
16 mm diameter/2.25 mm wall	12.5 mm	12.5 mm stonewool 40 kg/m <sup>3</sup>	20 mm stonewool 80 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	EI 120 C/C
20 mm diameter/2.5 mm wall				
26 mm diameter/3 mm wall				
32 mm diameter/3 mm wall				
40 mm diameter/3.5 mm wall				
50 mm diameter/4 mm wall				
63 mm diameter/4.5 mm wall				
75 mm diameter/4.7 mm wall				



### › Double side penetration seal with metallic (and composite) pipes

**Penetration Seal:** LI (Local Interrupted) of minimum length stated below or CI (Continuous Interrupted) insulated metallic pipes and composite (single) fitted at any position within the aperture, with Knauf FPA Acrylic to both sides of the wall, min. 10 mm seal width around service, backed with stone wool insulation or 'FP Backing'.

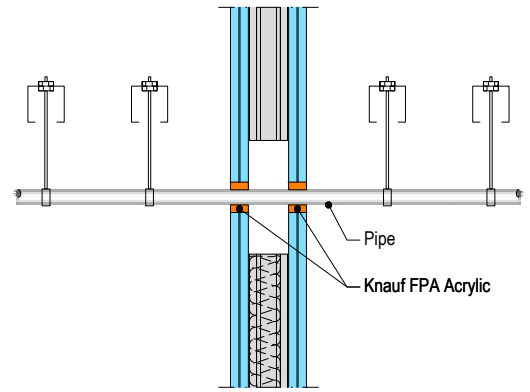
Services	Sealant depth	Backing	Insulation (minimum)	Classification	
Maximum aperture size 300 x 300 mm					
Copper pipe up to 54 mm diameter/1-14.2 mm wall	12.5 mm	20 mm Stone wool 40 kg/m <sup>3</sup>	500 mm length of 20 mm stone wool 80 kg/m <sup>3</sup>	EI 120 C/U	
Alupex composite pipe 75 mm diameter/7.5 mm wall		20 mm Stone wool 140 kg/m <sup>3</sup>	600 mm length of 25 mm FP Backing	EI 60 C/U	
40 mm diameter/1-14.2 mm wall		20mm Stone wool 40 kg/m <sup>3</sup>		500 mm length of 20 mm stone wool 80 kg/m <sup>3</sup>	EI 120 C/U
40 mm diameter/1-14.2 mm wall					
50 mm diameter/1.2-14.2 mm wall					
60 mm diameter/1.4-14.2 mm wall					
75 mm diameter/1.7-14.2 mm wall					
90 mm diameter/2-14.2 mm wall					
100 mm diameter/2.2-14.2 mm wall					
115 mm diameter/2.5-14.2 mm wall					
140 mm diameter/3-14.2 mm wall					
165 mm diameter/3.5-14.2 mm wall					
180 mm diameter/3.8-14.2 mm wall					
200 mm diameter/4.2-14.2 mm wall					
219 mm diameter/4.5-14.2 mm wall					



› **Double side penetration seal with plastic pipes**

**Penetration Seal:** Combustible pipes (single) fitted at any position within the aperture, with Knauf FPA Acrylic to both sides of the wall, Minimum annular space 10 mm and minimum separation between penetration seals 30 mm (A2).

Pipe material	Sealant depth	Pipe size	Maximum Annular space	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1	25 mm	6-32 mm Ø/ 1.0-2.4 mm wall*	10 mm	EI 120 U/C
		6-32 mm Ø/ 1.0-1.6 mm wall		E 120 U/C, EI 90 U/C
PP pipe according to EN 1451-1 or DIN 8077/8078	25 mm	20 mm Ø/ 2.2 mm wall	30 mm	EI 120 C/C
		20 mm Ø/ 2.2-4.4 mm wall		EI 60 U/C
		20-32 mm Ø/ 1.8-4.4 mm wall		EI 60 C/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1	25 mm	20 mm Ø/ 2.0 mm wall	30 mm	EI 120 U/C
		20-32 mm Ø/ 2.0-3.0 mm wall		EI 90 C/C
Uponor Wirsbo PEX pipe in pipe system according to ISO 15875	25 mm	Diameter up to 54 mm/0.4 mm wall thickness (outer pipe), 28 mm diameter/4.0 mm wall thickness (inner pipe)	30 mm	E 60 C/C, EI 45 C/C



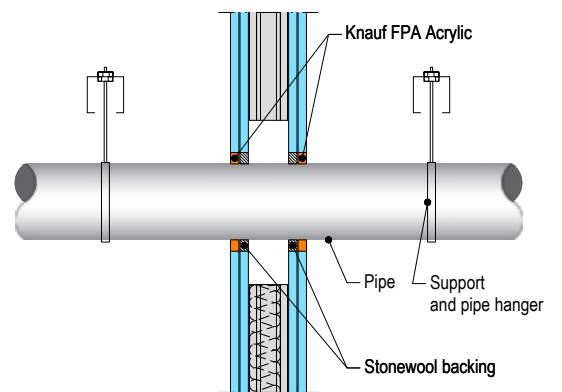
PENETRATION SEALS | FLEXIBLE AND RIGID WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 120 MM

› **Double side penetration seal with cables**

**Penetration Seal:** Non-insulated metallic pipes (single) fitted at any position within the aperture, with 15 mm deep Knauf FPA Acrylic to both sides of the wall, backed with stone wool insulation.

Services	Sealant depth	Backing	Classification
Mild or stainless steel pipe			
30 - 324 mm Ø /1.6-14.2 mm wall	15 mm	15 mm stone wool	E 120 C/U
Copper or steel pipe			
12 - 54 mm Ø /0.9-14.2 mm wall	15 mm	15 mm stone wool	E 120 C/C
Alupex Pipe			
16 - 75 mm Ø/2.0-4.6 mm wall	15 mm	15 mm stone wool	E 120 C/C, EI 30 C/C



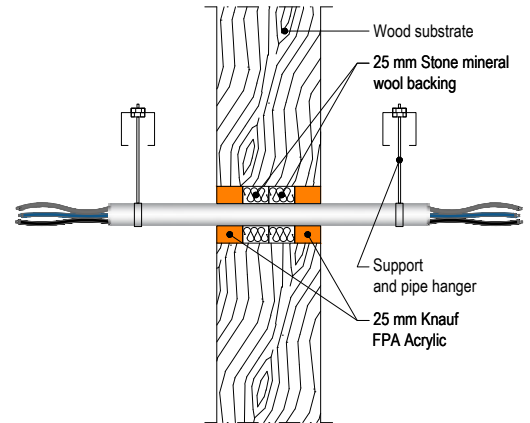
# PENETRATION SEALS | TIMBER WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 100 MM

## > Double side penetration seal with cables

**Penetration Seal:** Cables fitted at any position within the aperture, sealed with Knauf FPA Acrylic, minimum 25 mm deep to both sides of the wall and backed with stone wool insulation (minimum 33kg/m<sup>3</sup>), minimum 25 mm deep. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

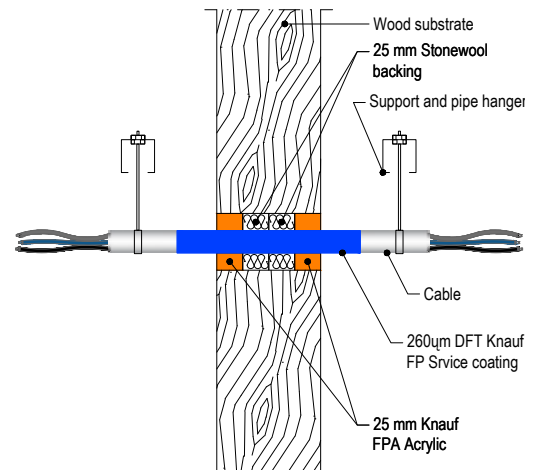
Services	Sealant depth	Backing	Maximum seal size	Classification
None (blank)	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	Ø 180 mm	E 240, EI 90
Cables up to 14 mm Ø, single or in bundles up to 100 mm Ø				E 240, EI 60
Cables up to 21 mm Ø, single or in bundles up to 100 mm Ø				
Cables up to 50 mm Ø, single or in bundles up to 100 mm Ø				E 240, EI 120
Telecom cables up to 14 mm Ø, single or in bundles up to 100 mm Ø				



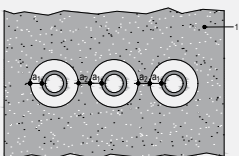
## > Double side penetration seal with cables and Knauf FP Service coating

**Penetration Seal:** Cables fitted at any position within the aperture with Knauf FP Service coating, sealed with Knauf FPA Acrylic, minimum 25 mm deep to both sides of the wall and backed with stone wool insulation (minimum 33kg/m<sup>3</sup>), minimum 25 mm deep. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Services	Sealant depth	Backing	Maximum seal size	Insulation, minimum	Classification
None (blank)	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	Ø 180 mm	Knauf FP Service coating, 260-micron DFT extending 150 mm from both sides of the seal	EI 120
Cables up to 21 mm Ø, single					EI 90
Cables up to 50 mm Ø, single or in bundles up to 100 mm Ø					E 90, EI 60



### Configuration 1

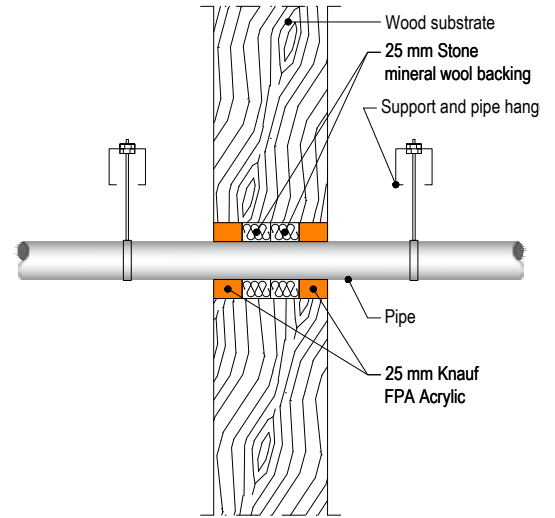


- Key
- 1 Supporting construction
  - a1 Pipe / top edge of seal separation
  - a2 Pipe / side edge of seal separation

› **Double side penetration seal with plastic pipes and composite pipes**

Penetration Seal: Plastic and composite pipes (single) fitted at any position within the aperture, with Knauf FPA Acrylic to both sides of the wall, backed with stone, mineral wool min. 33 kg/m<sup>3</sup>. Minimum annular space 10 mm and maximum 30 mm (a1) and minimum separation between penetration seals 0 mm (a2).

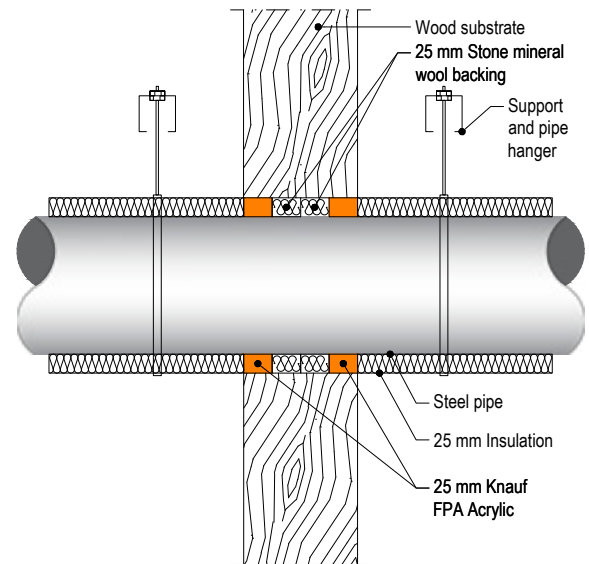
Services	Sealant depth	Backing	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1			
Maximum 32 mm diameter/ 1.0-2.4 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	EI 90 U/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Maximum 32 mm diameter/ 2.0-3.0 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	EI 90 U/C
PP pipe according to EN 1451-1 or DIN 8077/8078			
Maximum 32 mm diameter/1.8-4.4 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	EI 90 U/C
PEX pipe in pipe system			
25 mm diameter outer /15 mm diameter x 2.5 mm wall inner	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	EI 90 C/C



› **Double side penetration seal with metallic pipes**

Penetration Seal: 500 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes and composite pipes (single) with glass wool or stone, mineral wool min. 75 kg/m<sup>3</sup>, fitted at any position within the aperture, with Knauf FPA Acrylic to both sides of the wall, backed with stone wool insulation (minimum 33kg/m<sup>3</sup>), minimum 25 mm deep. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

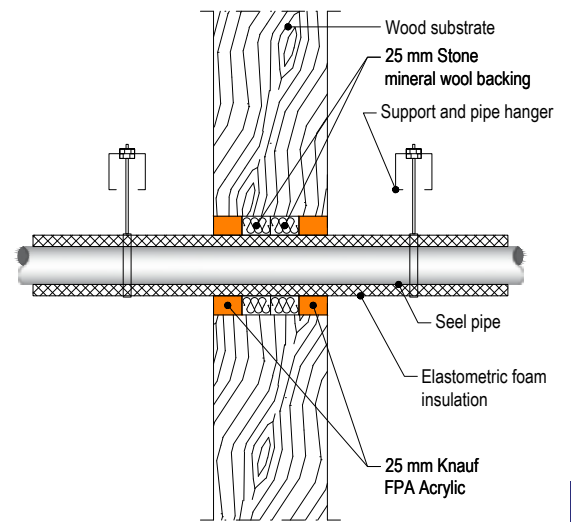
Services	Sealant depth	Backing	Maximum aperture	Insulation, minimum	Classification
Mild or stainless steel pipe					
Maximum 273 mm diameter /6.35-14.2 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	Ø 293 mm	25 mm glass wool or stone, mineral wool min. 75 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	E 90 C/C, EI 60 C/C
Copper or steel pipe					
Maximum 54 mm diameter /1.2-14.2 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	Ø 180 mm	20 mm glass wool or stone, mineral wool min. 75 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	E 90 C/C, EI 60 C/C
Alupex Pipe					
Maximum 75 mm diameter/wall 2.25-4.6 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	Ø 180 mm	25 mm glass wool or stone, mineral wool min. 75 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	EI 90 C/C



### › Double side penetration seal with metallic pipes

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with Knauf FPA Acrylic to both sides of the wall, min. 10 mm seal width around service, backed with stone, mineral wool min. 33 kg/m<sup>3</sup>. Minimum annular space 10 mm and maximum 30 mm (a1), and minimum separation between penetration seals 0 mm (a2).

Services	Sealant depth	Backing	Insulation, minimum	Classification
Mild or stainless steel pipe				
Maximum 114 mm diameter / 1.5-14.2 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	9-25 mm Elastomeric insulation minimum class D-s3, d0	EI 30 C/U
Copper or steel pipe				
Maximum 12 mm diameter / 0.7-6 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	9 mm Elastomeric insulation minimum class D-s3, d0	E 90 C/C, EI 60 C/C
Maximum 54 mm diameter / 1.2-14.2 mm wall*			10-25 mm Elastomeric insulation minimum class D-s3, d0	E 60 C/C, EI 30 C/C
Maximum 54 mm diameter / 1.2-14.2 mm wall*			10-25 mm Elastomeric insulation minimum class D-s3, d0	E 30 C/C, EI 20 C/C
Alupex Pipe				
Maximum 16 mm diameter/wall 2.25 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	9 mm Elastomeric insulation minimum class D-s3, d0	EI 90 C/C
Maximum 75 mm diameter/wall 4.6 mm wall*			10-25 mm Elastomeric insulation minimum class D-s3, d0	E 60 C/C, EI 45 C/C
Maximum 75 mm diameter/wall 4.6 mm wall*			10-25 mm Elastomeric insulation minimum class D-s3, d0	EI 45 C/C



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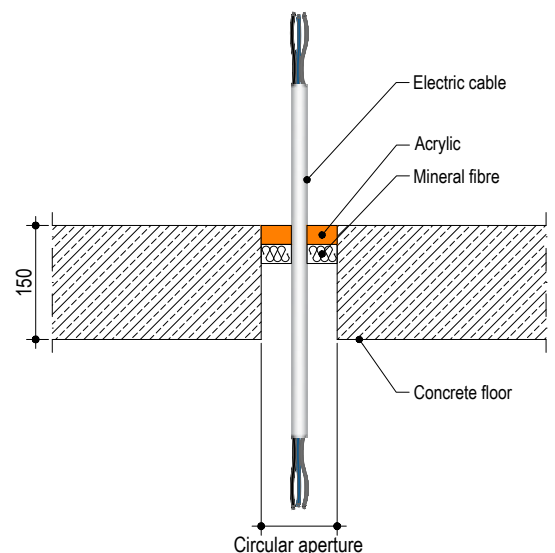
## PENETRATION SEALS | RIGID FLOOR CONSTRUCTIONS

WITH FLOOR THICKNESS OF MINIMUM 150 MM

### › Single side penetration seal with cables

**Penetration Seal:** Cables fitted with Knauf FPA Acrylic to the top side of the floor, backed with stone wool insulation 35kg/m<sup>3</sup> or FP Backing. Maximum seal size of 300 x 300 mm and minimum separation between cables and the edge of the seal of 10 mm.

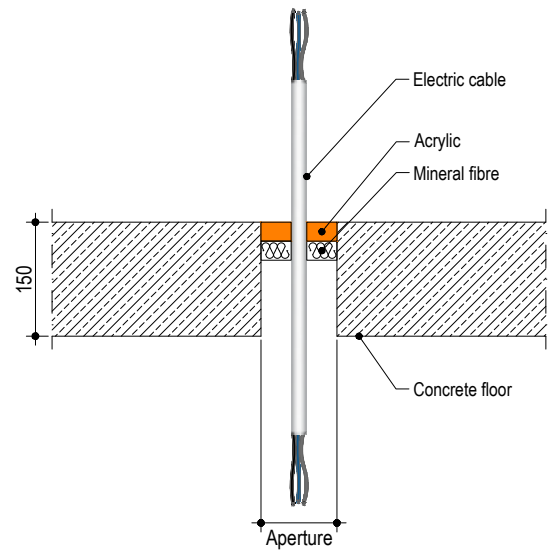
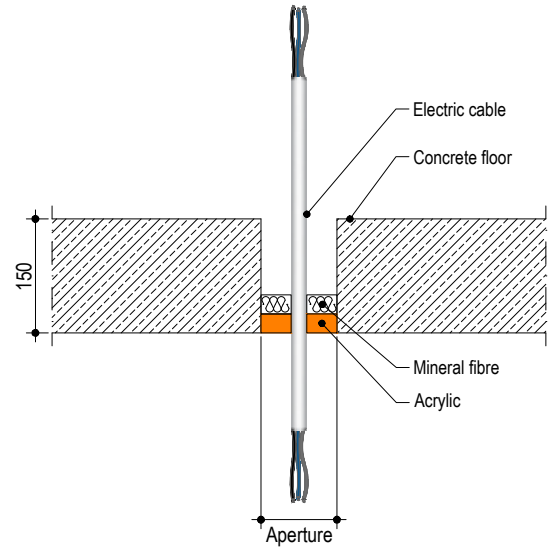
Services	Sealant depth	Backing	Insulation	Classification
Blank seals	15 mm	20 mm Stone wool 35 kg/m <sup>3</sup>	None	E 90 EI 60
	25 mm	25 mm Stone wool 35 kg/m <sup>3</sup>		EI 120 EI 240
		48 mm FP Backing		E 120 EI 90
Electric cables up to 21 mm diameter, single	25 mm	48 mm FP Backing		EI 240
23-27 mm diameter, 1 mm x 185 mm <sup>2</sup> core, PVC sheath and insulation electrical cable, single			EI 240	



> **Single side penetration seal with cables**

Penetration Seal: Cables (single) fitted at any position within the aperture, min. 10 mm from the edges, with Knauf FPA Acrylic to either side of the floor (or at any position in between), backed with 'FP Backing'.

Services	Sealant depth	Backing (minimum)	Aperture (minimum)	Classification
Single electrical cables up to 21 mm Ø	25 mm	FP Backing 25 mm deep	82 mm Ø or max. 100 x 1000 mm	E 120, EI 60



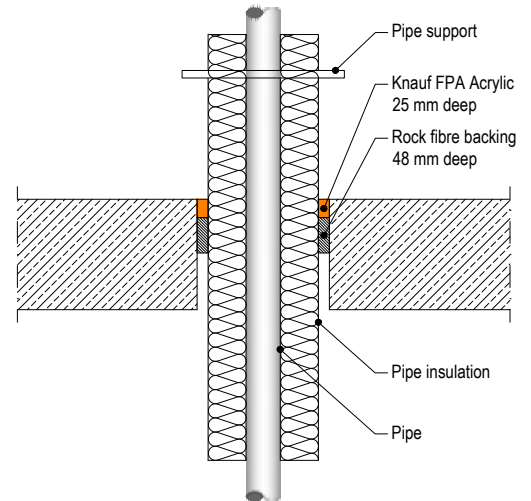
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### › Single side penetration seal with pipes

**Penetration Seal:** Pipes fitted at any position within the aperture, with Knauf FPA Acrylic to the top face of the floor, backed with 48 mm stone wool 33kg/m<sup>3</sup>. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2), maximum seal size 300 x 300 mm / 300 mm diameter.

Services	Sealant depth	Backing	Classification
Mild or stainless steel pipe			
4 - 16 mm diameter / 1.0-8.0 mm wall	25 mm	48 mm stone wool	EI 120 C/U
17 - 324 mm diameter /1.0-14.2 mm wall			E 120 C/U
Copper or steel pipe			
6 mm diameter /0.7-3.0 mm wall	25 mm	48 mm stone wool	EI 120 C/C
6 - 15 mm diameter /0.7-7.5 mm wall			E 120 C/C, EI 60 C/C
16 - 54 mm diameter /0.7-14.2mm wall			E 120 C/C
Copper or steel pipe with 80 kg/m <sup>3</sup> density stone wool insulation Continuous Sustained (CS)			
12 mm diameter/0.9-6 mm wall, 20-80 mm insulation	25 mm	48 mm stone wool	EI 240 C/C
13-54 mm diameter/0.9-14.2 mm wall, 20-80 mm insulation			E 240 C/C, EI 180 C/C
Alupex Pipe			
16 - 20 mm diameter/2.0 mm wall	25 mm	48 mm stone wool	EI 120 C/C
21-75 mm diameter/2.0-4.6 mm wall			E 120 C/C, EI 90 C/C
16-75 mm diameter/2.25-4.6 mm wall with 20-50 mm thick glass wool or stone, mineral wool min. 75 kg/m <sup>3</sup> insulation CS			E 180 C/C, EI 120 C/C

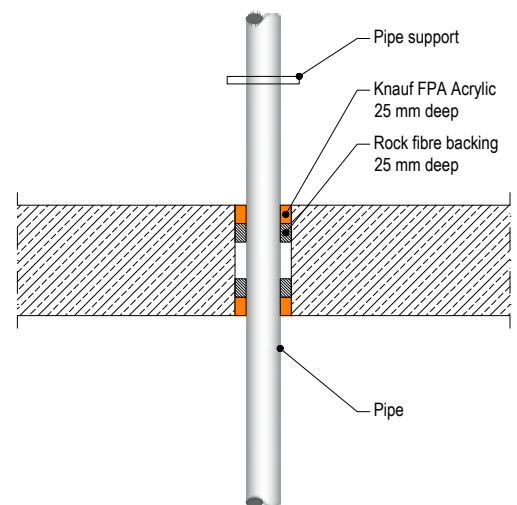


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### › Double side penetration seal with pipes

**Penetration Seal:** Pipes fitted at any position within the aperture, with Knauf FPA Acrylic to the both faces of the floor, backed with 25 mm stone wool 33kg/m<sup>3</sup>. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2), maximum seal size 300 x 300 mm / 300 mm diameter.

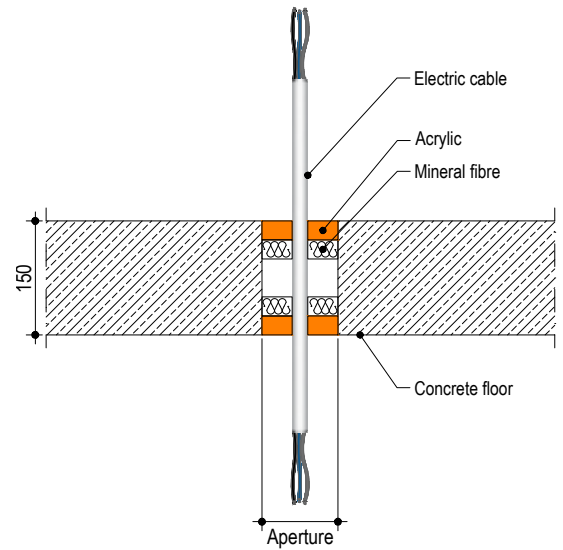
Services	Sealant depth	Backing	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1			
Up to 50 mm Ø/1.6-3.7 mm wall	25 mm	25 mm Stone wool	EI 240 U/C
Up to 40 mm Ø/1.6-3.7 mm wall, with bundle of cables up to 21 mm diameter			
PP pipe according to EN 1451 -1			
12 mm Ø/1.2 mm wall	25 mm	25 mm Stone wool	EI 240 U/C
13-75 mm Ø/1.2-6.8 mm wall			EI 90 U/C
Up to 40 mm Ø/1.2-1.8 mm wall, with bundle of cables up to 21 mm diameter			EI 180 U/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
20-40 mm Ø/2.0-2.4 mm wall	25 mm	25 mm stone wool	EI 240 U/C
Up to 40 mm Ø/2.0-2.4 mm wall, with bundle of cables up to 21 mm diameter			EI 180 U/C



› **Double side penetration seal with cables**

Penetration Seal: Cables fitted circular apertures or min. 7 mm from the edges of rectilinear apertures, with Knauf FPA Acrylic to both sides of the floor, backed with stone wool insulation 35kg/m<sup>3</sup>.

Services	Sealant depth	Backing	Maximum Aperture	Classification
Blank seals	15 mm	25 mm Stone wool 35 kg/m <sup>3</sup>	300 x 300 mm	EI 240
Electric cables up to 21 mm diameter, single or in a bundle				EI 120
Electric cables 22-50 mm diameter, single or in a bundle				E 120, EI 90
Electric cables 51-80 mm diameter, single or in a bundle				E 120, EI 60



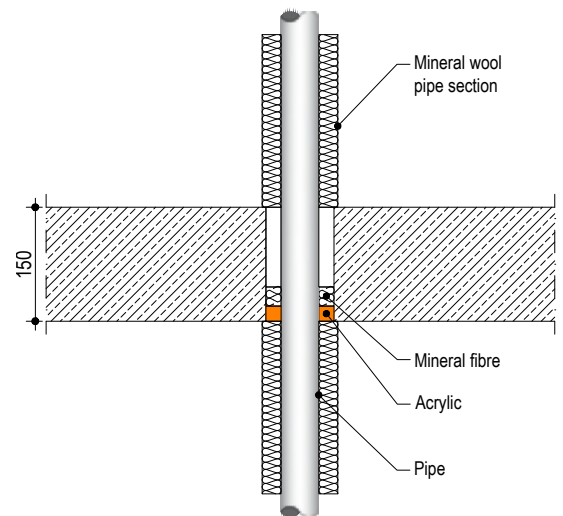
› **Single side penetration seal with metallic pipes**

Penetration Seal: 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 15 or 25 mm deep Knauf FPA Acrylic to either side of the floor (or at any position between), backed with 40 kg/m<sup>3</sup> stone wool insulation or FP Backing.

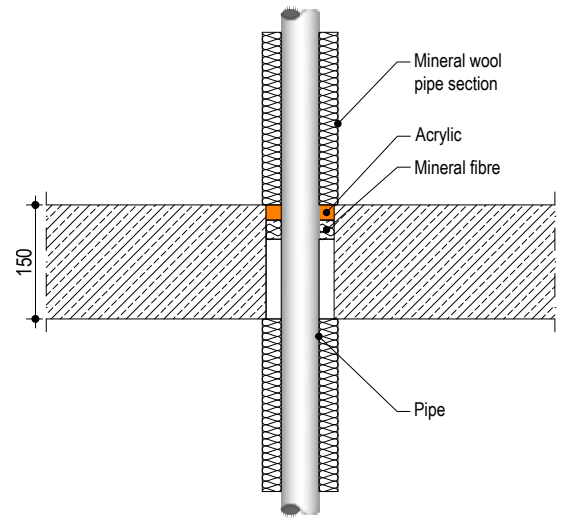
Services	Max. seal size	Insulation (min)	Sealant depth	Classification
Copper pipe up to 54 mm diameter/0.9-14.2 mm wall	10 mm width around pipe	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	15 mm	E 240 C/U, EI 180 C/U
Copper pipe up to 12 mm diameter/0.9-5 mm wall				EI 240 C/U
Copper pipe up to 54 mm diameter/0.9-14.2 mm wall	Up to 100 x 1000 mm		25 mm	EI 120 C/U
Copper pipe up to 54 mm diameter/0.9-14.2 mm wall	300 x 300 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	15 mm	E 90 C/U, EI 60 C/U
Copper pipe up to 12 mm diameter/0.9-5 mm wall				EI 120 C/U
Copper pipe up to 54 mm diameter/0.9-14.2 mm wall			25 mm	EI 120 C/U

Mild or stainless steel pipe

40 mm diameter/1-14.2 mm wall	10 mm width around pipe	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	15 mm	EI 240 C/U
40 mm diameter/1-14.2 mm wall		30 mm Stone wool insulation 80 kg/m <sup>3</sup>		E 240, EI 90 C/U
50 mm diameter/1.2-14.2 mm wall				
60 mm diameter/1.4-14.2 mm wall				
75 mm diameter/1.7-14.2 mm wall				
90 mm diameter/2-14.2 mm wall				
100 mm diameter/2.2-14.2 mm wall				
115 mm diameter/2.5-14.2 mm wall				
140 mm diameter/3-14.2 mm wall				



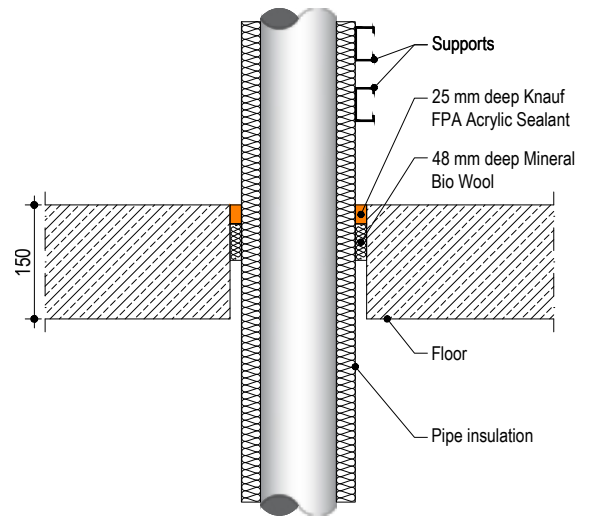
Services	Max. seal size	Insulation (min)	Sealant depth	Classification			
Mild or stainless steel pipe							
165 mm diameter/3.5-14.2 mm wall	10 mm width around pipe	30 mm Stone wool insulation 80 kg/m <sup>3</sup>	15 mm	E 240, EI 90 C/U			
180 mm diameter/3.8-14.2 mm wall							
200 mm diameter/4.2-14.2 mm wall							
219 mm diameter/4.5-14.2 mm wall							
40 mm diameter/1-14.2 mm wall	Up to 100 x 1000 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	25 mm	E 120, EI 90 C/U			
50 mm diameter/1.2-14.2 mm wall							
60 mm diameter/1.4-14.2 mm wall							
75 mm diameter/1.7-14.2 mm wall							
90 mm diameter/2-14.2 mm wall							
100 mm diameter/2.2-14.2 mm wall							
115 mm diameter/2.5-14.2 mm wall							
140 mm diameter/3-14.2 mm wall							
165 mm diameter/3.5-14.2 mm wall							
180 mm diameter/3.8-14.2 mm wall							
200 mm diameter/4.2-14.2 mm wall							
219 mm diameter/4.5-14.2 mm wall							
40 mm diameter/1-14.2 mm wall		300 x 300 mm			20 mm Stone wool insulation 80 kg/m <sup>3</sup>	15 mm	E 90 C/U, EI 60 C/U
40 mm diameter/1-14.2 mm wall							
50 mm diameter/1.2-14.2 mm wall							
60 mm diameter/1.4-14.2 mm wall							
75 mm diameter/1.7-14.2 mm wall							
90 mm diameter/2-14.2 mm wall							
100 mm diameter/2.2-14.2 mm wall							
115 mm diameter/2.5-14.2 mm wall							
140 mm diameter/3-14.2 mm wall							
165 mm diameter/3.5-14.2 mm wall							
180 mm diameter/3.8-14.2 mm wall							
200 mm diameter/4.2-14.2 mm wall							
219 mm diameter/4.5-14.2 mm wall							
40 mm diameter/1-14.2 mm wall	300 x 300 mm		20 mm Stone wool insulation 80 kg/m <sup>3</sup>	25 mm	EI20 C/U, EI 90 C/U		
50 mm diameter/1.2-14.2 mm wall							
60 mm diameter/1.4-14.2 mm wall							
75 mm diameter/1.7-14.2 mm wall							
90 mm diameter/2-14.2 mm wall							
100 mm diameter/2.2-14.2 mm wall							
115 mm diameter/2.5-14.2 mm wall							
140 mm diameter/3-14.2 mm wall							
165 mm diameter/3.5-14.2 mm wall							
180 mm diameter/3.8-14.2 mm wall							
200 mm diameter/4.2-14.2 mm wall							
219 mm diameter/4.5-14.2 mm wall							



› **Single side penetration seal with metallic pipes**

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with 25 mm Knauf FPA Acrylic to the top of the floor, backed with 48 mm deep FP Backing insulation. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). Maximum seal size 300 x 300 mm / 504 mm Ø.

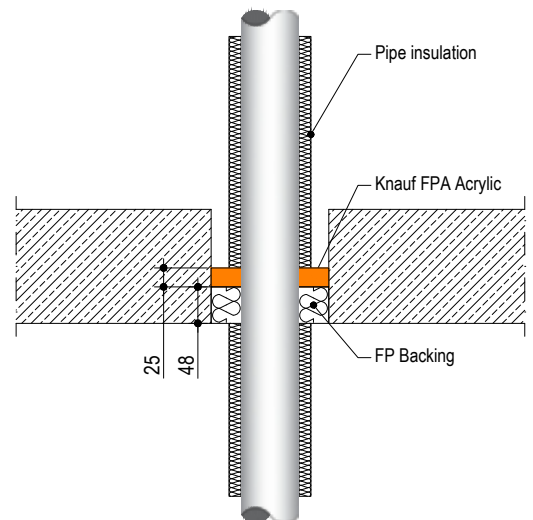
Services	Insulation	Classification
Mild or stainless steel pipe		
40 mm diameter/1-14.2 mm wall	20 mm thick stone, mineral wool min. 80 kg/m <sup>3</sup>  30-80 mm thick stone, mineral wool min. 80 kg/m <sup>3</sup>	EI 240 C/U
40 mm diameter/1-14.2 mm wall		
50 mm diameter/1.2-14.2 mm wall		
60 mm diameter/1.4-14.2 mm wall		
75 mm diameter/1.6-14.2 mm wall		
90 mm diameter/1.9-14.2 mm wall		
100 mm diameter/2.1-14.2 mm wall		
115 mm diameter/2.4-14.2 mm wall		
140 mm diameter/2.9-14.2 mm wall		
165 mm diameter/ 3.4-14.2 mm wall		
180 mm diameter/ 3.6-14.2 mm wall		
200 mm diameter/ 4.0-14.2 mm wall		
219 mm diameter/ 4.3-14.2 mm wall		
250 mm diameter/ 5.0-14.2 mm wall		
300 mm diameter/ 5.9-14.2 mm wall		
324 mm diameter/ 6.35-14.2 mm wall		
PEX pipe in pipe system		
15 mm diameter x 2.5 mm wall inner/ 25 mm diameter outer	None	EI 90 C/C



› **Single side penetration seal with composite pipes**

**Penetration Seal:** CI (Continuous Interrupted) insulated composite pipes (single) fitted at any position within the aperture, with Knauf FPA Acrylic, minimum 10 mm seal width around service and maximum 300 x 300 mm seal, backed with 'FP Backing'.

Services	Sealant depth	Backing	Insulation (minimums)	Classification
Alupex Composite Pipe				
16 mm diameter/2.25 mm wall	25 mm	48 mm FP Backing	20 mm stonewool 80 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	EI 240 C/C
20 mm diameter/2.5 mm wall				
26 mm diameter/3 mm wall				
32 mm diameter/3 mm wall				
40 mm diameter/3.5 mm wall				
50 mm diameter/4 mm wall				
63 mm diameter/4.5 mm wall				
75 mm diameter/4.7 mm wall				

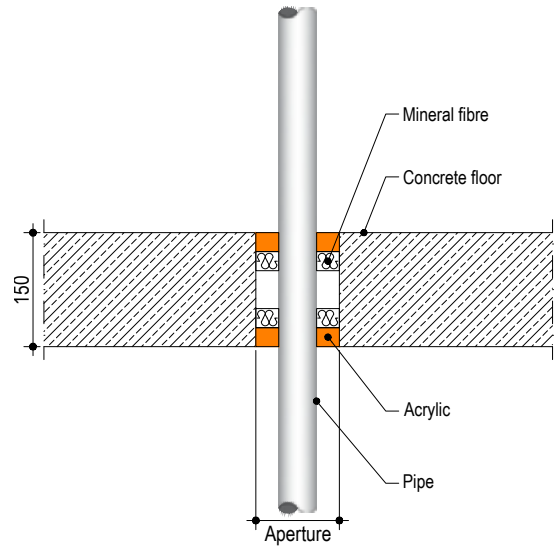


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› **Double side penetration seal with metallic pipes**

Penetration Seal: Non-insulated metallic pipes (single) fitted at any position within the aperture, with Knauf FPA Acrylic to both sides of the floor, backed with stone wool or mineral fibre insulation.

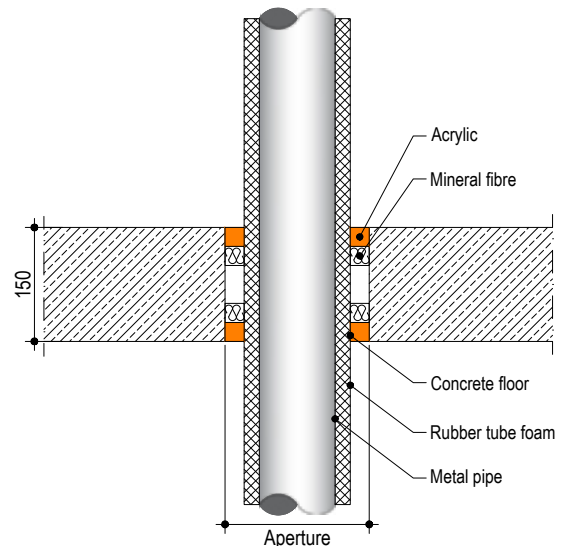
Services	Max. Seal Size	Insulation	Sealant depth	Backing	Classification
Copper or steel pipe 54 mm diameter/2-14.2 mm wall	300 x 300 mm	None	25 mm	25 mm deep 140 kg/m <sup>3</sup> stone wool	E 120 C/U, EI 20 C/U
Mild steel pipe 16 mm diameter/1.5-7.5 mm wall			25 mm		EI 240 C/U
Mild steel pipe maximum 63 mm diameter/1.5-14.2 mm wall			15 mm	25 mm deep 35 kg/m <sup>3</sup> stone wool	E 240 C/U EI 30 C/U
Mild steel pipe 16 mm diameter/1.5-7.5 mm wall	Up to 100 x 1000 mm		25 mm	FP Backing 25 mm deep	EI 120 C/U



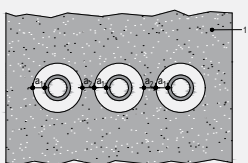
› **Double side penetration seal with metallic pipes**

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with Knauf FPA Acrylic to both sides of the wall, maximum 300 x 300 mm seal width around service, backed with stone wool insulation or 'FP Backing'.

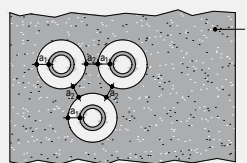
Services	Sealant depth	Backing	Insulation	Classification
Mild or stainless steel pipe				
40 mm diameter/1-14.2 mm wall	25 mm	20 mm Stone wool 40 kg/m <sup>3</sup>	13 - 19 mm Elastomeric insulation minimum class B-s3,d0	EI 180 C/U
40 mm diameter/1-14.2 mm wall				
50 mm diameter/1.3-14.2 mm wall				
60 mm diameter/1.6-14.2 mm wall		25 mm FP Backing		EI 60 C/U
75 mm diameter/2-14.2 mm wall				
90 mm diameter/2.4-14.2 mm wall				
100 mm diameter/2.7-14.2 mm wall				
115 mm diameter/3.1-14.2 mm wall				
140 mm diameter/3.8-14.2 mm wall				
165 mm diameter/ 4.5-14.2 mm wall				



Configuration 1



Configuration 2



- Key
- 1 Supporting construction
  - a1 Pipe / top edge of seal separation
  - a2 Pipe / side edge of seal separation
  - a3 Pipe / pipe separation

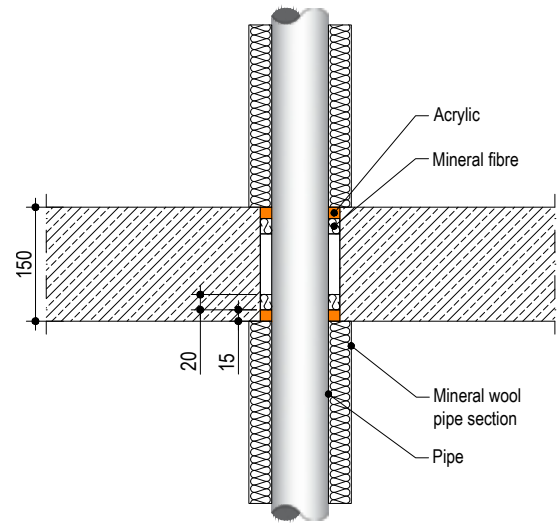
Services	Sealant depth	Backing	Insulation	Classification
Copper pipe				
12 mm diameter/1 mm wall	25 mm	25 mm FP Backing	9 mm Elastomeric insulation minimum class B-s3,d0 or phenolic foam insulation	E 240 C/C, EI 180 C/C
12-54 mm diameter/ 1-1.2 mm wall			9-13 mm Elastomeric insulation minimum class B-s3,d0 or phenolic foam insulation	E 180, EI 120 C/C
12-54 mm diameter/ 1-1.2 mm wall			13-25 mm Elastomeric insulation minimum class B-s3,d0 or phenolic foam insulation	E 90 C/C, EI 60 C/C
Alupex Composite Pipe				
16 mm diameter/2.25 mm wall	25 mm	25 mm FP Backing	9 mm Elastomeric insulation minimum class B-s3,d0 or phenolic foam insulation	EI 180 C/C
16 mm diameter/2.25 mm wall			9-13 mm Elastomeric insulation minimum class B-s3,d0 or phenolic foam insulation	E 120 C/C, EI 60 C/C
20 mm diameter/2.5 mm wall				
26 mm diameter/3 mm wall				
32 mm diameter/3 mm wall				
40 mm diameter/3.5 mm wall				
50 mm diameter/4 mm wall				
63 mm diameter/4.5 mm wall			13-25 mm Elastomeric insulation minimum class B-s3,d0 or phenolic foam insulation	EI 60 C/C
75 mm diameter/4.7 mm wall				
16 mm diameter/2.25 mm wall				
20 mm diameter/2.5 mm wall				
26 mm diameter/3 mm wall				
32 mm diameter/3 mm wall				
40 mm diameter/3.5 mm wall				
50 mm diameter/4 mm wall				
63 mm diameter/4.5 mm wall				
75 mm diameter/4.7 mm wall				

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### > Double side penetration seal with metallic pipes

Penetration Seal: 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 15 mm deep Knauf FPA Acrylic to both sides of the floor (or at any position between), backed with 20 mm deep minimum 40 kg/m<sup>3</sup> stone wool insulation\*.

Services	Maximum seal size	Insulation (minimum)	Classification
Mild or stainless steel pipe			
40 mm diameter/1-14.2 mm wall	300 x 300 mm or 100 x 1000 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 240 C/U
40 mm diameter/1-14.2 mm wall			
50 mm diameter/1.2-14.2 mm wall			
60 mm diameter/1.4-14.2 mm wall			
75 mm diameter/1.7-14.2 mm wall			
90 mm diameter/2-14.2 mm wall		30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, EI 120 C/U
100 mm diameter/2.2-14.2 mm wall			
115 mm diameter/2.5-14.2 mm wall			
140 mm diameter/3-14.2 mm wall			
165 mm diameter/3.5-14.2 mm wall			
180 mm diameter/3.8-14.2 mm wall			
200 mm diameter/4.2-14.2 mm wall			
219 mm diameter/4.5-14.2 mm wall			



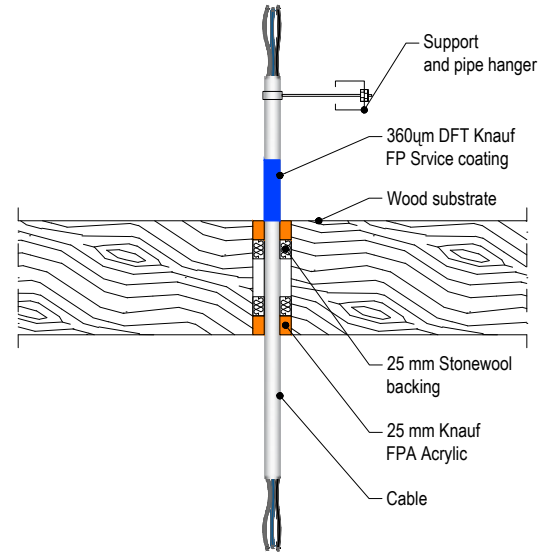
# PENETRATION SEALS | TIMBER FLOOR CONSTRUCTIONS

WITH FLOOR THICKNESS OF MINIMUM 150 MM

## › Double sided penetration seal with cables

Penetration Seal: Cables fitted at any position within the aperture, sealed with Knauf FPA Acrylic, minimum 25 mm deep to both sides of the floor and backed with stone wool insulation (minimum 33kg/m<sup>3</sup>), minimum 25 mm deep. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

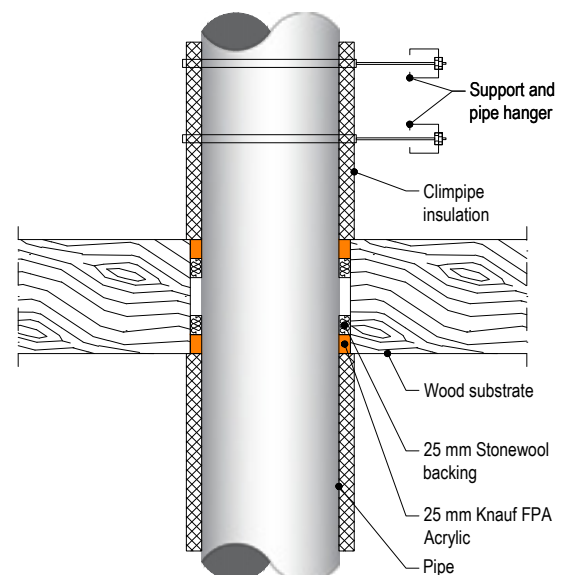
Services	Sealant depth	Backing (minimum)	Maximum aperture	Insulation, minimum	Classification
None (blank)	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	Ø 220 mm	Knauf FP Service coating, 260-micron DFT extending 150 mm from top side of the seal	Ei 120
Cables up to 14 mm Ø, single or in bundles up to 100 mm Ø					
Cables up to 21 mm Ø, single or in bundles up to 100 mm Ø					E 120, Ei 90
Cables up to 50 mm Ø, single or in bundles up to 100 mm Ø					
Telecom cables up to 14 mm Ø, single or in bundles up to 100 mm Ø					



## › Double side penetration seal with metallic pipes

Penetration Seal: 500 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes and composite pipes (single) with glass wool or stone, mineral wool min. 75 kg/m<sup>3</sup>, fitted at any position within the aperture, with Knauf FPA Acrylic to both sides of the floor, backed with stone wool insulation (minimum 33kg/m<sup>3</sup>), minimum 25 mm deep. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Services	Maximum aperture	Sealant depth	Backing	Insulation, minimum	Classification
Mild or stainless steel pipe					
Maximum 273 mm Ø / 6.35-14.2 mm wall*	Ø 293 mm	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	25 mm glass wool or stone, mineral wool min. 75 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	E 120 C/C, Ei 60 C/C



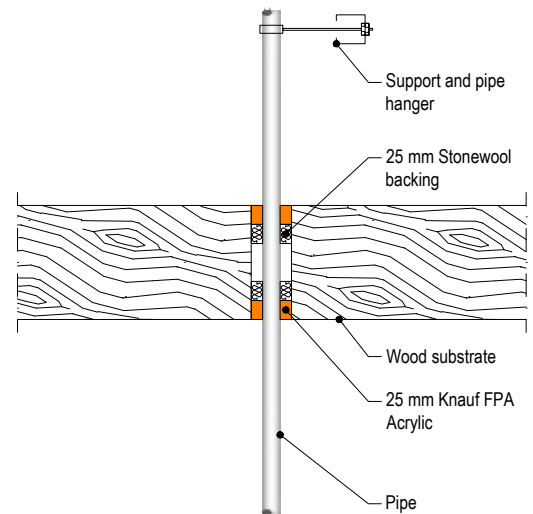


Services	Maximum aperture	Sealant depth	Backing	Insulation, minimum	Classification
Copper or steel pipe					
Maximum 15 mm Ø / 0.7-7.5 mm wall*	Ø 293 mm	25 mm	Stone wool 25 mm deep min. 33kg/m³	20 mm glass wool or stone, mineral wool min. 75 kg/m³, 500 mm length from both sides of the seal	EI 120 C/C
Maximum 54 mm Ø / 1.2-14.2 mm wall*				20 mm glass wool or stone, mineral wool min. 75 kg/m³, 500 mm length from both sides of the seal	E 120 C/C, EI 90 C/C
Alupex Pipe					
Maximum 16 mm Ø / 2.25 mm wall*	Ø 293 mm	25 mm	Stone wool 25 mm deep min. 33kg/m³	20 mm glass wool or stone, mineral wool min. 75 kg/m³, 500 mm length from both sides of the seal	EI 120 C/C
Maximum 75 mm Ø / 4.6 mm wall*				25 mm glass wool or stone, mineral wool min. 75 kg/m³, 500 mm length from both sides of the seal	E 120 C/C, EI 90 C/C

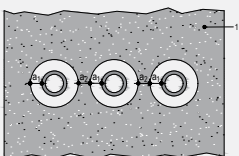
### › Double side penetration seal with plastic pipes and composite pipes

Penetration Seal: Plastic and composite pipes (single) fitted at any position within the aperture, with Knauf FPA Acrylic to both sides of the floor, backed with stone, mineral wool min. 33 kg/m³. Minimum annular space 10 mm and maximum 30 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Services	Sealant depth	Backing	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1			
Maximum 32 mm diameter / 1.0-2.4 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m³	EI 120 U/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Maximum 32 mm diameter / 2.0-3.0 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m³	EI 120 U/C
PP pipe according to EN 1451-1 or DIN 8077/8078			
Maximum 32 mm diameter / 1.8-4.4 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m³	EI 120 U/C
PEX pipe in pipe system			
25 mm diameter outer / 15 mm diameter x 2.5 mm wall inner	25 mm	Stone wool 25 mm deep min. 33kg/m³	EI 120 U/C



Configuration 1



- Key
- 1 Supporting construction
  - a1 Pipe / top edge of seal separation
  - a2 Pipe / side edge of seal separation

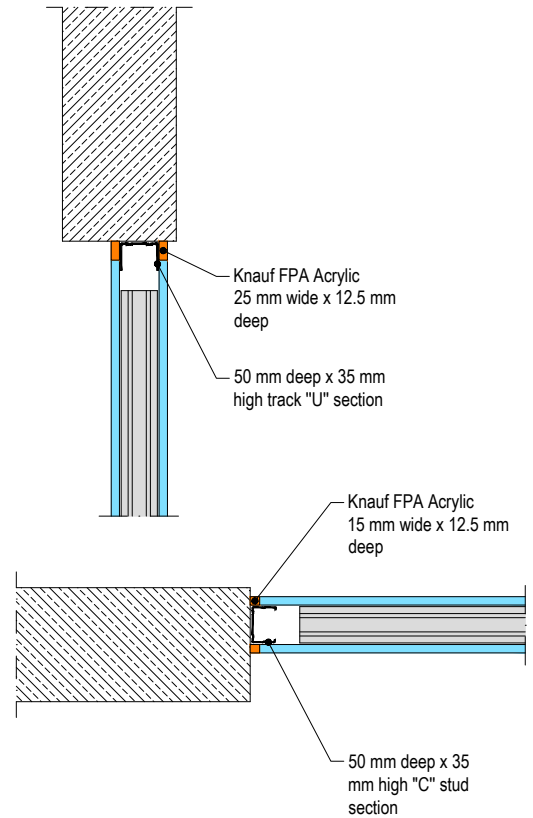
# LINEAR JOINT AND GAP SEALS | FLEXIBLE WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 75 MM AND MINIMUM 1 X LAYER OF 12.5 MM BOARD PER SIDE

> **Linear joint seals, between head of flexible wall and soffit of concrete floor and vertical end of flexible wall and concrete wall**

Joint Seal: Knauf FPA Acrylic to both sides of the wall, joint widths up to 30 mm

Substrate	Depth (mm)	Backing	Classification
Plasterboard/ concrete	12.5 min.	50 mm steel partition head track/ stud	E 60 - T - X - F - W 25 EI 45 - T - X - F - W 25
			E 60 - V - X - F - W 15 EI 45 - V - X - F - W 15

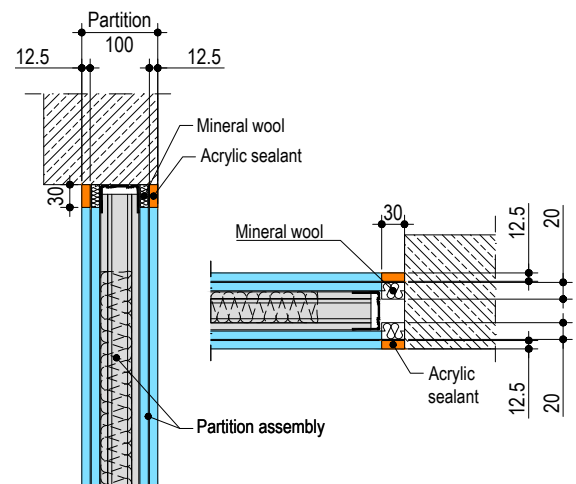


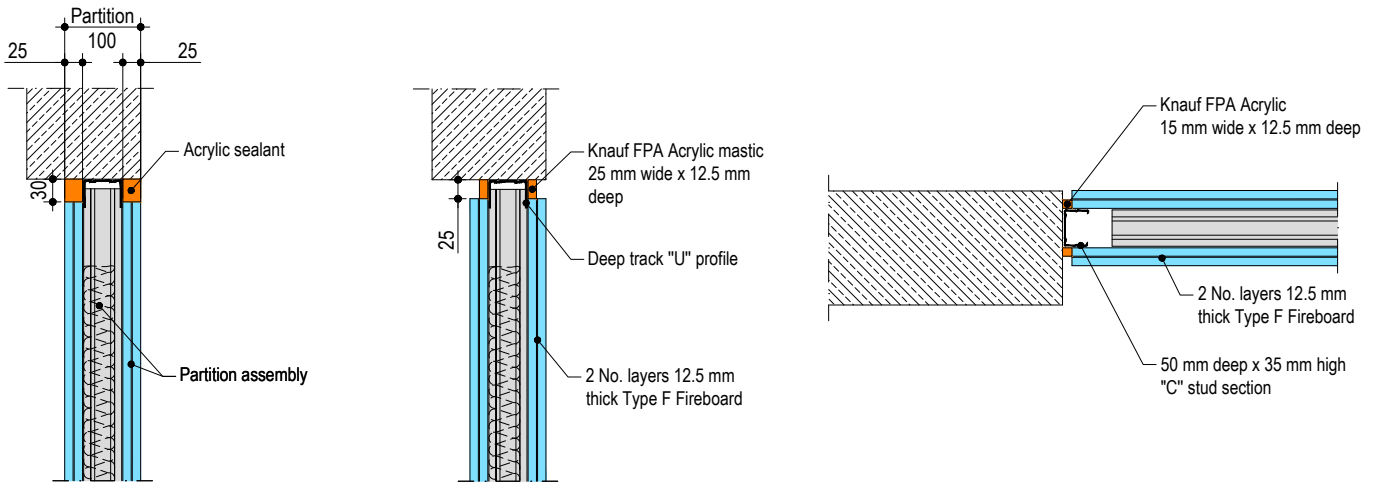
WITH WALL THICKNESS OF MINIMUM 100 MM AND MINIMUM 2 X LAYER OF 12.5 MM BOARD PER SIDE

> **Linear joint seals, between head of flexible wall and soffit of concrete floor and vertical end of flexible wall and concrete wall**

Joint Seal: Knauf FPA Acrylic to both sides of the wall, joint widths up to 30 mm

Substrate	Sealant depth	Backing	Classification
Plasterboard/ concrete	12.5 min.	12.5 mm Stone wool 35 kg/m <sup>3</sup> plus 50 mm steel partition head track	EI 120 - T - X - F - W 30
		20 mm Stone wool 35 kg/m <sup>3</sup>	EI 120 - V - X - F - W 30
	25 min.	50 mm steel partition head track/ stud	EI 120 - T - X - F - W 30
	12.5 min.		EI 90 - T - X - F - W 25 EI 90 - V - X - F - W 15



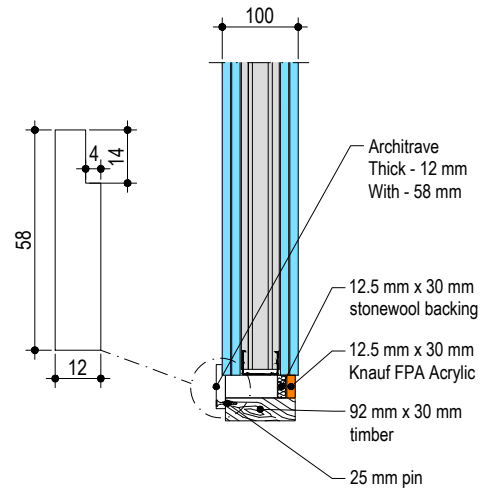


FLEXIBLE OR RIGID WALL CONSTRUCTION WITH WALL THICKNESS OF MINIMUM 100 MM AND TIMBER SUBSTRATES AND ARCHITRAVES

> **Linear joint or gap seals, vertically or horizontal orientated with backing materials**

Joint Seal: Knauf FPA Acrylic to one side of the wall, joint widths up to 30 mm.

Substrate	Depth (mm)	Facing (minimum)	Backing	Classification
Flexible or rigid wall / Timber	12.5 min.	Single sided linear seals in flexible or rigid walls against wooden frames covered with architraves on the other side fixed with 25 mm steel pins at nominal 300 mm centres.	Stonewool, 12.5 mm deep min. 35 kg/m <sup>3</sup>	EI 60 - V - X - F - W 30
				EI 60 - T - X - F - W 30



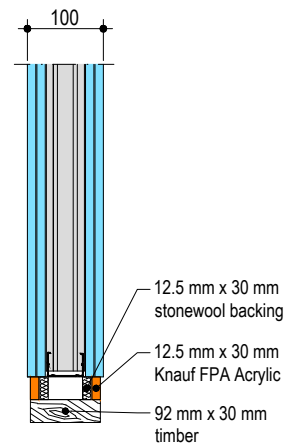
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FLEXIBLE OR RIGID WALL CONSTRUCTION WITH WALL THICKNESS OF MINIMUM 100 MM AND TIMBER SUBSTRATES

> **Linear joint or gap seals, vertically or horizontal orientated with backing materials**

Joint Seal: Knauf FPA Acrylic to one side of the wall, joint widths up to 30 mm.

Substrate	Depth (mm)	Backing	Classification
Flexible or rigid wall / Timber	12.5 min.	Stonewool, 12.5 mm deep min. 35 kg/m <sup>3</sup>	E 90 - V - X - F - W 30
			EI 60 - V - X - F - W 30
			E 90 - T - X - F - W 30
			EI 60 - T - X - F - W 30

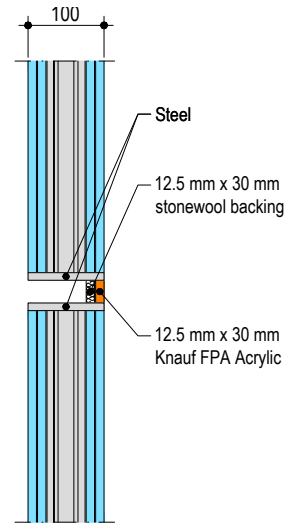


FLEXIBLE OR RIGID WALL CONSTRUCTION WITH WALL THICKNESS OF MINIMUM 100 MM AND STEEL SUBSTRATES

> **Linear joint or gap seals, vertically or horizontal orientated with backing materials**

Joint Seal: Knauf FPA Acrylic to one side of the wall, with joint widths up to 30 mm.

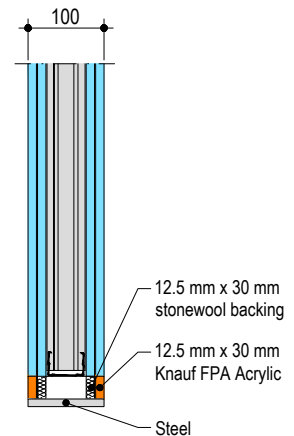
Substrate	Sealant depth	Backing	Classification
Steel / steel	12.5 min.	Stonewool, 12.5 mm deep min. 35 kg/m <sup>3</sup>	E 120 - V - X - F - W 30 EI 30 - V - X - F - W 30
			E 120 - T - X - F - W 30 EI 30 - T - X - F - W 30



> **Linear joint or gap seals, vertically or horizontal orientated with backing materials**

Joint Seal: Knauf FPA Acrylic to both sides of the wall, with joint widths up to 30 mm.

Substrate	Sealant depth	Backing	Classification
Flexible or rigid wall / Steel	12.5 min.	Stonewool, 12.5 mm deep min. 35 kg/m <sup>3</sup>	E 120 - V - X - F - W 30 <sup>1</sup> EI 30 - V - X - F - W 30 <sup>2</sup>
			E 120 - T - X - F - W 30 <sup>3</sup> EI 45 - T - X - F - W 30 <sup>4</sup>



The classifications provided in Table A.2.5.1 consider the insulation performance of all components within the firestopping system as per the requirements of EN 1366-4. This includes temperature evaluation of the steel substrate.

In relation to each of the above classifications, temperatures recorded on the seal (exclusive of the supporting construction) exceeded the maximum allowable after the following times (rounded down): <sup>1</sup> 120, <sup>2</sup> 90, <sup>3</sup> 120, <sup>4</sup> 60

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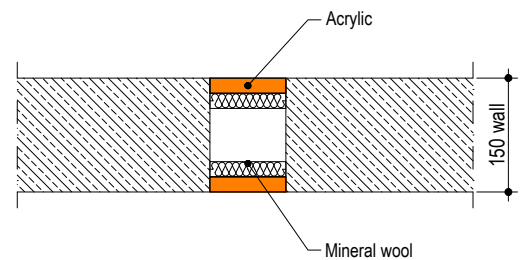
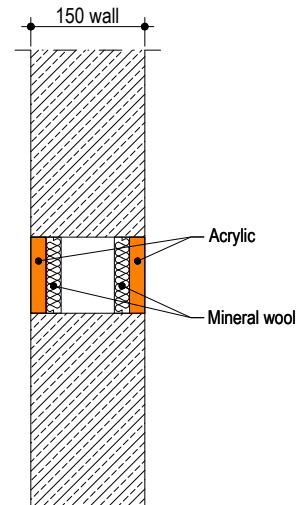
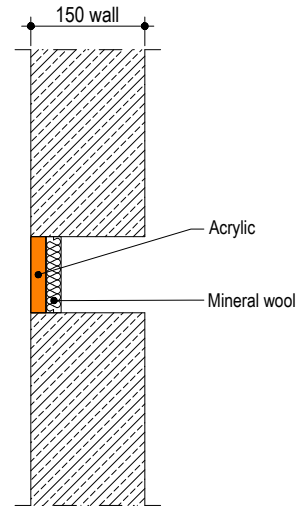
# LINEAR JOINT AND GAP SEALS | RIGID WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 150 MM

## > Linear joint or gap seal, between head of rigid wall and soffit of concrete floor / between rigid walls

Joint Seal: Knauf FPA Acrylic to either side (or any position between) or both sides of the wall, joint widths up to 30 mm.

Substrate	Depth (mm)	Backing	Classification
masonry/ concrete	25 min. (one side)	20 mm Stone wool 40 kg/m <sup>3</sup>	E 240 - T - X - F - W 00 to 30 EI 60 - T - X - F - W 00 to 30
	15 min. (both sides)		EI 240 - V - X - F - W 00 to 30 EI 240 - T - X - F - W 00 to 30
	10 min. (one side)	60 mm Stone wool 33 kg/m <sup>3</sup>	E 240 - T - X - F - W 50 EI 60 - T - X - F - W 50 EI 120 - V - X - F - W 50
	25 min. (one side)	48 mm FP Backing	E 240 - T - X - F - W 00 to 30 EI 120 - T - X - F - W 00 to 30



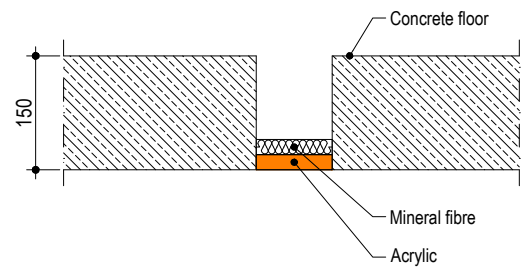
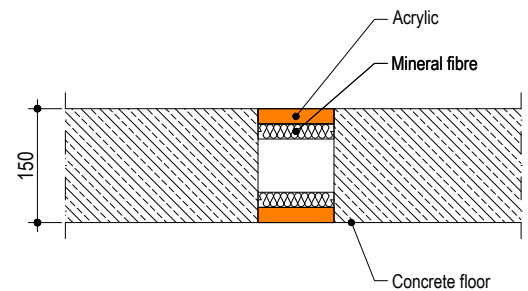
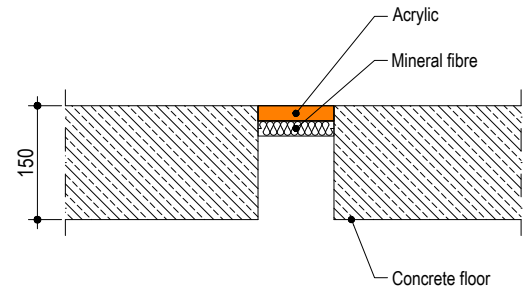
# LINEAR JOINT AND GAP SEALS | RIGID FLOOR CONSTRUCTIONS

WITH FLOOR THICKNESS OF MINIMUM 150 MM

› **Linear joint or gap seal, between floor slabs or between floor slab and wall with sealant to the top face of the floor only**

Joint Seal: Knauf FPA Acrylic to either side (or any position between) or both sides of the floor, joint widths up to 100 mm.

Substrate	Depth (mm)	Backing	Classification
masonry/ concrete	25 min. (any position)	25 mm FP Backing	E 120 – H – X – F – W 100
	25 min (top face)		EI 60 – H – X – F – W 100
	15 min. (both sides)	25 mm Stone wool 40 kg/m <sup>3</sup>	EI 120 – H – X – F – W 100
		25 mm Stone wool 140 kg/m <sup>3</sup>	EI 180 – H – X – F – W 100
	15 min. (both sides)	25 mm stone wool 35 kg/m <sup>3</sup> insulation	EI 240 – H – X – F – W 30
	10 min. (top face)	90 mm Stone wool 33 kg/m <sup>3</sup>	EI 240 – H – X – F – W 100



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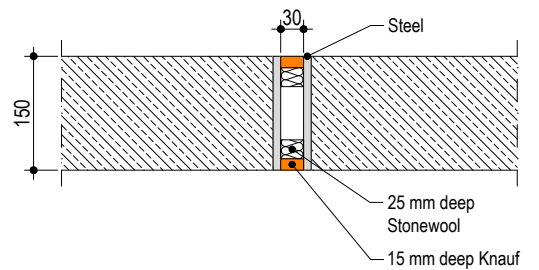
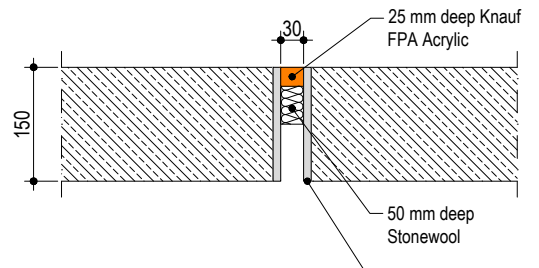
> **Linear joint or gap seals, in or between rigid floors**

Joint Seal: Knauf FPA Acrylic in floor, joint widths up to 30 mm

Substrate	Depth (mm)	Backing	Position	Classification
Steel/ steel or Steel/ concrete	25 min.	Stonewool, 50 mm deep min. 35 kg/m <sup>3</sup>	Top	E 240 – H – X – F – W 30 <sup>1</sup> EI 30 – H – X – F – W 30 <sup>2</sup>
	15 min.	Stonewool, 25 mm deep min. 35 kg/m <sup>3</sup>	Both	E 240 – H – X – F – W 30 <sup>3</sup> EI 45 – H – X – F – W 30 <sup>4</sup>
Aluminium / concrete	25 min.	Stonewool, 50 mm deep min. 35 kg/m <sup>3</sup>	Top	E 180 – H – X – F – W 30 <sup>5</sup> EI 20 – H – X – F – W 30 <sup>6</sup>

The classifications provided in Table A.4.2.1 consider the insulation performance of all components within the firestopping system as per the requirements of EN 1366-4. This includes temperature evaluation of the steel substrate.

In relation to each of the above classifications, temperatures recorded on the seal (exclusive of the supporting construction) exceeded the maximum allowable after the following times (rounded down): <sup>1</sup> 240, <sup>2</sup> 60, <sup>3</sup> 240, <sup>4</sup> 120, <sup>5</sup> 180, <sup>6</sup> 60



# KNAUF FIRE PROTECTION PUTTY CORD

5



Knauf Firecollar are designed to maintain the fire resistance of fire rated walls and floors where these are breached by plastic pipes, and may be used in gypsum, masonry and concrete walls and floors.

Each pipe collar consists of a white coated circular steel shell that splits in two to fit around the service penetrations by means of a simple 'slide-lock' system. The steel shell contains a graphite based reactive material which reacts when exposed to heat closing the openings left by the softening plastic pipe in fire.

## Properties:

- › Classified for fire sealing in all types of constructions
- › Excellent sound insulation
- › No emissions - environmentally and user friendly
- › Simple to install using widely available standard screws
- › Collars come in two different heights for different fire classifications to maximize cost efficiency
- › Very high fire classifications up to 240 minutes for both integrity and insulation
- › 30 years working life guarantee
- › ETA 21/0993
- › EAD 350141-00-1104



**Supporting constructions:****Flexible walls:**

The wall must have a minimum thickness of 100 mm and comprise steel studs or timber studs\*) lined on both faces with minimum 2 layers of 12.5 mm thick boards.

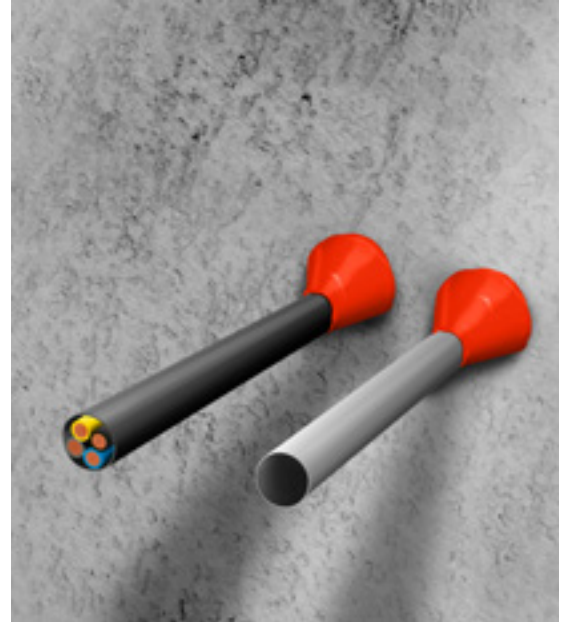
**Rigid walls:**

The wall must have a minimum thickness of 100 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m<sup>3</sup>.

**Rigid floors:**

The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m<sup>3</sup>.

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.



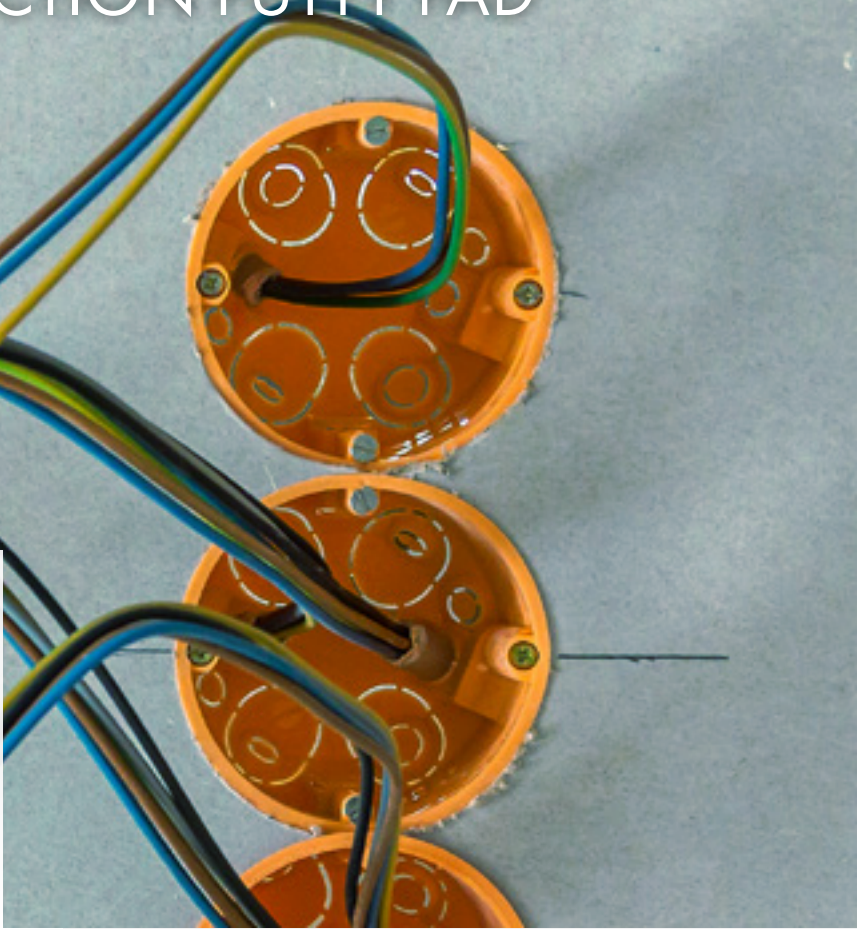
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**Installation Instructions**

1. Ensure the faces of the aperture opening are free of dust and any other contaminants. The faces may be moistened for better adhesion.
2. If the mortar seal is required to be load bearing, please see instructions in the Technical Data Sheet.
3. Bare metal pipes passing through the seal must be protected against corrosion using a suitable primer/protection system.
4. When sealing drywalls the mortar should be flush with the surface of the wall on both sides.
5. When sealing masonry or concrete constructions, the seal can be positioned to either side of the construction or anywhere in between.
6. When installing Knauf Fire Protection Mortar in hollow floor slabs or boards, level the fire seal with the soffit side. Ensure there is sufficient thickness of concrete below the void for the depth of mortar. Where this is not the case, tubular voids should be filled with stone wool normally the same thickness as the depth of the floor slab. Alternatively, simply fire seal on both sides.
7. Install a stone wool shutter board where is necessary to achieve the required thickness of mortar (see the drawings on pages 2-19). Make sure that this achieves a very tight seal – any small openings should be sealed with Knauf FPA Acrylic.
8. Pour clean water into a suitable mixing vessel and add the mortar to obtain the required consistency. Mix steadily at low speed and ensure that any lumps of powder are fully dispersed. Always add the mortar to the water, do not reverse this mixing process. For different mix ratios and drying times, please refer to the Technical Data Sheet.
9. Once the desired consistency is achieved pour or trowel the mortar onto the shutter board making sure that it flows into all corners and around services. Apply a firm pressure to the mortar to eliminate any trapped air bubbles. Build up to the required depth.

# KNAUF FIRE PROTECTION PUTTY PAD

5



Knauf Firecollar are designed to maintain the fire resistance of fire rated walls and floors where these are breached by plastic pipes, and may be used in gypsum, masonry and concrete walls and floors.

Each pipe collar consists of a white coated circular steel shell that splits in two to fit around the service penetrations by means of a simple 'slide-lock' system. The steel shell contains a graphite based reactive material which reacts when exposed to heat closing the openings left by the softening plastic pipe in fire.

### Properties:

- > Classified for fire sealing in all types of constructions
- > Excellent sound insulation
- > No emissions - environmentally and user friendly
- > Simple to install using widely available standard screws
- > Collars come in two different heights for different fire classifications to maximize cost efficiency
- > Very high fire classifications up to 240 minutes for both integrity and insulation
- > 30 years working life guarantee
- > ETA 21/0993
- > EAD 350141-00-1104

**Supporting constructions:****Flexible walls:**

The wall must have a minimum thickness of 100 mm and comprise steel studs or timber studs\*) lined on both faces with minimum 2 layers of 12.5 mm thick boards.

**Rigid walls:**

The wall must have a minimum thickness of 100 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m<sup>3</sup>.

**Rigid floors:**

The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m<sup>3</sup>.

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.



5

**Installation Instructions**

1. Ensure the faces of the aperture opening are free of dust and any other contaminants. The faces may be moistened for better adhesion.
2. If the mortar seal is required to be load bearing, please see instructions in the Technical Data Sheet.
3. Bare metal pipes passing through the seal must be protected against corrosion using a suitable primer/protection system.
4. When sealing drywalls the mortar should be flush with the surface of the wall on both sides.
5. When sealing masonry or concrete constructions, the seal can be positioned to either side of the construction or anywhere in between.
6. When installing Knauf Fire Protection Mortar in hollow floor slabs or boards, level the fire seal with the soffit side. Ensure there is sufficient thickness of concrete below the void for the depth of mortar. Where this is not the case, tubular voids should be filled with stone wool normally the same thickness as the depth of the floor slab. Alternatively, simply fire seal on both sides.
7. Install a stone wool shutter board where is necessary to achieve the required thickness of mortar (see the drawings on pages 2-19). Make sure that this achieves a very tight seal – any small openings should be sealed with Knauf FPA Acrylic.
8. Pour clean water into a suitable mixing vessel and add the mortar to obtain the required consistency. Mix steadily at low speed and ensure that any lumps of powder are fully dispersed. Always add the mortar to the water, do not reverse this mixing process. For different mix ratios and drying times, please refer to the Technical Data Sheet.
9. Once the desired consistency is achieved pour or trowel the mortar onto the shutter board making sure that it flows into all corners and around services. Apply a firm pressure to the mortar to eliminate any trapped air bubbles. Build up to the required depth.

# KNAUF FIRE PROTECTION PUTTY PAD FOR TAP WATER BOXES

5



Knauf Firecollar are designed to maintain the fire resistance of fire rated walls and floors where these are breached by plastic pipes, and may be used in gypsum, masonry and concrete walls and floors.

Each pipe collar consists of a white coated circular steel shell that splits in two to fit around the service penetrations by means of a simple 'slide-lock' system. The steel shell contains a graphite based reactive material which reacts when exposed to heat closing the openings left by the softening plastic pipe in fire.

## Properties:

- › Classified for fire sealing in all types of constructions
- › Excellent sound insulation
- › No emissions - environmentally and user friendly
- › Simple to install using widely available standard screws
- › Collars come in two different heights for different fire classifications to maximize cost efficiency
- › Very high fire classifications up to 240 minutes for both integrity and insulation
- › 30 years working life guarantee
- › ETA 21/0993
- › EAD 350141-00-1104

**Supporting constructions:****Flexible walls:**

The wall must have a minimum thickness of 100 mm and comprise steel studs or timber studs\*) lined on both faces with minimum 2 layers of 12.5 mm thick boards.

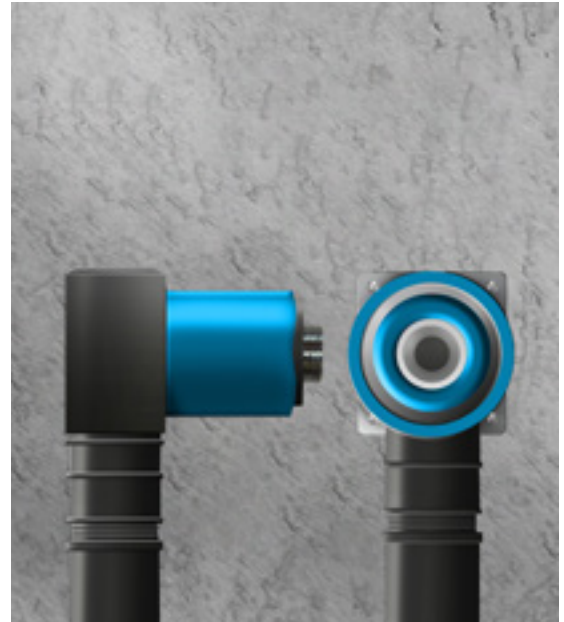
**Rigid walls:**

The wall must have a minimum thickness of 100 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m<sup>3</sup>.

**Rigid floors:**

The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m<sup>3</sup>.

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.



5

**Installation Instructions**

1. Ensure the faces of the aperture opening are free of dust and any other contaminants. The faces may be moistened for better adhesion.
2. If the mortar seal is required to be load bearing, please see instructions in the Technical Data Sheet.
3. Bare metal pipes passing through the seal must be protected against corrosion using a suitable primer/protection system.
4. When sealing drywalls the mortar should be flush with the surface of the wall on both sides.
5. When sealing masonry or concrete constructions, the seal can be positioned to either side of the construction or anywhere in between.
6. When installing Knauf Fire Protection Mortar in hollow floor slabs or boards, level the fire seal with the soffit side. Ensure there is sufficient thickness of concrete below the void for the depth of mortar. Where this is not the case, tubular voids should be filled with stone wool normally the same thickness as the depth of the floor slab. Alternatively, simply fire seal on both sides.
7. Install a stone wool shutter board where is necessary to achieve the required thickness of mortar (see the drawings on pages 2-19). Make sure that this achieves a very tight seal – any small openings should be sealed with Knauf FPA Acrylic.
8. Pour clean water into a suitable mixing vessel and add the mortar to obtain the required consistency. Mix steadily at low speed and ensure that any lumps of powder are fully dispersed. Always add the mortar to the water, do not reverse this mixing process. For different mix ratios and drying times, please refer to the Technical Data Sheet.
9. Once the desired consistency is achieved pour or trowel the mortar onto the shutter board making sure that it flows into all corners and around services. Apply a firm pressure to the mortar to eliminate any trapped air bubbles. Build up to the required depth.

# PENETRATION SEALS | FLEXIBLE WALL CONSTRUCTIONS

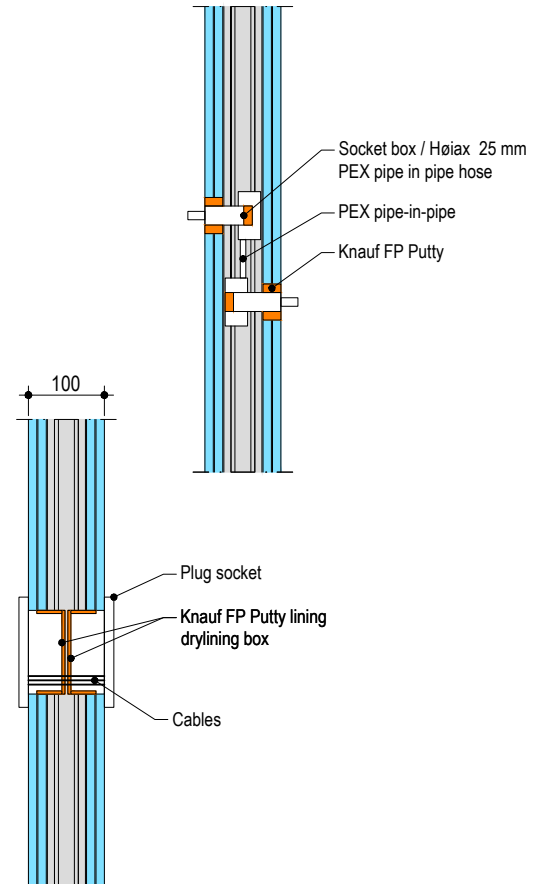
WITH WALL THICKNESS OF MINIMUM 100 MM

## > Pipe and cable penetration seals with 4 mm thick Knauf FR Putty in socket box

Penetration Seal: Socket boxes with 15 mm long Knauf FR Putty wrapped around the pipe protrusion from the socket box. Min. 30 mm between cable penetrations.

Services	Socket box	Knauf FR Putty (mm)	Aperture	Classification
Høiax 25mm PEX pipe in pipe hose	Single or double Høiax Push Wallbox 15mm*	174 x 64 x 4 mm pad around pipe / 50 Ø x 25 mm at back of the box	Ø 63 mm	EI 90
Cables up to Ø 14 mm	UK standard double socket box, max. 130 mm wide x 70 mm high x 47 mm deep, each with up to 22 mm hole cut to accept the cables	Interior of box fully lined with pad	Max. 135 mm wide x 75 mm high	EI 60

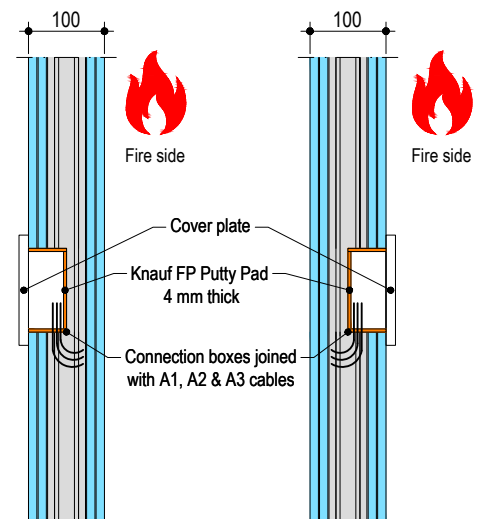
\*Fixed directly to studs or with steel plate between studs.



## > Cable penetration seals with 4 mm thick Knauf FR Putty in socket box

Penetration Seal: Socket boxes with Knauf FR Putty wrapped around the cable protrusion from the socket box.

Services	Socket box	Knauf FR Putty (mm)	Position	Aperture	Classification
Cables up to Ø 14 mm	Schneider Electric Ref. IMT 36026 connection box, 72 mm wide x 90 mm high x 50 mm deep	Fitted lining the back of the back box	Side by side – 1 fitted to each face, or separated	73 mm wide x 91 mm high x 51 mm deep	E 60, EI 45
	Elko 4189 1223720 connection box, 72 mm wide x 90 mm high x 58 mm deep	Interior of box fully lined with pad	Adjacent – 1 fitted to each face, or separated	92 mm wide x 112 mm high	EI 90
	ELKO 5421 123740 connection box, 73 mm wide x 73 mm high x 55 mm deep			74 mm wide x 74 mm high	



› **Double sided penetration seal with cables**

**Penetration Seal:** Cables (single or bundled up to 50 mm Ø) penetrating through a flexible or rigid wall construction and fitted at any position within the aperture, sealed with a 15mm diameter cord of Knauf FR Putty on both sides of the wall. Maximum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2).

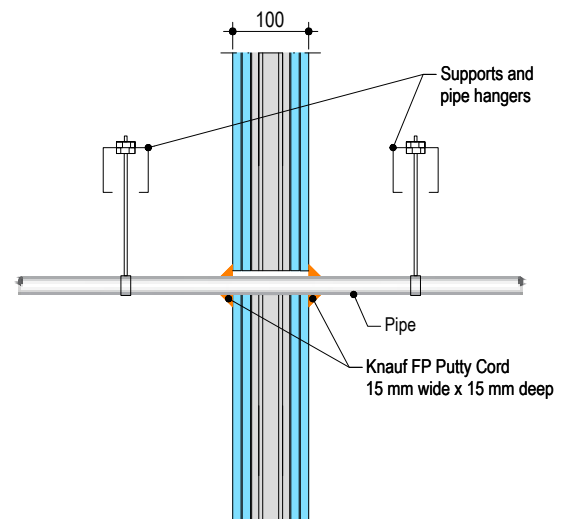
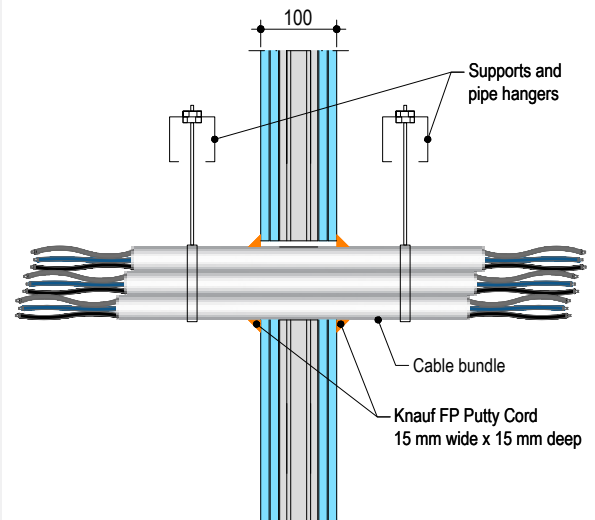
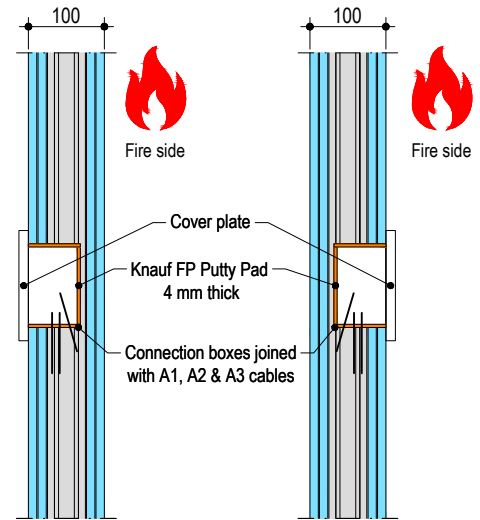
Services	Classification
Blank seal with a 15 mm deep cord of Knauf FR Putty on both sides of the wall	EI 120
Cables up to Ø 21 mm, single or in a bundle up to Ø 50 mm*	
Cables up to Ø 80 mm, single or in a bundle up to Ø 50 mm*	EI 60

\*Cable specification from EN 1366-3 standard cable configuration

› **Double sided penetration seal with metallic pipes**

**Penetration Seal:** Metallic pipes penetrating through a flexible or rigid wall construction and fitted at any position within the aperture, sealed with a 15mm diameter cord of Knauf FR Putty on both sides of the wall. Max. annular space 10 mm (A1) and min. separation between penetration seals 30 mm (A2).

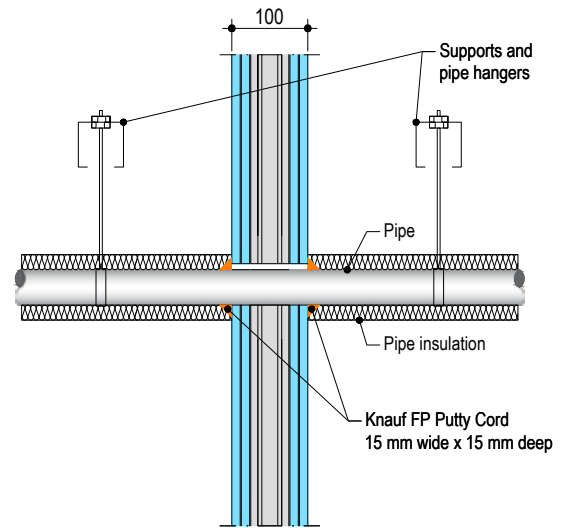
Services	Insulation	Classification
Mild or stainless steel pipe		
Maximum Ø 22 mm	-	EI 120 C/U
Ø 23-30 mm		E 120, EI 45 C/U
ALUPEX pipe		
Ø 16 mm	-	EI 120 C/C
Ø 17-20 mm		E 120, EI 90 C/C
Alupex pipe		
Ø 6 mm	-	EI 120 C/C
Ø 7-12 mm		E 120, EI 60 C/C



› **Double sided penetration seal with insulated metallic pipes, Local Interrupted (LI)**

**Penetration Seal:** Metallic pipes insulated with minimum 80 kg/m<sup>3</sup> density mineral wool insulation, Local Interrupted (LI), penetrating through a flexible or rigid wall construction, fitted at any position within the aperture, sealed with a 15mm diameter cord of Knauf FR Putty on both sides of the wall. Maximum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2).

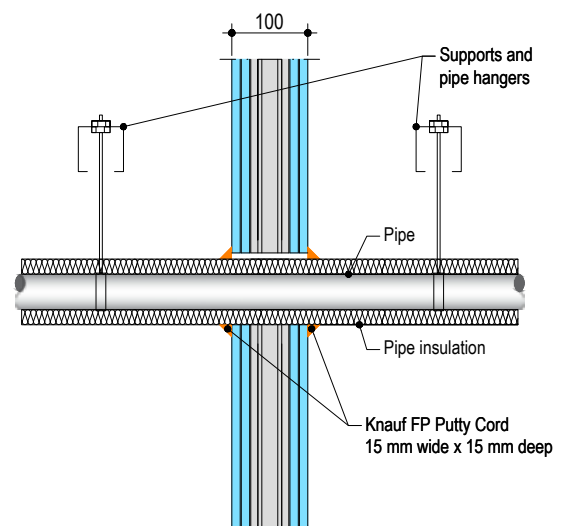
Services	Insulation	Classification
Mild or stainless steel pipe, with minimum 80 kg/m <sup>3</sup> density mineral wool insulation		
Maximum Ø 40 mm	Minimum 20 mm thick insulation, 500 mm long butted up to the wall on both faces	EI 120 C/U
Ø 40-324 mm	Minimum 30 mm thick insulation, 500 mm long butted up to the wall on both faces	
Copper or steel pipe with minimum 80 kg/m <sup>3</sup> density mineral wool insulation		
Maximum Ø 54 mm/ 1.2-14.2 mm wall	Minimum 20 mm thick insulation, 500 mm long butted up to the wall on both faces	E 90, EI 60 C/C
ALUPEX pipe with minimum 80 kg/m <sup>3</sup> density mineral wool insulation		
Maximum Ø 16 mm	Minimum 20 mm thick insulation, 500 mm long butted up to the wall on both faces	EI 90 C/C
Maximum Ø 75 mm	Minimum 30 mm thick insulation, 500 mm long butted up to the wall on both faces	



› **Double sided penetration seal with insulated metallic pipes, Continuous Sustained (CS)**

**Penetration Seal:** Metallic pipes insulated with minimum 80 kg/m<sup>3</sup> density mineral wool insulation, Continuous Sustained (CS), penetrating through a flexible or rigid wall construction, fitted at any position within the aperture, sealed with a 15mm diameter cord of Knauf FR Putty on both sides of the wall. Maximum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2).

Services	Insulation	Classification
Mild or stainless steel pipe, with minimum 80 kg/m <sup>3</sup> density mineral wool insulation		
Maximum Ø 40 mm	20 mm thick	EI 120 C/U
Ø 40-324 mm	30-80 mm thick	E 90, EI 60 C/U
Copper or steel pipe with minimum 80 kg/m <sup>3</sup> density mineral wool insulation		
Maximum Ø 12 mm/ 0.7-6.0 mm wall	20 mm thick	E 90, EI 60 C/C
Maximum Ø 54 mm/ 1.2-14.2 mm wall	30-80 mm thick	
ALUPEX pipe with minimum 80 kg/m <sup>3</sup> density mineral wool insulation		
Maximum Ø 16 mm	20 mm thick	EI 90 C/C
Maximum Ø 75 mm	30-80 mm thick	



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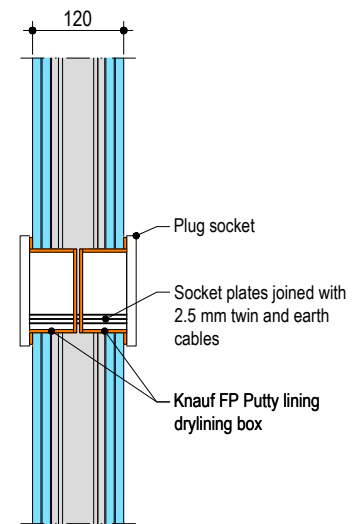
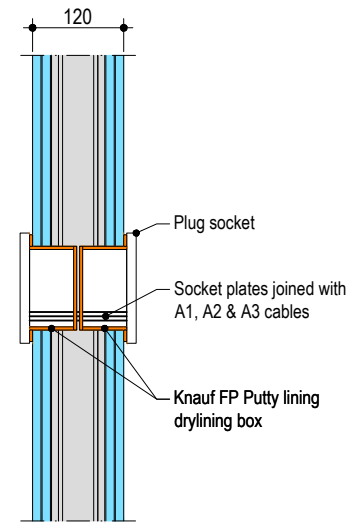


WITH WALL THICKNESS OF MINIMUM 120 MM

› **Cable penetration seals with 4 mm thick Knauf FR Putty in socket box**

Penetration Seal: Socket boxes with Knauf FR Putty wrapped around the cable protrusion from the socket box.

Services	Socket box	Knauf FR Putty (mm)	Position	Aperture	Classification
Cables up to Ø 14 mm	UK standard double socket box, maximum 130 mm wide x 70 mm high x 48 mm deep, each with a 25 mm wide x 14 mm high knock out section centrally located at the bottom back angle of the box to accept the cables	Interior of box fully lined with pad	Back to back – 1 fitted to each face, or separated	Maximum 135 mm wide x 72 mm high	EI 20
2.5 mm twin and earth cables					

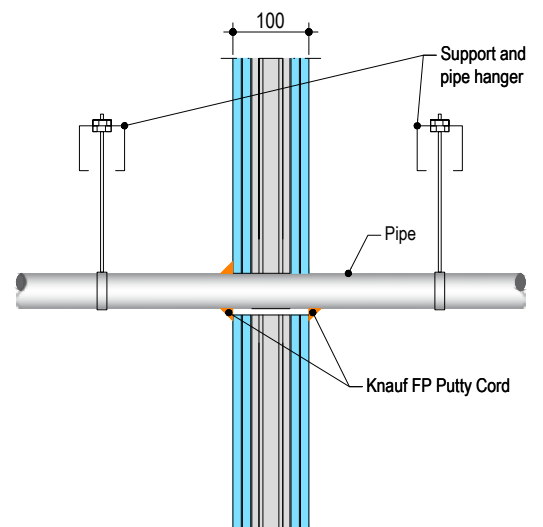


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› **Double sided penetration seal with metallic pipes**

Penetration Seal: Metallic pipes penetrating through a flexible or rigid wall construction and fitted at any position within the aperture, sealed with a 15mm diameter cord of Knauf FR Putty on both sides of the wall. Max. annular space 10 mm (A1) and min. separation between penetration seals 30 mm (A2).

Services	Insulation	Classification
Mild or stainless steel pipe		
Maximum Ø 324 mm/6.35-14.2 mm wall	-	E 90, EI 20 C/U
ALUPEX pipe		
Maximum Ø 75 mm/4.6-14.2 mm wall	-	EI 90 C/C
Alupex pipe		
Maximum Ø 54 mm/1.2-14.2 mm wall	-	E 90, EI 15 C/C



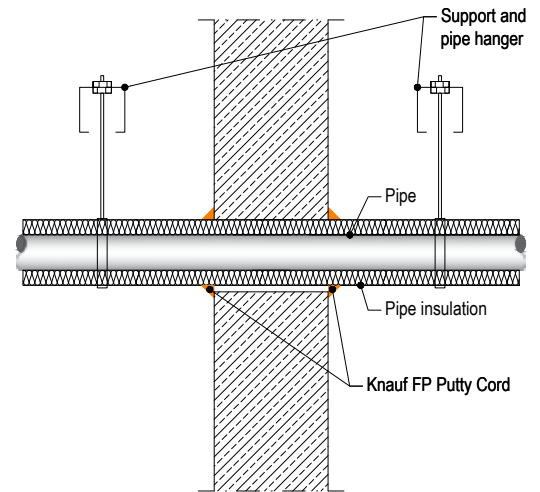
# PENETRATION SEALS | RIGID WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 150 MM

## > Double sided penetration seal with insulated metallic pipes, Continuous Sustained (CS)

**Penetration Seal:** Metallic pipes insulated with minimum 80 kg/m<sup>3</sup> density mineral wool insulation, Continuous Sustained (CS), penetrating through a rigid wall construction, fitted at any position within the aperture, sealed with a 1.5mm diameter cord of Knauf FR Putty on both sides of the wall. Maximum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2).

Services	Insulation	Classification
Mild or stainless steel pipe, with minimum 80 kg/m <sup>3</sup> density mineral wool insulation		
Maximum Ø 40 mm	20 mm thick	EI 120 C/U
Maximum Ø 324 mm	30-80 mm thick	E 240, EI 180 C/U
Copper or steel pipe with minimum 80 kg/m <sup>3</sup> density mineral wool insulation		
Maximum Ø 54 mm/ 1.2-14.2 mm wall	20 mm thick	E 240, EI 120 C/C
ALUPEX pipe with minimum 80 kg/m <sup>3</sup> density mineral wool insulation		
Maximum Ø 16 mm	20 mm thick	EI 240 C/C
Maximum Ø 75 mm	30 mm thick	



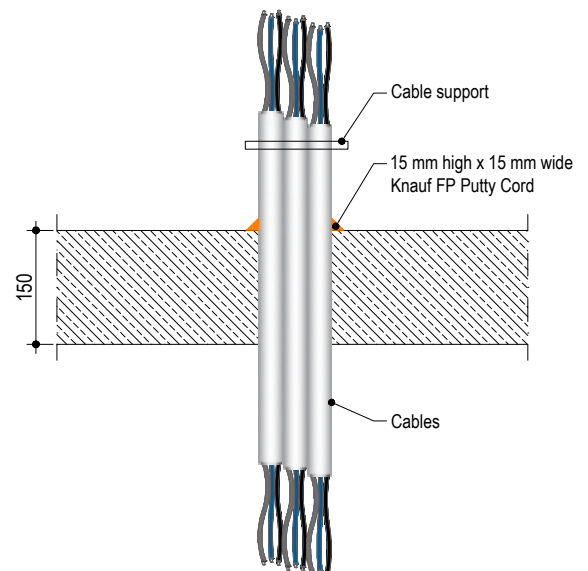
# LINEAR JOINT AND GAP SEALS | RIGID FLOOR CONSTRUCTIONS

WITH FLOOR THICKNESS OF MINIMUM 150 MM

## > Single sided penetration seal with cables

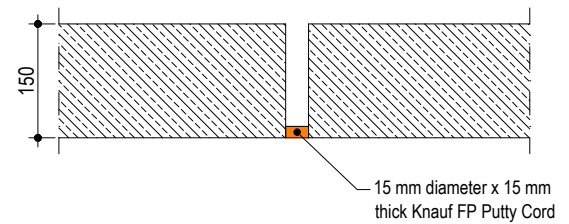
**Penetration Seal:** Cables (single or bundled up to 50 mm Ø) penetrating through a rigid floor construction and fitted at any position within the aperture, sealed with a 1.5mm diameter cord of Knauf FR Putty on the top face of the floor. Max. annular space 10 mm (A1) and min. separation between penetration seals 30 mm (A2). When incorporating blank penetration seals, the aperture is sealed with 15 mm wide by 15 mm thick cord of Knauf FR Putty, applied flush with the bottom face of the floor.

Services	Classification
-	E 120, EI 30
Cables up to Ø 21 mm in tied bundles up to Ø 50 mm	E 120, EI 60
Cables up to Ø 21 mm*	EI 120
Cables Ø 22-50 mm*	E 120, EI 90
Cables Ø 51-80 mm*	E 120, EI 60



Services	Classification
Single 'A1' type cable*	EI 240
Single 'C3' type cable*	
Single 'E' type cable*	EI 120
Single 'D1' type cable*	
Single 'D2' type cable*	
Single 'D3' type cable*	E 240, EI 60

\*Cable specification from EN 1366-3 standard cable configuration

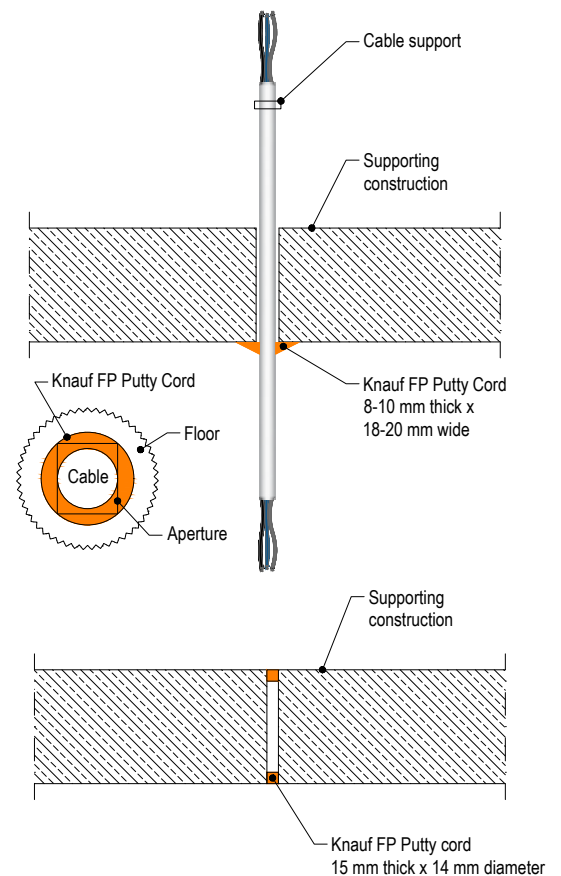


### > Single sided penetration seal with cables

**Penetration Seal:** Cables (single or bundled up to 75 mm Ø) penetrating through a rigid floor construction and fitted at any position within the aperture, sealed with a 15mm diameter cord of Knauf FR Putty on the bottom face of the floor. Maximum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). When incorporating blank penetration seals, the aperture is sealed with 15mm wide by 15mm thick cord of Knauf FR Putty, applied flush with both faces of the floor.

Services	Insulation	Classification
-	15 mm deep	EI 120
Cables up to Ø 21 mm in tied bundles up to Ø 75mm*	Ø 15 mm cord	E 60, EI 45
Cables up to Ø 21 mm*		E 120, EI 60
Cables Ø 22-80 mm*		E 90, EI 45

\*Cable specification from EN 1366-3 standard cable configuration

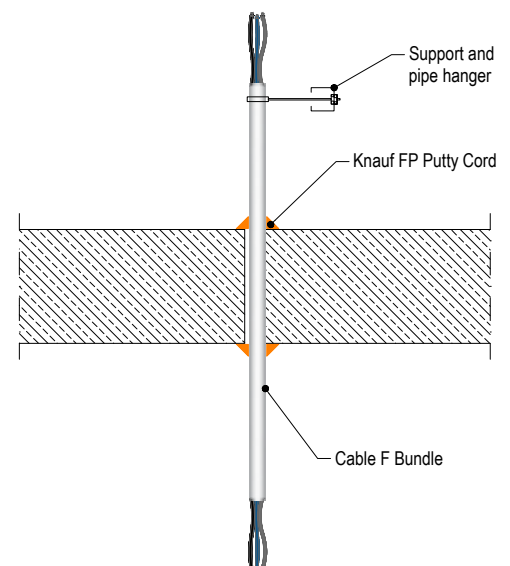


### > Double sided penetration seal with cables

**Penetration Seal:** Cables (single or bundled up to Ø 50 mm) penetrating through a rigid floor construction and fitted at any position within the aperture, sealed with a 15mm diameter cord of Knauf FR Putty on both sides of the floor. Maximum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2).

Services	Insulation	Classification
Cables up to Ø 21 mm in tied bundles up to Ø 50 mm*	Ø 15 mm cord	EI 240

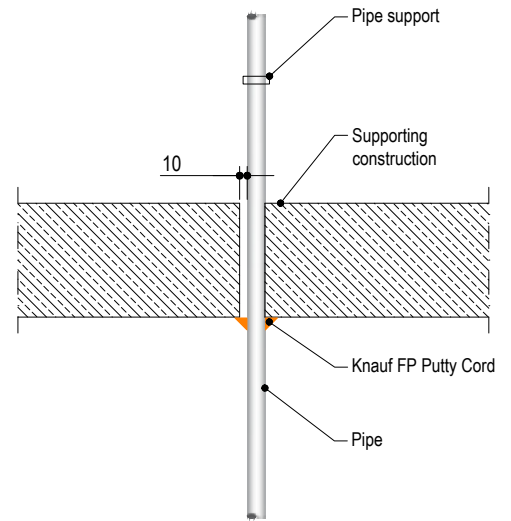
\*Cable specification from EN 1366-3 standard cable configuration



> **Single sided penetration seal with metallic pipes**

**Penetration Seal:** Metallic pipes penetrating through a rigid floor construction and fitted at any position within the aperture, sealed with a 15 mm diameter cord of Knauf FR Putty on the bottom face of the floor. Maximum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2).

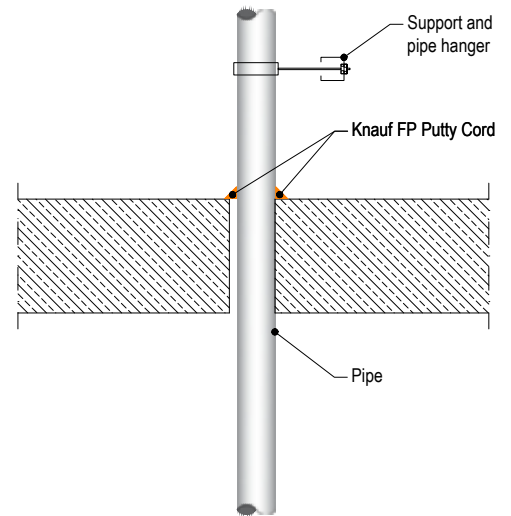
Services	Insulation	Classification
Mild or stainless steel pipe		
Ø 4 mm	-	EI 120 C/U
Ø 5-30 mm		E 120, EI 45 C/U
Copper or steel pipe		
Ø 6 mm	-	E 120, EI 90 C/C
Ø 7-12 mm		E 120, EI 30 C/C



> **Single sided penetration seal with metallic pipes**

**Penetration Seal:** Metallic pipes penetrating through a rigid floor construction and fitted at any position within the aperture, sealed with a 15 mm diameter cord of Knauf FR Putty on the top face of the floor. Maximum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2).

Services	Insulation	Classification
Mild or stainless steel pipe		
Maximum Ø 22 mm/ 1.2-11.0 mm wall	-	EI 120 C/U
Maximum Ø 324 mm/ 6.35-14.2 mm wall		E 240, EI 15 C/U
Copper or steel pipe		
Ø 6 mm	-	EI 120 C/C
Ø 7-10 mm		E 120, EI 90 C/C
Maximum Ø 54 mm/ 1.2-14.2 mm wall		E 120 C/C
ALUPEX pipe with minimum 80 kg/m <sup>3</sup> density mineral wool insulation		
Ø 16-20 mm	-	EI 240 C/C
Maximum Ø 75 mm/ 4.6-14.2 mm wall		E 45, EI 30 C/C

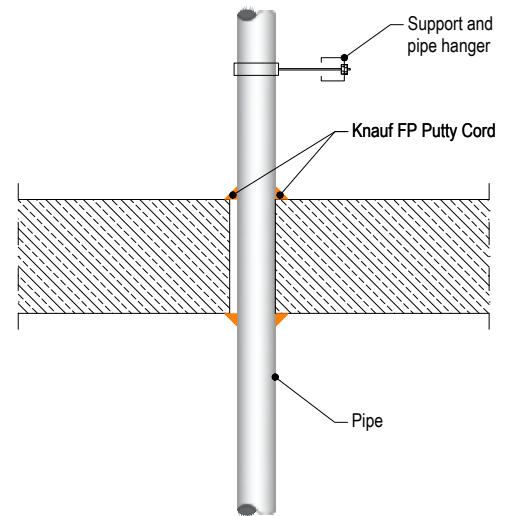


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› **Double sided penetration seal with metallic pipes**

**Penetration Seal:** Metallic pipes penetrating through a rigid floor construction and fitted at any position within the aperture, sealed with a 15 mm diameter cord of Knauf FR Putty on both sides of the floor. Maximum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2).

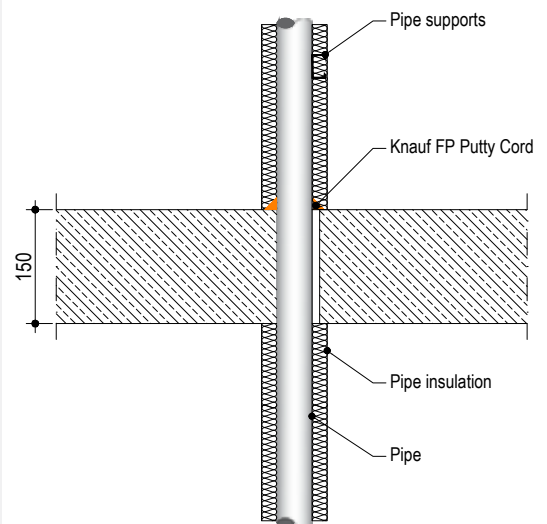
Services	Insulation	Classification
Copper or steel pipe		
Maximum Ø 10 mm/ 0.7-14.2 mm wall	-	E 240, EI 180 C/C



› **Single sided penetration seal with insulated metallic pipes, Local Interrupted (LI)**

**Penetration Seal:** Metallic pipes insulated with minimum 80 kg/m<sup>3</sup> density mineral wool insulation, Local Interrupted (LI), penetrating through a rigid floor construction, fitted at any position within the aperture, sealed with a 15 mm diameter cord of Knauf FR Putty on the top face of the floor. Maximum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2).

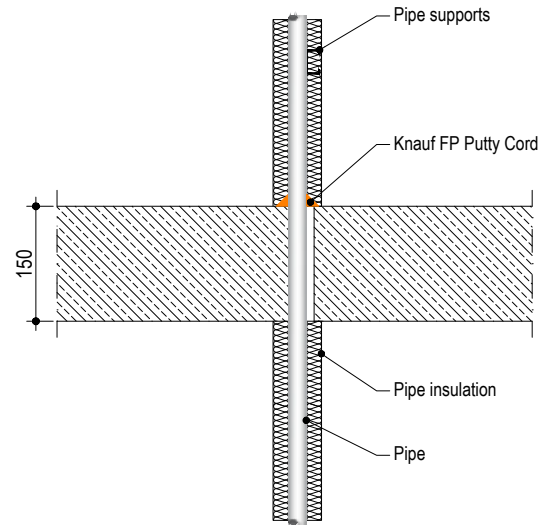
Services	Insulation	Classification
Mild or stainless steel pipe, with minimum 80 kg/m <sup>3</sup> density mineral wool insulation		
Maximum Ø 40 mm	Minimum 20 mm thick insulation, 500 mm long butted up to each face of the floor	EI 240 C/U
Ø 41-324 mm	Minimum 30 mm thick insulation, 500 mm long butted up to each face of the floor	E 240, EI 60 C/U
ALUPEX pipe with minimum 80 kg/m <sup>3</sup> density mineral wool insulation		
Maximum Ø 16 mm/2.25-8.0 mm wall	Minimum 20 mm thick insulation, 500 mm long butted up to each face of the floor	EI 240 C/C
Maximum Ø 75 mm/4.6-14.2 mm wall	Minimum 30 mm thick insulation, 500 mm long butted up to each face of the floor	



› **Single sided penetration seal with insulated metallic pipes, Local Interrupted (LI)**

**Penetration Seal:** Metallic pipes insulated with minimum 75 kg/m<sup>3</sup> density glass or mineral wool insulation, Local Interrupted (LI), penetrating through a rigid floor construction, fitted at any position within the aperture, sealed with a 15 mm diameter cord of Knauf FR Putty on the top face of the floor. Maximum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2).

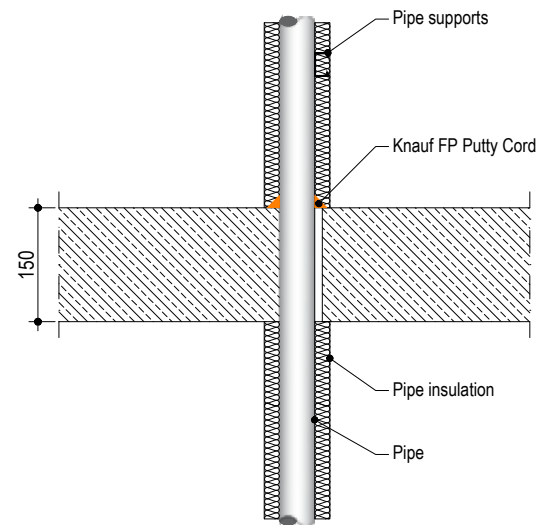
Services	Insulation	Classification
Copper or steel pipe with minimum 75 kg/m <sup>3</sup> density glass or mineral wool insulation		
Maximum Ø 12 mm/ 0.7-14.2 mm wall	Minimum 20 mm thick insulation, 500 mm long butted up to each face of the floor	EI 240 C/C
Maximum Ø 54 mm/ 1.2-14.2 mm wall		E 180, EI 120 C/C



› **Single sided penetration seal with insulated metallic pipes, Continuous Sustained (CS)**

**Penetration Seal:** Metallic pipes insulated with minimum 80 kg/m<sup>3</sup> density mineral wool insulation, Continuous Sustained (CS), penetrating through a rigid floor construction, fitted at any position within the aperture, sealed with a 15 mm diameter cord of Knauf FR Putty on the top face of the floor. Maximum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2).

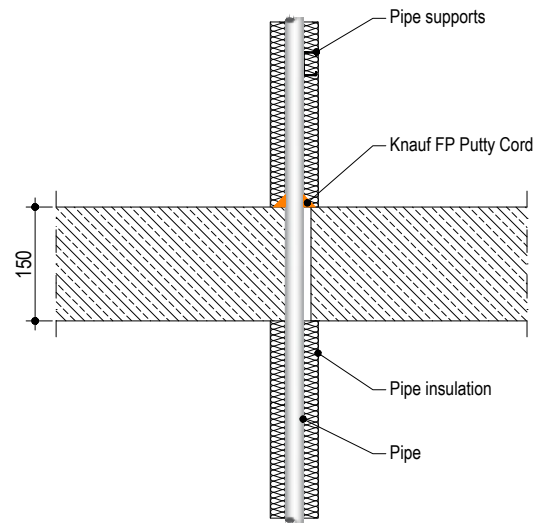
Services	Insulation	Classification
Mild or stainless steel pipe, with minimum 80 kg/m <sup>3</sup> density mineral wool insulation		
Maximum Ø 40 mm/ 1.0-14.2 mm wall	20 mm thick	EI 240 C/U
Maximum Ø 324 mm	30-80 mm thick	
Copper or steel pipe with minimum 80 kg/m <sup>3</sup> density mineral wool insulation		
Maximum Ø 12 mm/ 0.7-6.0 mm wall	20 mm thick	EI 240 C/C
Maximum Ø 54 mm/ 1.2-14.2 mm wall	30-80 mm thick	
ALUPEX pipe with minimum 80 kg/m <sup>3</sup> density mineral wool insulation		
Maximum Ø 16 mm/ 2.25-8.0 mm wall	20 mm thick	EI 240 C/C
Maximum Ø 75 mm/ 4.6-14.2 mm wall	30-80 mm thick	



› **Single sided penetration seal with insulated metallic pipes, Continuous Sustained (CS)**

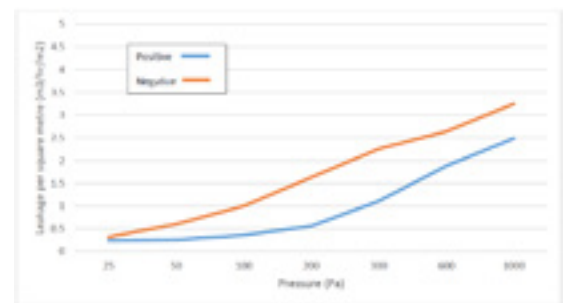
**Penetration Seal:** Metallic pipes insulated with minimum 75 kg/m<sup>3</sup> density glass wool insulation, Continuous Sustained (CS), penetrating through a rigid floor construction, fitted at any position within the aperture, sealed with a 15 mm diameter cord of Knauf FR Putty on the top face of the floor. Max. annular space 10 mm (A1) and min. separation between penetration seals 30 mm (A2).

Services	Insulation	Classification
Copper or steel pipe with minimum 75 kg/m <sup>3</sup> density glass wool insulation		
Maximum Ø 12 mm/0.7-6.0 mm wall	20 mm thick	EI 240, EI 90 C/C
Maximum Ø 54 mm/1.2-14.2 mm wall	20-40 mm thick	EI 90 C/C
ALUPEX pipe with minimum 75 kg/m <sup>3</sup> density glass wool insulation		
Maximum Ø 16 mm/2.25-8.0 mm wall	20 mm thick	EI 120 C/C
Maximum Ø 75 mm/4.6-14.2 mm wall	20-50 mm thick	



ANNEX B – AIR PERMEABILITY – KNAUF FR PUTTY

Product tested	Knauf FR Putty Cord around 48mm electrical cable in 58mm hole		
Summary of testing procedure			Result
	Pressure (Pa)	Leakage (m <sup>3</sup> /h)	Leakage (m <sup>3</sup> /m <sup>2</sup> /h)
Results under negative chamber pressure	25	0.32	N/A
	50	0.60	
	100	1.00	
	200	1.63	
	300	2.26	
	600	2.64	
	1000	3.25	
Results under positive chamber pressure	25	0.24	N/A
	50	0.26	
	100	0.36	
	200	0.56	
	300	1.11	
	600	1.88	
	1000	2.49	



# KNAUF FIRE PROTECTION POLYMER

5



Knauf Fire Protection Polymer is a high performance, professional quality, one part ready to use sealant and adhesive.

Based on an innovative new Inert Polymer Technology it is suitable for a wide variety of building trade applications including decorating, fire sealing, flooring, joinery, plumbing and tiling and out-performs conventional silicone, MSP, butyl and acrylic based products as a sealant and adhesive – the only sealant free from dangerous emissions.

**Properties:**

- > Excellent adhesion to most common substrates
- > Easy to apply and tool off
- > 3D joint movement capability minimum 25%
- > Fire rated up to 4 hours both integrity and insulation
- > Low shrinkage
- > 24 months storage time
- > Only technology available that is VOC free
- > Certified according to ETA 21/0995 and ETA 21/1006
- > EAD 350141-00-1106
- > EAD 350454-00-1104



**Supporting constructions:****Flexible walls:**

The wall must have a minimum thickness of 100 mm (Penetration Seals) / 75 mm (Linear Joint and Gap Seals) and comprise steel studs or timber studs\*) lined on both faces with minimum 2 layers of 12.5 mm thick boards (Penetration Seals) / 1 layer of 12.5 mm thick boards (The wall is permitted with or without insulation) (Linear Joint and Gap Seals).

**Rigid walls:**

The wall must have a minimum thickness of 100 mm (Penetration Seals) / 75 mm (Linear Joint and Gap Seals) and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m<sup>3</sup>.

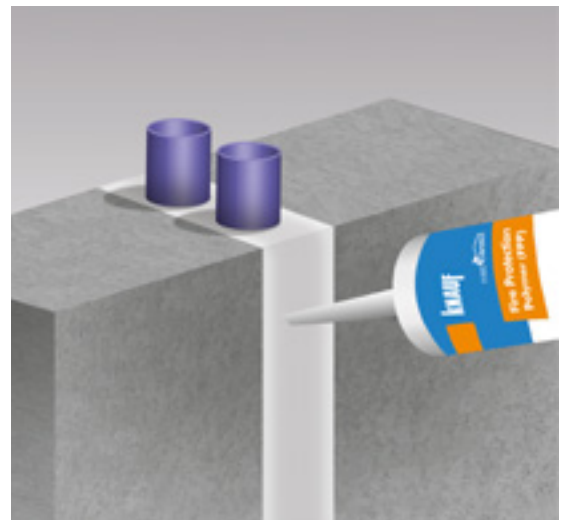
**Rigid floors:**

The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m<sup>3</sup>.

\* no part of the penetration seal may be closer than 100 mm to a stud, the cavity must be closed between the penetration seal and the stud, and minimum 100

mm of insulation of class A1 or A2 according to EN 13501-1 must be provided within the cavity between the penetration seal and the stud.

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.



5

**Installation Instructions**

1. All surfaces must be clean and sound, free from dirt, grease and other contaminants. The surfaces may be damp but not running wet. Use a wet brush to clean surfaces before application to remove loose material and to ensure good contact for adhesion. Primers are not usually required.
2. As Knauf FP Polymer contains some water, in cases where corrosion protection is a problem; some metals may require a barrier between the sealant and the metal surface prior to this installation.
3. When installing Knauf FP Polymer in hollow floor slabs or boards, tubular voids should be filled with stone wool normally the same thickness as the depth of the floor slab. Alternatively, simply fire seal on both sides.
4. Refer to the drawings on following pages 2 to 4, or the Technical Data Sheet on page 3 for guidance on joint design/ dimensions for fire sealing. If installation does not have to meet any specific fire specification, the depth of the joint should be at least half the width and not less than 6mm in order to obtain maximum performance as a sealant.
5. When installing any backing material, cut this slightly oversize and insert into the gap ensuring a tight friction fit. Ensure correct depth is achieved. The use of backing material is strongly recommended.
6. Cut nozzle to the desired angle and gun firmly into the joint to give a good solid fill. Strike off the sealant flush with the joint sides within ten minutes of application, before surface skinning occurs. The sealant will have medium shrinkage during cure and if a flush surface is required it is recommended to leave the sealant proud.
7. The sealant can be tooled to a smooth finish using a moist plastic stick or similar within 30 minutes of application. IPT Tooling designed for the optimum finish is recommended instead of soap and water as it forms a film between the stick and the sealant.
8. Do not spray the sealant with water or other fluids before skin formation (<30 min). Uncured sealant is soluble in water prior to skinning due to its environmentally friendly IPT chemistry that uses water instead of solvents.
9. Knauf FP Polymer can be over-painted.

# PENETRATION SEALS | FLEXIBE AND RIGID WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 100 MM

## > Double side penetration seal with metallic (and composite) pipes

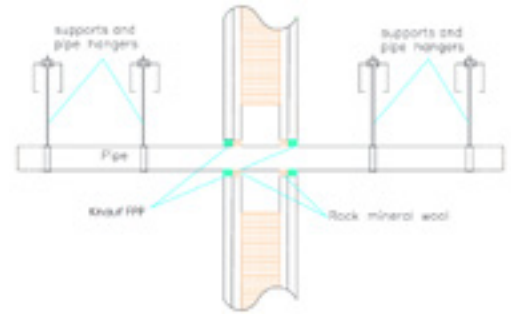
Penetration Seal: Pipe (single) fitted at any position within the aperture, with 12.5 mm deep Knauf FPP Sealant to both sides of the wall, backed with 12.5 mm deep stone wool insulation min. 33kg/m<sup>3</sup>. Min. annular space 10 mm (A1) and min. separation between penetration seals 30 mm (A2).

Services	Sealant depth	Backing	Aperture Ø	Classification
Alupex composite pipe Ø 16-20 mm/ 2.0 mm wall	12.5 mm	Stone wool 12.5 mm deep min. 33 kg/m <sup>3</sup>	Maximum annular ring width 30 mm	EI 120 C/C
Steel pipe Ø 4.0-22 mm/ 1.0-11.0 mm wall				EI 120 C/U
Copper or steel pipe Ø 6-12 mm/ 0.8-6.0 mm wall				E 120, EI 60 C/C

## > Double side penetration seal with plastic pipes

Penetration Seal: Plastic pipes (single) fitted at any position within the aperture, with 25 mm Knauf FPP to both sides of the wall. Min. annular space 10 mm (A1) and min. separation between penetration seals 30 mm (A2).

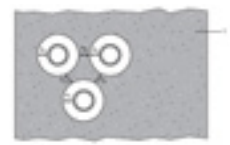
Services	Sealant depth	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1	25 mm	EI 90 C/C
Ø 6-32 mm/1.0-2.4 mm wall		
PP pipe according to EN 1451-1	25 mm	EI 90 C/C
Ø 12-32 mm/1.8-4.4 mm wall		
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1	25 mm	EI 90 C/C
Ø 20-32 mm/2.0-3.0 mm wall		



Configuration 1

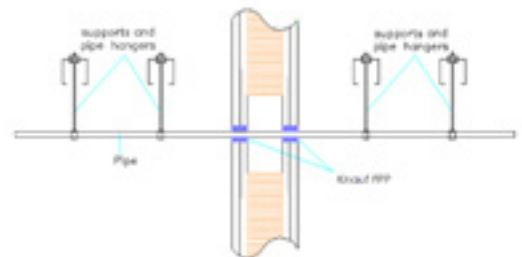


Configuration 2



Key

- 1 Supporting construction
- a1 Pipe / top edge of seal separation
- a2 Pipe / side edge of seal separation
- a3 Pipe / pipe separation



Configuration 1



Configuration 2



Key

- 1 Supporting construction
- a1 Pipe / top edge of seal separation
- a2 Pipe / side edge of seal separation

# PENETRATION SEALS | RIGID FLOOR CONSTRUCTIONS

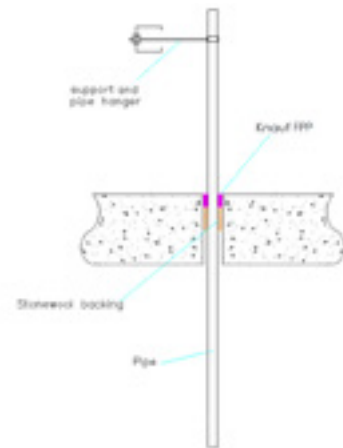
WITH FLOOR THICKNESS OF MINIMUM 150 MM

## › Single side penetration seal with pipes

**Penetration Seal:** Pipes fitted at any position within the aperture, with Knauf FPP to the top face of the floor, backed with 48 mm stone wool minimum 35kg/m<sup>3</sup>. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2).

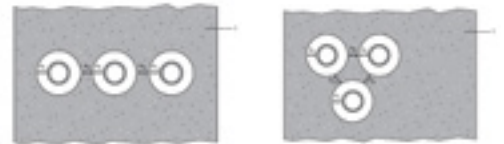
Services	Sealant depth	Backing (minimum)	Aperture (maximum)	Classification
Mild or stainless steel pipe				
Ø 4.0-16 mm/1.0-8.0 mm wall	25 mm	48 mm stone wool	Max. annular ring width 30 mm	EI 120 C/U
Copper or steel pipe				
Up to Ø 10 mm/0.7-5.0 mm wall	25 mm	48 mm stone wool	Max. annular ring width 30 mm	EI 120 C/C
Ø 11-15 mm/0.7-7.5 mm wall				E 120, EI 45 C/C
Alupex composite pipe				
Ø 16-20 mm/2.0 mm wall	25 mm	48 mm stone wool	Max. annular ring width 30 mm	EI 120 C/C

Services	Sealant depth	Backing (minimum)	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1			
Ø 6.0-32.0 mm/1.0-2.4 mm wall	25 mm	48 mm stone wool	EI 120 U/C
PP pipe according to EN 1451-1			
Ø 12.0-32.0 mm/1.8-4.4 mm wall	25 mm	48 mm stone wool	EI 120 U/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Ø 20.0-32.0 mm/2.0-3.0 mm wall	25 mm	48 mm stone wool	EI 120 U/C



Configuration 1

Configuration 2



### Key

1 Supporting construction

a1 Pipe / top edge of seal separation

a2 Pipe / side edge of seal separation

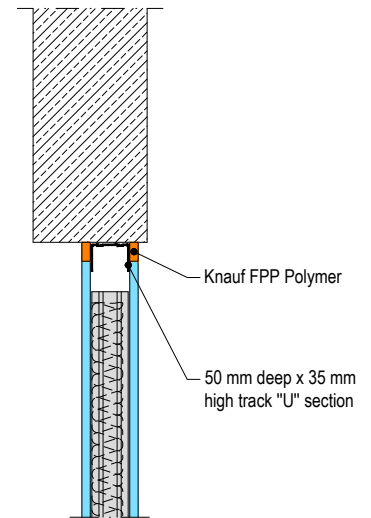
# LINEAR JOINT AND GAP SEALS | FLEXIBE AND RIGID WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 75 MM

## > Linear joint seals, between head of wall min. 75 mm thick and soffit of concrete floor

Joint Seal: Knauf FPP to both sides of the wall, joint widths up to 25 mm.

Substrate	Depth (mm)	Backing	Classification
Wall/Floor	Minimum 12.5 mm	Minimum 50 mm steel partition head track/stud	E 60 - T - X - F - W 25 EI 45 - T - X - F - W 25

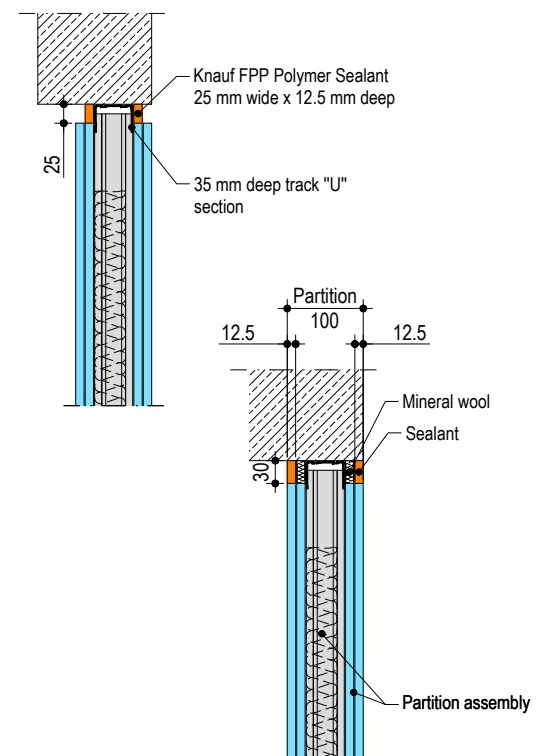
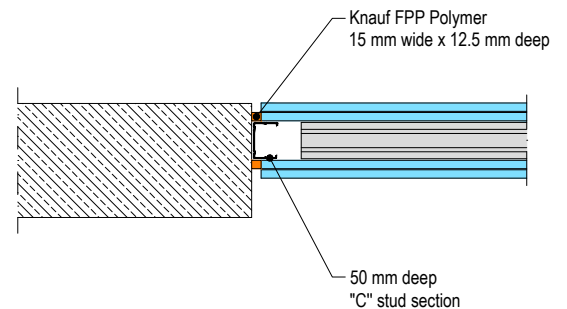


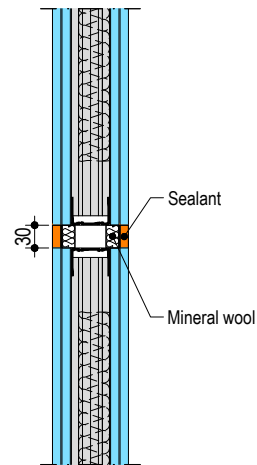
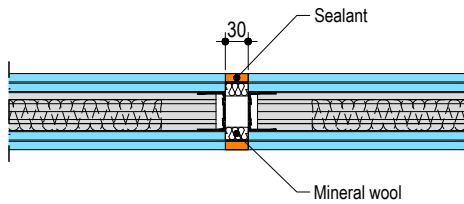
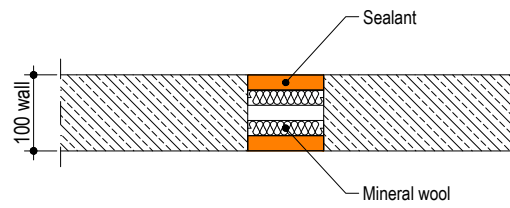
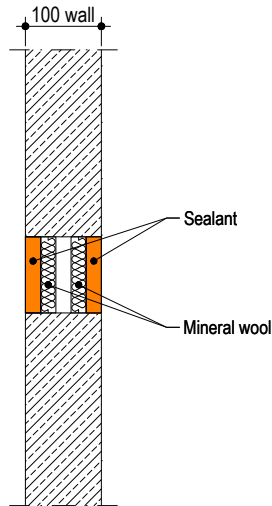
WITH WALL THICKNESS OF MINIMUM 100 MM

## > Linear joint seals, between head or side of wall min. 100 mm thick and soffit of concrete floor

Joint Seal: Knauf FPP to both sides of the wall, joint widths up to 30 mm.

Substrate	Depth (mm)	Backing	Classification
Wall/Floor	Minimum 12.5 mm	12.5 mm stonewool minimum 35 kg/m <sup>3</sup> plus minimum 50 mm steel partition head track	EI 120 - T - X - F - W 30
		Minimum 50 mm steel partition head track /stud	E 90 - T - X - F - W 25 EI 60 - T - X - F - W 25
			EI 120 - V - X - F - W 15





Joint Seal: Knauf FPP to both sides of the wall, joint widths up to 30 mm.

Substrate	Depth (mm)	Backing	Classification
Wall/Floor	Minimum 12.5 mm	12.5 mm stonewool minimum 35 kg/m <sup>3</sup>	EI 120 - T - X - F - W 30 EI 120 - V - X - F - W 30

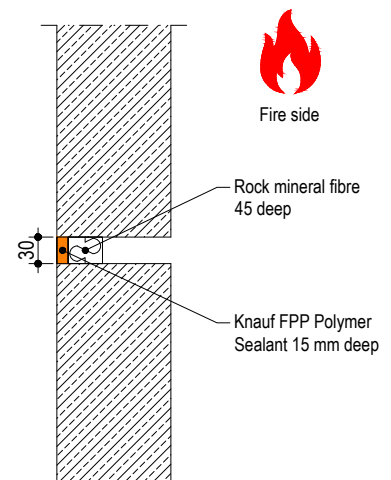
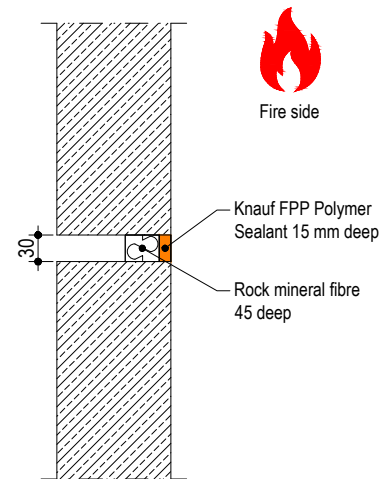
# LINEAR JOINT AND GAP SEALS | RIGID WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 150 MM

## > Linear joint or gap seal, between head of rigid wall and soffit of concrete floor / between rigid walls

Joint Seal: Knauf FPP to one or both sides of the wall, joint widths up to 30 mm.

Substrate	Depth (mm)	Backing	Classification
Concrete/masonry	Minimum 15 mm (one side)	45 mm stone wool minimum 33 kg/m <sup>3</sup>	E 240 – T – X – F – W 30 EI 60 – T – X – F – W 30
	Minimum 15 mm (both side)		EI 240 – T – X – F – W 30



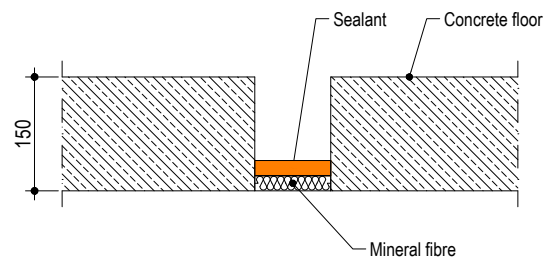
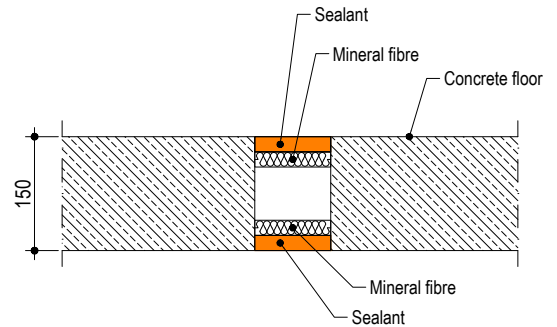
# LINEAR JOINT AND GAP SEALS | RIGID FLOOR CONSTRUCTIONS

WITH FLOOR THICKNESS OF MINIMUM 150 MM

> **Linear joint or gap seal, between concrete floors and between the end of concrete floors and rigid walls**

Joint Seal: Knauf FPP Polymer to one or both sides of the floor, joint widths up to 30 mm

Substrate	Depth (mm)	Backing	Classification
Concrete	Minimum 15 mm to both faces	20 mm stonewool minimum 33 kg/m <sup>3</sup>	EI 240 - H - X - F - W 30
	25 mm	48 mm FP Backing 128 kg/m <sup>3</sup>	E 240 - H - X - F - W 30 EI 180 - H - X - F - W 30



# KNAUF FIRE PROTECTION GRAPHITE

5



Knauf Fire Protection Graphite is a high specification formulation designed to prevent the spread of fire, smoke and gases through openings in fire rated walls and floors. Knauf Fire Protection Graphite expands when it is subjected to fire and closes openings around penetrations when any combustible or low temperature melting materials have burnt away.

Knauf Fire Protection Graphite is designed to fire seal difficult services which traditional fire rated mastics do not achieve such as large plastic pipes.

Knauf Fire Protection Graphite can be used with a suitable filling material, i.e. stone wool or backing material in order to ensure correct width to depth ratio and to reduce the shrinking of the sealant during curing. Minimum depth and maximum width of the joints are included in the installation instructions. Thermal activation takes place at 150°C when the material will expand (intumesce) to prevent the passage of fire and smoke for periods up to 4 hours.

## Properties:

- > Classified in most constructions for plastic pipes and cables
- > Easy to apply
- > Movement capability up to 12.5%
- > No priming necessary for application to most materials
- > 30 years working life
- > Minimum 12 months storage time
- > High sound insulation
- > Certified according to ETA 21/0040
- > EAD 350454-00-1104



**Supporting constructions:****Flexible walls:**

The wall must have a minimum thickness of 100 mm and comprise steel studs or timber studs\*) lined on both faces with minimum 2 layers of 12.5 mm thick boards.

**Rigid walls:**

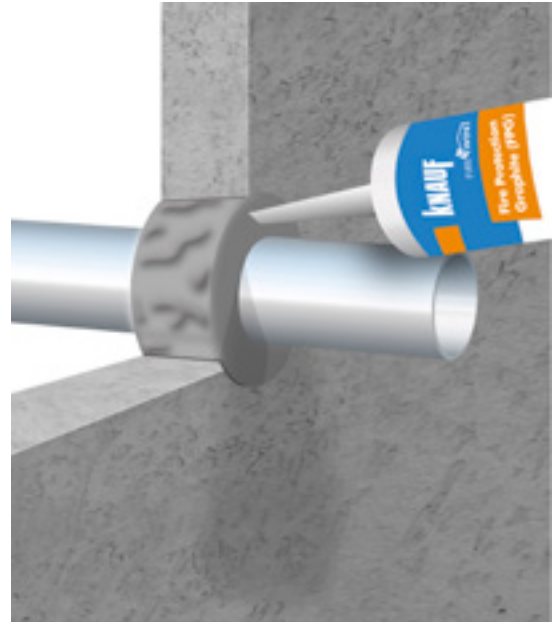
The wall must have a minimum thickness of 100 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m<sup>3</sup>.

**Rigid floors:**

The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m<sup>3</sup>.

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.

\*) Timber studs: no part of the penetration seal may be closer than 100mm to a stud, and minimum 100mm of insulation of class A1 or A2 according to EN 13501-1 must be provided within the cavity between the penetration seal and the stud.



5

**Installation Instructions**

1. Before installing Knauf Fire Protection Graphite ensure that the surface of all service penetrations and surrounding construction is free from all loose contaminants, dust and grease.
2. As Knauf Fire Protection Graphite is water based, in cases where corrosion protection is a problem; some metals may require a barrier between the sealant and the metal surface prior to this installation.
3. When installing any backing material, cut this slightly oversize and insert into the gap ensuring a tight friction fit.
4. Ensure correct depth is achieved.
4. Fill the gap or joint with Knauf Fire Protection Graphite to the required depth. Refer to the drawings on following pages for guidance on joint design/dimensions.
5. Apply the sealant generously avoiding air bubbles. Finish the bead with a moist spatula or pallet knife. Avoid excessive tooling/smoothing as this may make the seal surface wet and soft.
6. Knauf Fire Protection Graphite can be over-painted with most emulsion or alkyd (gloss) paints.

# PENETRATION SEALS | FLEXIBLE OR RIGID WALL CONSTRUCTIONS

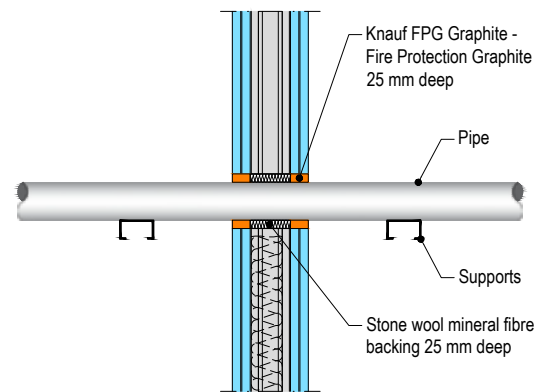
WITH WALL THICKNESS OF MINIMUM 100 MM

## > Penetration seals, in drywalls\* and concrete/masonry walls

Penetration Seal: Combustible pipes sealed with Knauf FPG - fire protection graphite, 25 mm deep to both sides of the wall backed with Stonewool (35kg/m<sup>3</sup> density), 25 mm deep. Minimum separation between penetration seals of 30 mm (a2).

Services	Seal & Backing width (a1)	Permitted configuration for seal separation	Classification
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1, PVC-C according to EN 1566-1			
Ø 40 mm, wall thickness 1.9-3.7 mm to Ø 110 mm, wall thickness 2.7-6.6 mm	10-30 mm	1 & 2	EI 120 U/C, EI 120 C/C
Ø 40, wall thickness 1.9 - 3.7 mm			
Ø 40 mm, wall thickness 1.9-3.7 mm to Ø 110 mm, wall thickness 2.7-6.6 mm			
Ø 40 mm, wall thickness 1.9-3.7 mm to Ø 110 mm, wall thickness 2.7-6.6 mm			
PE pipe according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Ø 40 mm, wall thickness 2.4-3.7 mm	10-30 mm	1 & 2	EI 120 U/C, EI 120 C/C
Ø 40, wall thickness 2.4-3.7 mm to Ø 110 mm, wall thickness 4.3-10 mm			
Ø 110 mm, wall thickness 4.3-10 mm		1	E 120 U/C, E 120 C/C EI 90 U/C, EI 90 C/C
PP pipe according to EN 1852-1: 2009			
Ø 110 mm, wall thickness 6.6 mm	30 mm	1 & 2	EI 120 U/C, EI 120 C/C
Ø 40 mm, wall thickness 1.8 - 5.5 mm	10 mm		EI 90 U/C

**\*Partition wall must incorporate a full fill core insulation of Stonewool (35kg/m<sup>3</sup> density)**

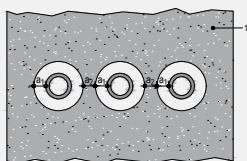


### > Penetration seals with no backing material, in drywalls and concrete/masonry walls

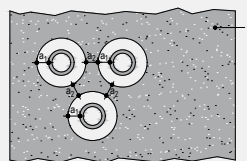
**Penetration Seal:** Combustible cable conduit or combustible pipes sealed with Knauf FPG - fire protection graphite, 25 mm deep to both sides of the wall without backing material. Minimum separation between penetration seals of 30 mm (a2).

Services	Seal width (a1)	Permitted configuration for seal separation	Classification
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1, PVC-C according to EN 1566-1 or PP pipe according to EN 1852-1: 2009			
Max. Ø 110 mm, wall thickness 1.9-6.6 mm for PVC pipes, fully or partially filled conduits with cables up to Ø 20mm	10-30 mm	1 & 2	EI 90 U/C
Max. Ø 110 mm, wall thickness 2.7-6.6 mm for PP pipes, fully or partially filled conduits with cables up to Ø 20mm			
PE pipe according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Max. Ø 110 mm, wall thickness 2.4-10 mm, fully or partially filled conduits with cables up to 20mm conduit	10-30 mm	1 & 2	EI 60 U/C
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1, PVC-C according to EN 1566-1			
Max. Ø 160 mm, wall thickness 3.2-9.5 mm	10-30 mm	1 & 2	EI 30 U/C
Max. Ø 160 mm, wall thickness 9.5 mm			EI 90 U/C
PP pipe according to EN 1852-1: 2009			
Max. 110 mm, wall thickness 2.7 mm	10-30 mm	1 & 2	EI 60 C/C
Max. 110 mm			EI 60 U/C

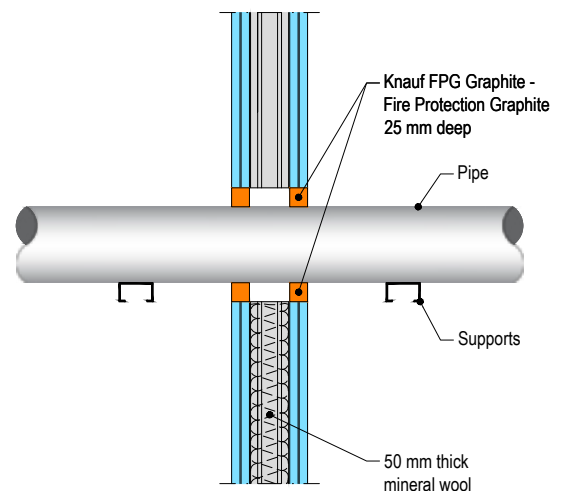
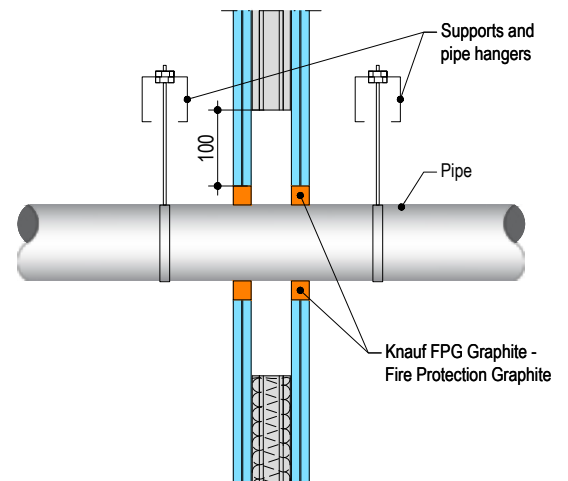
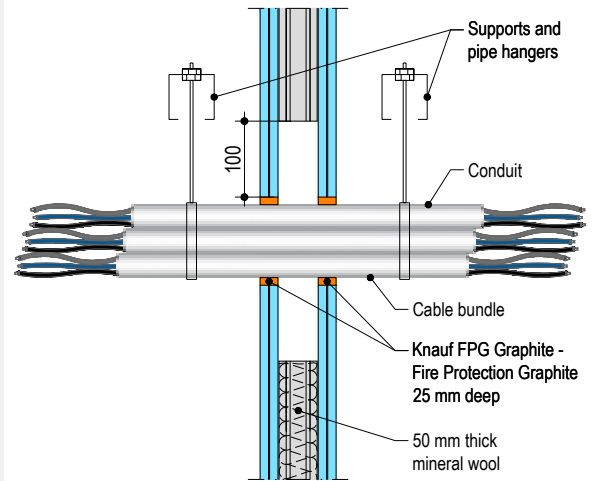
Configuration 1



Configuration 2



- Key
- 1 Supporting construction
  - a1 Pipe / top edge of seal separation
  - a2 Pipe / side edge of seal separation
  - a3 Pipe / pipe separation



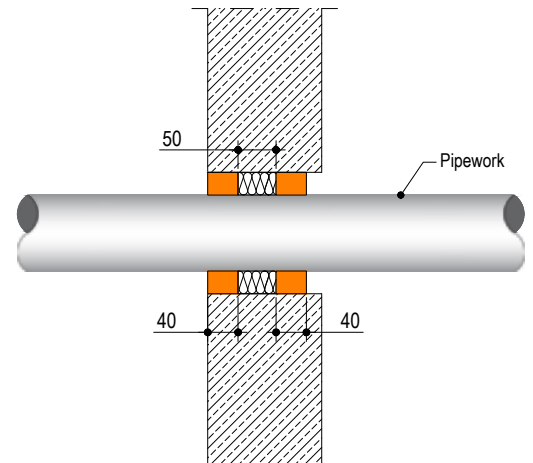
# PENETRATION SEALS | RIGID WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 150 MM

## > Penetration seals for pipes, in concrete/masonry walls

Penetration Seal: Combustible pipes sealed with 40 mm deep Knauf FPG - fire protection graphite, to both sides of the wall backed with Knauf FPC Panel 2S, 50 mm thick. Minimum separation between penetration seals of 30 mm.

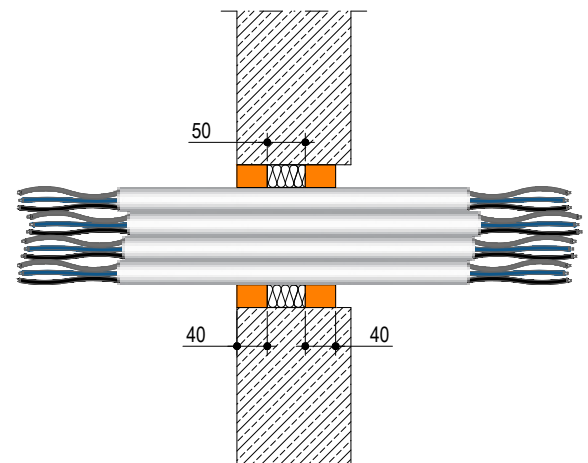
Services	Seal & Backing width	Classification
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1, PVC-C according to EN 1566-1		
Ø 48 mm, wall thickness 3.2 mm	17 mm	EI 240 U/C, EI 240 C/C
Ø 68 mm, wall thickness 2.0 mm	41 mm	
Ø 110 mm, wall thickness 3.5 mm	22 mm	
PE pipe according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Ø 32 mm, wall thickness 3.2 mm	25 mm	EI 240 U/C, EI 240 C/C
ABS pipe according to EN 1455-1		
Ø 36 mm, wall thickness 2.3 mm	23 mm	EI 240 U/C, EI 240 C/C
Ø 110 mm, wall thickness 3.5 mm	26 mm	



## > Penetration seals for cables, in concrete/masonry walls

Penetration Seal: Cables sealed with 40 mm deep Knauf FPG - fire protection graphite, to both sides of the wall backed with Knauf FPC Panel 2S, 50 mm thick. Min. separation between penetration seals of 30 mm.

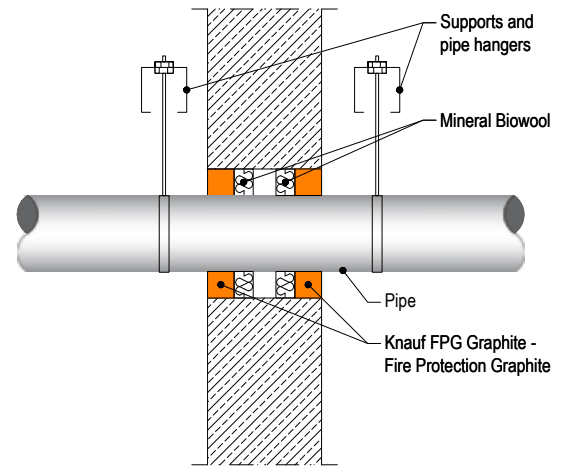
Services	Seal size (WxH or diameter)	Classification
150 x 25 mm perforated steel cable tray	200 x 100 mm	E 240, EI 180
Ø 20 mm, single copper core armoured cable		
Twin/earth cable	Ø 150 mm	E240, EI 60
Ø 100 mm bundle of up to 4 no. Ø 20mm, single copper core armoured cable and 12 no. twin/earth cables		



› **Penetration seals for pipes, in concrete/masonry walls**

**Penetration Seal:** Combustible pipes sealed with 35 mm deep Knauf FPG - fire protection graphite, to both sides of the wall backed with AES Fibre ≥ 128kg/m<sup>3</sup> material, 25 mm thick. Minimum separation between penetration seals of 30 mm.

Services	Seal & Backing width (a1)	Classification
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1, PVC-C according to EN 1566-1		
Max. Ø 160 mm, wall thickness 4.0-9.5 mm	10-30 mm	EI 90 U/C
Max. Ø 160 mm, wall thickness 9.5 mm		E 240, EI 180 U/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Max. Ø 160 mm, wall thickness 4.9-9.5mm	10-30 mm	EI 30 U/C
PP pipe according to EN 1852-1: 2009		
Max. Ø 160 mm, wall thickness 6.2-9.1 mm	10 mm	EI 30 U/C



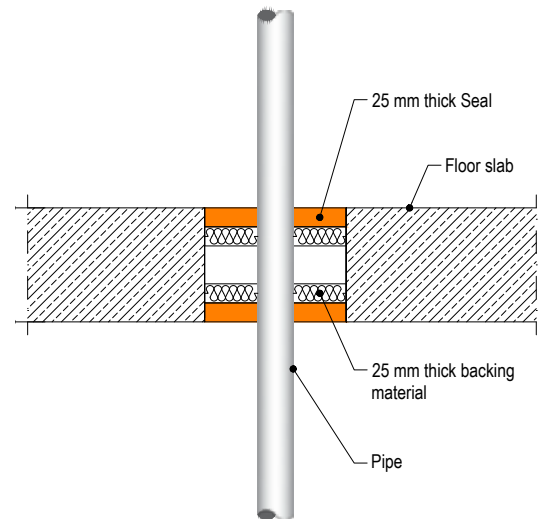
**PENETRATION SEALS | RIGID FLOOR CONSTRUCTIONS**

WITH FLOOR THICKNESS OF MINIMUM 150 MM

› **Penetration seals, surface mounted in concrete floors**

**Penetration Seal:** Combustible pipes sealed with Knauf FPG - fire protection graphite, to both sides of the floor backed with Stonewool (35kg/m<sup>3</sup> density), 25 mm deep. Minimum separation between penetration seals of 30 mm.

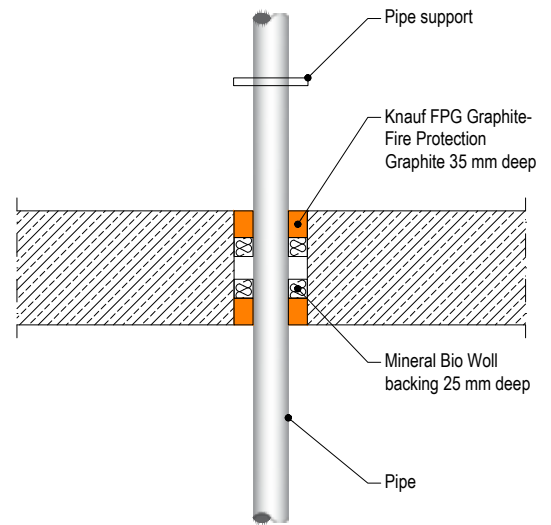
Services	Seal & Backing width	Permitted configuration for seal separation	Classification
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1, PVC-C according to EN 1566-1			
Ø 40 mm, wall thickness 1.8 – 3.7 mm	10-30 mm	1 & 2	EI 240 U/U, EI 240 C/U, EI 240 U/C, EI 240 C/C
Ø 40 mm, wall thickness 1.8 – 3.7 mm to Ø 110 mm, wall thickness 2.7-6.6 mm			EI 90 C/U, EI 90 C/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Ø 40 mm, wall thickness 2.4-3.7 mm	10-30 mm	1 & 2	EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Ø 40, wall thickness 2.4-3.7 mm to Ø 110 mm, wall thickness 4.3-10 mm			EI 240 U/C, EI 240 C/C
Ø 110 mm, wall thickness 4.3-10 mm			EI 60 U/C, EI 60 C/C
Ø 110 mm, wall thickness 10 mm			EI 90 U/C, EI 90 C/C
Ø 110 mm, wall thickness 10 mm			EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C



› **Penetration seals, surface mounted in concrete floors**

**Penetration Seal:** Combustible pipes sealed with Knauf FPG - fire protection graphite, 35 mm deep to both sides of the floor backed with Mineral Bio Wool (128kg/m<sup>3</sup> density), 25 mm deep. Min. separation between penetration seals of 30 mm.

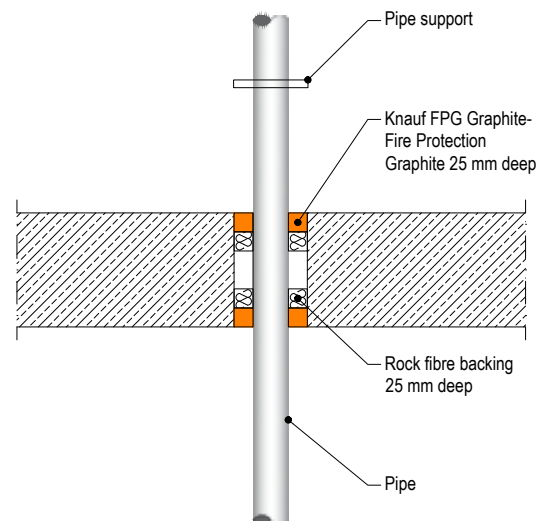
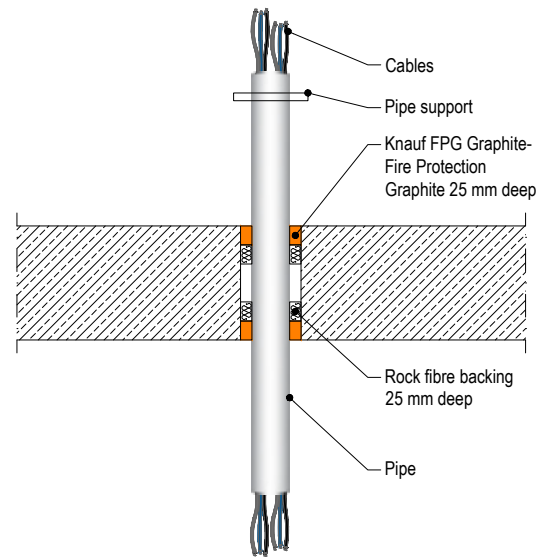
Services	Seal & Backing width (a1)	Classification
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1, PVC-C according to EN 1566-1		
Max. Ø 160 mm, wall thickness 4.0-9.5mm	10-30 mm	EI 60 U/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Max. Ø 160 mm, wall thickness 4.9-14.6 mm	10-30 mm	EI 30 U/C
Max. Ø 160 mm diameter, wall thickness 14.6 mm		EI 60 U/C



› **Penetration seals, surfaces mounted in concrete floors**

**Penetration Seal:** Combustible pipes sealed with Knauf FPG - fire protection graphite, 25 mm deep to both sides of the floor backed with Rock mineral wool (33kg/m<sup>3</sup> density), 25 mm deep. Minimum separation between penetration seals of 30 mm (a2).

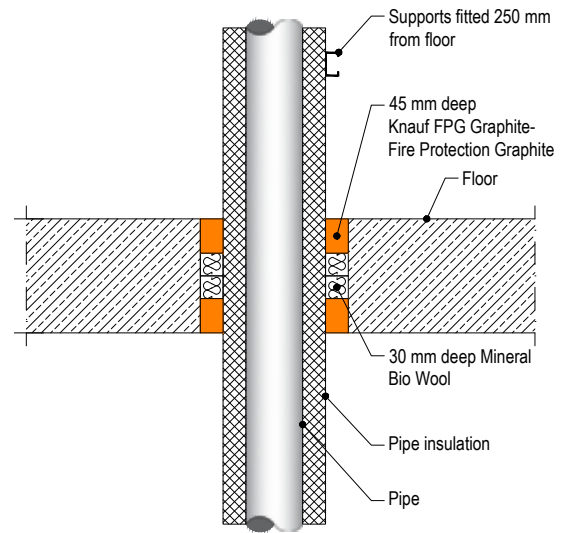
Services	Seal width (a1)	Permitted configuration for seal separation	Classification
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1, PVC-C according to EN 1566-1 or PP pipe according to EN 1852-1: 2009			
Max. Ø 110 mm, wall thickness 1.8-6.6 mm for PVC pipes, fully or partially filled conduits with cables up to Ø 20 mm	10-30 mm	1 & 2	EI 90 U/C
Max. Ø 110 mm, wall thickness 2.7 mm for PP pipes, fully or partially filled conduits with cables up to Ø 20 mm			EI 30 U/C
Max. Ø 110 mm, wall thickness 1.8-6.3 mm for PP pipes, fully or partially filled conduits with cables up to Ø 20 mm			EI 60 U/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Max. Ø 110 mm, wall thickness 2.4-10 mm, fully or partially filled conduits with cables up to Ø 20 mm	10-30 mm	1 & 2	EI 60 U/C
PP pipe according to EN 1852-1: 2009			
Max. Ø 40 mm, wall thickness 1.8 mm	10-30 mm	1 & 2	EI 120 C/C
Max. Ø 110 mm, wall thickness 1.8-6.3 mm			EI 90 U/C



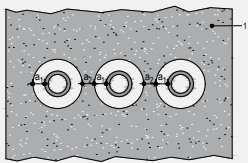
> **Penetration seals, surface mounted in concrete floors**

**Penetration Seal:** Metallic pipes insulated with Elastomeric insulation minimum class B-s3, d0, Continuous Sustained (CS), sealed with Knauf FPG - fire protection graphite, 45 mm deep to both sides of the floor and backed with AES Fibre  $\geq 128\text{kg/m}^3$ , 30 mm deep. Minimum separation between penetration seals of 30 mm (a2).

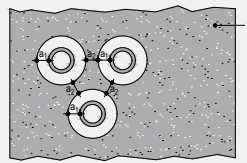
Services	Seal & backing material width (a1)	Permitted configuration for seal separation	Insulation CS	Classification
Mild or stainless steel pipe, with Elastomeric insulation minimum class B-s3, d0				
Max. $\varnothing$ 324 mm, wall thickness 1.0-14.2 mm	10-30 mm	1 & 2	25-50 mm Elastomeric insulation minimum class B-s3, d0	EI 60 C/U
Max. $\varnothing$ 324 mm, wall thickness 6.35-14.2 mm			50 mm Elastomeric insulation minimum class B-s3, d0	EI 120 C/U



Configuration 1



Configuration 2



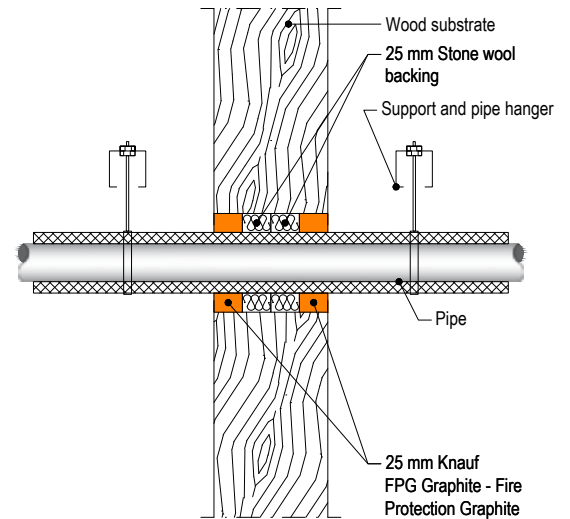
- Key
- 1 Supporting construction
  - a1 Pipe / top edge of seal separation
  - a2 Pipe / side edge of seal separation
  - a3 Pipe / pipe separation

# PENETRATION SEALS | TIMBER WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 100 MM

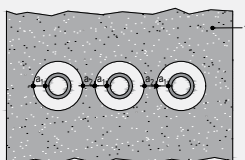
## > Pipe penetration seals, in timber walls

**Penetration Seal:** Metallic pipes insulated with Elastomeric insulation minimum class D-s3,d0, Continuous Sustained (CS), sealed with Knauf FPG Graphite - Fire Protection Graphite, minimum 25 mm deep to both sides of the wall and backed with Stonewool (minimum 33kg/m<sup>3</sup> density), minimum 25 mm deep. Minimum separation between penetration seals of 30 mm (a2).

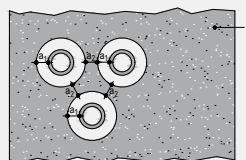


Services	Seal & backing material width (a1)	Permitted configuration for seal separation	Insulation CS	Classification
Copper, mild or stainless steel pipe				
Diameter 12 mm, wall thickness 0.7	10 mm	1	13 mm Elastomeric insulation minimum class D-s3, d0	EI 120 C/C
Diameter 12-54 mm, wall thickness*				E 120 C/C, EI 90 C/C
Diameter 12-54 mm, wall thickness*				E 120 C/C, EI 30 C/C
Mild or stainless steel pipe, with Elastomeric insulation minimum class D-s3, d0				
Diameter 12-114 mm, wall thickness*	10 mm	1	13 mm Elastomeric insulation minimum class D-s3, d0	EI 90 C/C
			14-25 mm Elastomeric insulation minimum class D-s3, d0	E 90 C/C, EI 45 C/C
Diameter 114 mm, wall thickness 1.5-14.2			13 mm Elastomeric insulation minimum class D-s3, d0	EI 90 C/U
			13-25 mm Elastomeric insulation minimum class D-s3, d0	E 90 C/U, EI 45 C/U
Alupex pipe, with Elastomeric insulation minimum class D-s3, d0				
Diameter 16 mm, wall thickness 2.25	10 mm	1	13 mm Elastomeric insulation minimum class D-s3, d0	EI 120 C/C
Diameter 16-75 mm, wall thickness*				E 120 C/C, EI 45 C/C
				14-24 mm Elastomeric insulation minimum class D-s3, d0
	25 mm Elastomeric insulation minimum class D-s3, d0	EI 90 C/C		

Configuration 1



Configuration 2



Key

1 Supporting construction

a1 Pipe / top edge of seal separation

a2 Pipe / side edge of seal separation

a3 Pipe / pipe separation



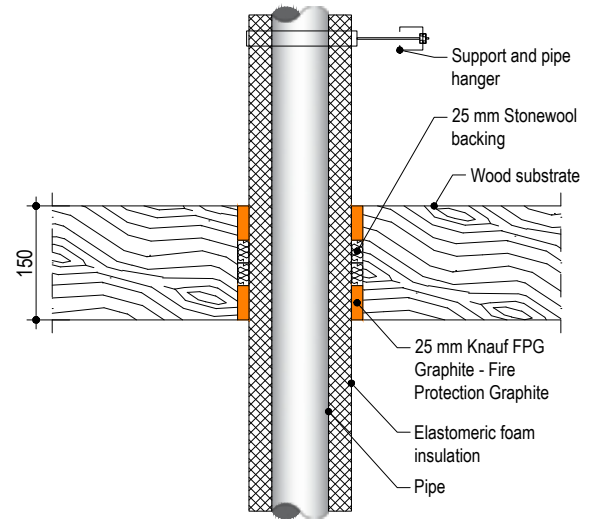
# PENETRATION SEALS | TIMBER FLOOR CONSTRUCTIONS

WITH FLOOR THICKNESS OF MINIMUM 150 MM

## > Pipe penetration seals, in timber floors

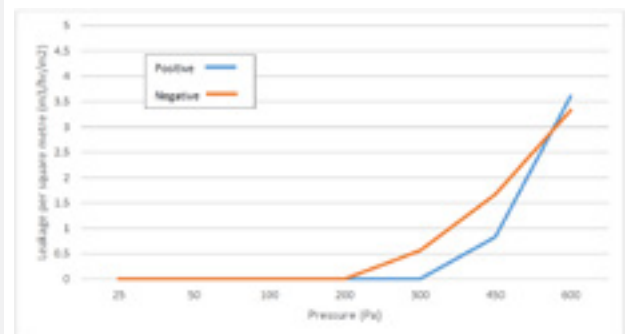
Penetration Seal: Metallic pipes insulated with Elastomeric insulation minimum class D-s3,d0, Continuous Sustained (CS), sealed with Knauf FPG Graphite - Fire Protection Graphite, minimum 25 mm deep to both sides of the floor and backed with Stonewool (minimum 33kg/m<sup>3</sup> density), minimum 25 mm deep. Minimum separation between penetration seals of 0 mm (a2).

Services	Seal & backing material width (a1)	Permitted configuration for seal separation	Insulation CS	Classification
Copper, mild or stainless steel pipe				
Diameter 12 mm, wall thickness 0.7	10 mm	1	9 mm Elastomeric insulation minimum class D-s3, d0	EI 120 C/C
Diameter 12-54 mm, wall thickness*				E 120 C/C, EI 45 C/C
Diameter 12-54 mm, wall thickness*			10-25 mm Elastomeric insulation minimum class D-s3, d0	E 120 C/C, EI 30 C/C
Mild or stainless steel pipe, with Elastomeric insulation minimum class D-s3, d0				
Diameter 12-114 mm, wall thickness*	10 mm	1	9-24 mm Elastomeric insulation minimum class D-s3, d0	E 120 C/C, EI 45 C/C
Diameter 114 mm, wall thickness 1.5-14.2			25 mm Elastomeric insulation minimum class D-s3, d0	E 120 C/C, EI 60 C/C
			9-25 mm Elastomeric insulation minimum class D-s3, d0	E 120 C/U, EI 45 C/U
			25 mm Elastomeric insulation minimum class D-s3, d0	E 120 C/U, EI 60 C/U
Alupex pipe, with Elastomeric insulation minimum class D-s3, d0				
Diameter 16 mm, wall thickness 2.25	10 mm	1	9 mm Elastomeric insulation minimum class D-s3, d0	EI 120 C/C
Diameter 16-75 mm, wall thickness*			9-24 mm Elastomeric insulation minimum class D-s3, d0	E 120 C/C, EI 60 C/C
			25 mm Elastomeric insulation minimum class D-s3, d0	E 120 C/C, EI 90 C/C



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Product tested	25mm deep x 30mm wide Knauf FPG Graphite – Fire Protection Graphite		
Summary of testing procedure			Result
	Pressure (Pa)	Leakage (m <sup>3</sup> /h)	Leakage (m <sup>3</sup> /m <sup>2</sup> /h)
Results under negative chamber pressure	25	0.00	0.00
	50	0.00	0.00
	100	0.00	0.00
	200	0.00	0.00
	300	0.02	0.56
	450	0.06	1.67
	600	0.12	3.33
Results under positive chamber pressure	25	0.00	0.00
	50	0.00	0.00
	100	0.00	0.00
	200	0.00	0.00
	300	0.00	0.00
	450	0.03	0.83
	600	0.13	3.61



# KNAUF FIRECOLLAR

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Knauf Firecollar are designed to maintain the fire resistance of fire rated walls and floors where these are breached by plastic pipes, and may be used in gypsum, masonry and concrete walls and floors.

Each pipe collar consists of a white coated circular steel shell that splits in two to fit around the service penetrations by means of a simple 'slide-lock' system. The steel shell contains a graphite based reactive material which reacts when exposed to heat closing the openings left by the softening plastic pipe in fire.

**Properties:**

- > Classified for fire sealing in all types of constructions
- > Excellent sound insulation
- > No emissions - environmentally and user friendly
- > Simple to install using widely available standard screws
- > Collars come in two different heights for different fire classifications to maximize cost efficiency
- > Very high fire classifications up to 240 minutes for both integrity and insulation
- > 30 years working life guarantee
- > ETA 21/0070
- > EAD 350141-00-1104

### Supporting constructions:

#### Flexible walls:

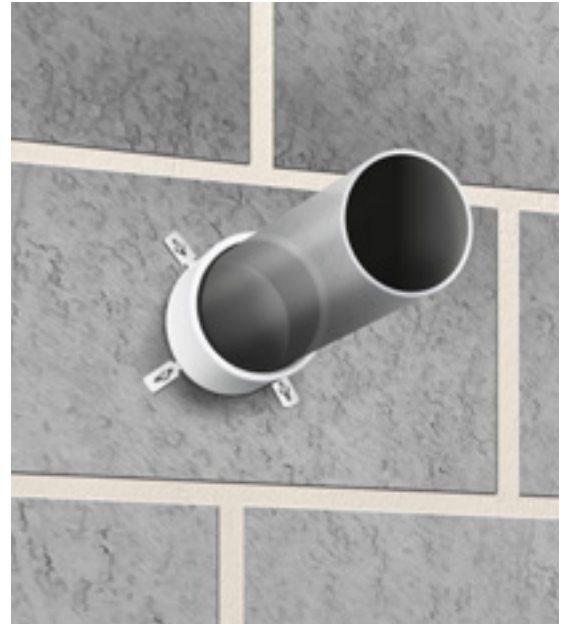
The wall must have a minimum thickness of 100 mm and comprise steel studs or timber studs\*) lined on both faces with minimum 2 layers of 12.5 mm thick boards.

#### Rigid walls:

The wall must have a minimum thickness of 100 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m<sup>3</sup>.

#### Rigid floors:

The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m<sup>3</sup>. The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.



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### Installation Instructions

1. For sealing plastic pipes in floors, a single firecollar is installed on the underside of the floor and for flexible and solid walls, a firecollar is installed on both sides of the wall.
2. Before fitting the firecollar ensure that any gaps between the pipe and the separating element are sealed as follows:
  - In gypsum walls, gaps between the pipe and the construction below 8 mm must have a bead of Knauf FPA Acrylic to cover the opening, and for gaps 8 mm or above, the seal must be plugged with 25 mm deep Knauf FPA Acrylic.
  - In masonry/concrete walls, gaps between the pipe and the construction below 8 mm must have a bead of Knauf FPA Acrylic to cover the opening, and for gaps 8 mm or above, the seal must be plugged with 20 mm deep Knauf FPA Acrylic on 20mm deep backing of stonewool.
  - In floors, gaps between the pipe and the construction below 10 mm must have 20 mm deep stonewool to plug the opening, and for gaps 10 mm or above, the seal must be plugged with 10 mm deep Knauf FPA Acrylic on 40 mm deep backing of stonewool.
3. Place a firecollar around the service penetration (pipe) and ensure that the fixing lugs are positioned tightly to the surface of the wall or the floor so that the anchors/fixings can be inserted fully.
4. Where the surface is uneven, apply a sealing bead of Knauf FPA Acrylic between the wall/floor and the firecollar.
5. Attach the firecollar with steel screws, anchors or fixings that are suitable for the substrate that the firecollar will be fitted to. For flexible walls use  $\geq \text{Ø}4$  mm gypsum-, wood screws or anchors with a length suitable for the number of boards that form the wall. For concrete/masonry walls and floors, use  $\geq \text{Ø}4 \times 50$  mm long masonry screws or expansion bolts.
6. On site where the penetration size is greater than the pipe diameter and/or the pipe is in an angle an oversized collar can be used. Knauf Firecollars are tested 'oversize', i.e. the internal diameter of the firecollar can be larger than the pipe.

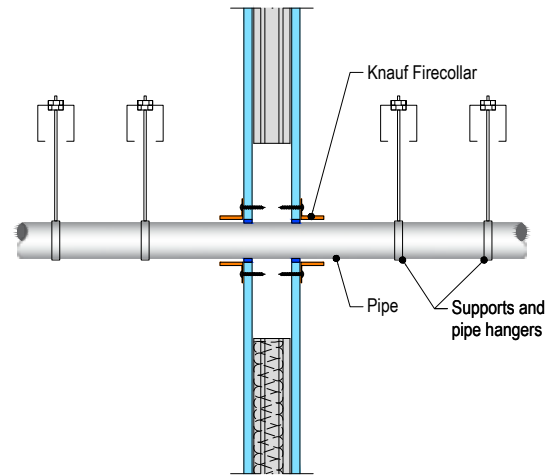
# PENETRATION SEALS | FLEXIBLE OR RIGID WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 75 MM

## > Penetration seals, in drywalls and concrete/masonry walls

Penetration Seal: Combustible pipes fitted with Knauf Firecollar, to both sides of the wall.

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Ø 32 mm, wall thickness 2.4-4.6 mm	30 x 3.0 mm	E 60 U/U, E 60 C/U, E 60 U/C, E 60 C/C, EI 30 U/U, EI 30 C/U, EI 30 U/C, EI 30 C/C
Ø 40 mm, wall thickness 2.4-4.6 mm		
Ø 50 mm, wall thickness 2.4-4.6 mm		
Ø 55 mm, wall thickness 2.4-4.8 mm	30 x 3.2 mm	E 60 U/C, E 60 C/C, EI 30 U/C, EI 30 C/C
Ø 63 mm, wall thickness 2.5-5.0 mm	30 x 3.6 mm	
Ø 75 mm, wall thickness 2.5-5.4 mm	30 x 4.2 mm	
Ø 82 mm, wall thickness 2.6-5.6 mm	30 x 4.6 mm	
Ø 90 mm, wall thickness 2.6-5.9 mm	30 x 5.0 mm	
Ø 110 mm, wall thickness 2.7-6.6 mm	30 x 6.0 mm	E 60 U/C, E 60 C/C, EI 45 U/C, EI 45 C/C
Ø 125 mm, wall thickness 2.9-7.4 mm	60 x 8.8 mm	
Ø 140 mm, wall thickness 3.0-8.3 mm	60 x 11.5 mm	
Ø 160 mm, wall thickness 3.2-9.5 mm	60 x 15.0 mm	
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Ø 32 mm, wall thickness 3.0-4.6 mm	30 x 3.0 mm	E 60 U/C, E 60 C/C, EI 30 U/C, EI 30 C/C
Ø 40 mm, wall thickness 3.0-4.6 mm		
Ø 50 mm, wall thickness 3.0-4.6 mm		
Ø 55 mm, wall thickness 3.0-5.0 mm	30 x 3.2 mm	
Ø 63 mm, wall thickness 3.1-5.8 mm	30 x 3.6 mm	
Ø 75 mm, wall thickness 3.2-6.8 mm	30 x 4.2 mm	
Ø 82 mm, wall thickness 3.2-7.5 mm	30 x 4.6 mm	
Ø 90 mm, wall thickness 3.3-8.2 mm	30 x 5.0 mm	EI 60 U/C, EI 60 C/C
Ø 110 mm, wall thickness 3.4-10.0 mm	30 x 6.0 mm	
Ø 125 mm, wall thickness 4.2-9.8 mm	60 x 8.8 mm	
Ø 140 mm, wall thickness 5.1-9.6 mm	60 x 11.5 mm	E 60 U/C, E 60 C/C, EI 45 U/C, EI 45 C/C
Ø 160 mm, wall thickness 6.2-9.5 mm	60 x 15.0 mm	
PP pipe according to EN 1451-1		
Ø 32 mm, wall thickness 2.0-4.6 mm	30 x 3.0 mm	E 60 U/U, E 60 C/U, E 60 U/C, E 60 C/C, EI 30 U/U, EI 30 C/U, EI 30 U/C, EI 30 C/C
Ø 40 mm, wall thickness 2.0-4.6 mm		
Ø 50 mm, wall thickness 2.0-4.6 mm		
Ø 55 mm, wall thickness 2.1-5.1 mm	30 x 3.2 mm	E 60 U/C, E 60 C/C, EI 30 U/C, EI 30 C/C
Ø 63 mm, wall thickness 2.3-5.8 mm	30 x 3.6 mm	
Ø 75 mm, wall thickness 2.6-6.9 mm	30 x 4.2 mm	
Ø 82 mm, wall thickness 2.7-7.5 mm	30 x 4.6 mm	
Ø 90 mm, wall thickness 2.9-8.2 mm	30 x 5.0 mm	



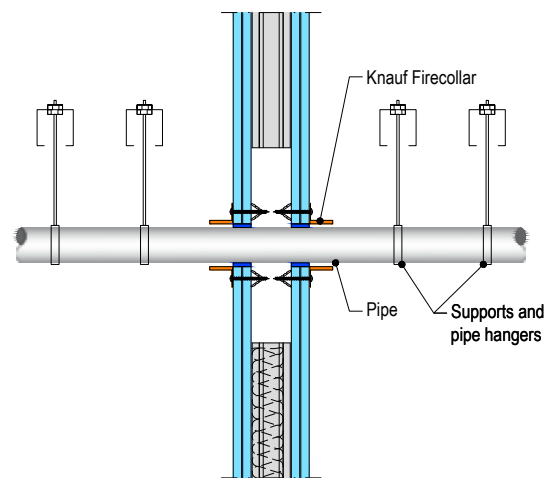
Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Ø 110 mm, wall thickness 3.4-10.0 mm	30 x 6.0 mm	E 60 U/C, E 60 C/C EI 45 U/C, EI 45 C/C
Ø 125 mm, wall thickness 3.9-11.4 mm	60 x 8.8 mm	
Ø 140 mm, wall thickness 4.3-12.8 mm	60 x 11.5 mm	
Ø 160 mm, wall thickness 4.9-14.6 mm	60 x 15.0 mm	EI 60 U/C, EI 60 C/C

## WITH WALL THICKNESS OF MINIMUM 100 MM

### › Penetration seals, in drywalls and concrete/masonry walls

Penetration Seal: Combustible pipes fitted with Knauf Firecollar, to both sides of the wall.

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Ø 32 mm, wall thickness 1.2-3.7 mm	30 x 3.0 mm	E 90 U/C, E 90 C/C EI 60 U/C, EI 60 C/C
Ø 40 mm, wall thickness 1.2-3.7 mm		
Ø 50 mm, wall thickness 1.2-4.6 mm		
Ø 55 mm, wall thickness 1.3-4.7 mm	30 x 3.2 mm	EI 60 U/C, EI 60 C/C
Ø 63 mm, wall thickness 1.5-5.0 mm	30 x 3.6 mm	
Ø 75 mm, wall thickness 1.8-5.4 mm	30 x 4.2 mm	
Ø 82 mm, wall thickness 2.0-5.6 mm	30 x 4.6 mm	
Ø 90 mm, wall thickness 2.2-5.9 mm	30 x 5.0 mm	
Ø 110 mm, wall thickness 2.7-6.6 mm	30 x 6.0 mm	
Ø 110 mm, wall thickness 2.7-6.6 mm	50 x 6.0 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Ø 125 mm, wall thickness 2.9-7.4 mm	50 x 8.8 mm	
Ø 140 mm, wall thickness 3.0-8.3 mm	50 x 11.5 mm	
Ø 160 mm, wall thickness 3.2-9.5 mm	50 x 15.0 mm	
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Ø 32 mm, wall thickness 2.4-4.6 mm	30 x 3.0 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Ø 40 mm, wall thickness 2.4-4.6 mm		
Ø 50 mm, wall thickness 2.4-4.6 mm		
Ø 55 mm, wall thickness 2.5-4.7 mm	50 x 3.2 mm	
Ø 63 mm, wall thickness 2.5-5.0 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 2.6-5.4 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 2.6-5.6 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 2.6-5.9 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 2.7-6.6 mm	50 x 6.0 mm	
Ø 110 mm, wall thickness 2.7-6.6 mm	60 x 6.0 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Ø 125 mm, wall thickness 2.9-7.4 mm	60 x 9.0 mm	
Ø 140 mm, wall thickness 3.0-8.3 mm	60 x 11.5 mm	EI 60 U/U, EI 60 C/U
Ø 160 mm, wall thickness 3.2-9.5 mm	60 x 15.0 mm	EI 120 U/C, EI 120 C/C
Ø 200 mm, wall thickness 4.9-11.9 mm	60 x 18 mm	
Ø 315 mm, wall thickness 7.7-12.1 mm	75 x 30 mm	EI 90 C/C
Ø 400 mm, wall thickness 9.8-11.9 mm	100 x 40 mm	E 120 C/C EI 90 C/C



Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Ø 32 mm, wall thickness 3.0-4.6 mm	30 x 3.0 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 45 U/U, EI 45 C/U, EI 45 U/C, EI 45 C/C
Ø 40 mm, wall thickness 3.0-4.6 mm		
Ø 50 mm, wall thickness 3.0-4.6 mm		
Ø 32 mm, wall thickness 3.0-5.6 mm		E 90 U/C, E 90 C/C EI 60 U/C, EI 60 C/C
Ø 40 mm, wall thickness 3.0-5.6 mm		
Ø 50 mm, wall thickness 3.0-5.6 mm		
Ø 55 mm, wall thickness 3.0-6.0 mm	30 x 3.2 mm	EI 60 U/C, EI 60 C/C
Ø 63 mm, wall thickness 3.1-6.6 mm	30 x 3.6 mm	
Ø 75 mm, wall thickness 3.2-7.5 mm	30 x 4.2 mm	
Ø 82 mm, wall thickness 3.2-8.0 mm	30 x 4.6 mm	
Ø 90 mm, wall thickness 3.3-8.6 mm	30 x 5.0 mm	
Ø 110 mm, wall thickness 3.4-10.0 mm	30 x 6.0 mm	
Ø 110 mm, wall thickness 3.4-10.0 mm	50 x 6.0 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Ø 125 mm, wall thickness 4.2-9.8 mm	50 x 9.0 mm	EI 60 U/C, EI 60 C/C
Ø 140 mm, wall thickness 5.1-9.6 mm	50 x 11.5 mm	
Ø 160 mm, wall thickness 6.2-9.5 mm	50 x 15.0 mm	
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Ø 32 mm, wall thickness 3.0-4.6 mm	50 x 3.0 mm	E 120 U/U, EI 90 U/U
Ø 40 mm, wall thickness 3.0-4.6 mm		
Ø 50 mm, wall thickness 3.0-4.6 mm		
Ø 55 mm, wall thickness 3.1-5.0 mm	50 x 3.2 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Ø 63 mm, wall thickness 3.1-5.7 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 3.2-6.8 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 3.2-7.4 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 3.3-8.1 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 3.4-10.0 mm	50 x 6.0 mm	
Ø 110 mm, wall thickness 3.4-10.0 mm	60 x 6.0 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Ø 125 mm, wall thickness 4.0-11.5 mm	60 x 8.8 mm	
Ø 140 mm, wall thickness 4.4-12.8 mm	60 x 11.5 mm	
Ø 160 mm, wall thickness 4.9-14.6 mm	60 x 15.0 mm	EI 90 U/U, EI 90 C/U, EI 90 U/C, EI 90 C/C
Ø 200 mm, wall thickness 6.2-18.2 mm	60 x 18.0 mm	E 120 U/C, E 120 C/C EI 90 U/C, EI 90 C/C
Ø 400 mm, wall thickness 36.3 mm	100 x 40.0 mm	EI 90 C/C
PP pipe according to EN 1451-1		
Ø 32 mm, wall thickness 3.0-5.6 mm	30 x 3.0 mm	E 90 U/C, E 90 C/C EI 60 U/C, EI 60 C/C
Ø 40 mm, wall thickness 3.0-5.6 mm		
Ø 50 mm, wall thickness 3.0-5.6 mm		
Ø 32 mm, wall thickness 1.8-4.6 mm	30 x 3.0 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Ø 40 mm, wall thickness 1.8-4.6 mm		
Ø 50 mm, wall thickness 1.8-4.6 mm		

Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Ø 50 mm, wall thickness 1.8-5.6 mm	30 x 3.0 mm	E 90 U/C, E 90 C/C EI 60 U/C, EI 60 C/C
Ø 55 mm, wall thickness 2.0-5.7 mm	30 x 3.2 mm	
Ø 63 mm, wall thickness 2.2-5.8 mm	30 x 3.6 mm	
Ø 75 mm, wall thickness 2.5-5.9 mm	30 x 4.2 mm	
Ø 82 mm, wall thickness 2.7-6.0 mm	30 x 4.6 mm	
Ø 90 mm, wall thickness 2.9-6.1 mm	30 x 5.0 mm	
Ø 110 mm, wall thickness 3.4-6.3 mm	30 x 6.0 mm	
PP pipe according to EN 1451-1		
Ø 50 mm, wall thickness 1.8-5.6 mm	50 x 3.0 mm	E 90 U/C, E 90 C/C EI 60 U/C, EI 60 C/C
Ø 55 mm, wall thickness 2.0-6.0 mm	50 x 3.2 mm	EI 60 U/C, EI 60 C/C
Ø 63 mm, wall thickness 2.2-6.6 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 2.5-7.6 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 2.7-8.2 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 2.9-8.9 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 3.4-10.5 mm	50 x 6.0 mm	
Ø 125 mm, wall thickness 3.8-11.7 mm	50 x 8.8 mm	
Ø 140 mm, wall thickness 4.2-12.9 mm	50 x 11.5 mm	
Ø 160 mm, wall thickness 4.9-14.6 mm	50 x 15.0 mm	
PP pipe according to EN 1451-1		
Ø 50 mm, wall thickness 1.8-4.6 mm	50 x 3.0 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Ø 55 mm, wall thickness 2.0-4.7 mm	50 x 3.2 mm	
Ø 63 mm, wall thickness 2.2-5.0 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 2.5-5.4 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 2.7-5.6 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 2.9-5.9 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 3.4-6.6 mm	50 x 6.0 mm	
Ø 110 mm, wall thickness 3.4-6.6 mm	60 x 6.0 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Ø 125 mm, wall thickness 3.9-9.0 mm	60 x 9.0 mm	EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Ø 140 mm, wall thickness 4.4-11.4 mm	60 x 11.5 mm	
Ø 160 mm, wall thickness 4.9-14.6 mm	60 x 15.0 mm	
Ø 200 mm, wall thickness 4.9-18.2 mm	60 x 18.0 mm	E 120 U/C, E 120 C/C EI 90 U/C, EI 90 C/C
Ø 400 mm, wall thickness 22.7 mm	100 x 40.0 mm	EI 60 C/C
Wavin SiTech + PP-M B according to EN 13501-1		
Ø 32-40 mm / wall thickness 1.8 mm	50 x 3.0 mm	EI 120 U/U
Ø 50 mm / wall thickness 1.8 mm	50 x 3.2 mm	
Ø 75 mm / wall thickness 1.8-2.5 mm	50 x 4.2 mm	E 120 U/U, EI 60 U/U
Ø 90 mm / wall thickness 1.8-2.9 mm	50 x 5.0 mm	
Ø 110 mm / wall thickness 1.8-3.4 mm	50 x 6.0 mm	
Aquatherm Green SDR9 MF PP-RP according to ISO 21003		
Ø 32 mm / wall thickness 3.0-5.6 mm	30 x 3.0 mm	EI 120 C/C
Ø 40 mm / wall thickness 3.0-5.6 mm	50 x 3.0 mm	
Ø 50 mm / wall thickness 3.0-5.6 mm	50 x 3.2 mm	

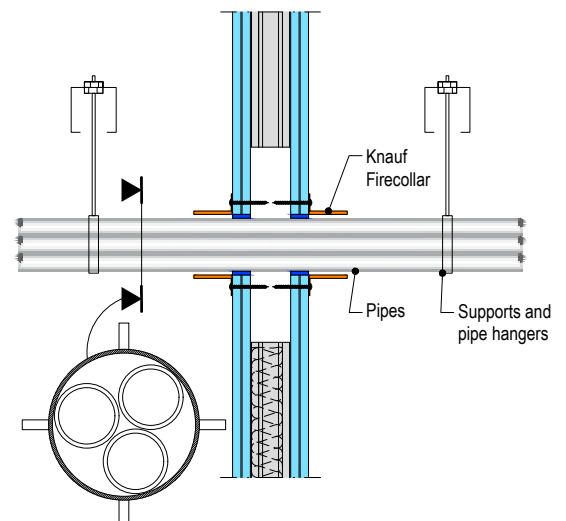
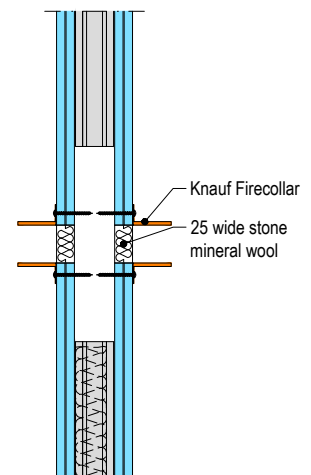
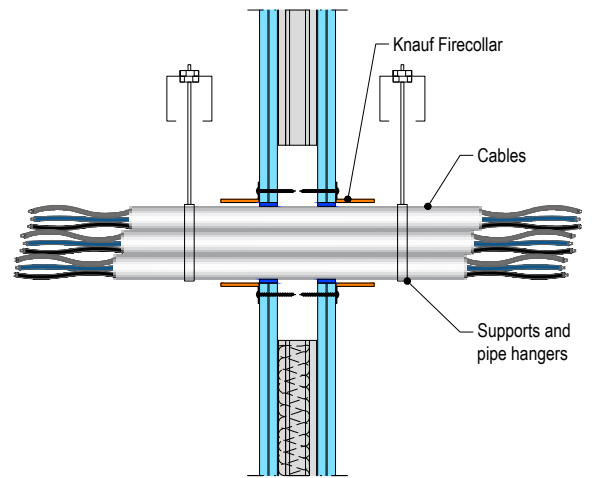
Services	Collar Inlay	Classification
Aquatherm Green SDR9 MF PP-RP according to ISO 21003		
Ø 63 mm / wall thickness 3.6-7.0 mm	50 x 3.6 mm	E 120 C/C, EI 60 C/C
Ø 75 mm / wall thickness 4.1-8.4 mm	50 x 4.2 mm	
Ø 90 mm / wall thickness 4.7-10.1 mm	50 x 5.0 mm	
Ø 110 mm / wall thickness 5.6-12.3 mm	50 x 6.0 mm	
Geberit Silent PP according to DIN 4102		
Ø 32-50 mm / wall thickness 1.8 mm	50 x 3.0 mm	EI 120 U/U
Ø 75 mm / wall thickness 1.8-2.5 mm	50 x 4.2 mm	E 120 U/U, EI 60 U/U
Ø 90 mm / wall thickness 1.8-2.9 mm	50 x 5.0 mm	
Ø 110 mm / wall thickness 1.8-3.4 mm	50 x 6.0 mm	
Polo-Kal NG Poloplast PP-MV according to DIN 4102		
Ø 32-40 mm / wall thickness 1.8-2.0 mm	50 x 3.0 mm	EI 120 U/U
Ø 50 mm / wall thickness 1.8-2.0 mm	50 x 3.2 mm	
Ø 75 mm / wall thickness 1.9-2.6 mm	50 x 4.2 mm	E 120 U/U, EI 90 U/U
Ø 90 mm / wall thickness 1.9-2.9 mm	50 x 5.0 mm	
Ø 110 mm / wall thickness 2.0-3.4 mm	50 x 6.0 mm	
Ø 125 mm, wall thickness 3.9 mm	60 x 9.0 mm	E 120 U/U, EI 120 U/C
Ø 160 mm, wall thickness 4.9 mm	60 x 15 mm	EI 120 U/U
Rehau Raupiano Plus PP-DD according to DIN 4102		
Ø 40 mm / wall thickness 1.8 mm	50 x 3.0 mm	E 120 U/U, EI 90 U/U
Ø 50 mm / wall thickness 1.8 mm	50 x 3.2 mm	
Ø 75 mm / wall thickness 1.8-2.2 mm	50 x 4.2 mm	E 120 U/U, EI 60 U/U
Ø 90 mm / wall thickness 1.8-2.4 mm	50 x 5.0 mm	
Ø 110 mm / wall thickness 1.8-2.7 mm	50 x 6.0 mm	
Ø 125 mm, wall thickness 3.1 mm	60 x 9.0 mm	EI 120 U/U
Ø 160 mm, wall thickness 3.9 mm	60 x 15.0 mm	
BluePower Multilayer pipe – TR02-PP according to EN 1451-1		
Ø 32-40 mm / wall thickness 1.8 mm	50 x 3.0 mm	E 120 U/U, EI 90 U/U
Ø 50 mm / wall thickness 1.8 mm	50 x 3.2 mm	
Ø 75 mm / wall thickness 1.8-2.5 mm	50 x 4.2 mm	E 120 C/U, EI 60 C/U
Ø 90 mm / wall thickness 1.8-2.9 mm	50 x 5.0 mm	
Ø 110 mm / wall thickness 1.8-3.4 mm	50 x 6.0 mm	
Ø 125 mm / wall thickness 2.3-3.8 mm	60 x 9.0 mm	EI 60 C/U
Ø 160 mm / wall thickness 3.4-4.9 mm	60 x 15.0 mm	EI 90 C/U
Uponor Decibel according to EN 1451-1		
Ø 50 mm / 2.0 mm wall thickness	50 x 3.0 mm	E 120 U/U, EI 60 U/U
Ø 75 mm / 2.6 mm wall thickness	50 x 4.2 mm	
Ø 110 mm / 3.8 mm wall thickness	50 x 6.0 mm	



## > Penetration seals, in drywalls and concrete/masonry walls

Penetration Seal: Cables and pipes fitted with Knauf Firecollar, to both sides of the wall.

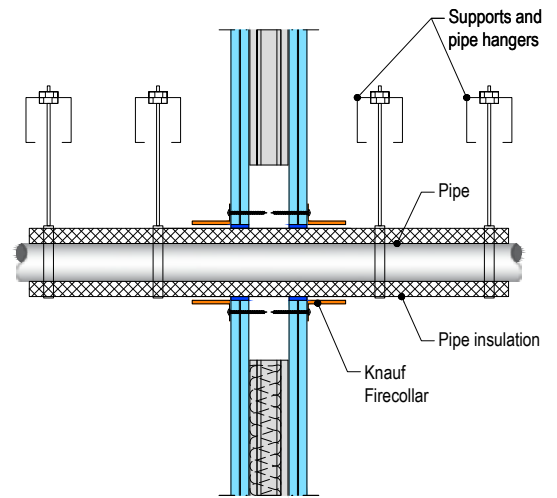
Services	Collar	Collar Inlay	Classification
Cables up to 21 mm Ø, in partial or fully filled tied bundles up to 110 mm Ø (Collar internal diameter to match cable bundle size)	Up to 110 mm collar at 30 mm height	Between 3.0 and 6.0 mm	E 120, EI 60
Cables up to 80 mm Ø, in partial or fully filled tied bundles up to 160 mm Ø (Collar internal diameter to match cable bundle size)	Up to 110 mm collar at 50 mm height, 125-160 mm at 60 mm height	Between 3.0 and 15.0 mm	E 120, EI 60
PVC pipes up to 40 mm Ø, wall thickness 1.0-3.7 mm with or without cables up to 21 mm Ø, in partial or fully filled pipe bundles up to 160 mm Ø	Up to 110 mm collar at 50 mm height, 125-160 mm at 60 mm height	Between 3.0 and 15.0 mm	EI 90 U/C
PE pipes up to 40 mm Ø, wall thickness 2.0-3.7 mm with or without cables up to 21 mm Ø, in partial or fully filled pipe bundles up to 160 mm Ø			
PP pipes up to 40 mm Ø, wall thickness 1.8-3.7 mm with or without cables up to 21 mm Ø, in partial or fully filled pipe bundles up to 160 mm Ø			
None (blank). Hole behind collar to be fitted with minimum 25 mm thick stone mineral wool insulation at minimum 33 kg/m <sup>3</sup>	Up to 110 mm collar at 30 mm height	Between 3.0 and 6.0 mm	E 120, EI 60
None (blank). Hole behind collar to be fitted with minimum 25 mm thick stone mineral wool insulation at minimum 33 kg/m <sup>3</sup>	160 mm collar at 60 mm height	15.0 mm	EI 120
Upon Aqua PEX pipe in pipe system			
Diameter up to 25 mm pipes, wall thickness 0.6 mm, in bundles up to 55 mm	55 mm collar at 30 mm height	3.2 mm	E 120, EI 90 C/C



› **Penetration seals, in drywalls and concrete/masonry walls**

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes fitted with Knauf Firecollar, to both sides of the wall.

Services	Insulation	Collar	Classification
<b>Copper pipe or mild steel</b>			
Maximum Ø 54 mm, wall thickness 0.7-14.2 mm	9-50 mm thick Elastomeric insulation minimum class B-s3, d0	Up to 110 mm collar at 50 mm height, 125-160 mm at 60 mm height	E 90 C/C, EI 60 C/C
Ø 54 mm, wall thickness 1.2 mm	25 mm thick Phenolic Foam insulation	Ø 110 x 50 x 6.0 mm	E 120 C/C, EI 60 C/C
Ø 54 mm, wall thickness 1.2 mm	20 mm thick PE foam insulation	Ø 110 x 50 x 6.0 mm	E 120 C/C, EI 90 C/C
<b>Alupex pipe</b>			
Maximum Ø 75 mm, wall thickness 2.25-4.6 mm	9-50 mm thick Elastomeric insulation minimum class B-s3, d0	Up to 110 mm collar at 50 mm height, 125-200 mm at 60 mm height	E 90 C/C, EI 60 C/C
<b>PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1</b>			
Maximum Ø 160 mm, wall thickness 3.0-9.5 mm*	9-50 mm thick Elastomeric insulation minimum class D-s3, d0	Up to 110 mm collar at 50 mm height, 125-200 mm at 60 mm height, 250-315 mm at 75 mm height	EI 90 C/C
Ø 160 mm, wall thickness 4.9-9.5 mm			EI 120 C/C
<b>PP pipe according to EN 1451-1</b>			
Maximum Ø 160 mm, wall thickness 1.8-14.6 mm	9-50 mm thick Elastomeric insulation minimum class D-s3, d0	Up to 110 mm collar at 50 mm height, 125-200 mm at 60 mm height, 250-315 mm at 75 mm height	EI 90 C/C
Ø 160 mm, wall thickness 4.9-14.6 mm			EI 120 C/C

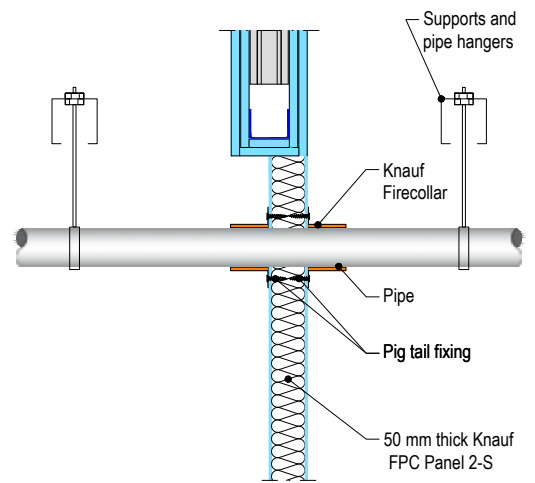


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## > Penetration seals, in drywalls and concrete/masonry walls

**Penetration Seal:** Combustible pipes fitted with Knauf Firecollar, to both sides of the FR Board. Minimum separation between penetration seals and seal edges of 50 mm (Configuration 1 & 2). Maximum seal size 1200 mm wide x 600 mm high.

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Ø 32-50 mm / wall thickness 1.9-3.7 mm	50 x 3.0 mm	E 120 U/C, EI 60 U/C
Ø 55 mm / wall thickness 1.9-4.0 mm	50 x 3.2 mm	E 90 U/C, EI 60 U/C
Ø 63 mm / wall thickness 2.0-4.4 mm	50 x 3.6 mm	
Ø 75 mm / wall thickness 2.2-4.9 mm	50 x 4.2 mm	
Ø 82 mm / wall thickness 2.3-5.3 mm	50 x 4.6 mm	
Ø 90 mm / wall thickness 2.4-5.7 mm	50 x 5.0 mm	
Ø 110 mm / wall thickness 2.7-6.6 mm	50 x 6.0 mm	
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Ø 32-50 mm / wall thickness 3.0-4.6 mm	50 x 3.0 mm	E 120 U/C, EI 60 U/C
Ø 50 mm, wall thickness 3.0-5.2 mm	50 x 3.2 mm	E 90 C/C, EI 60 C/C
Ø 63 mm, wall thickness 3.0-5.9 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 3.1-6.9 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 3.1-7.6 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 3.2-8.3 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 3.4-10.0 mm	50 x 6.0 mm	



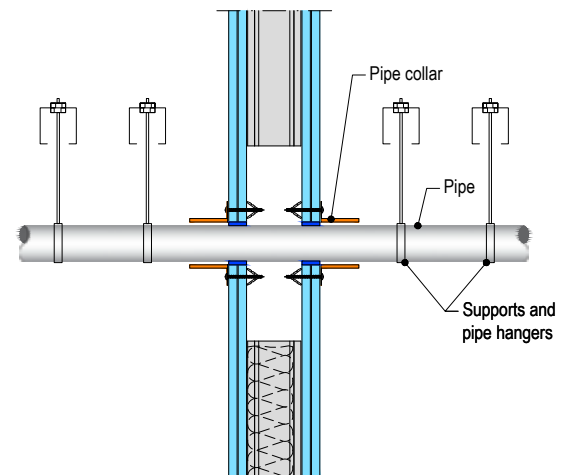
# PENETRATION SEALS | FLEXIBLE OR RIGID WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 120 MM

## > Penetration seals, in drywalls and concrete/masonry walls

Penetration Seal: Combustible pipes fitted with Knauf Firecollar, to both sides of the wall.

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Ø 32-50 mm, wall thickness 2.4-3.7 mm	50 x 3.0 mm	EI 120 C/C
Ø 55 mm, wall thickness 2.4-3.9 mm	50 x 3.2 mm	
Ø 63 mm, wall thickness 2.5-4.3 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 2.5-4.9 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 2.6-5.2 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 2.6-5.6 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 2.7-6.6 mm	50 x 6.0 mm	
Ø 110 mm, wall thickness 2.7-6.6 mm	50 x 6.0 mm	
Ø 125 mm, wall thickness 3.1-7.5 mm	60 x 8.8 mm	
Ø 140 mm, wall thickness 3.5-8.4 mm	60 x 11.5 mm	
Ø 160 mm, wall thickness 4.0-9.5 mm	60 x 15.0 mm	
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Ø 32-50 mm, wall thickness 3.0-4.6 mm	50 x 3.0 mm	EI 120 C/C
Ø 55 mm, wall thickness 3.1-5.0 mm	50 x 3.2 mm	E 120 C/C, EI 90 C/C
Ø 63 mm, wall thickness 3.1-5.7 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 3.2-6.8 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 3.2-7.5 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 3.3-8.2 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 3.4-10.0 mm	50 x 6.0 mm	EI 120 C/C
Ø 110 mm, wall thickness 3.4-10.0 mm	50 x 6.0 mm	E 120 C/C, EI 90 C/C
Ø 125 mm, wall thickness 3.9-9.8 mm	60 x 8.8 mm	EI 90 C/C
Ø 140 mm, wall thickness 4.4-9.7 mm	60 x 11.5 mm	
Ø 160 mm, wall thickness 4.9-9.5 mm	60 x 15.0 mm	EI 120 C/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Ø 110 mm, wall thickness 3.4 mm	50 x 6.0 mm	EI 120 C/C
Ø 125 mm, wall thickness 3.9-5.3 mm	60 x 8.8 mm	
Ø 140 mm, wall thickness 4.3-7.1 mm	60 x 11.5 mm	
Ø 160 mm, wall thickness 4.9-9.5 mm	60 x 15.0 mm	



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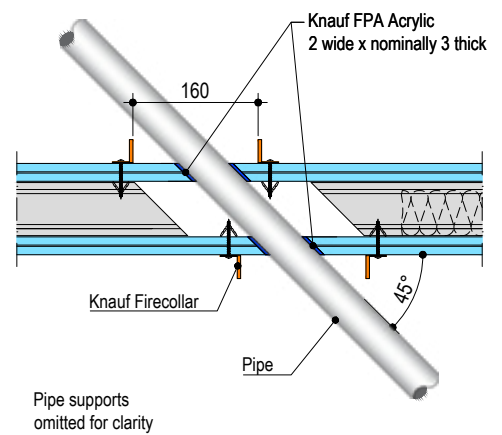
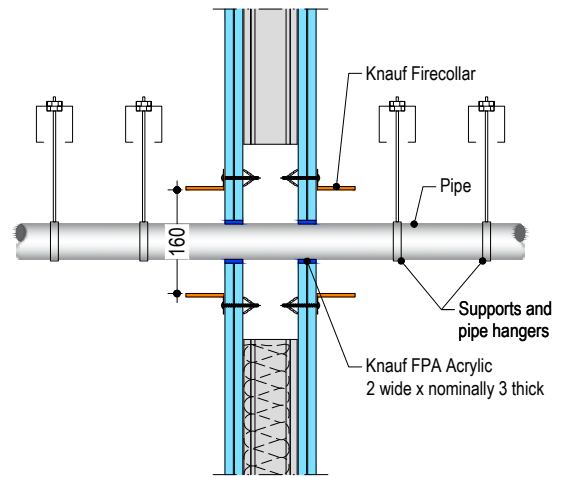
Services	Collar Inlay	Classification
PP pipe according to DIN 8077/8078		
Ø 32-50 mm, wall thickness 2.9-4.6 mm	50 x 3.0 mm	EI 120 C/C  E 120 C/C, EI 90 C/C
Ø 55 mm, wall thickness 2.9-5.0 mm	50 x 3.2 mm	
Ø 63 mm, wall thickness 2.9-5.7 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 2.8-6.8 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 2.8-7.5 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 2.8-8.2 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 2.7-10 mm	50 x 6.0 mm	
Ø 125 mm, wall thickness 3.3-11.3 mm	60 x 8.8 mm	
Ø 140 mm, wall thickness 4.0-12.8 mm	60 x 11.5 mm	EI 120 C/C
Ø 160 mm, wall thickness 4.9-14.6 mm	60 x 15.0 mm	

### > Penetration seals, in drywalls and concrete/masonry walls

Penetration Seal: Combustible pipes fitted with Knauf Firecollar, to both sides of the wall.

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Ø 50 mm, wall thickness 2.4 mm*	60 x 15.0 mm	EI 90 C/C

\*Pipe fitted at 45° to the face of the partition in a horizontal plane



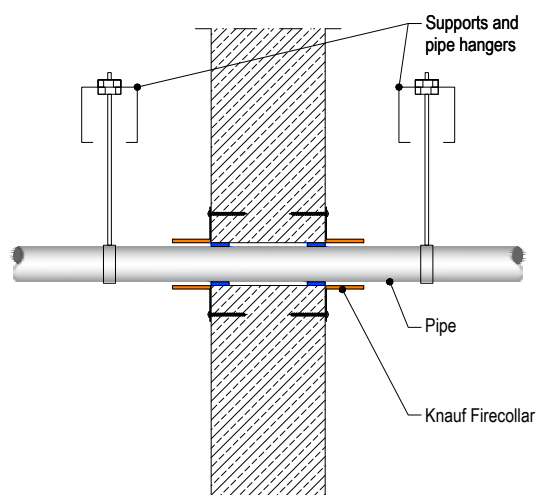
# PENETRATION SEALS | RIGID WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 150 MM

## > Penetration seals, in concrete/masonry walls

Penetration Seal: Combustible pipes fitted with Knauf Firecollar, to both sides of the wall.

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Ø 32 mm, wall thickness 2.0-3.7 mm	50 x 3.0 mm	E 240 U/U, E 240 C/U, E 240 U/C, E 240 C/C EI 180 U/U, EI 180 C/U, EI 180 U/C, EI 180 C/C
Ø 40 mm, wall thickness 2.0-3.7 mm		
Ø 50 mm, wall thickness 2.0-3.7 mm		
Ø 55 mm, wall thickness 2.1-3.9 mm	50 x 3.2 mm	EI 180 U/U, EI 180 C/U, EI 180 U/C, EI 180 C/C
Ø 63 mm, wall thickness 2.2-4.3 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 2.3-4.9 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 2.4-5.2 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 2.5-5.6 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 2.7-6.6 mm	50 x 6.0 mm	
Ø 125 mm, wall thickness 3.1-7.5 mm	60 x 8.8 mm	EI 240 U/U, EI 240 C/U, EI 240 U/C, EI 240 C/C
Ø 140 mm, wall thickness 3.5-8.4 mm	60 x 11.5 mm	
Ø 160 mm, wall thickness 4.0-9.5 mm	60 x 15.0 mm	
Ø 315 mm, wall thickness 9.2 mm	75 x 18 mm	EI 120 C/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Ø 32 mm, wall thickness 3.0-4.6 mm	50 x 3.0 mm	EI 240 U/U, EI 240 C/U, EI 240 U/C, EI 240 C/C
Ø 40 mm, wall thickness 3.0-4.6 mm		
Ø 50 mm, wall thickness 3.0-4.6 mm		
Ø 55 mm, wall thickness 3.1-4.5 mm	50 x 3.2 mm	E 240 U/U, E 240 C/U, E 240 U/C, E 240 C/C EI 180 U/U, EI 180 C/U, EI 180 U/C, EI 180 C/C
Ø 63 mm, wall thickness 3.1-4.3 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 3.2-4.1 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 3.3-3.9 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 3.3-3.8 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 3.4 mm	50 x 6.0 mm	
Ø 125 mm, wall thickness 3.9-5.2 mm	60 x 9.0 mm	EI 180 U/U, EI 180 C/U, EI 180 U/C, EI 180 C/C
Ø 140 mm, wall thickness 4.3-7.0 mm	60 x 11.5 mm	
Ø 160 mm, wall thickness 4.9-9.5 mm	60 x 15.0 mm	
Ø 200 mm, wall thickness 18.2 mm	75 x 10.8 mm	EI 60 C/C
Ø 250 mm, wall thickness 22.7 mm	75 x 12.6 mm	E 120 C/C EI 90 C/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Ø 50 mm, wall thickness 3.0-4.6 mm	50 x 3.0 mm	EI 240 U/U, EI 240 C/U, EI 240 U/C, EI 240 C/C
Ø 55 mm, wall thickness 3.1-4.8 mm	50 x 3.2 mm	E 180 U/C, E 180 C/C EI 120 U/C, EI 120 C/C
Ø 63 mm, wall thickness 3.1-5.0 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 3.2-5.4 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 3.2-5.7 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 3.3-5.9 mm	50 x 5.0 mm	

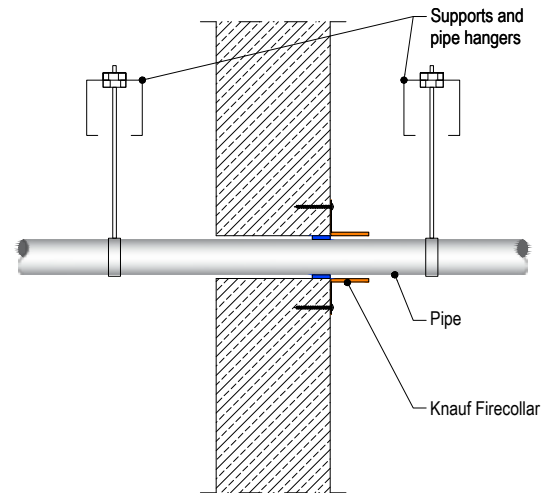


Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Ø 110 mm, wall thickness 3.4-6.6 mm	50 x 6.0 mm	E 180 U/C, E 180 C/C EI 120 U/C, EI 120 C/C
Ø 125 mm, wall thickness 3.8-7.5	50 x 9.0 mm	
Ø 140 mm, wall thickness 4.3-8.3 mm	50 x 11.5 mm	
Ø 160 mm, wall thickness 4.9-9.5 mm	50 x 15.0 mm	EI 180 U/U, EI 180 C/U, EI 180 U/C, EI 180 C/C
PP pipe according to EN 1451-1		
Ø 32 mm, wall thickness 1.6-5.5 mm	30 x 3.0 mm	EI 240 U/C, EI 240 C/C
Ø 40 mm, wall thickness 1.6-5.5 mm		
Ø 50 mm, wall thickness 1.6-5.5 mm		
Ø 55 mm, wall thickness 1.7-5.9 mm	50 x 3.2 mm	
Ø 63 mm, wall thickness 1.8-6.5 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 2.1-7.3 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 2.2-7.9 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 2.3-8.5 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 2.7-10.0 mm	50 x 6.0 mm	
Ø 125 mm, wall thickness 3.3-11.4 mm	60 x 9.0 mm	
Ø 140 mm, wall thickness 4.0-12.8 mm	60 x 11.5 mm	
Ø 160 mm, wall thickness 4.9-14.6 mm	60 x 15.0 mm	
PP pipe according to EN 1451-1		
Ø 32 mm, wall thickness 1.6-5.5 mm	30 x 3.0 mm	EI 240 U/U, EI 240 C/U, EI 240 U/C, EI 240 C/C
Ø 40 mm, wall thickness 1.6-5.5 mm		
Ø 50 mm, wall thickness 1.6-5.5 mm		
Ø 50 mm, wall thickness 1.6-5.5 mm	50 x 3.0 mm	E 240 U/U, E 240 C/U, EI 60 U/U, EI 60 C/U
Ø 55 mm, wall thickness 1.7-5.9 mm	50 x 3.2 mm	
Ø 63 mm, wall thickness 1.8-6.5 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 2.1-7.3 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 2.2-7.9 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 2.3-8.5 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 2.7-10.0 mm	50 x 6.0 mm	
PP pipe according to EN 1451-1		
Ø 50 mm, wall thickness 1.6-5.5 mm	50 x 3.0 mm	EI 240 U/U, EI 240 C/U, EI 240 U/C, EI 240 C/C
Ø 55 mm, wall thickness 1.7-5.6 mm	50 x 3.2 mm	E 240 U/U, EI 90 U/U
Ø 63 mm, wall thickness 1.8-5.7 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 2.0-5.9 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 2.1-6.0 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 2.3-6.1 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 2.7-6.3 mm	50 x 6.0 mm	
Ø 110 mm, wall thickness 2.7-10.0 mm	60 x 6.0 mm	E 240 U/U, E 240 C/U, EI 60 U/U, EI 60 C/U
Ø 125 mm, wall thickness 3.3-11.4 mm	60 x 8.8 mm	
Ø 140 mm, wall thickness 4.0-12.8 mm	60 x 11.5 mm	
Ø 160 mm, wall thickness 4.9-14.6 mm	60 x 15.0 mm	E 240 U/U, E 240 C/U, E 240 U/C, E 240 C/C EI 180 U/U, EI 180 C/U, EI 180 U/C, EI 180 C/C

> Penetration seals, in concrete/masonry walls

Penetration Seal: Combustible pipes fitted with single Knauf Firecollar, to either side of the wall.

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Ø 32 mm, wall thickness 2.4-3.7 mm	50 x 3.0 mm	E 240 U/C, E 240 C/C EI 180 U/C, EI 180 C/C
Ø 40 mm, wall thickness 2.4-3.7 mm		
Ø 50 mm, wall thickness 2.4-3.7 mm		
Ø 55 mm, wall thickness 2.5-3.9 mm	50 x 3.2 mm	E 180 U/C, E 180 C/C EI 120 U/C, EI 120 C/C
Ø 63 mm, wall thickness 2.6-4.3 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 2.7-4.9 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 2.8-5.2 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 2.9-5.6 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 3.2-6.6 mm	50 x 6.0 mm	EI 120 U/C, EI 120 C/C
Ø 125 mm, wall thickness 3.4-7.5 mm	60 x 8.8 mm	
Ø 140 mm, wall thickness 3.7-8.4 mm	60 x 11.5 mm	
Ø 160 mm, wall thickness 4.0-9.5 mm	60 x 15.0 mm	
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Ø 32 mm, wall thickness 3.0-4.6 mm	50 x 3.0 mm	E 180 U/C, E 180 C/C EI 120 U/C, EI 120 C/C
Ø 40 mm, wall thickness 3.0-4.6 mm		
Ø 50 mm, wall thickness 3.0-4.6 mm		
Ø 55 mm, wall thickness 3.1-4.5 mm	50 x 3.2 mm	EI 90 U/C, EI 90 C/C
Ø 63 mm, wall thickness 3.1-4.3 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 3.2-4.1 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 3.2-3.9 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 3.3-3.8 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 3.4 mm	50 x 6.0 mm	
PP pipe according to EN 1451-1		
Ø 32 mm, wall thickness 2.0-4.6 mm	50 x 3.0 mm	EI 90 U/C, EI 90 C/C
Ø 40 mm, wall thickness 2.0-4.6 mm		
Ø 50 mm, wall thickness 2.0-4.6 mm		



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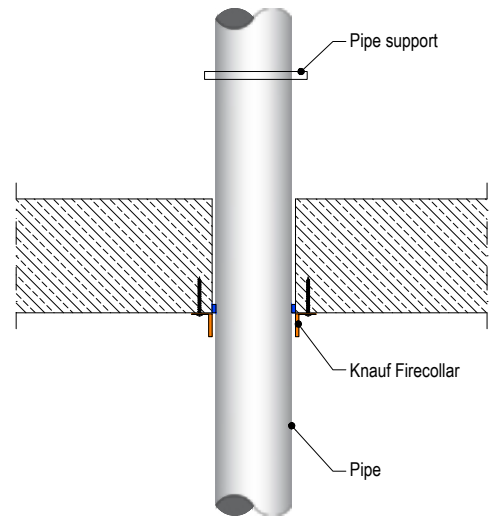
# PENETRATION SEALS | RIGID FLOOR CONSTRUCTIONS

WITH FLOOR THICKNESS OF MINIMUM 150 MM

## > Penetration seals, surface mounted in concrete floors

Penetration Seal: Combustible pipes fitted with Knauf Firecollar, to the soffit of the floor.

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Ø 32 mm, wall thickness 1.9-3.7 mm	30 x 3.0 mm	E 90 U/U, E 90 C/U, E 90 U/C, E 90 C/C EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Ø 40 mm, wall thickness 1.9-3.7 mm		
Ø 50 mm, wall thickness 2.0-3.7 mm		
Ø 55 mm, wall thickness 2.1-3.9 mm	30 x 3.2 mm	EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Ø 63 mm, wall thickness 2.2-4.3 mm	30 x 3.6 mm	
Ø 75 mm, wall thickness 2.5-4.9 mm	30 x 4.2 mm	
Ø 82 mm, wall thickness 2.6-5.2 mm	30 x 4.6 mm	
Ø 90 mm, wall thickness 2.8-5.6 mm	30 x 5.0 mm	
Ø 110 mm, wall thickness 3.2-6.6 mm	30 x 6.0 mm	
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Ø 32 mm, wall thickness 2.0-3.7 mm	50 x 3.0 mm	EI 120 U/C, EI 120 C/C
Ø 40 mm, wall thickness 2.0-3.7 mm		
Ø 50 mm, wall thickness 2.0-3.7 mm		
Ø 55 mm, wall thickness 2.4-3.9 mm		
Ø 63 mm, wall thickness 3.0-4.3 mm		
Ø 75 mm, wall thickness 3.8-4.8 mm		
Ø 82 mm, wall thickness 4.3-5.1 mm		
Ø 90 mm, wall thickness 4.9-5.4 mm		
Ø 110 mm, wall thickness 6.3 mm		
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Ø 50 mm, wall thickness 2.0-3.7 mm	50 x 3.0 mm	E 120 U/C, EI 90 U/C
Ø 55 mm, wall thickness 2.1-4.0 mm	50 x 3.2 mm	
Ø 63 mm, wall thickness 2.2-4.4 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 2.4-5.0 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 2.4-5.4 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 2.5-5.8 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 2.7-6.9 mm	50 x 6.0 mm	
Ø 125 mm, wall thickness 2.9-7.6 mm	50 x 8.8 mm	
Ø 140 mm, wall thickness 3.0-8.4 mm	50 x 11.5 mm	
Ø 160 mm, wall thickness 3.2-9.5 mm	50 x 15.0 mm	
Ø 160 mm, wall thickness 3.2-9.5 mm	50 x 15.0 mm	E 180 U/C, E 180 C/C EI 90 U/C, EI 90 C/C
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Ø 110 mm, wall thickness 6.3 mm	60 x 6.0 mm	EI 120 U/C, EI 120 C/C
Ø 125 mm, wall thickness 5.6-7.3 mm	60 x 9.0 mm	
Ø 140 mm, wall thickness 5.0-8.2 mm	60 x 11.5 mm	
Ø 160 mm, wall thickness 4.0-9.5 mm	60 x 15.0 mm	



Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Ø 110 mm, wall thickness 2.7-6.3 mm	60 x 6.0 mm	EI 60 U/C
Ø 125 mm, wall thickness 2.8-7.2 mm	60 x 8.7 mm	
Ø 140 mm, wall thickness 3.0-8.2 mm	60 x 11.4 mm	
Ø 160 mm, wall thickness 3.2-9.5 mm	60 x 15.0 mm	
Ø 110 mm, wall thickness 3.2-6.6 mm	60 x 6.0 mm	EI 60 U/U
Ø 125 mm, wall thickness 3.2-7.4 mm	60 x 8.7 mm	
Ø 140 mm, wall thickness 3.2, 8.3 mm	60 x 11.4 mm	
Ø 160 mm, wall thickness 3.2-9.5 mm	60 x 15.0 mm	
Ø 110 mm, wall thickness 2.7-6.6 mm	50 x 6.0 mm	EI 60 C/U
Ø 125 mm, wall thickness 2.8-7.4 mm	60 x 8.7 mm	
Ø 140 mm, wall thickness 3.0-8.3 mm	60 x 11.4 mm	
Ø 160 mm, wall thickness 3.2-9.5 mm	60 x 15.0 mm	
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Ø 32 mm, wall thickness 3.0-4.6 mm	30 x 3.0 mm	EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Ø 40 mm, wall thickness 3.0-4.6 mm		
Ø 50 mm, wall thickness 3.0-4.6 mm		
Ø 110 mm, wall thickness 10.0 mm	30 x 6.0 mm	EI 180 U/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Ø 50 mm, wall thickness 3.0-4.6 mm	30 x 3.0 mm	EI 60 U/U, EI 60 C/U, EI 60 U/C, EI 60 C/C
Ø 55 mm, wall thickness 3.0-5.2 mm	30 x 3.2 mm	
Ø 63 mm, wall thickness 3.0-5.9 mm	30 x 3.6 mm	EI 60 U/C, EI 60 C/C
Ø 75 mm, wall thickness 3.1-6.9 mm	30 x 4.2 mm	
Ø 82 mm, wall thickness 3.1-7.6 mm	30 x 4.6 mm	
Ø 90 mm, wall thickness 3.2-8.3 mm	30 x 5.0 mm	
Ø 110 mm, wall thickness 3.4-10.0 mm	30 x 6.0 mm	
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Ø 32-40 mm, wall thickness 3.0-4.6 mm	50 x 3.0 mm	EI 240 U/C
Ø 50 mm, wall thickness 3.0-4.6 mm	50 x 3.2 mm	EI 240 U/U
Ø 32-40 mm, wall thickness 3.0 mm	50 x 3.0 mm	
Ø 50 mm, wall thickness 3.0 mm	50 x 3.2 mm	EI 60 U/U, EI 60 C/U
Ø 50 mm, wall thickness 3.0-4.6 mm	50 x 3.0 mm	
Ø 55 mm, wall thickness 3.1-5.1 mm	50 x 3.2 mm	
Ø 63 mm, wall thickness 3.1-5.8 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 3.2-6.9 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 3.3-7.5 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 3.3-8.2 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 3.4-10.0 mm	50 x 6.0 mm	
Ø 110 mm, wall thickness 3.4-10.0 mm	60 x 6.0 mm	
Ø 125 mm, wall thickness 3.9-11.3 mm	60 x 8.8 mm	
Ø 140 mm, wall thickness 4.3-12.7 mm	60 x 11.5 mm	
Ø 160 mm, wall thickness 4.9-14.6 mm	60 x 15.0 mm	

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Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Ø 32 mm, wall thickness 3.0-4.6 mm	50 x 3.0 mm	EI 120 U/C, EI 120 C/C
Ø 40 mm, wall thickness 3.0-4.6 mm		
Ø 50 mm, wall thickness 3.0-4.6 mm		
Ø 55 mm, wall thickness 3.1-5.0 mm		
Ø 63 mm, wall thickness 3.1-5.8 mm		
Ø 75 mm, wall thickness 3.2-6.9 mm		
Ø 82 mm, wall thickness 3.3-7.5 mm		
Ø 90 mm, wall thickness 3.3-8.2 mm		
Ø 110 mm, wall thickness 3.4-10.0 mm		
Ø 125 mm, wall thickness 3.9-11.3 mm		
Ø 140 mm, wall thickness 4.4-12.7 mm	50 x 11.5 mm	
Ø 160 mm, wall thickness 4.9-14.7 mm	50 x 15.0 mm	E 180 U/C, E 180 C/C EI 120 U/C, EI 120 C/C
PP pipe according to EN 1451-1		
Ø 32 mm, wall thickness 1.8-4.6 mm	30 x 3.0 mm	EI 120 U/U, EI 120 C/U, EI 120 U/C, EI 120 C/C
Ø 40 mm, wall thickness 1.8-4.6 mm		
Ø 50 mm, wall thickness 1.8-4.6 mm		
Ø 55 mm, wall thickness 2.0-4.8 mm	30 x 3.2 mm	EI 120 U/C, EI 120 C/C
Ø 63 mm, wall thickness 2.3-5.5 mm	30 x 3.6 mm	
Ø 75 mm, wall thickness 2.8-5.4 mm	30 x 4.2 mm	
Ø 82 mm, wall thickness 3.1-5.6 mm	30 x 4.6 mm	
Ø 90 mm, wall thickness 3.4-5.9 mm	30 x 5.0 mm	
Ø 110 mm, wall thickness 4.2-6.6 mm	30 x 6.0 mm	EI 180 U/C, EI 180 C/C
PP pipe according to EN 1451-1		
Ø 50 mm, wall thickness 2.9 mm	50 x 3.2 mm	EI 240 U/U
Ø 50 mm, wall thickness 1.8-4.6 mm	50 x 3.0 mm	EI 120 U/U, EI 120 C/U, EI 120 U/C, EI 120 C/C
Ø 55 mm, wall thickness 1.9-4.8 mm	50 x 3.2 mm	EI 60 U/U, EI 60 C/U
Ø 63 mm, wall thickness 2.0-5.0 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 2.2-5.4 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 2.3-5.6 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 2.4-5.9 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 2.7-6.6 mm	50 x 6.0 mm	
PP pipe according to EN 1451-1		
Ø 50 mm, wall thickness 1.8-4.6 mm	50 x 3.0 mm	EI 120 U/U, EI 120 C/U, EI 120 U/C, EI 120 C/C
Ø 55 mm, wall thickness 1.9-4.8 mm	50 x 3.2 mm	EI 120 U/C, EI 120 C/C
Ø 63 mm, wall thickness 2.0-5.0 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 2.2-5.4 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 2.3-5.6 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 2.4-5.9 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 2.7-6.6 mm	50 x 6.0 mm	
PP pipe according to EN 1451-1		
Ø 50 mm, wall thickness 1.8-4.6 mm	30 x 3.0 mm	EI 60 U/C, EI 60 C/C
Ø 55 mm, wall thickness 1.9-5.1 mm	50 x 3.2 mm	
Ø 63 mm, wall thickness 2.0-5.8 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 2.2-6.9 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 2.3-7.5 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 2.5-8.2 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 2.7-10.1 mm	50 x 6.0 mm	
Ø 125 mm, wall thickness 4.7-11.4 mm	50 x 8.8 mm	
Ø 140 mm, wall thickness 6.8-12.8 mm	50 x 11.5 mm	
Ø 160 mm, wall thickness 9.5-14.6 mm	50 x 15.0 mm	

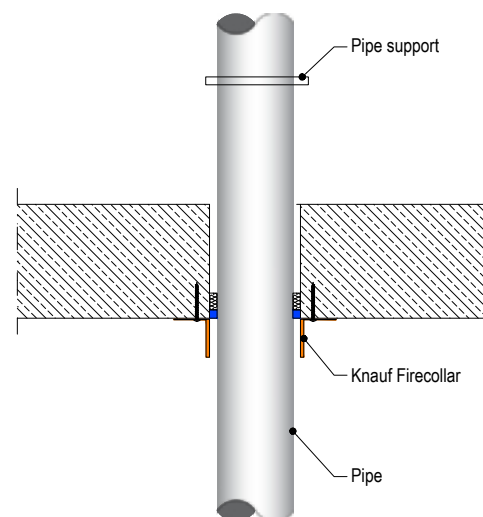
Services	Collar Inlay	Classification
PP pipe according to EN 1451-1		
Ø 110 mm, wall thickness 2.7-6.6 mm	60 x 6.0 mm	EI 120 U/C, EI 120 C/C
Ø 125 mm, wall thickness 3.4-8.9 mm	60 x 8.8 mm	
Ø 140 mm, wall thickness 4.1-11.2 mm	60 x 11.5 mm	
Ø 160 mm, wall thickness 4.9-14.6 mm	60 x 15.0 mm	EI 180 U/C, EI 180 C/C
Ø 110 mm, wall thickness 2.7-6.6 mm	50 x 6.0 mm	EI 60 U/U
Ø 125 mm, wall thickness 3.6-8.9 mm	60 x 8.8 mm	
Ø 140 mm, wall thickness 4.7-11.3 mm	60 x 11.5 mm	
Ø 160 mm, wall thickness 6.2-14.7 mm	60 x 15.0 mm	
Ø 160 mm, wall thickness 6.2 mm	60 x 15.0 mm	EI 90 U/U
Wavin SiTech + PP-M B according to EN 13501-1		
Ø 32-40 mm / 1.8 mm wall thickness	50 x 3.0 mm	EI 240 U/U
Ø 50 mm / 1.8 mm wall thickness	50 x 3.2 mm	
Ø 75 mm / 1.8-2.5 mm wall thickness	50 x 4.2 mm	EI 180 C/U
Ø 90 mm / 1.8-2.9 mm wall thickness	50 x 5.0 mm	
Ø 110 mm / 1.8-3.4 mm wall thickness	50 x 6.0 mm	
Aquatherm Green SDR9 MF PP-RP according to ISO 21003		
Ø 32 mm / 3.6-5.6 mm wall thickness	30 x 3.0 mm	EI 240 C/C
Ø 40 mm / 3.6-5.6 mm wall thickness	50 x 3.0 mm	
Ø 50 mm / 3.6-5.6 mm wall thickness	50 x 3.2 mm	
Ø 63 mm / 5.6-12.3 mm wall thickness	50 x 3.6 mm	EI 120 C/C
Ø 75 mm / 4.4-8.4 mm wall thickness	50 x 4.2 mm	
Ø 90 mm / 4.9-10.0 mm wall thickness	50 x 5.0 mm	
Ø 110 mm / 5.6-12.3 mm wall thickness	50 x 6.0 mm	
Geberit Silent PP according to DIN 4102		
Ø 32-40 mm / 1.8 mm wall thickness	50 x 3.0 mm	EI 240 U/U
Ø 50 mm / 1.8 mm wall thickness	50 x 3.2 mm	
Ø 75 mm / 1.8-2.4 mm wall thickness	50 x 4.2 mm	EI 180 C/U
Ø 90 mm / 1.8-2.8 mm wall thickness	50 x 5.0 mm	
Ø 110 mm / 1.8-3.4 mm wall thickness	50 x 6.0 mm	
Polo-Kal NG Poloplast PP-MV according to DIN 4102		
Ø 32-40 mm / 1.8-2.0 mm wall thickness	50 x 3.0 mm	EI 240 U/U
Ø 50 mm / 1.8-2.0 mm wall thickness	50 x 3.2 mm	
Ø 75 mm / 1.9-2.6 wall thickness	50 x 4.2 mm	EI 240 C/U
Ø 90 mm / 2.0-2.9 wall thickness	50 x 5.0 mm	
Ø 110 mm / 2.0-3.4 wall thickness	50 x 6.0 mm	
Ø 125 mm, wall thickness 3.9 mm	60 x 9.0 mm	EI 240 U/C
Ø 160 mm, wall thickness 4.9 mm	60 x 15 mm	E 240 C/U, EI 240 U/C
Rehau Raupiano Plus PP-DD according to DIN 4102		
Ø 40 mm / 1.8 wall thickness	50 x 3.0 mm	EI 240 U/U
Ø 50 mm / 1.8 wall thickness	50 x 3.2 mm	

Services	Collar Inlay	Classification
Rehau Raupiano Plus PP-DD according to DIN 4102		
Ø 75 mm, wall thickness 1.8-2.2 mm	50 x 4.2 mm	EI 120 C/U
Ø 90 mm, wall thickness 1.8-2.4 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 1.8-2.7 mm	50 x 6.0 mm	
Ø 125 mm, wall thickness 3.1 mm	60 x 9.0 mm	EI 180 C/U
Ø 160 mm, wall thickness 3.9 mm	60 x 15.0 mm	E 240 C/U, EI 240 U/C
BluePower Multilayer pipe – TR02-PP according to EN 1451-1		
Ø 32-40 mm / 1.8 mm wall thickness	50 x 3.0 mm	EI 180 U/U
Ø 50 mm / 1.8 mm wall thickness	50 x 3.2 mm	
Ø 75 mm / 1.8-3.4 mm wall thickness	50 x 4.2 mm	EI 180 C/U
Ø 90 mm / 1.8-3.4 mm wall thickness	50 x 5.0 mm	
Ø 110 mm / 1.8-3.4 mm wall thickness	50 x 6.0 mm	
Ø 125 mm / 3.4-4.9 mm wall thickness	60 x 9.0 mm	
Ø 160 mm / 3.4-4.9 mm wall thickness	60 x 15.0 mm	EI 240 C/U
Uponor Decibel according to EN 14366		
Ø 50 mm / 2.0 mm wall thickness	50 x 3.0 mm	EI 180 U/U
Ø 75 mm / 2.6 mm wall thickness	50 x 4.2 mm	EI 120 C/U
Ø 110 mm / 3.8 mm wall thickness	50 x 6.0 mm	

## › Penetration seals, surface mounted in concrete floors

Penetration Seal: Combustible pipes fitted with Knauf Firecollar, to the soffit of the floor.

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Ø 32 mm, wall thickness 2.0-3.7 mm	50 x 3.0 mm	EI 120 C/C, EI 60 C/U
Ø 40 mm, wall thickness 2.0-3.7 mm		
Ø 50 mm, wall thickness 2.0-3.7 mm		
Ø 55 mm, wall thickness 2.1-3.9 mm		
Ø 63 mm, wall thickness 2.2-4.3 mm		
Ø 75 mm, wall thickness 2.3-4.8 mm		
Ø 82 mm, wall thickness 2.4-5.1 mm		
Ø 90 mm, wall thickness 2.5-5.4 mm		
Ø 110 mm, wall thickness 2.7-6.3 mm		
Up to Ø 200 mm / 4.9-11.9 mm wall thickness	60 x 18 mm	E 120 C/C, EI 60 C/C
Up to Ø 250 mm / 6.1-11.9 mm wall thickness	75 x 24 mm	EI 60 C/C
Up to Ø 315 mm / 7.7-12.1 mm wall thickness	75 x 30 mm	
Up to Ø 400 mm / 15.3 mm wall thickness	100 x 39 mm	
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Up to Ø 200 mm / 6.2-18.2 mm wall thickness	60 x 18 mm	E 240 C/C, EI 120 C/C
Up to Ø 250 mm / 11.5-18.4 mm wall thickness	75 x 24 mm	EI 240 C/C
Up to Ø 315 mm / 18.7 mm wall thickness	75 x 30 mm	
Up to Ø 400 mm / 36.3 mm wall thickness	100 x 39 mm	EI 90 C/C

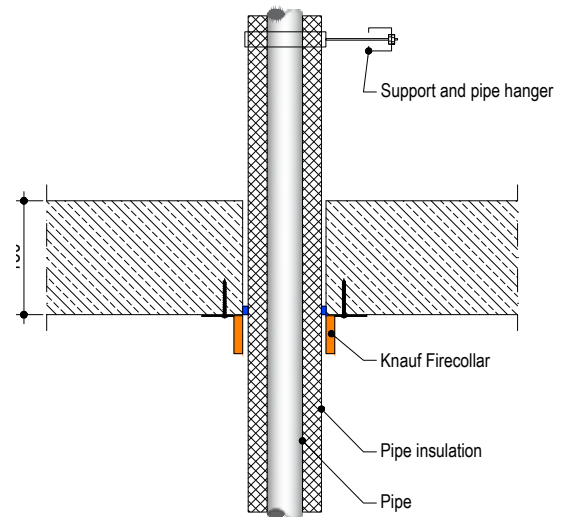


Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Up to Ø 200 mm / 4.9-11.9 mm wall thickness	60 x 18 mm	E 120 C/C, EI 60 C/C
Up to Ø 250 mm / 6.1-11.9 mm wall thickness	75 x 24 mm	EI 60 C/C
Up to Ø 315 mm / 7.7-12.1 mm wall thickness	75 x 30 mm	
Up to Ø 400 mm / 15.3 mm wall thickness	100 x 39 mm	
PP pipe according to EN 1451-1		
Up to Ø 200 mm / 4.9-18.2 mm wall thickness	60 x 18 mm	EI 120 C/C
Up to Ø 250 mm / 15.1-22.7 mm wall thickness	75 x 24 mm	EI 60 C/C
Up to Ø 315 mm / 28.6 mm wall thickness	75 x 30 mm	
Up to Ø 400 mm / 9.8-22.7 mm wall thickness	100 x 39 mm	EI 30 C/C

### 5 > Penetration seals, surface mounted in concrete floors

Penetration Seal: Metallic pipes fitted with Knauf Firecollar, to the soffit of the floor.

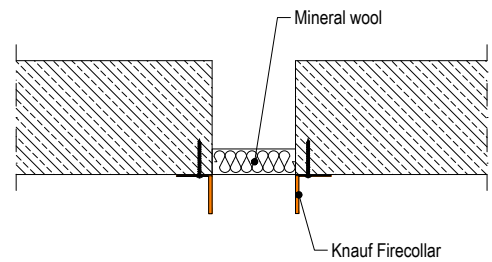
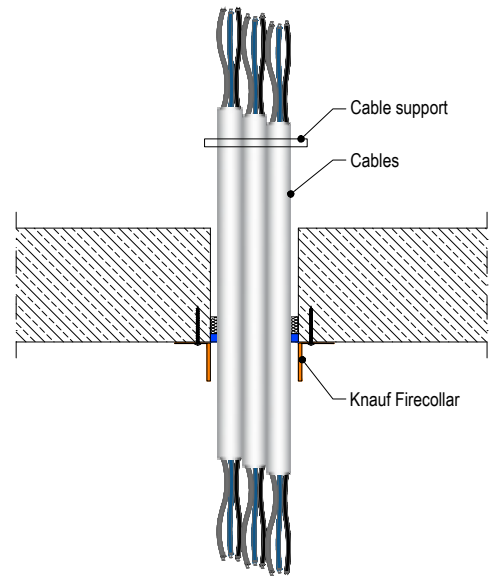
Services	Insulation	Collar	Classification
Copper pipe or mild steel			
Maximum Ø 42 mm, wall thickness 0.7-14.2 mm*	9 mm thick Elastomeric insulation minimum class D-s3, d0	Up to 63 mm collar at 50 mm height	EI 120 C/C
Maximum Ø 42 mm, wall thickness 0.7-14.2 mm*	10-50 mm thick Elastomeric insulation minimum class D-s3, d0	Up to 110 mm collar at 50 mm height, 125-160 mm at 60 mm height	EI 60 C/C
Maximum Ø 54 mm, wall thickness 0.7-14.2 mm*	19 mm thick Elastomeric insulation minimum class B-s3, d0	Up to 110 mm collar at 50 mm height	E 120 C/C, EI 60 C/C
Alupex pipe			
Maximum Ø 75 mm, wall thickness 2.25-4.6 mm	9 mm thick Elastomeric insulation minimum class D-s3, d0	Up to 110 mm collar at 50 mm height	EI 120 C/C
	10-50 mm thick Elastomeric insulation minimum class B-s3, d0	Up to 110 mm collar at 50 mm height, 125-200 mm at 60 mm height	E 120 C/C, EI 90 C/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Maximum Ø 160 mm, wall thickness 3.0-9.5 mm	9 mm thick Elastomeric insulation minimum class BL-s3, d0	Up to 110 mm collar at 50 mm height, 125-200 mm at 60 mm height	EI 180 C/C
	10-50 mm thick Elastomeric insulation minimum class B-s3, d0	Up to 110 mm collar at 50 mm height, 125-200 mm at 60 mm height, 250-315 mm at 75 mm height	EI 120 C/C
PP pipe according to EN 1451-1			
Maximum Ø 160 mm, wall thickness 1.8-9.1 mm	9 mm thick Elastomeric insulation minimum class BL-s3, d0	Up to 110 mm collar at 50 mm height, 125-200 mm at 60 mm height	E 180 C/C, EI 120 C/C
	10-50 mm thick Elastomeric insulation minimum class B-s3, d0	Up to 110 mm collar at 50 mm height, 125-200 mm at 60 mm height, 250-315 mm at 75 mm height	EI 60 C/C



## › Penetration seals, surface mounted in concrete floors

Penetration Seal: Cables (in bundles up to 100 mm Ø) fitted with Knauf Firecollar, to the soffit of the floor.

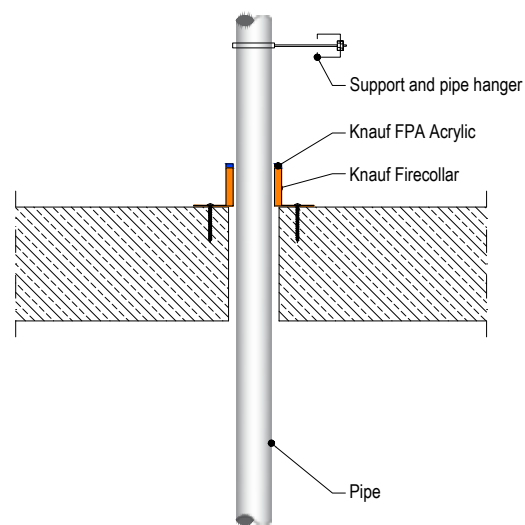
Services	Collar Inlay	Classification
-	Ø 55 x 30 x 3.2 mm	E 240, EI 60
-	Ø 160 x 60 x 15.0 mm	EI 120
Cables up to 21 mm Ø, in bundles up to 55 mm Ø	Ø 55 x 30 x 3.2 mm	EI 120
Cables up to 21 mm Ø, in bundles up to 100 mm Ø	Ø 110 x 50 x 6.0 mm	EI 90
Cables up to 21 mm Ø, in bundles up to 160 mm Ø	Ø 160 x 60 x 15.0 mm	EI 180
PVC pipes up to 32 mm Ø, wall thickness 1.0-2.4 mm with or without cables up to 21 mm Ø, in partial or fully filled pipe bundles up to 160 mm Ø *	Up to 110 mm collar at 50 mm height, 125-160 mm at 60 mm height	EI 90 C/U
PE pipes up to 32 mm Ø, wall thickness 2.0-3.0 mm with or without cables up to 21 mm Ø, in partial or fully filled pipe bundles up to 160 mm Ø *		
PP pipes up to 32 mm Ø, wall thickness 1.8-4.4 mm with or without cables up to 21 mm Ø, in partial or fully filled pipe bundles up to 160 mm Ø *		
PEX pipe-in-pipe system		
Diameter up to 25 mm pipes, wall thicknesses 0.6 mm outer and 2.5 mm inner pipe, in bundle up to 50 mm	50 mm collar at 50 mm height	EI 90 C/C



› **Penetration seals, surface mounted in concrete floors**

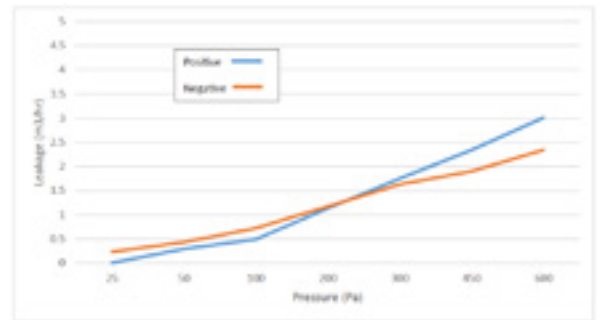
Penetration Seal: Combustible pipes fitted with Knauf Firecollar, to the top face of the floor.

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Ø 32 mm, wall thickness 1.9-3.7 mm	50 x 3.0 mm	EI 240 U/C
Ø 40 mm, wall thickness 1.9-3.7 mm	50 x 3.0 mm	
Ø 50 mm, wall thickness 1.9-3.7 mm	50 x 3.2 mm	
Ø 55 mm, wall thickness 2.0-4.0 mm	50 x 3.2 mm	EI 120 U/C
Ø 63 mm, wall thickness 2.1-4.4 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 2.4-5.0 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 2.5-5.3 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 2.7-5.7 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 3.2-6.6 mm	50 x 6.0 mm	E240 U/C, EI 180 U/C
Ø 125 mm, wall thickness 5.0-7.5 mm	60 x 8.8 mm	
Ø 140 mm, wall thickness 6.9-8.3 mm	60 x 11.5 mm	E 180 U/C, EI 90 U/C
Ø 160 mm, wall thickness 9.5 mm	60 x 15 mm	
Ø 125 mm, wall thickness 4.1-7.5 mm	60 x 8.8 mm	
Ø 140 mm, wall thickness 5.0-8.3 mm	60 x 11.5 mm	E 180 U/C, EI 90 U/C
Ø 160 mm, wall thickness 6.2-9.5 mm	60 x 15 mm	
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Ø 32 mm, wall thickness 3.0-4.6 mm	50 x 3.0 mm	EI 240 U/C
Ø 40 mm, wall thickness 3.0-4.6 mm	50 x 3.0 mm	
Ø 50 mm, wall thickness 3.0-4.6 mm	50 x 3.2 mm	
Ø 55 mm, wall thickness 3.0-5.1 mm	50 x 3.2 mm	E 240 U/C, EI 60 U/C
Ø 63 mm, wall thickness 3.0-5.8 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 3.1-6.9 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 3.2-7.5 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 3.2-8.2 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 3.4-10.0 mm	50 x 6.0 mm	EI 60 U/C
Ø 125 mm, wall thickness 3.9-9.8 mm	60 x 8.8 mm	
Ø 140 mm, wall thickness 4.3-9.7 mm	60 x 11.5 mm	EI 60 U/C
Ø 160 mm, wall thickness 4.9-9.5 mm	60 x 15 mm	
PP pipe according to EN 1451-1		
Ø 32 mm, wall thickness 2.9-4.6 mm	50 x 3.0 mm	E 240 U/C, EI 180 U/C
Ø 40 mm, wall thickness 2.9-4.6 mm	50 x 3.0 mm	
Ø 50 mm, wall thickness 2.9-4.6 mm	50 x 3.2 mm	
Ø 55 mm, wall thickness 3.5-5.1 mm	50 x 3.2 mm	E 180 U/C, EI 90 U/C
Ø 63 mm, wall thickness 4.4-5.8 mm	50 x 3.6 mm	
Ø 75 mm, wall thickness 5.8-6.9 mm	50 x 4.2 mm	
Ø 82 mm, wall thickness 6.6-7.5 mm	50 x 4.6 mm	
Ø 90 mm, wall thickness 7.5-8.2 mm	50 x 5.0 mm	
Ø 110 mm, wall thickness 10.0 mm	50 x 6.0 mm	E 240 U/C, EI 60 U/C
Ø 125 mm, wall thickness 11.3 mm	60 x 8.8 mm	
Ø 140 mm, wall thickness 12.7 mm	60 x 11.5 mm	E 240 U/C, EI 60 U/C
Ø 160 mm, wall thickness 14.6 mm	60 x 15 mm	





Product tested	110mm Knauf Firecollar each face fixed with plasterboard anchors		
Summary of testing procedure		Result	
	Pressure (Pa)	Leakage (m <sup>3</sup> /h)	Leakage (m <sup>3</sup> /m <sup>2</sup> /h)
Results under negative chamber pressure	25	0.23	N/A
	50	0.43	N/A
	100	0.72	N/A
	200	1.17	N/A
	300	1.63	N/A
	450	1.9	N/A
	600	2.34	N/A
Results under positive chamber pressure	25	0.2	N/A
	50	0.29	N/A
	100	0.49	N/A
	200	1.13	N/A
	300	1.75	N/A
	450	2.34	N/A
	600	3.01	N/A



# KNAUF FIREWRAP

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Knauf Firewrap is designed to maintain the fire resistance of fire separating walls and floors when these are breached by plastic pipes or metal pipes with continuous combustible insulation, and may be used in gypsum, masonry or concrete walls and concrete floors.

Each pipe wrap consists of a graphite based reactive intumescent strip, which reacts to heat and closes the opening left by the softening plastic pipe or pipe insulation in a fire. The pipe wrap is installed completely around the pipes or insulation and secured with the self-adhesive tab. The annular space around the pipe wrap is sealed with Knauf FP Mortar or Knauf FPC Panel.

**Properties:**

- > For plastic pipe sizes from smallest pipes available to Ø400 mm with a wide range of pipe wall thicknesses
- > For metal pipes with continuous combustible pipe insulation
- > For plastic pipes with cables (conduits)
- > Firewraps come in two different types; ready made for most common diameters and in 25 metre rolls for all diameters
- > Fire classifications up to 240 minutes for both integrity and insulation
- > 30 years working life guarantee
- > ETA 21/0039
- > EAD 350141-00-1104

### Supporting constructions:

#### Flexible walls:

The wall must have a minimum thickness of 100 mm and comprise steel studs or timber studs\*) lined on both faces with minimum 2 layers of 12.5 mm thick boards.

#### Rigid walls:

The wall must have a minimum thickness of 100 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m<sup>3</sup>.

#### Rigid floors:

The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m<sup>3</sup>.

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period. First service support should be fitted at 300 mm from the fire seal in walls and 250 mm in floors.



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### Installation Instructions

1. Ensure the faces of the aperture opening are free of dust and any other contaminants. The faces may be moistened for better adhesion.
2. Fix a suitable pipe wrap around the service penetration and fasten with the tape as tightly as possible in order to prevent any excess opening between the pipe wrap and the service.
3. In floors, only one pipe wrap is required to be installed flush with the soffit so that the edge of the wrap is visible from the underside when back-filled. For walls it is normal to fit a wrap on both sides of the wall, again with the edge just visible. Please see detail drawings of installation methods on pages 4 to 9.
4. When installing pipe wraps in hollow floor slabs or boards, level the fire seal with the soffit side. Ensure there is sufficient thickness of concrete below the void for the depth of the fire seal. Where this is not the case, tubular voids should be filled with stone wool normally the same thickness as the depth of the floor slab.
5. Once the wrap is securely installed, fire seal the empty

aperture surrounding the pipe wraps as follows:  
Floors with Knauf FP Mortar: Install a cast shutter plate or board. Make sure that this achieves a very tight seal. Pour clean water into a suitable mixing vessel and pour enough mortar to obtain the required consistency. Pour or trowel the mortar onto the shutter making sure that it flows into all corners and around services. Apply a firm pressure to the mortar to eliminate any trapped air bubbles.

Walls with Knauf FPC Panel: Cut the required panels to suit the aperture dimensions and type and size of service penetrations. All exposed and cut edges of the panels can be sealed with Knauf FP Coating or Knauf FPA Acrylic prior to fitting which will act as an adhesive and ensure a smoke tight seal. All joints, gaps or imperfections in the installed seal must be sealed with Knauf FPA Acrylic on both sides.

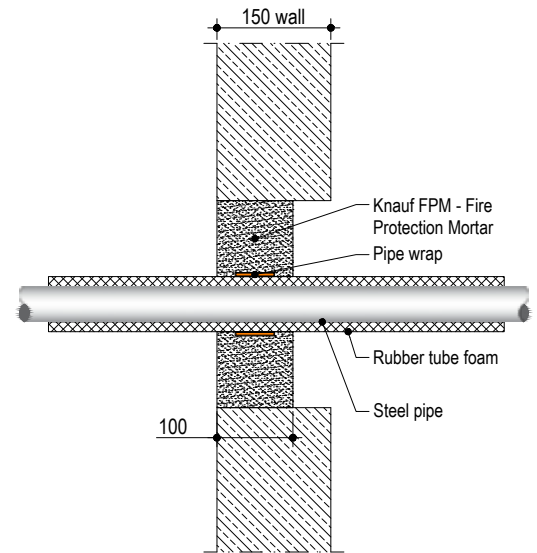
Please see Technical Data Sheets and Installation Instructions for Knauf FP Mortar and Knauf FPC Panel for additional details.

# PENETRATION SEALS | RIGID WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 150 MM

## › Knauf Firewrap penetration seals, in 100 mm thick Knauf FPM - fire protection mortar seals in rigid walls with insulated metal pipes

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture (min. separation 10 mm from seal edges), with 100 mm Knauf FPM - fire protection mortar to either side of the wall. Knauf Firewraps are required to be centrally within the seal for pipes with combustible insulation. Maximum seal size 2400 mm wide x 1200 mm high.

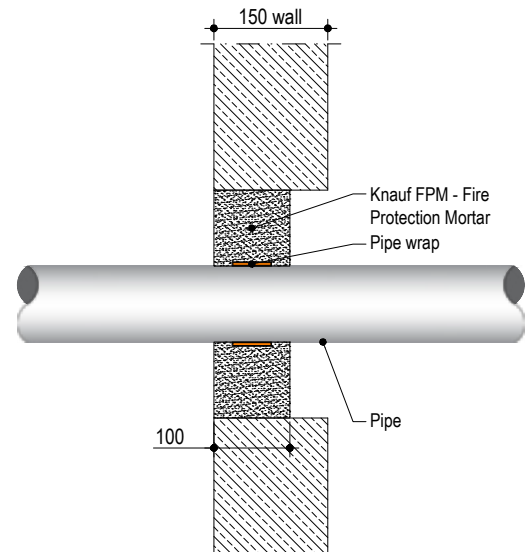


Services	Wrap	Insulation	Classification
Mild or stainless steel pipe			
Ø 40 mm / 1.5-14.2 mm wall	1 off 50 x 3.6mm Knauf Firewrap, fitted central	13 mm Elastomeric insulation minimum class B-s3,d0 or PE Foam insulation	EI 240 C/U
Ø 165 mm / 4.5-14.2 mm wall		9 mm Elastomeric insulation minimum class B-s3,d0 or PE Foam insulation	E 240 C/U, EI 30 C/U
Ø 40 mm / 1.5-14.2 mm wall	1 off 50 x 1.8mm Knauf Firewrap, fitted central	13 - 19 mm Elastomeric insulation minimum class B-s3,d0 or PE Foam insulation	E 240 C/U, EI 60 C/U
Ø 50 mm / 1.6-14.2 mm wall			
Ø 60 mm / 1.7-14.2 mm wall			
Ø 75 mm / 1.9-14.2 mm wall			
Ø 90 mm / 2.0-14.2 mm wall			
Ø 100 mm / 2.1-14.2 mm wall			
Ø 115 mm / 2.3-14.2 mm wall			
Ø 140 mm / 2.6-14.2 mm wall			
Ø 165 mm / 2.8-14.2 mm wall			
Ø 40 mm / 1.5-14.2 mm wall			
Ø 50 mm / 1.8-14.2 mm wall			
Ø 60 mm / 2.0-14.2 mm wall			
Ø 75 mm / 2.3-14.2 mm wall			
Ø 90 mm / 2.7-14.2 mm wall			
Ø 100 mm / 2.9-14.2 mm wall			
Ø 115 mm / 3.3-14.2 mm wall			
Ø 140 mm / 3.9-14.2 mm wall			
Ø 165 mm / 4.5-14.2 mm wall			

### › Knauf Firewrap penetration seals, in 100 mm thick Knauf FPM - fire protection mortar seals in rigid walls with plastic pipes

**Penetration Seal:** Plastic pipes fitted at any position within the aperture (min. separation 10 mm from seal edges), with 100 mm Knauf FPM - fire protection mortar to either side of the wall. Knauf Firewraps are required to be centrally within the seal. Maximum seal size 2400 mm wide x 1200 mm high.

Services	Wrap	Insulation	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1			
Ø 315 mm / 9.2 mm wall	1 off 75 x 18 mm Knauf Firewrap, fitted central	None	EI 120 C/C



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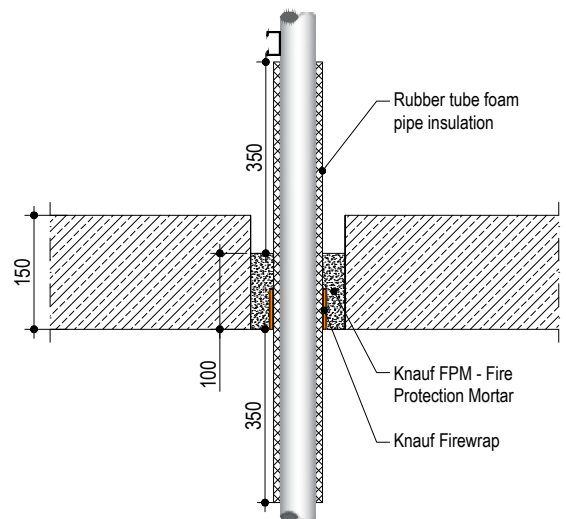
## PENETRATION SEALS | RIGID FLOOR CONSTRUCTIONS

WITH FLOOR THICKNESS OF MINIMUM 150 MM

### › Knauf Firewrap penetration seals, in 100 mm thick Knauf FPM - fire protection mortar seals in rigid floors, with insulated metal pipes

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture (min. separation 25 mm from seal edges and 30 mm from other services), with 100 mm Knauf FPM - fire protection mortar at any position within the floor. Knauf Firewraps are required to be fitted around combustible pipe insulation. Maximum seal size 1200 x 2400 mm.

Services	Wrap	Insulation	Classification
Copper pipe			
Ø 12 mm / 1 mm wall	50 x 3.6 mm Knauf Firewrap fitted to the soffit	9 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	EI 240 C/C
Ø 12-54 mm / 1-1.2 mm wall		13-25 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	E 240 C/C, EI 60 C/C
Geberit Mepla MLC (PE-Xb/Aluminium/PE-HD pipe)			
16 mm diameter/2.25 mm wall	50 x 3.6 mm Knauf Firewrap fitted to the soffit	9 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	EI 240 C/C

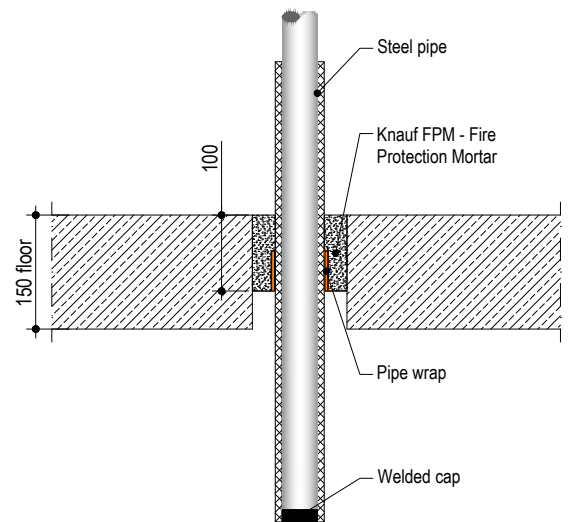


Services	Wrap	Insulation	Classification
Geberit Mepla MLC (PE-Xb/Aluminium/PE-HD pipe)			
Ø 16 mm / 2.25 mm wall Ø 20 mm / 2.5 mm wall Ø 26 mm / 3 mm wall Ø 32 mm / 3 mm wall Ø 40 mm / 3.5 mm wall Ø 50 mm / 4 mm wall Ø 63 mm / 4.5 mm wall Ø 75 mm / 4.7 mm wall	50 x 3.6 mm Knauf Firewrap fitted to the soffit 1 off 50 x 3.6mm Knauf Firewrap, fitted central	9-13 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	E 240 C/C, EI 90 C/C
Ø 16 mm / 2.25 mm wall Ø 20 mm / 2.5 mm wall Ø 26 mm / 3 mm wall Ø 32 mm / 3 mm wall Ø 40 mm / 3.5 mm wall Ø 50 mm / 4 mm wall Ø 63 mm / 4.5 mm wall Ø 75 mm / 4.7 mm wall		13-25 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	E 180 C/C, EI 90 C/C

› **Knauf Firewrap penetration seals, in 100 mm thick Knauf FPM - fire protection mortar seals in rigid floors, with insulated metal pipes**

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges and 30 mm from other services), with 100 mm Knauf FPM - fire protection mortar to the top surface of the floor. Knauf Firewraps are required to be fitted around combustible pipe insulation. Maximum seal size 2400 mm x 1200 mm.

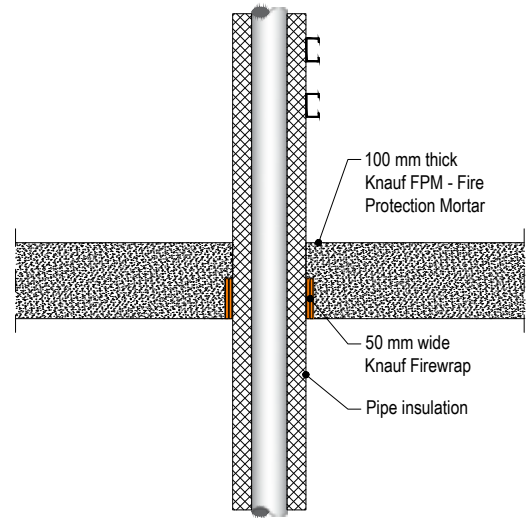
Services	Wrap	Insulation	Classification
Mild or stainless steel pipe			
Ø 40 mm / -14.2 mm wall Ø 40 mm / 1.5-14.2 mm wall Ø 50 mm / 1.6-14.2 mm wall Ø 60 mm / 1.7-14.2 mm wall Ø 75 mm / 1.9-14.2 mm wall Ø 90 mm / 2.0-14.2 mm wall Ø 100 mm / 2.1-14.2 mm wall Ø 115 mm / 2.3-14.2 mm wall Ø 140 mm / 2.6-14.2 mm wall Ø 165 mm / 2.8-14.2 mm wall	1 off 50 x 1.8 mm Knauf Firewrap, fitted at soffit	13 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	EI 180 C/U
		13 - 19 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	E 180 C/U, EI 120 C/U



› **Knauf Firewrap penetration seal for insulated metal pipes, in Knauf FPM - fire protection mortar Seal, in rigid floors**

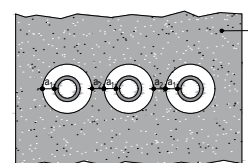
Penetration Seal: CS (Continuous Sustained) insulated metallic pipes sealed with Knauf Firewraps, fitted at any position within the aperture, with 100 mm Knauf FPM - fire protection mortar Seal. Minimum separation between penetration seals and seal edges of 30 mm (Configuration 1 & 2).

Mild or stainless steel pipe	Insulation	Knauf Firewraps	Classification
Ø 40 mm / 1-14.2 mm wall	25 mm thick Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	50 x 3.6 mm (2 x 1.8 layer)	EI 240 C/U
Ø 40 mm / 1-14.2 mm wall			
Ø 50 mm / 1.2-14.2 mm wall			
Ø 60 mm / 1.4-14.2 mm wall			
Ø 75 mm / 1.6-14.2 mm wall			
Ø 90 mm / 1.9-14.2 mm wall			
Ø 100 mm / 2.1-14.2 mm wall			
Ø 115 mm / 2.4-14.2 mm wall			
Ø 140 mm / 2.9-14.2 mm wall			
Ø 165 mm / 3.4-14.2 mm wall			
Ø 180 mm / 3.6-14.2 mm wall			
Ø 200 mm / 4.0-14.2 mm wall			
Ø 219 mm / 4.3-14.2 mm wall			
Ø 250 mm / 5.0-14.2 mm wall			
Ø 300 mm / 5.9-14.2 mm wall			
Ø 324 mm / 6.35-14.2 mm wall			
Ø 40 mm / 1-14.2 mm wall	25-50mm thick Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	50 x 5.4 mm (3 x 1.8 layer)	EI 120 C/U
Ø 50 mm / 1.2-14.2 mm wall			
Ø 60 mm / 1.4-14.2 mm wall			
Ø 75 mm / 1.6-14.2 mm wall			
Ø 90 mm / 1.9-14.2 mm wall			
Ø 100 mm / 2.1-14.2 mm wall			
Ø 115 mm / 2.4-14.2 mm wall			
Ø 140 mm / 2.9-14.2 mm wall			
Ø 165 mm / 3.4-14.2 mm wall			
Ø 180 mm / 3.6-14.2 mm wall			
Ø 200 mm / 4.0-14.2 mm wall			
Ø 219 mm / 4.3-14.2 mm wall			
Ø 250 mm / 5.0-14.2 mm wall			
Ø 300 mm / 5.9-14.2 mm wall			
Ø 324 mm / 6.35-14.2 mm wall			

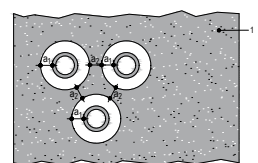


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Configuration 1



Configuration 2

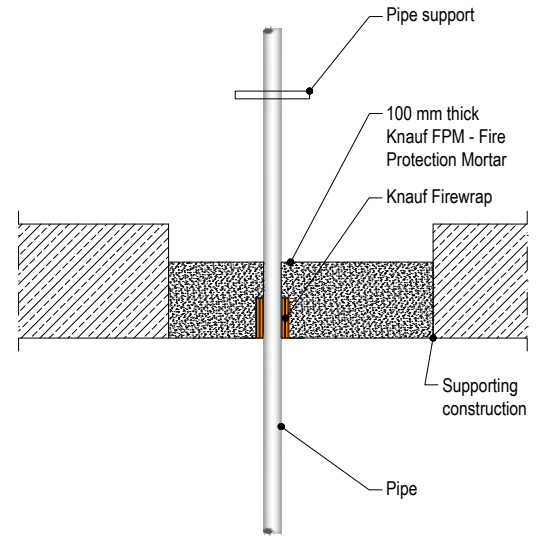


- Key
- 1 Supporting construction
  - a1 Pipe / top edge of seal separation
  - a2 Pipe / side edge of seal separation
  - a3 Pipe / pipe separation

› **Knauf Firewrap penetration seals, in 100 mm deep Knauf FPM - fire protection mortar seals in rigid floors, with plastic pipes**

Penetration Seal: Plastic pipes fitted at any position within the aperture, with 100 mm Knauf FPM - fire protection mortar to the either surface of the floor or anywhere between. Knauf Firewraps are required to be fitted to the bottom of the seal, as indicated below. Minimum separation between penetration seals and seal edges of 30 mm (Configuration 1 & 2).

Services	Wrap	Maximum aperture	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1			
Up to Ø 40 mm / 1.8-3.7 mm wall	50 x 1.8 mm	2400 x 1200 mm	E 180 U/U, EI 120 U/U
Up to Ø 110 mm / 3.0-6.6 mm wall	50 x 3.6 mm		EI 240 U/C
Up to Ø 125 mm / 3.5-7.4 mm wall	50 x 7.2 mm		EI 120 U/C
Up to Ø 160 mm / 4.5 mm wall	50 x 10.8 mm		EI 240 C/C
Up to Ø 160 mm / 4.5-9.5 mm wall	50 x 10.8 mm		EI 90 C/C
Up to Ø 110 mm / 2.7-6.6 mm wall, containing up to 90mm Ø bundle of up to 14 mm Ø telecom cables	50 x 3.6 mm		EI 120 U/C
PP pipe according to EN 1451-1			
Up to Ø 40 mm / 1.8-4.4 mm wall	-	2400 x 1200 mm	EI 120 U/C
Up to Ø 40 mm / 1.8-5.5 mm wall	50 x 1.8 mm		EI 120 U/U
Up to Ø 50 mm / 2.5-5.5 mm wall	50 x 3.6 mm		EI 240 C/C
Up to Ø 75 mm / 3.5-5.5 mm wall	50 x 3.6 mm		EI 240 C/C
Up to Ø 110 mm / 2.7-6.3 mm wall	50 x 3.6 mm		EI 240 U/C
Up to Ø 125 mm / 3.4-11.4 mm wall	50 x 7.2 mm		EI 240 U/C
Up to Ø 160 mm / 4.9-14.6 mm wall	50 x 10.8 mm		EI 240 U/C
Up to Ø 110 mm / 3.4-6.3 mm wall, containing up to 90mm Ø bundle of up to 14 mm Ø telecom cables	50 x 3.6 mm		EI 60 U/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Up to Ø 40 mm / 2.0-4.4 mm wall	-	2400 x 1200 mm	EI 120 U/C
Up to Ø 40 mm / 2.4-3.7 mm wall	50 x 1.8 mm		EI 240 U/U
Up to Ø 110 mm / 3.4-10.0 mm wall	50 x 3.6 mm		EI 120 U/C
Up to Ø 125 mm / 3.9-11.4 mm wall	50 x 7.2 mm		EI 240 U/C
Up to Ø 160 mm / 4.9-14.6 mm wall	50 x 10.8 mm		EI 120 U/C
Up to Ø 250 mm / 7.8 mm wall	75 x 12.6 mm		EI 180 C/C
Up to Ø 110 mm / 2.7-10.0 mm wall, containing up to 90mm Ø bundle of up to 14 mm Ø telecom cables	50 x 3.6 mm		E 120 U/C, EI 60 U/C



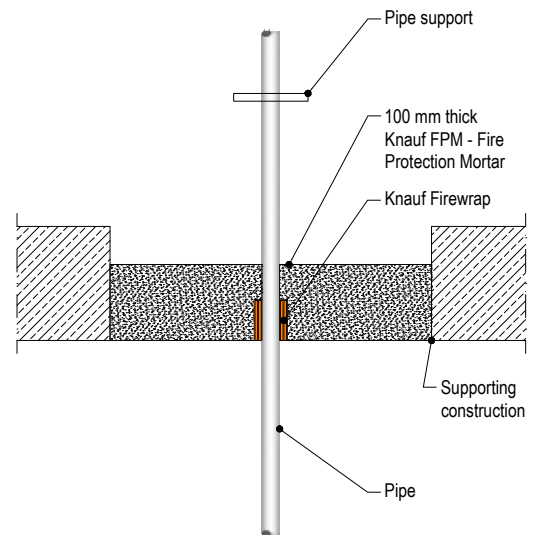
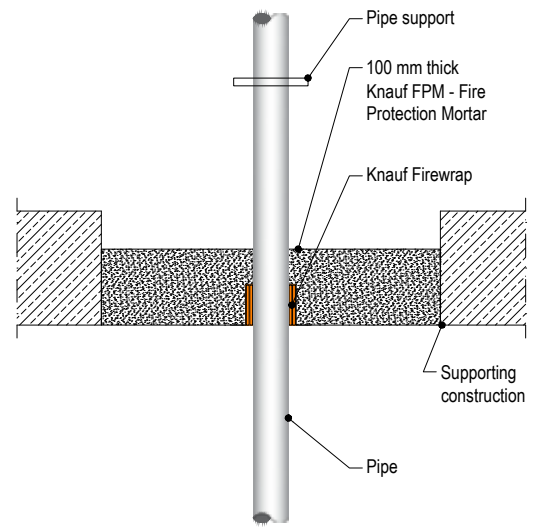
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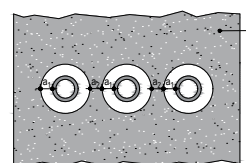
› **Knauf Firewrap penetration seals, in 100 mm thick Knauf FPM - fire protection mortar seals in rigid floors, with plastic pipes**

**Penetration Seal:** Plastic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges and from other services), with 100 mm Knauf FPM - fire protection mortar to the bottom surface of the floor. Knauf Firewraps are required to be fitted to the bottom of the seal, as indicated below. Maximum seal size 2400 mm x 1200 mm.

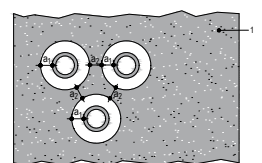
Services	Wrap	Permitted configuration for seal separation	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1			
Ø 160 mm / 9.5 mm wall	50 x 10.8 mm (6 x 1.8 layers)	1 & 2	EI 90 U/C
Uponor Wirsbo PEX pipe in pipe system according to ISO 15875			
Maximum Ø 54 mm/0.4 mm wall thickness (outer pipe), Ø 28 mm/4.0 mm wall thickness (inner pipe)	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 C/C
Rehau Raupiano Plus PP-DD according to DIN 4102			
Ø 40-50 mm / 1.8-2.7 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/U
Ø 75-110 mm / 2.7 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/C
Ø 125 mm / 3.1 mm wall thickness	50 x 7.2 mm (4 x 1.8 layers)	1 & 2	E 240 U/C, EI 120 U/C
Ø 160 mm / 3.9 mm wall thickness	50 x 10.8 mm (6 x 1.8 layers)	1 & 2	EI 120 U/C
Polo-Kal NG Poloplast PP-MV according to DIN 4102			
Ø 32-110 mm / 3.4 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 180 U/C
Ø 125 mm / 3.9 mm wall thickness	50 x 7.2 mm (4 x 1.8 layers)	1 & 2	EI 240 U/C
Ø 160 mm / 4.3 mm wall thickness	50 x 10.8 mm (6 x 1.8 layers)	1 & 2	EI 240 U/C
Aquatherm Green SDR9 MF PP-RP according to ISO 21003			
Ø 32 mm / 3.6 mm wall thickness	50 x 1.8 mm (1 x 1.8 layers)	1 & 2	EI 240 C/C
Ø 40-50 mm / 5.6-12.3 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 240 C/C
Ø 63-110 mm / 12.3 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 240 C/C
Wavin SiTech + PP-M B according to EN 13501-1			
Ø 32-50 mm / 1.8-3.4 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/U
Ø 75-110 mm / 3.4 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/C
Gilbert Silent PP according to DIN 4102			
Ø 32-50 mm / 1.8-3.4 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/U
Ø 75-110 mm / 3.4 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/C



Configuration 1



Configuration 2



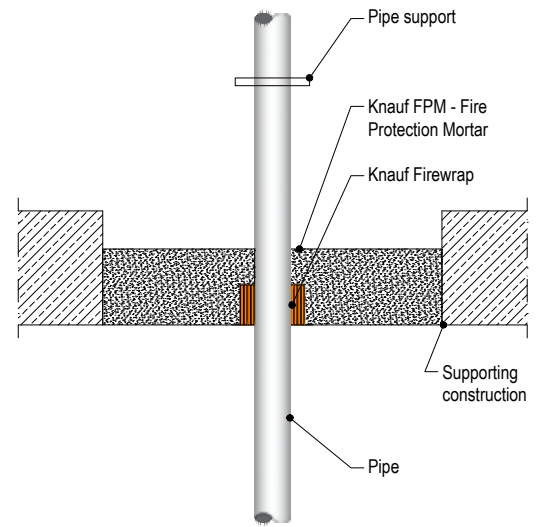
Key

- 1 Supporting construction
- a1 Pipe / top edge of seal separation
- a2 Pipe / side edge of seal separation
- a3 Pipe / pipe separation

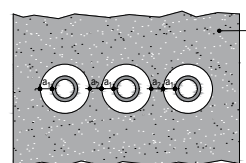
› **Knauf Firewrap penetration seals, in Knauf FPM - fire protection mortar seals in rigid floors, with plastic pipes**

Penetration Seal: Plastic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges and from other services), with Knauf FPM - fire protection mortar to the bottom surface of the floor. Knauf Firewraps are required to be fitted to the bottom of the seal, as indicated below. Maximum seal size 2400 mm x 1200 mm.

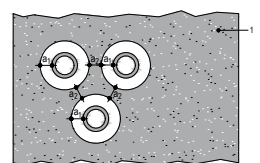
Services	Wrap	Permitted configuration for seal separation	Mortar depth	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1				
Ø 41 mm, wall thickness 1.8-3.7 mm to Ø 125 mm, wall thickness 4.8-7.4 mm	50 x 7.2 mm (4 x 1.8 layers)	1 & 2	150 mm	EI 60 U/U
Ø 125 mm / 7.4 mm wall thickness	50 x 7.2 mm (4 x 1.8 layers)	1 & 2	150 mm	EI 120 U/U
Ø 126 mm, wall thickness 4.8-7.4 mm to Ø 160 mm, wall thickness 9.5 mm	75 x 10.8 mm (6 x 1.8 layers)	1	150 mm	E 120 U/U, EI 30 U/U
Ø 160 mm / 9.5 mm wall thickness	75 x 7.2 mm (4 x 1.8 layers)	1	150 mm	E 120 U/U, EI 30 U/U
Ø 160 mm / 4.5-9.5 mm wall thickness	50 x 10.8 mm (6 x 1.8 layers)	1 & 2	120 mm	EI 120 U/C, EI 120 C/C
Ø 315 mm / 7.7 mm wall thickness	75 x 18 mm (10 x 1.8 layers)	1	120 mm	EI 120 C/C
Ø 161 mm, wall thickness 4.5-9.5 mm to Ø 315 mm, wall thickness 7.7-12.1 mm	75 x 18 mm (10 x 1.8 layers)	1	120 mm	EI 90 C/C
Ø 315 mm / 12.1 mm wall thickness	75 x 18 mm (10 x 1.8 layers)	1	120 mm	EI 90 C/C
PP pipe according to EN 1451-1				
Ø 41 mm, wall thickness 1.8-5.5 mm to Ø 160 mm, wall thickness 4.9-14.6 mm	75 x 10.8 mm (6 x 1.8 layers)	1 & 2	150 mm	EI 120 U/C
Ø 160 mm / 14.6 mm wall	75 x 7.2 mm (4 x 1.8 layers)	1 & 2	150 mm	EI 240 U/U
Ø 161 mm, wall thickness 4.9-14.6 mm to Ø 200 mm, wall thickness 4.9-18.2 mm	75 x 10.8 mm (6 x 1.8 layers)	1 & 2	120 mm	EI 240 C/C
Ø 201 mm, wall thickness 4.9-18.2 mm to Ø 315 mm, wall thickness 7.7-28.6 mm	75 x 18 mm (10 x 1.8 layers)	N/A	150 mm	EI 60 C/C
Ø 315 mm / 7.7 mm wall	75 x 18 mm (10 x 1.8 layers)	N/A	150 mm	EI 180 C/C
Ø 315 mm / 7.7-28.6 mm wall	75 x 18 mm (10 x 1.8 layers)	1	150 mm	EI 60 C/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1				
Ø 126 mm, wall thickness 3.9-11.4 mm to Ø 160 mm, wall thickness 14.6	75 x 18 mm (10 x 1.8 layers)	N/A	150 mm	E 240 U/U, EI 120 U/U
160 mm Ø / 14.6 mm wall	75 x 7.2 mm (4 x 1.8 layers)	1 & 2	150 mm	E 240 U/U, EI 120 U/U
Ø 161 mm, wall thickness 4.9-14.6 mm to Ø 315 mm, wall thickness 9.7-18.7 mm	75 x 18 mm (10 x 1.8 layers)	N/A	150 mm	EI 60 C/C



Configuration 1



Configuration 2

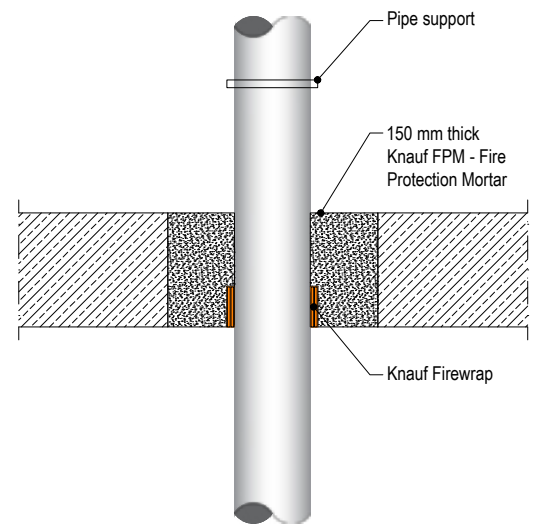


- Key
- 1 Supporting construction
  - a1 Pipe / top edge of seal separation
  - a2 Pipe / side edge of seal separation
  - a3 Pipe / pipe separation

### › Knauf Firewrap penetration seals, in 150 mm thick Knauf FPM - fire protection mortar seals in rigid floors, with plastic pipes

**Penetration Seal:** Plastic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges and from other services), with 150 mm Knauf FPM - fire protection mortar to the bottom surface of the floor. Knauf Firewraps are required to be fitted to the bottom of the seal, as indicated below. Maximum seal size 2400 mm x 1200 mm.

Services	Wrap	Permitted configuration for seal separation	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1			
Up to Ø 40 mm/1.8-3.7 mm wall thickness	50 x 1.8 mm	1 & 2	EI 120 U/U
Up to Ø 125 mm/4.8-7.4 mm wall thickness	50 x 7.2 mm		EI 60 U/U
Up to Ø 160 mm/9.5 mm wall thickness	75 x 7.2 mm		E 120 U/U, EI 30 U/U
PP pipe according to EN 1451-1			
Up to Ø 40 mm/1.8-5.5 mm wall thickness	50 x 1.8 mm	1 & 2	EI 120 U/U
Up to Ø 125 mm/11.4 mm wall thickness	50 x 7.2 mm		EI 240 U/U
Up to Ø 160 mm/14.6 mm wall thickness	75 x 7.2 mm		EI 240 U/U
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Up to Ø 40 mm/2.4-3.7 mm wall thickness	50 x 1.8 mm	1 & 2	EI 240 U/U
Up to Ø 110 mm/3.4-10 mm wall thickness	75 x 5.4 mm		EI 240 U/U
Up to Ø 125 mm/11.4 mm wall thickness	50 x 7.2 mm		EI 240 U/U
Up to Ø 160 mm/4.9-14.6 mm wall thickness	75 x 7.2 mm		EI 120 U/U

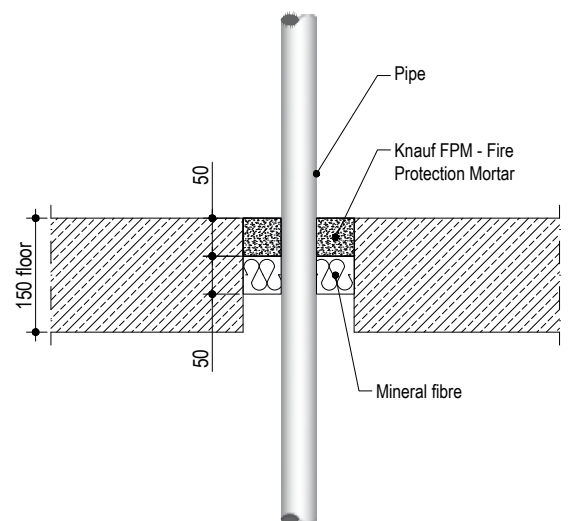


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### › Knauf Firewrap penetration seals, in 50 mm deep Knauf FPM - fire protection mortar seals, backed with 50 mm stone wool, in rigid floors, with plastic pipes

**Penetration Seal:** Plastic pipes (single) fitted at any position within the aperture (min. separation 30 mm from seal edges and 30 mm from other services), with 50 mm Knauf FPM - fire protection mortar flush with the top of floor, backed with 50 mm stone wool 150 kg/m<sup>3</sup>. Knauf Firewraps are required to be fitted into the mortar seal.

Services	Wrap	Maximum aperture	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Ø 110 mm / 4.3 mm wall	50 x 2 mm	2400 x 1200 mm	EI 60 C/C



# PENETRATION SEALS | FLEXIBLE AND RIGID WALL CONSTRUCTIONS

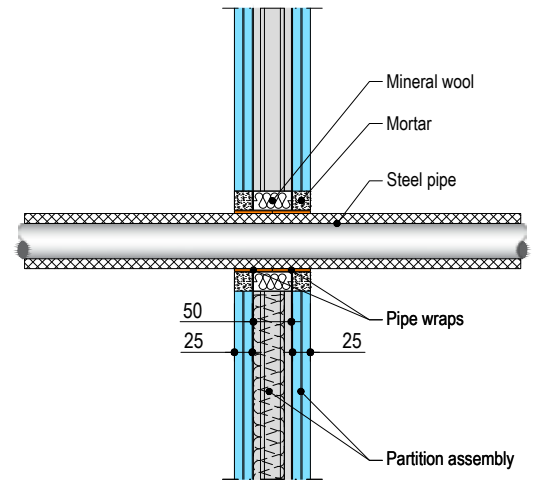
WITH WALL THICKNESS OF MINIMUM 100 MM

## > Knauf Firewrap penetration seal for insulated metal pipes, in seals comprising 25 mm deep Knauf FPM - fire protection mortar to both faces backed with 50 mm mineral fibre board, installed within flexible or rigid wall

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges), with 25 mm Knauf FPM - fire protection mortar to both sides of the wall, backed with 50 mm stone wool board 150 kg/m<sup>3</sup> or 50 mm Knauf FPM - fire protection mortar to both sides of the wall without backing\*.

Knauf Firewraps are required to be fitted to both faces of the seal.

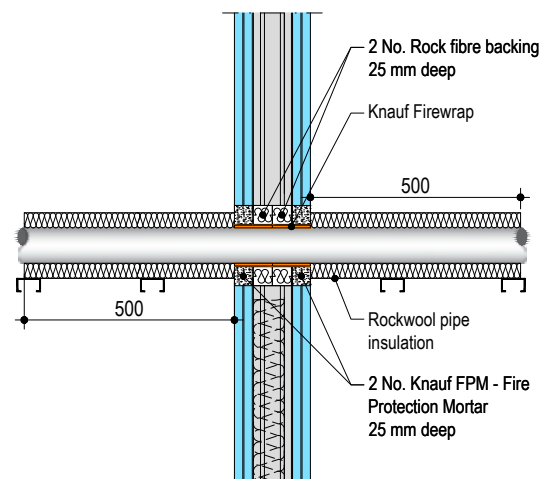
\* Maximum seal size of 2400 mm wide x 1200 mm high



Services	Wrap	Insulation	Classification
Mild or stainless steel pipe			
Ø 40 mm/1.0-14.2 mm wall thickness	2 off 50 x 1.8 mm Knauf Firewrap, one fitted flush to each face of seal	13 mm Elasto- meric insulation minimum class B-s3,d0 or PE Foam insulation	EI 120 C/U
Ø 40 mm/1.0-14.2 mm wall thickness	2 off 50 x 3.6 mm Knauf Firewrap, one fitted flush to each face of seal		E 120 C/U, EI 60 C/U
Ø 50 mm/1.3-14.2 mm wall thickness			
Ø 60 mm/1.6-14.2 mm wall thickness			
Ø 75 mm/2.0-14.2 mm wall thickness			
Ø 90 mm/2.4-14.2 mm wall thickness			
Ø 100 mm/2.7-14.2 mm wall thickness			
Ø 115 mm/3.1-14.2 mm wall thickness			
Ø 140 mm/3.8-14.2 mm wall thickness			
Ø 165 mm/4.5-14.2 mm wall thickness			

## > Knauf Firewrap penetration seal for composite pipes, in seals comprising 25 mm deep Knauf FPM - fire protection mortar to both faces backed with 50 mm mineral fibre board, installed within flexible or rigid wall

Penetration Seal: 500 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic (and composite) pipes (single) fitted at any position within the aperture (min. separation 30 mm from seal edges and from other services), with 25 mm Knauf FPM - fire protection mortar to both sides of the wall backed with 50 mm stone wool board 150 kg/m<sup>3</sup>. Maximum seal size 2400 mm wide x 1200 mm high.

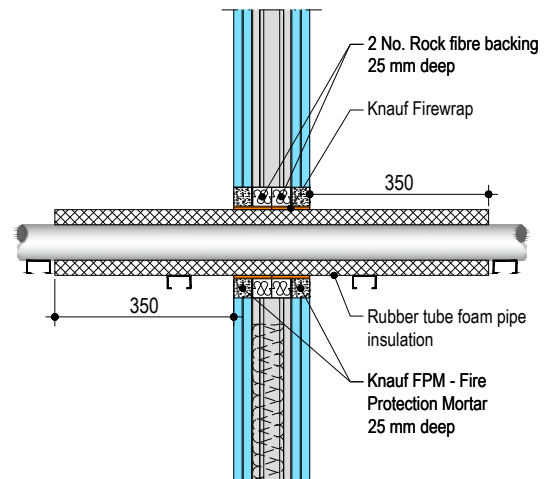


Services	Insulation	Classification
Geberit Mepla MLC (PE-Xb/Aluminium/PE-HD) pipe		
Ø 16 mm / 2.25 mm wall	Minimum 20 mm stone wool, minimum 80 kg/m <sup>3</sup>	EI 120 C/C
Ø 20 mm / 2.5 mm wall		
Ø 26 mm / 3.0 mm wall		
Ø 32 mm / 3.0 mm wall		
Ø 40 mm / 3.5 mm wall		
Ø 50 mm / 4.0 mm wall		
Ø 63 mm / 4.5 mm wall		
Ø 75 mm / 4.7 mm wall		

› **Knauf Firewrap penetration seal for insulated metal & composite pipes, in seals comprising 25 mm deep Knauf FPM - fire protection mortar to both faces backed with 50 mm mineral fibre board, installed within flexible or rigid wall**

**Penetration Seal:** CS insulated metallic and composite pipes fitted at any position within the aperture (min. separation 25 mm from seal edges), with 25 mm Knauf FPM - fire protection mortar to both sides of the wall, backed with 25 mm stone wool 150 kg/m<sup>3</sup>. Knauf Firewraps are required to be fitted to both faces of the seal. Maximum seal size 2400 mm wide x 1200 mm long.

Services	Wrap	Insulation	Classification
Copper pipe			
Ø 12-54 mm / 1.0-1.2 mm wall	50 x 3.6 mm Knauf Firewrap fitted to both sides of the seal	9-25 mm Elastomeric insulation min class B-s3, d0 or PE Foam insulation	EI 120 C/C
Geberit Mepla MLC (PE-Xb/Aluminium/PE-HD pipe)			
Ø 16 mm / 2.25 mm wall	50 x 3.6 mm Knauf Firewrap fitted to both sides of the seal	9-25 mm Elastomeric insulation minimum class B-s3, d0 or PE Foam insulation	EI 120 C/C
Ø 20 mm / 2.5 mm wall			
Ø 26 mm / 3.0 mm wall			
Ø 32 mm / 3.0 mm wall			
Ø 40 mm / 3.5 mm wall			
Ø 50 mm / 4.0 mm wall			
Ø 63 mm / 4.5 mm wall			
Ø 75 mm / 4.7 mm wall			

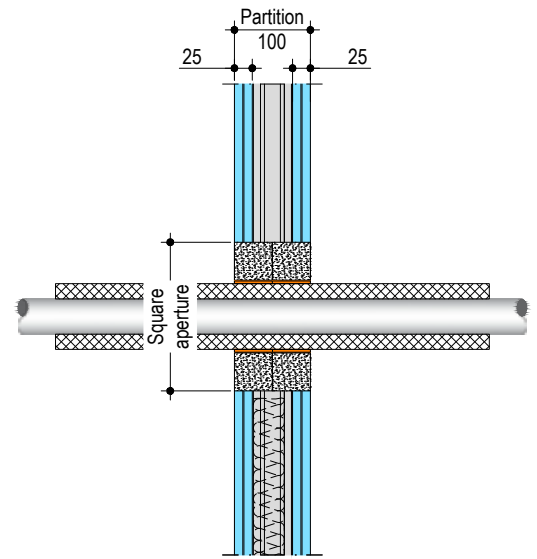


› **Knauf Firewrap penetration seal for insulated metal pipes, in seals comprising 50 mm deep Knauf FPM - fire protection mortar to both faces, installed within flexible or rigid wall**

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges), 50 mm Knauf FPM - fire protection mortar to both sides of the wall without backing\*. Knauf Firewraps are required to be fitted to both faces of the seal.

\* Maximum seal size of 2400 mm wide x 1200 mm high

Services	Wrap	Insulation	Classification
Mild or stainless steel pipe			
Ø 40 mm/1.0-14.2 mm wall thickness	2 off 50 x 3.6 mm Knauf Fire-wrap, one fitted flush to each face of seal	13 -32 mm Elastomeric insulation minimum class B-s3,d0 or PE Foam insulation	E 120 C/U, EI 60 C/U
Ø 50 mm/1.3-14.2 mm wall thickness			
Ø 60 mm/1.6-14.2 mm wall thickness			
Ø 75 mm/2.0-14.2 mm wall thickness			
Ø 90 mm/2.4-14.2 mm wall thickness			
Ø 100 mm/2.7-14.2 mm wall thickness			
Ø 115 mm/3.1-14.2 mm wall thickness			
Ø 140 mm/3.8-14.2 mm wall thickness			
Ø 165 mm/4.5-14.2 mm wall thickness			



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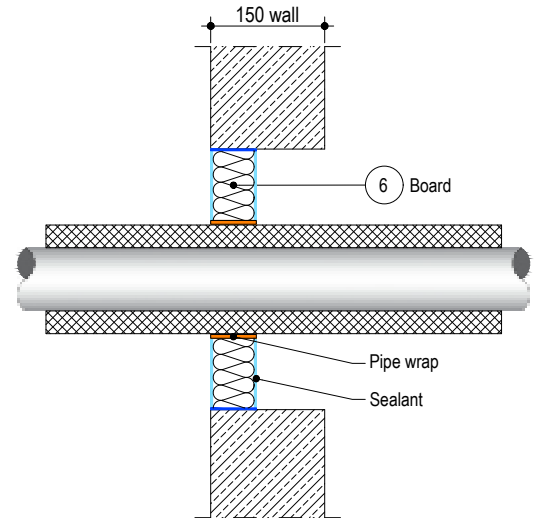
# PENETRATION SEALS | RIGID WALL CONSTRUCTIONS

WITH FLOOR THICKNESS OF MINIMUM 150 MM

## > Knauf Firewrap penetration seal for insulated metal pipes, in 1x Knauf FPC panel 2-S seals, in rigid walls

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture, with 60 mm Knauf FPC panel 2-S to either side of the wall (or anywhere in between). Knauf Firewraps are required to be fitted around combustible pipe insulation.

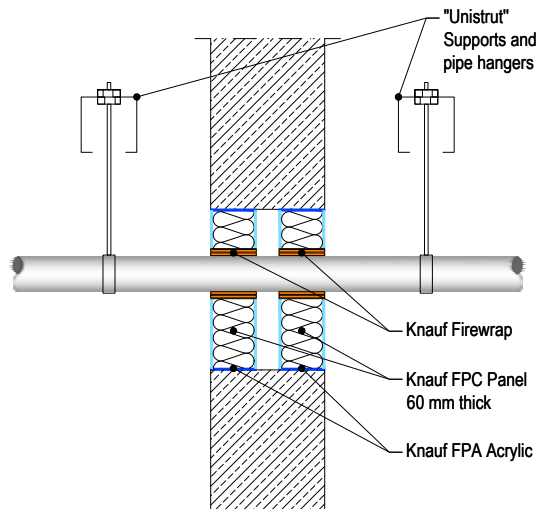
Services	Wrap	Insulation	Classification
Mild or stainless steel pipe			
Ø 165 mm / 4.5-14.2 mm wall	50 x 1.8 mm Knauf Firewrap fitted centrally	9-25 mm Elastomeric insulation minimum class B-s3,d0 or PE Foam insulation	E 120 U/C, E 120 C/U, E 120 C/C, EI 45 U/C, EI 45 C/U, EI 45 C/C



## > Knauf Firewrap penetration seal for insulated metal pipes, in 2x Knauf FPC panel 2-S seals, in rigid walls

Penetration Seal: Plastic pipes fitted at any position within the aperture, with 60 mm Knauf FPC panel 2-S to both sides of the wall. Knauf Firewraps are required to be fitted around pipes. Min. 30 mm separation between pipes.

Services	Wrap	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Up to Ø 40 mm / 1.9-3.0 mm wall	50 x 1.8 mm	EI 240 U/C
Up to Ø 110 mm / 2.7-6.6 mm wall	50 x 3.6 mm	
Up to Ø 125 mm / 4.7-7.4 mm wall	50 x 7.2 mm	
Up to Ø 160 mm / 4.0-9.5 mm wall	50 x 10.8 mm	
Up to Ø 315 mm / 7.7-12.1 mm wall thickness*	75 x 18 mm	EI 120 C/C
Up to Ø 400 mm / 9.8-15.3 mm wall thickness*	75 x 28.8 mm	EI 120 C/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Up to Ø 40 mm / 2.4-4.6 mm wall	50 x 1.8 mm	EI 240 U/C
Up to Ø 110 mm / 3.4-10.0 mm wall	50 x 3.6 mm	
Up to Ø 125 mm / 3.9-7.4 mm wall	50 x 7.2 mm	
Up to Ø 160 mm / 4.9-9.5 mm wall	50 x 10.8 mm	
PP pipe according to EN 1451-1		
Up to Ø 40 mm / 1.8-5.5 mm wall	50 x 1.8 mm	EI 240 U/C
Up to Ø 110 mm / 2.7-10.0 mm wall	50 x 3.6 mm	EI 240 C/C
Up to Ø 125 mm / 3.1-11.4 mm wall	50 x 7.2 mm	
Up to Ø 160 mm / 4.9-14.6 mm wall	50 x 10.8 mm	



\*Configuration 1 & 2

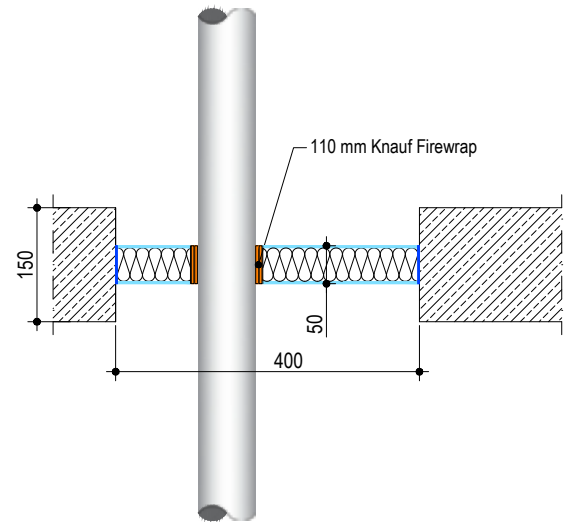
# PENETRATION SEALS | RIGID FLOOR CONSTRUCTIONS

WITH FLOOR THICKNESS OF MINIMUM 150 MM

## > Knauf Firewrap penetration seal for plastic pipes, in 1x Knauf FPC panel 2-S, in rigid floors

**Penetration Seal:** Combustible pipes fitted at any position within the aperture, with 50 mm Knauf FPC panel 2-S at mid-depth of the floor. Knauf Firewraps are required to be fitted around combustible pipe insulation. Maximum aperture size 2400 mm x 1200 mm.

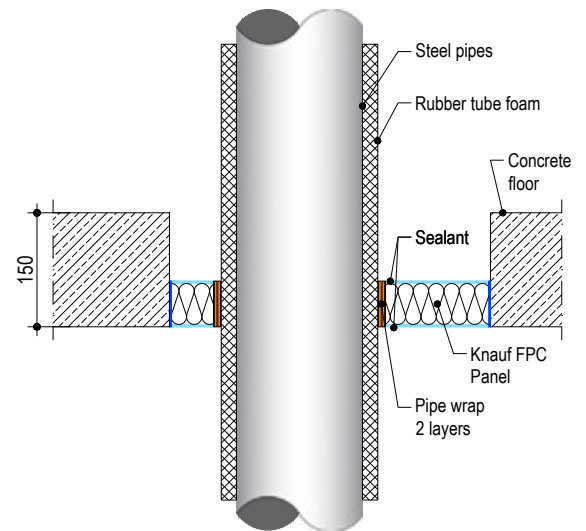
Services	Wrap	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1		
Ø 110 mm / 3.4 mm wall	50 x 3.6 mm Knauf Firewrap	EI 90 U/C, EI 90 C/C



## > Knauf Firewrap penetration seal for insulated metal pipes, in 1x Knauf FPC panel 2-S, in rigid floors

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture, with 60 mm Knauf FPC panel 2-S to either side of the floor (or anywhere in between). Knauf Firewraps are required to be fitted around combustible pipe insulation. Maximum aperture size 2400 mm x 1200 mm.

Services	Wrap	Insulation	Classification
Mild or stainless steel pipe			
Ø 165 mm / 4.5-14.2 mm wall	50 x 3.6 mm Knauf Firewrap fitted at bottom of seal	13 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	E 90 C/U, EI 45 C/U
		19 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	EI 90 C/U

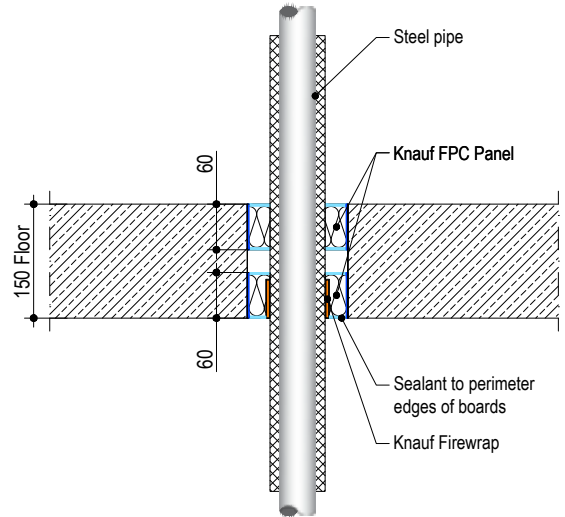


## > Knauf Firewrap penetration seal for insulated metal pipes in 2x Knauf FPC panel 2-S (separated), in rigid floors

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture, with 60 mm Knauf FPC panel 2-S to both sides of the floor. Knauf Firewraps are required to be fitted around combustible pipe insulation at the soffit. Maximum aperture size 2400 mm x 1200 mm.



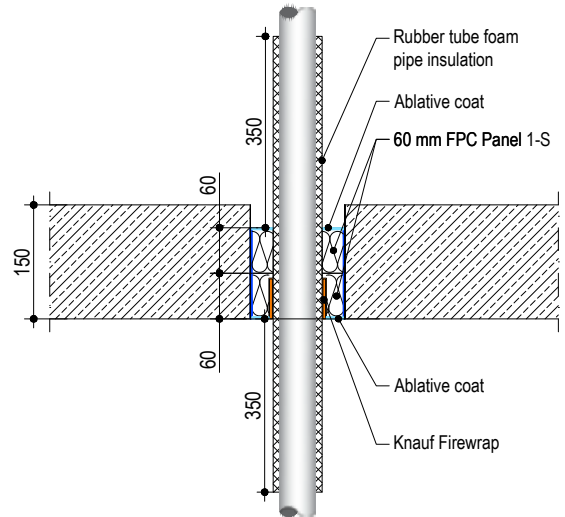
Services	Wrap	Insulation	Classification
Mild or stainless steel pipe			
Ø 40 mm / 1.0-14.2 mm wall	50 x 1.8 mm Knauf Firewrap	13 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	E 180 C/U, EI 120 C/U



› **Knauf Firewrap penetration seal for insulated metal pipes, in 2x Knauf FPC panel 2-S (back to back), in rigid floors**

Penetration Seal: CS (Continuous Sustained) insulated metallic and composite pipes fitted at any position within the aperture, with two layers of 60 mm Knauf FPC panel 1-S installed together to either side of the floor (or anywhere in between). Knauf Firewraps are required to be fitted around combustible pipe insulation at the bottom of the seal. Max. aperture size 2400 mm x 1200 mm.

Services	Wrap	Insulation	Classification
Copper pipe			
Ø 12-54 mm / 1.0-1.2 mm wall	50 x 3.6 mm Knauf Firewrap fitted to both sides of the seal	9-13 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	E240 C/C, EI 60 C/C
Ø 12-54 mm / 1.0-1.2 mm wall		13-25 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	E 180 C/C, EI 45 C/C



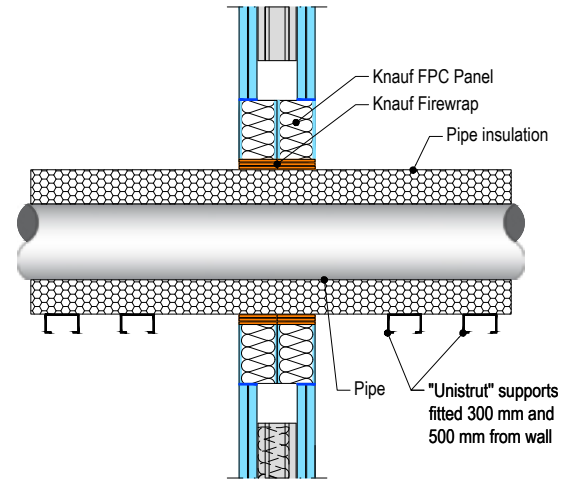
Geberit Mepla MLC (PE-Xb/Aluminium/PE-HD pipe)			
Ø 16 mm / 2.25 mm wall	50 x 3.6 mm Knauf Firewrap fitted to both sides of the seal	9 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	EI 120 C/C
Ø 20 mm / 2.5 mm wall			
Ø 26 mm / 3.0 mm wall			
Ø 32 mm / 3.0 mm wall			
Ø 40 mm / 3.5 mm wall			
Ø 50 mm / 4.0 mm wall			
Ø 63 mm / 4.5 mm wall			
Ø 75 mm / 4.7 mm wall		13-25 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	E 60 C/C, EI 45 C/C
Ø 16 mm / 2.25 mm wall			
Ø 20 mm / 2.5 mm wall			
Ø 26 mm / 3.0 mm wall			
Ø 32 mm / 3.0 mm wall			
Ø 40 mm / 3.5 mm wall			
Ø 50 mm / 4.0 mm wall			
Ø 63 mm / 4.5 mm wall			
Ø 75 mm / 4.7 mm wall			

# PENETRATION SEALS | FLEXIBLE WALL CONSTRUCTIONS

## > Knauf Firewrap penetration seal for insulated metal pipes, in 2x Knauf FPC panel 1-S in flexible or rigid walls

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture, with 50 mm Knauf FPC panel 1-S to both sides of the wall. Minimum separation between penetration seals and seal edges of 30 mm. Knauf Firewraps are required to be fitted around the pipe insulation.

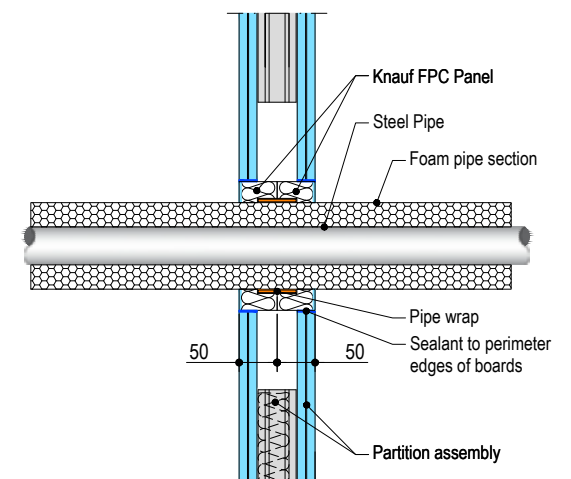
Mild or stainless steel pipe	Insulation	Knauf Firewraps	Classification
Ø 40 mm/1.0-14.2 mm wall thickness	32-50 mm thick Elastomeric insulation minimum class B-s3,d0 or PE Foam insulation	3 layers 50 x 1.8 mm	EI 90 C/U
Ø 50 mm/1.2-14.2 mm wall thickness			
Ø 60 mm/1.4-14.2 mm wall thickness			
Ø 75 mm/1.6-14.2 mm wall thickness			
Ø 90 mm/1.9-14.2 mm wall thickness			
Ø 100 mm/2.1-14.2 mm wall thickness			
Ø 115 mm/2.4-14.2 mm wall thickness			
Ø 140 mm/2.9-14.2 mm wall thickness			
Ø 165 mm/3.4-14.2 mm wall thickness			
Ø 180 mm/3.6-14.2 mm wall thickness			
Ø 200 mm/4.0-14.2 mm wall thickness			
Ø 219 mm/4.3-14.2 mm wall thickness			
Ø 250 mm/5.0-14.2 mm wall thickness			
Ø 300 mm/5.9-14.2 mm wall thickness			
Ø 324 mm/6.35-14.2 mm wall thickness			



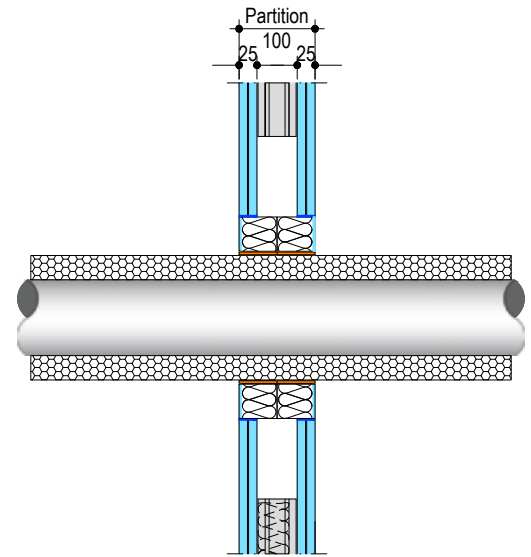
## > Knauf Firewrap penetration seal for insulated metal pipes, in 2x Knauf FPC panel 1-S, in flexible or rigid walls

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture, with 50 mm Knauf FPC panel 1-S to both sides of the wall. Knauf Firewraps are required to be fitted around the pipe insulation.

Services	Wrap	Insulation	Classification
Mild or stainless steel pipe			
Ø 40 mm / 1.0-14.2 mm wall	50 x 1.8 mm Knauf Firewrap fitted centrally	13 mm Elastomeric insulation minimum class B-s3,d0 or PE Foam insulation	EI 120 U/C, EI 120 U/U, EI 120 C/U, EI 120 C/C



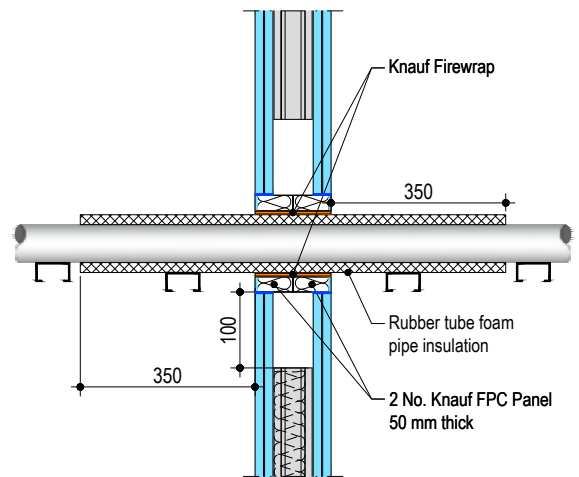
Services	Wrap	Insulation	Classification
Mild or stainless steel pipe			
Ø 40 mm / 1.0-14.2 mm wall	2 off 50 x 3.6 mm Knauf Firewrap, one fitted flush to each face of seal	13 - 32mm Elastomeric insulation minimum class B-s3,d0 or PE Foam insulation	E 120 U/C, E 120 U/U, E 120 C/U, E 120 C/C, EI 60 U/C, EI 60 U/U, EI 60 C/U, EI 60 C/C
Ø 50 mm / 1.3-14.2 mm wall			
Ø 60 mm / 1.6-14.2 mm wall			
Ø 75 mm / 2.0-14.2 mm wall			
Ø 90 mm / 2.4-14.2 mm wall			
Ø 100 mm / 2.7-14.2 mm wall			
Ø 115 mm / 3.1-14.2 mm wall			
Ø 140 mm / 3.8-14.2 mm wall			
Ø 165 mm / 4.5-14.2 mm wall			



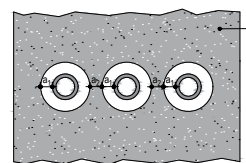
› **Knauf Firewrap penetration seal for insulated metal pipes, in 2x Knauf FPC panel 1-S, in flexible or rigid walls**

Penetration Seal: LS (Local Sustained) or CS (Continuous Sustained) insulated metallic and composite pipes (single) fitted at any position within the aperture, with 50 mm Knauf FPC panel 1-S to both sides of the wall. Knauf Firewraps are required to be fitted around the pipe to both sides of the seal.

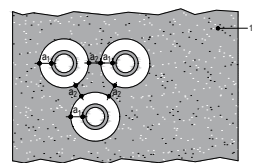
Services	Wrap	Insulation	Classification
Copper pipe			
Ø 12 mm / 1.0 mm wall	50 x 3.6 mm Knauf Firewrap fitted to both sides of the seal	9 mm Elastomeric insulation minimum class B-s3,d0 or PE Foam insulation	EI 120 C/C
Ø 12-54 mm / 1.0-1.2 mm wall		9-13 mm Elastomeric insulation minimum class B-s3,d0 or PE Foam insulation	E 120 C/C, EI 90 C/C
Ø 12-54 mm / 1.0-1.2 mm wall		13-25 mm Elastomeric insulation minimum class B-s3,d0 or PE Foam insulation	E 120 C/C, EI 60 C/C
Geberit Mepla MLC (PE-Xb/Aluminium/PE-HD pipe)			
Ø 16 mm / 2.25 mm wall	50 x 3.6 mm Knauf Firewrap fitted to both sides of the seal	9-25 mm Elastomeric insulation minimum class B-s3,d0 or PE Foam insulation	EI 120 C/C
Ø 20 mm / 2.5 mm wall			
Ø 26 mm / 3.0 mm wall			
Ø 32 mm / 3.0 mm wall			
Ø 40 mm / 3.5 mm wall			
Ø 50 mm / 4.0 mm wall			
Ø 63 mm / 4.5 mm wall			
Ø 75 mm / 4.7 mm wall			



Configuration 1



Configuration 2

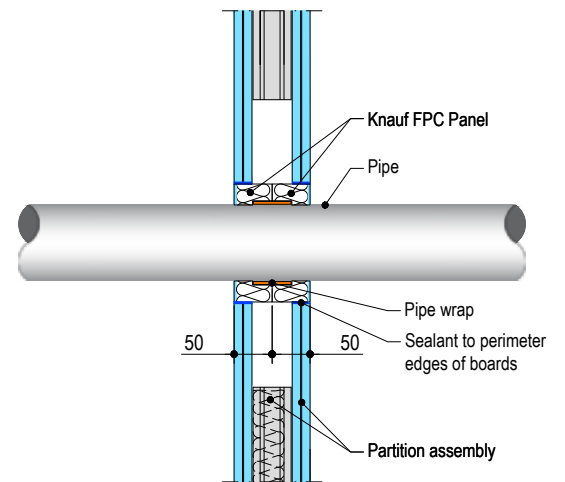


- Key
- 1 Supporting construction
  - a1 Pipe / top edge of seal separation
  - a2 Pipe / side edge of seal separation
  - a3 Pipe / pipe separation

› **Knauf Firewrap penetration seal for insulated metal pipes, in 2x Knauf FPC panel 1-S, in flexible or rigid walls**

Penetration Seal: Combustible pipes (single) fitted central within the aperture, with Knauf FPC panel 1-S to both sides of the wall. Knauf Firewraps are required to be fitted around the pipe.

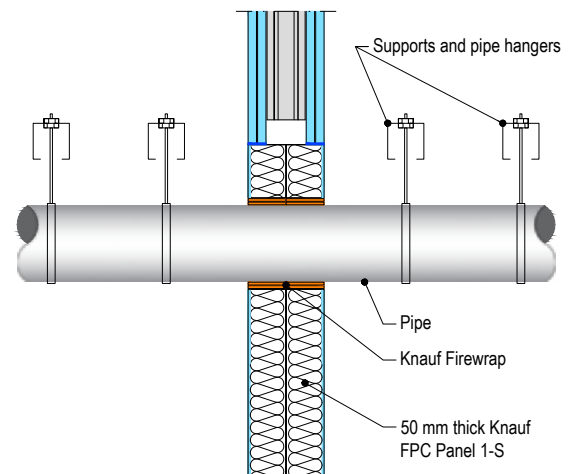
Services	Pipe wrap	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1		
Ø 315 mm/9.2 mm wall thickness	Knauf Firewrap 75 x 18 mm fitted centrally around the pipe	EI 45 C/C



› **Knauf Firewrap penetration seal for plastic pipes, in 2x Knauf FPC panel 1-S, in flexible or rigid walls**

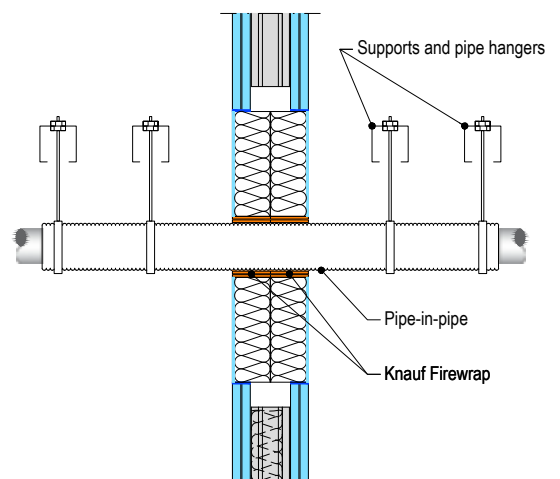
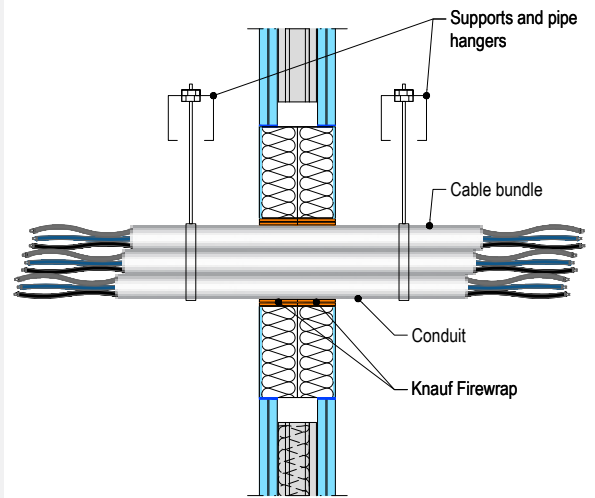
Penetration Seal: Combustible pipes sealed with Knauf Firewrap, to both sides of the wall. Minimum separation between penetration seals and seal edges of 30 mm. (Configuration 1 & 2).

Services	Wraps (both sides)	Permitted configuration for seal separation	Classification
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1 and PVC-C according to EN 1566-1			
Up to Ø 40 mm, wall thickness 1.9-3.0 mm	50 x 1.8 mm (1 layer)	1 & 2 between PVC-U/PVC-C, PE/ABS/SAN+PVC and PP pipes in any combination	EI 120 U/U, EI 120 C/U, EI 120 U/C, EI 120 C/C
Up to Ø 110 mm, wall thickness 2.7-6.6 mm	50 x 3.6 mm (2 x 1.8 layer)		E 120 U/C, EI 120 C/C, EI 90 U/C, EI 90 C/C
Up to Ø 125 mm, wall thickness 3.7-7.4 mm	50 x 5.4 mm (3 x 1.8 layer)		
Up to Ø 160 mm, wall thickness 9.5 mm	50 x 7.2 mm (4 x 1.8 layer)		
Up to Ø 315 mm, wall thickness 7.7-12.1 mm	50 x 18 mm (10 x 1.8 layer)	-	EI 90 C/C
Up to Ø 400 mm, wall thickness 9.8-15.3 mm	50 x 28.8 mm (16 x 1.8 layer)	-	EI 90 C/C
Up to Ø 110 mm, wall thickness 2.7-6.6 mm, fully or partially filled conduits with cables up to Ø 14 mm	50 x 3.6 mm (2 x 1.8 layer)	1 & 2	E 120 U/C, EI 90 U/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Up to Ø 40 mm, wall thickness 2.4-3.7 mm	50 x 1.8 mm (1 layer)	1 & 2 between PVC-U/PVC-C, PE/ABS/SAN+PVC and PP pipes in any combination	EI 120 U/U, EI 120 C/U, EI 120 U/C, EI 120 C/C
Up to Ø 110 mm, wall thickness 4.2-10.0 mm	50 x 3.6 mm (2 x 1.8 layer)		E 120 U/C, EI 120 C/C, EI 90 U/C, EI 90 C/C
Up to Ø 125 mm, wall thickness 4.8-12.0 mm	50 x 5.4 mm (3 x 1.8 layer)		
Up to Ø 160 mm, wall thickness 14.6 mm	50 x 7.2 mm (4 x 1.8 layer)		

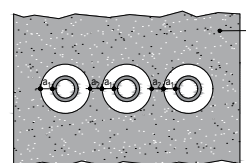


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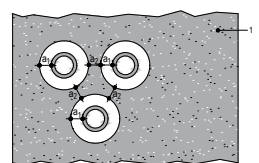
Services	Wraps (both sides)	Permitted configuration for seal separation	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Up to Ø 110 mm, wall thickness 4.2-10.0 mm, fully or partially filled conduits with cables up to Ø 14 mm	50 x 3.6 mm (2 x 1.8 layer)	1 & 2	E 120 U/C, EI 90 U/C
PP pipe according to EN 1852-1: 2009			
Up to Ø 40 mm, wall thickness 1.8-5.5 mm	50 x 1.8 mm (1 layer)	1 & 2 between PVC-U/PVC-C, PE/ABS/SAN+PVC and PP pipes in any combination	EI 120 U/U, EI 120 C/U, EI 120 U/C, EI 120 C/C
Up to Ø 110 mm, wall thickness 2.7-15.1 mm	50 x 3.6 mm (2 x 1.8 layer)		EI 90 U/U, EI 90 C/U, EI 90 U/C, EI 90 C/C
Up to Ø 125 mm, wall thickness 3.1-17.1 mm	50 x 5.4 mm (3 x 1.8 layer)		E 120 U/C, E 120 C/C, EI 90 U/C, EI 90 C/C
Up to Ø 160 mm, wall thickness 21.9 mm	50 x 7.2 mm (4 x 1.8 layer)		
Up to Ø 110 mm, wall thickness 2.7-15.1 mm, fully or partially filled conduits with cables up to Ø 14 mm	50 x 3.6 mm (2 x 1.8 layer)	1 & 2	E 120 U/C, EI 90 U/C
Uponor Wirsbo PEX pipe in pipe system according to ISO 15875			
Up to Ø 54 mm/wall thickness 4.0 mm (outer pipe), Ø 28 mm/0.4 mm wall thickness (inner pipe)	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 C/C
Uponor Wirsbo PEX double pipe in pipe system			
Up to Ø 25 mm pipes, wall thickness 0.6 mm, in bundles up to 50 mm	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 90 C/C
BluePower Multilayer pipe according to EN 1451-1			
Ø 32-50 mm/ 1.8 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 90 U/U
Ø 75-110 mm/ 3.4 mm wall thickness			EI 90 C/U
Rehau Raupiano Plus PP-DD according to DIN 4102			
Ø 40-50 mm/ 1.8-2.7 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/U
Ø 75-110 mm/ 2.7 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)		EI 120 U/C
Ø 125 mm/ 3.9 mm wall thickness	50 x 7.2 mm (4 x 1.8 layer)		
Ø 160 mm/ 3.9 mm wall thickness	50 x 10.8 mm (6 x 1.8 layer)		
Polo-Kal NG Poloplast PP-MV according to DIN 4102			
Ø 32-50 mm/ 2.0-3.4 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/U
Ø 75-110 mm/ 3.4 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)		EI 120 C/U
Ø 125 mm/ 3.9 mm wall thickness	50 x 7.2 mm (4 x 1.8 layer)		
Ø 160 mm/ 4.9 mm wall thickness	50 x 10.8 mm (6 x 1.8 layer)		



Configuration 1



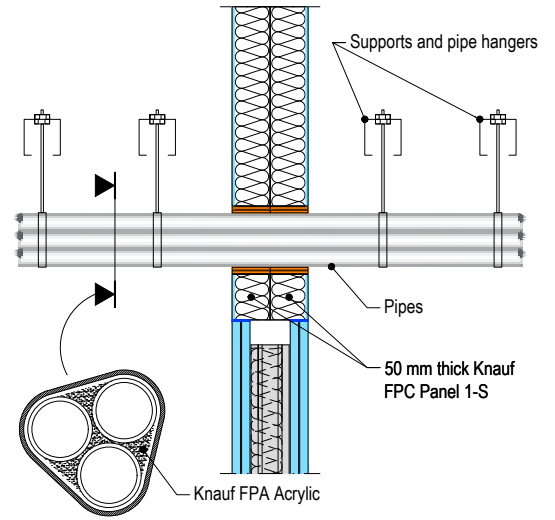
Configuration 2



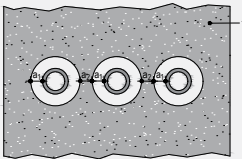
Key

- 1 Supporting construction
- a1 Pipe / top edge of seal separation
- a2 Pipe / side edge of seal separation
- a3 Pipe / pipe separation

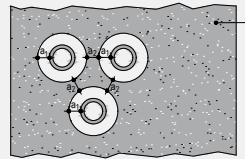
Services	Wraps (both sides)	Permitted configuration for seal separation	Classification
Aquatarm Green SDR9 MF PP-RP according to ISO 21003			
Ø 32 mm/ 3.0 mm wall thickness	50 x 1.8 mm (1 x 1.8 layer)	1 & 2	E 120 C/C, EI 90 C/C
Ø 40-50 mm/ 5.6-12.3 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)		
Ø 63-110 mm/ 12.3 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)		
Wavin SiTech + PP-M B according to EN 13501-1			
Ø 32-50 mm/ 1.8-3.4 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	E 120 U/U, EI 90 U/U
Ø 75-110 mm/ 3.4 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)		E 120 U/C, EI 60 U/C
Gilbert Silent PP according to DIN 4102			
Ø 32-50 mm/ 1.8-3.4 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/U
Ø 75-110 mm/ 3.4 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)		EI 120 U/C



Configuration 1



Configuration 2



Key

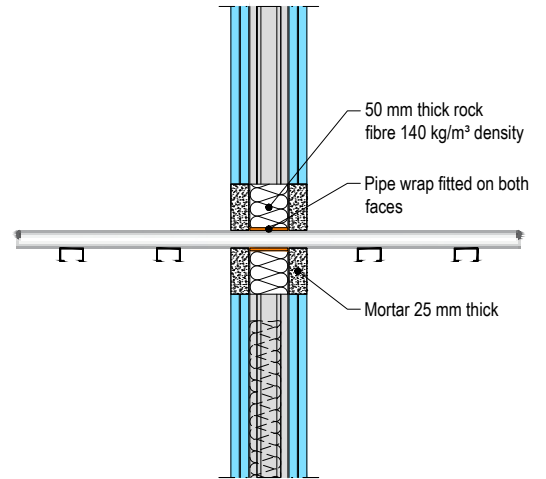
- 1 Supporting construction
- a1 Pipe / top edge of seal separation
- a2 Pipe / side edge of seal separation
- a3 Pipe / pipe separation

› **Penetration seal in Knauf FPM - fire protection mortar seals, in flexible\* and rigid walls minimum 100 mm thick**

**Penetration Seal:** Combustible pipes sealed with Knauf Firewrap, installed into Knauf FPM - fire protection mortar seals. Minimum separation between penetration seals and seal edges of 30 mm.

Services	Wraps (both sides)	Permitted configuration for seal separation	Classification
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1 and PVC-C according to EN 1566-1			
Up to Ø 40 mm, 3.0-4.3 mm wall thickness	50 x 1.8 mm (1 layers)	1 & 2 between PVC-U/ PVC-C, PE/ABS/SAN+PVC and PP pipes in any combination	E 120 U/C, E 120 C/U, EI 60 U/C, EI 60 C/C
Up to Ø 110 mm, 2.7-6.6 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)		E 120 U/C, E 120 C/C, EI 90 U/C, EI 90 C/C
Up to Ø 125 mm, 3.7-7.4 mm wall thickness	50 x 5.4 mm (3 x 1.8 layers)		EI 120 U/C, EI 120 C/C
Up to Ø 160 mm, 3.2-9.5 mm wall thickness	50 x 7.2 mm (4 x 1.8 layers)		EI 60 U/C, EI 60 C/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Up to Ø 40 mm, 3.2-3.7 mm wall thickness	50 x 1.8 mm (1 layers)	1 & 2 between PVC-U/ PVC-C, PE/ABS/SAN+PVC and PP pipes in any combination	EI 120 U/C, EI 120 C/C
Up to Ø 110 mm, 4.2-10.0 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)		EI 60 U/C, EI 60 C/C
Up to Ø 125 mm, 12.0 mm wall thickness	50 x 5.4 mm (3 x 1.8 layers)		EI 120 U/C, EI 120 C/C
Up to Ø 160 mm, 4.9-12.0 mm wall thickness	50 x 7.2 mm (4 x 1.8 layers)		E 120 U/C, E 120 C/C
Up to Ø 160 mm, 12.0 mm wall thickness			EI 90 U/C, EI 90 C/C
PP pipe according to EN 1852-1: 2009			
Up to Ø 40 mm, 4.0-5.5 mm wall thickness	50 x 1.8 mm (1 layers)	1 & 2 between PVC-U/ PVC-C, PE/ABS/SAN+PVC and PP pipes in any combination	EI 120 U/C, EI 120 C/C
Up to Ø 110 mm, 6.6 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)		E 120 U/C, E 120 C/C, EI 90 U/C, EI 90 C/C
Up to Ø 125 mm, 17.1 mm wall thickness	50 x 5.4 mm (3 x 1.8 layers)		E 120 U/C, E 120 C/C, EI 90 U/C, EI 90 C/C
Up to Ø 160 mm, 4.0-21.9 mm wall thickness	50 x 7.2 mm (4 x 1.8 layers)		E 120 U/C, E 120 C/C
Up to Ø 160 mm, 21.9 mm wall thickness			EI 60 U/C, EI 60 C/C

**\*Partition wall must incorporate a full fill core insulation of Stonewool (35kg/m<sup>3</sup> density)**



# KNAUF FIRE PROTECTION SERVICE TRANSIT

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Knauf FP Service Transit has been designed to maintain the fire resistance of walls and floors when these are breached by continuous cables and plastic pipes.

The Service Transit consists of a circular high temperature plastic tube containing a graphite based intumescent lining material which expands upon heating to seal spaces or voids around cables and pipes, thus preventing the passage of flames, smoke and gases. After installation of the Service Transit, cables and pipes can be retrofitted without having to install a new fire seal.

The Service Transit is available in three different lengths, 150mm, 250mm and 400mm and the selection of which to use depends on the thickness of the supporting construction and the required fire classification.

## Properties:

- › Safe, easy and quick to fire stop service penetrations
- › Ideal for installations where it is likely that services will be inserted or replaced later on
- › New patented fast expanding graphite material
- › Very high fire classifications up to 240 minutes for both integrity and insulation
- › Unlimited storage time (under correct conditions)
- › 30 years working life guarantee
- › ETA 21/0043
- › EAD 350141-00-1104



### Supporting constructions:

#### Flexible walls:

The wall must have a minimum thickness of 75 mm and comprise steel studs or timber studs\*) lined on both faces with minimum 1 layer of 12.5 mm thick boards.

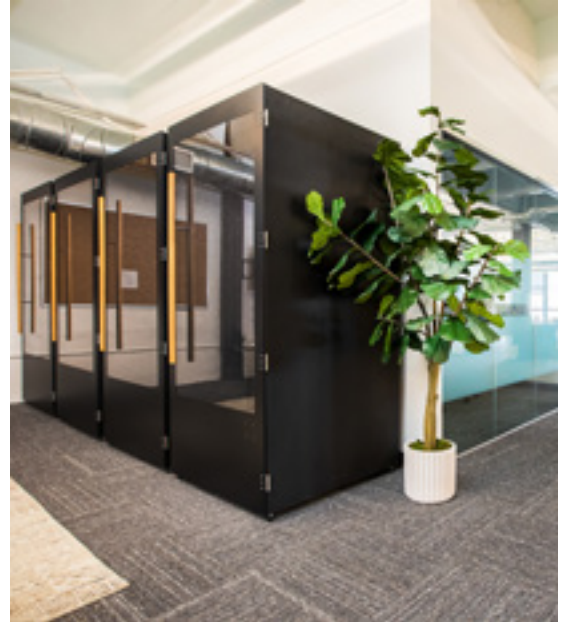
#### Rigid walls:

The wall must have a minimum thickness of 75 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m<sup>3</sup>.

#### Rigid floors:

The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m<sup>3</sup>.

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.



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### Installation Instructions

1. Install the Service Transit centrally in the wall, floor or fire seal ensuring that the centre point of the transit is located mid-depth in the wall, floor or fire seal.
2. Friction fitted or cast installation:
  - Make sure there is a tight seal with no gaps around the Service Transit and that it is securely locked in position. If this is not the case, simply apply a bead of Knauf FPA Acrylic on both sides.
  - Installation with Knauf FPA Acrylic, Knauf FPC Panel or Knauf FP Mortar:
  - Follow the Technical Data Sheet and Installation Instructions supplied with the product selected together with installation instructions and detailed drawings in this document.
3. Before cables and/or plastic pipes are inserted through the Service Transit, remove the fibre plug from the middle of the Service Transit. After the insertion of services is completed, ensure that the fibre plug is refitted and positioned correctly around the services in the middle of the Service Transit, leaving no openings so a cold smoke barrier is achieved.
4. Make sure labels with retrofit instructions are placed near the Service Transit on both sides after installation, so future service installations are completed correctly by reinstating the fibre plug.

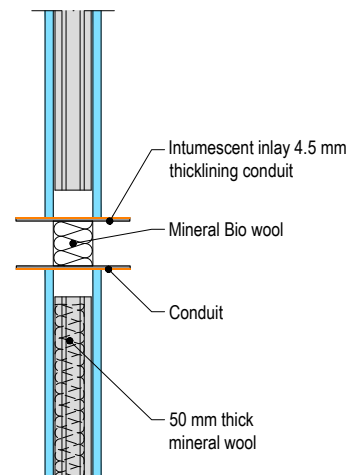
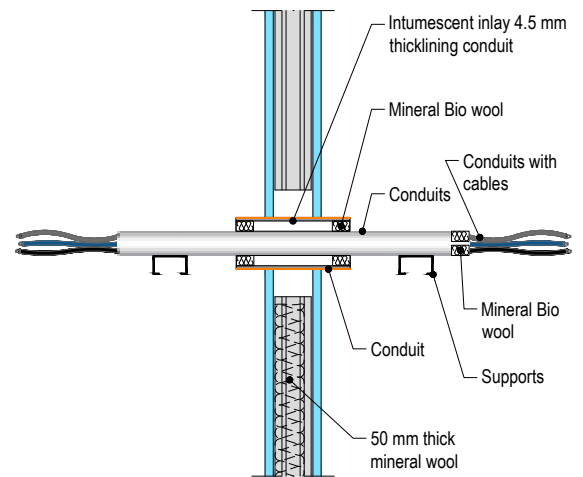
# PENETRATION SEALS | FLEXIBLE OR RIGID WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 75 MM

## > Penetration seals, in drywalls (min. 1 x 12.5 mm board per side) and concrete/masonry walls

**Penetration Seal:** Cables and conduits fitted with 150 mm long Knauf FP Service Transit, central within the wall. Spaces around cables and conduits within the device are sealed with 50 mm deep Mineral Bio Wool installed centrally. Min. Separation between seals (a2) = 30 mm. Min. separation between seals (a2) = 30 mm, min. Separation between transit and supporting construction (a1) = 0 mm.

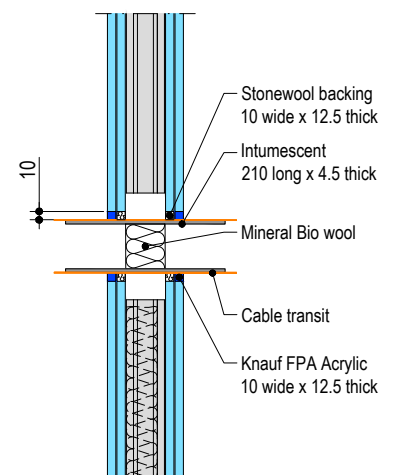
Services	Inlay size	Transit size	Classification
Up to Ø 35 mm bundle of cables up to Ø 14 mm	1.5 mm thick by 150 mm long	40 mm Ø x 150 mm long	EI 60
Up to Ø 50 mm bundle of cables up to Ø 14 mm	2.0 mm thick by 150 mm long	63 mm Ø x 150 mm long	
Up to Ø 80 mm bundle of cables up to Ø 14 mm	4.0 mm thick by 150 mm long	90 mm Ø x 150 mm long	
Up to Ø 100 mm bundle of cables up to Ø 14 mm	4.5 mm thick by 150 mm long	110 mm Ø x 150 mm long	
Up to 100 mm diameter bundle of cables up to 80 mm diameter	All inlay sizes specified above	All transit sizes specified above	E 60 EI 45
Empty filled at mid-depth with 50 mm deep plug of Mineral Bio Wool			E 60 EI 30
Up to Ø 32mm plastic pipes in bundle, empty or with penetrating bundle of cables up to Ø 14 mm			EI 60 U/C



WITH WALL THICKNESS OF MINIMUM 100 MM

## > Penetration seals, in drywalls (min. 2 x 12.5 mm board per side) and concrete/masonry walls

**Penetration Seal:** Cables and conduits fitted with 250 mm long Knauf FP Service Transit, central within the wall. Spaces around cables and conduits within the device are sealed with 50 mm deep Mineral Bio Wool installed centrally. Min. separation between seals (a2) = 30 mm, min. separation between transit and supporting construction (a1) = 0 mm **Tab.1.1.** and minimum 10 mm with maximum aperture 300 x 300mm **Tab.1.2.**



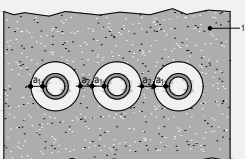
Services	Inlay size	Transit size	Classification
Up to Ø 35 mm bundle of cables up to Ø 21 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	EI 90
Up to Ø 35 mm bundle of cables up to Ø 35 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	E 90 EI 60
Up to Ø 50 mm bundle of cables up to Ø 21 mm	2.0 mm thick by 210 mm long	63 mm Ø x 250 mm long	EI 90
Up to Ø 50 mm bundle of cables up to Ø 50 mm	2.0 mm thick by 210 mm long	63 mm Ø x 250 mm long	E 90 EI 60
Up to Ø 80 mm bundle of cables up to Ø 21 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	EI 90
Up to Ø 80 mm bundle of cables up to Ø 80 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	E 90 EI 60
Up to Ø 100 mm bundle of cables up to Ø 21 mm	4.5 mm thick by 210 mm long	110 mm Ø x 250 mm long	EI 90
Up to Ø 100 mm bundle of cables up to Ø 80 mm	4.5 mm thick by 210 mm long	110 mm Ø x 250 mm long	E 90 EI 60
Empty filled at mid-depth with 50 mm deep plug of Mineral Bio Wool	All inlay sizes specified above	All transit sizes specified above	E 90 EI 60
Up to Ø 32mm plastic pipes in bundle, empty or with penetrating bundle of cables up to Ø 21 mm			EI 90 U/C

Tab. 1.1. FP Service transit friction fitted into wall

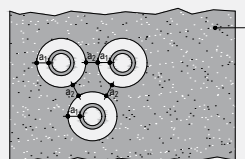
Services	Inlay size	Transit size	Classification
Up to Ø 35 mm bundle of cables up to Ø 21 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	EI 90
Up to Ø 35 mm bundle of cables up to Ø 35 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	E 90 EI 60
Up to Ø 50 mm bundle of cables up to Ø 21 mm	2.0 mm thick by 210 mm long	63 mm Ø x 250 mm long	EI 90
Up to Ø 50 mm bundle of cables up to Ø 50 mm	2.0 mm thick by 210 mm long	63 mm Ø x 250 mm long	E 90 EI 60
Up to Ø 80 mm bundle of cables up to Ø 21 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	EI 90
Up to Ø 80 mm bundle of cables up to Ø 80 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	E 90 EI 60
Up to Ø 100 mm bundle of cables up to Ø 21 mm	4.5 mm thick by 210 mm long	110 mm Ø x 250 mm long	EI 90
Up to Ø 100 mm bundle of cables up to Ø 80 mm	4.5 mm thick by 210 mm long	110 mm Ø x 250 mm long	E 90 EI 60
Empty filled at mid-depth with 50 mm deep plug of Mineral Bio Wool	All inlay sizes specified above	All transit sizes specified above	EI 90
Up to Ø 32mm plastic pipes in bundle, empty or with penetrating bundle of cables up to Ø 21 mm			EI 90 U/C

Tab. 1.2. Knauf FP Service Transit in minimum 20 mm oversize aperture fitted with Knauf FPA Acrylic

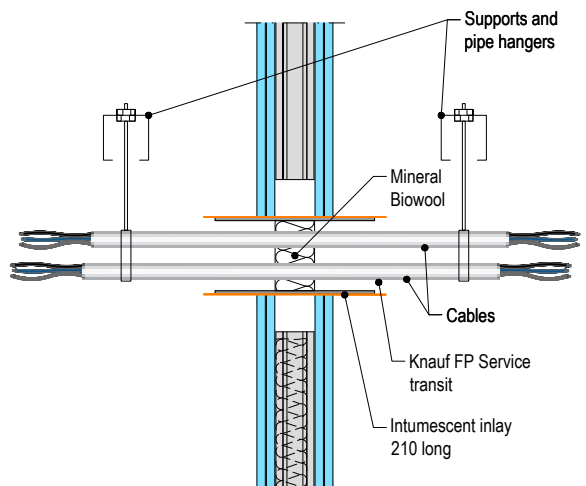
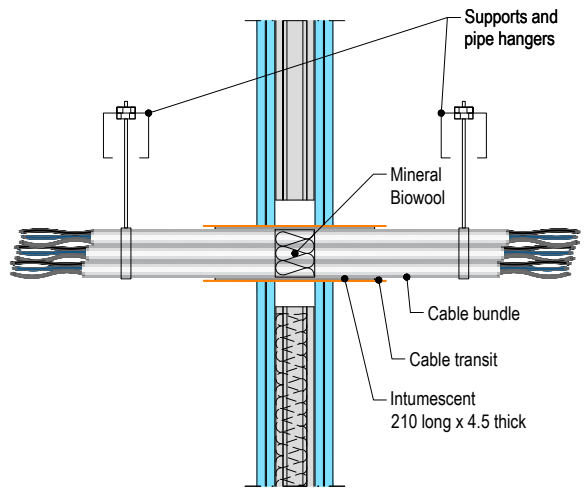
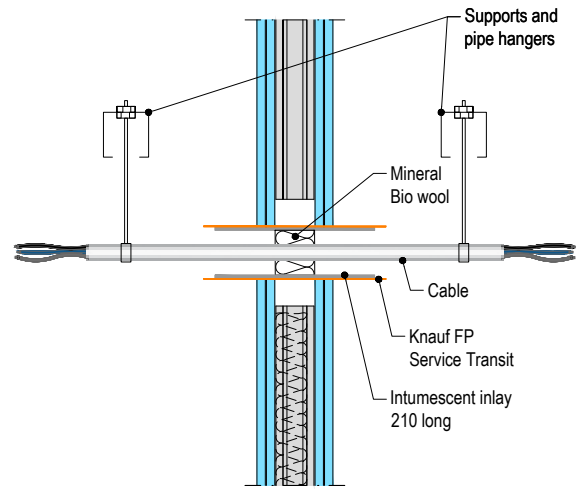
Configuration 1



Configuration 2



- Key  
 1 Supporting construction  
 a1 Pipe / top edge of seal separation  
 a2 Pipe / side edge of seal separation  
 a3 Pipe / pipe separation

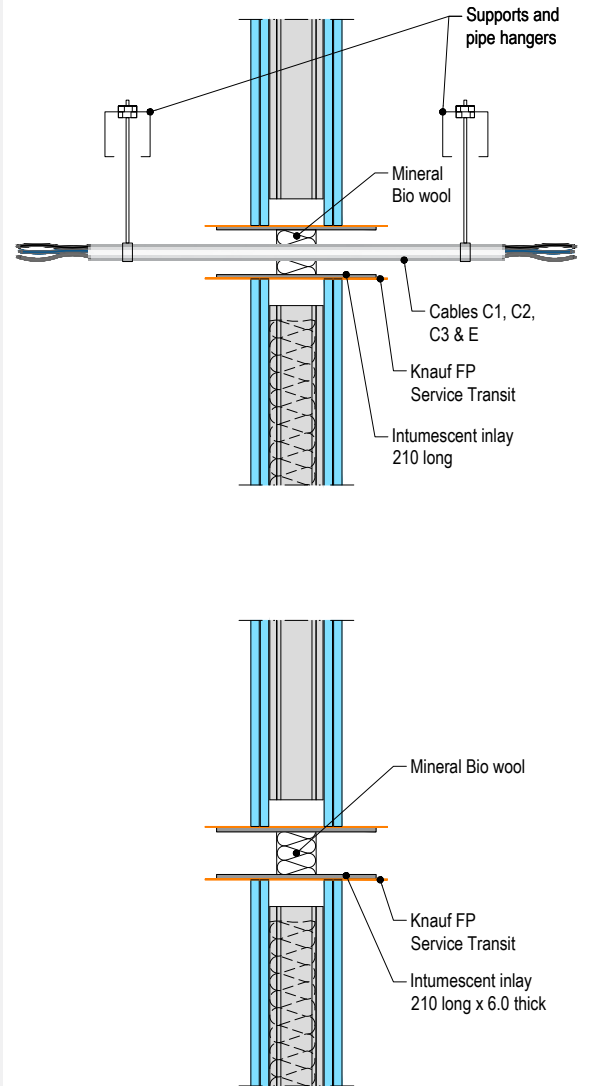


WITH WALL THICKNESS OF MINIMUM 120 MM

> **Penetration seals, in drywalls (min. 2 x 15 mm board per side) and concrete/masonry walls**

**Penetration Seal:** Cables and conduits fitted with minimum 250 mm long Knauf FP Service Transit, central within the wall. Spaces around cables and conduits within the device are sealed with 50 mm deep Mineral Bio Wool installed centrally. Min. Separation between seals ( $a_2$ ) = 30 mm, min. Separation between transit and supporting construction ( $a_1$ ) = 0 mm.

Services	Inlay size	Transit size	Classification
Up to Ø 35 mm bundle of cables up to Ø 21 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	EI 120
Up to Ø 35 mm bundle of cables up to Ø 35 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	E 120 EI 90
Up to Ø 50 mm bundle of cables up to Ø 21 mm	2.0 mm thick by 210 mm long	63 mm Ø x 250 mm long	EI 120
Up to Ø 50 mm bundle of cables up to Ø 50 mm	2.0 mm thick by 210 mm long	63 mm Ø x 250 mm long	E 120 EI 90
Up to Ø 80 mm bundle of cables up to Ø 21 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	EI 120
Up to Ø 80 mm bundle of cables up to Ø 50 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	E 120 EI 90
Up to Ø 100 mm bundle of cables up to Ø 21 mm	4.5 mm thick by 210 mm long	110 mm Ø x 250 mm long	EI 120
Up to Ø 100 mm bundle of cables up to Ø 50 mm	4.5 mm thick by 210 mm long	110 mm Ø x 250 mm long	E 120 EI 90
Empty filled at mid-depth with 50 mm deep plug of Mineral Bio Wool	All inlay sizes specified above	All transit sizes specified above	E 120 EI 90

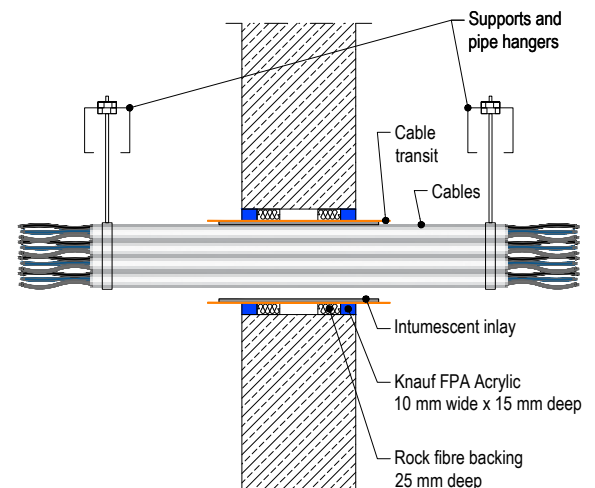


PENETRATION SEALS | RIGID WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 150 MM

> **Penetration seals in concrete/masonry walls**

**Penetration Seal:** Cables and conduits fitted with 250 mm long Knauf FP Service Transit, central within the wall. Spaces around cables and conduits within the device are sealed with 50 mm deep Mineral Bio Wool installed centrally. Min. separation between seals ( $a_2$ ) = 30 mm, min. separation between transit and supporting construction ( $a_1$ ) = 0 mm **Tab.2.1.** and minimum 10 mm with maximum aperture 300 x 300mm **Tab.2.2.**

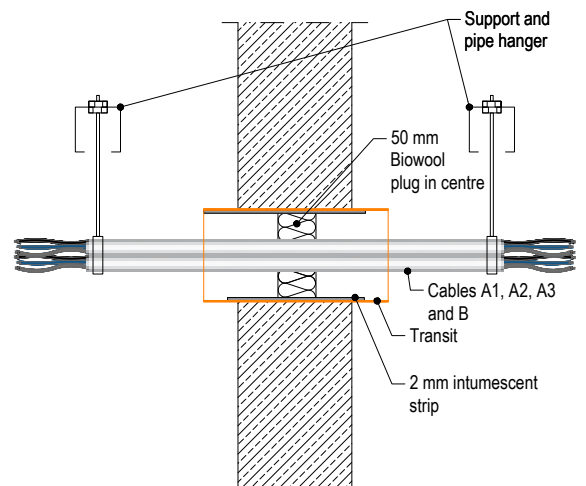
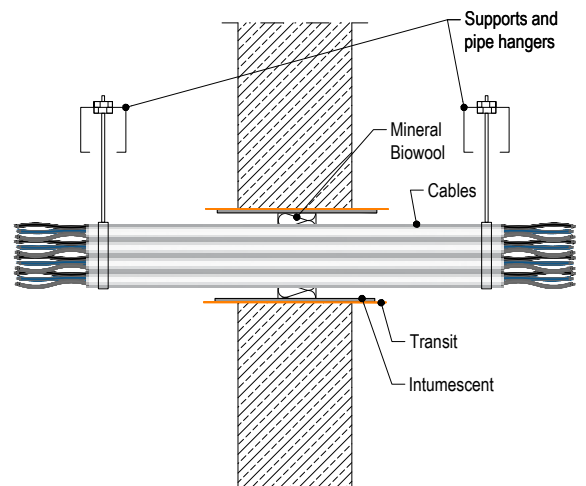
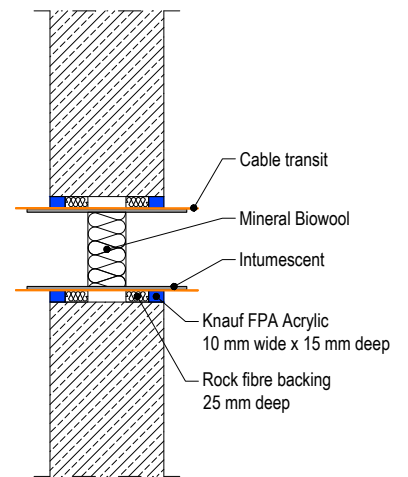


Services	Inlay size	Transit size	Classification
Up to Ø 35 mm bundle of cables up to Ø 21 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	EI 240
Up to Ø 50 mm bundle of cables up to Ø 21 mm	2.0 mm thick by 210 mm long	63 mm Ø x 250 mm long	
Up to Ø 80 mm bundle of cables up to Ø 21 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	
Up to Ø 100 mm bundle of cables up to Ø 21 mm	4.5 mm thick by 210 mm long	110 mm Ø x 250 mm long	E 240 EI 180
Empty filled at mid-depth with 50 mm deep plug of Mineral Bio Wool	All inlay sizes specified above	All transit sizes specified above	E 240 EI 90
Up to Ø 32mm plastic pipes in bundle, empty or with penetrating bundle of cables up to Ø 21 mm			EI 240 U/C

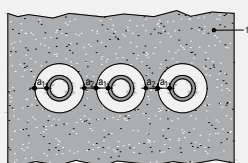
Tab. 2.1. FP Service transit friction fitted into wall

Services	Inlay size	Transit size	Classification
Up to Ø 35 mm bundle of cables up to Ø 21 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	EI 240
Up to Ø 50 mm bundle of cables up to Ø 21 mm	2.0 mm thick by 210 mm long	63 mm Ø x 250 mm long	
Up to Ø 80 mm bundle of cables up to Ø 21 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	
Up to Ø 100 mm bundle of cables up to Ø 21 mm	4.5 mm thick by 210 mm long	110 mm Ø x 250 mm long	E 240 EI 180
Empty filled at mid-depth with 50 mm deep plug of Mineral Bio Wool	All inlay sizes specified above	All transit sizes specified above	E 240 EI 90
Up to Ø 32mm plastic pipes in bundle, empty or with penetrating bundle of cables up to Ø 21 mm			EI 240 U/C

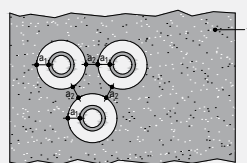
Tab. 2.2. Knauf FP Service Transit in minimum 20 mm oversize aperture fitted with Knauf FPA Acrylic



Configuration 1



Configuration 2

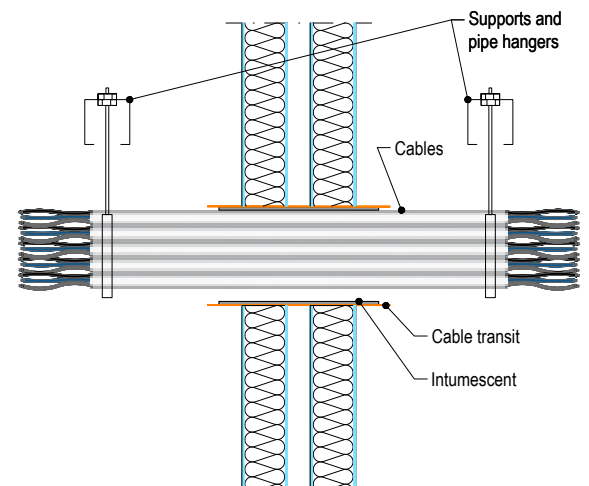
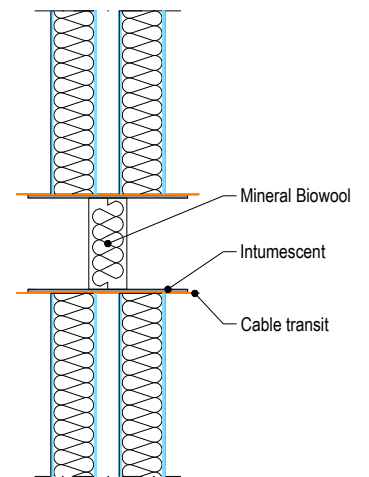


- Key
- 1 Supporting construction
  - a1 Pipe / top edge of seal separation
  - a2 Pipe / side edge of seal separation
  - a3 Pipe / pipe separation

› **Penetration seals, in 150 mm thick Knauf FPC panel 2-S seals (including 30 mm air gap) in concrete/masonry walls**

**Penetration Seal:** Cables and conduits fitted with 250 mm long Knauf FP Service Transit, central within the seal. Spaces around cables and conduits within the device are sealed with 50 mm deep Mineral Bio Wool installed centrally. Min. separation between transits and between transits and the edges of the board seal (a1, a2, a3) = 30 mm, min.

Services	Inlay size	Transit size	Classification
Up to Ø 35 mm bundle of cables up to Ø 21 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	E 240 EI 180
Up to Ø 50 mm bundle of cables up to Ø 21 mm	2.0 mm thick by 210 mm long	63 mm Ø x 250 mm long	
Up to Ø 80 mm bundle of cables up to Ø 21 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	E 180 EI 120
Up to Ø 100 mm bundle of cables up to Ø 21 mm	4.5 mm thick by 210 mm long	110 mm Ø x 250 mm long	E 240 EI 120
Empty filled at mid-depth with 50 mm deep plug of Mineral Bio Wool	All inlay sizes specified above	All transit sizes specified above	E 240 EI 90
Up to Ø 32 mm plastic pipes in bundle, empty or with penetrating bundle of cables up to Ø 21 mm			EI 90 U/C



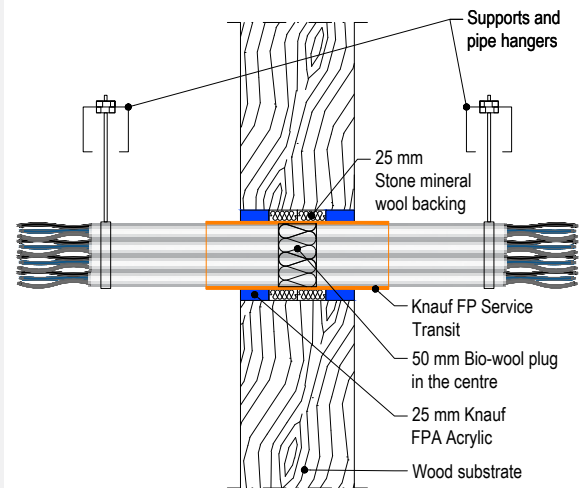
5

# PENETRATION SEALS | TIMBER WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 100 MM

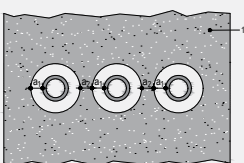
## > Penetration seals in timber walls

**Penetration Seal:** Cables fitted with minimum 250 mm long Knauf FP Service Transit central within the wall. The annular space around the Service Transit is sealed with Knauf FPA Acrylic, minimum 25 mm deep to both sides of the wall backed with Stonewool (minimum 33kg/m<sup>3</sup> density), minimum 25 mm deep. Spaces around cables within the device are sealed with 50 mm deep Mineral Bio Wool installed centrally. Min. Separation between seals (a2) = 30 mm, min. Minimum separation between transit and supporting construction (a1) = 10 mm. Maximum aperture size is Ø 180mm.

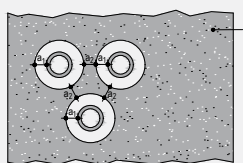


Services	Inlay size	Transit size	Classification
Up to Ø 35 mm bundle of cables up to Ø 21 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	EI 90
Up to Ø 35 mm bundle of cables up to Ø 35 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	E 90 EI 60
Up to Ø 50 mm bundle of cables up to Ø 21 mm	2.0 mm thick by 210 mm long	63 mm Ø x 250 mm long	EI 90
Up to Ø 50 mm bundle of cables up to Ø 50 mm	2.0 mm thick by 210 mm long	63 mm Ø x 250 mm long	E 90 EI 60
Up to Ø 80 mm bundle of cables up to Ø 21 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	EI 90
Up to Ø 80 mm bundle of cables up to Ø 80 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	E 90 EI 60
Up to Ø 100 mm bundle of cables up to Ø 21 mm	4.5 mm thick by 210 mm long	110 mm Ø x 250 mm long	EI 90
Up to Ø 100 mm bundle of cables up to Ø 80 mm	4.5 mm thick by 210 mm long	110 mm Ø x 250 mm long	E 90 EI 60
Empty filled at mid-depth with 50 mm deep plug of Mineral Bio Wool	All inlay sizes specified above	All transit sizes specified above	EI 90
Up to Ø 32mm plastic pipes in bundle, empty or with penetrating bundle of cables up to Ø 21 mm			EI 90 U/C

Configuration 1



Configuration 2



Key

- 1 Supporting construction
- a1 Pipe / top edge of seal separation
- a2 Pipe / side edge of seal separation
- a3 Pipe / pipe separation

# PENETRATION SEALS | RIGID FLOOR CONSTRUCTIONS

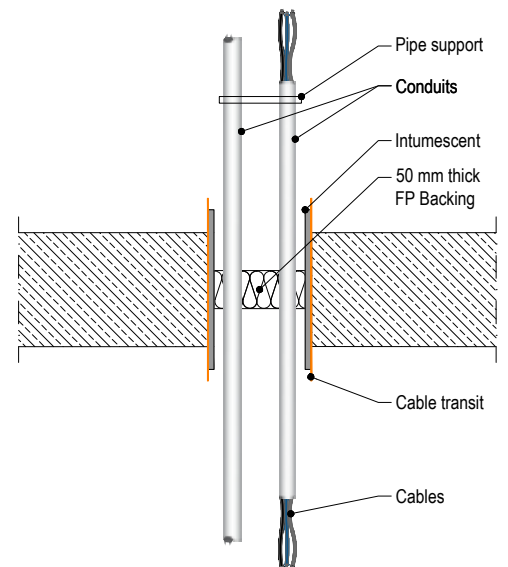
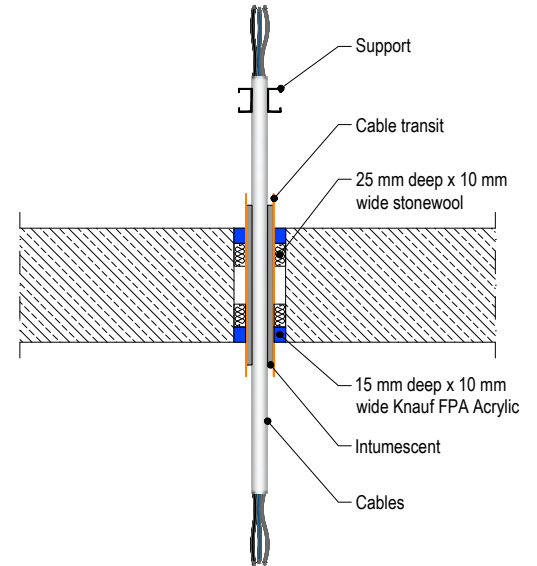
WITH FLOOR THICKNESS OF MINIMUM 150 MM

## > Penetration seals in concrete/masonry floors

Penetration Seal: Cables and conduits fitted with 250 mm long Knauf FP Service Transit, central within the floor. Spaces around cables and conduits within the device are sealed with 50 mm deep Mineral Bio Wool installed centrally. Min. separation between seals (a2) = 30 mm, min. separation between transit and supporting construction (a1) = 0 mm **Tab.3.1** and minimum 10 mm with maximum aperture 300 x 300mm **Tab.3.2**.

Services	Inlay size	Transit size	Classification
Up to Ø 35 mm bundle of cables up to Ø 21 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	EI 180
Up to Ø 35 mm bundle of cables up to Ø 35 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	E 180 EI 60
Up to Ø 50 mm bundle of cables up to Ø 21 mm	2.0 mm thick by 210 mm long	63 mm Ø x 250 mm long	EI 180
Up to Ø 50 mm bundle of cables up to Ø 50 mm	2.0 mm thick by 210 mm long	63 mm Ø x 250 mm long	E 180 EI 60
Up to Ø 80 mm bundle of cables up to Ø 21 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	EI 180
Up to Ø 80 mm bundle of cables up to Ø 50 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	E 180 EI 60
Up to Ø 80 mm bundle of cables up to Ø 80 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	E 90 EI 60
Up to Ø 100 mm bundle of cables up to Ø 21 mm	4.5 mm thick by 210 mm long	110 mm Ø x 250 mm long	EI 180
Up to Ø 100 mm bundle of cables up to Ø 50 mm	4.5 mm thick by 210 mm long	4.5 mm thick by 210 mm long	E 180 EI 60
Up to Ø 100 mm bundle of cables up to Ø 80 mm	4.5 mm thick by 210 mm long	110 mm Ø x 250 mm long	E 90 EI 60
Empty filled at mid-depth with 50 mm deep plug of Mineral Bio Wool	All inlay sizes specified above	All transit sizes specified above	E 240 EI 180
Up to Ø 32mm plastic pipes in bundle, empty or with penetrating bundle of cables up to Ø 21 mm			E 120 C/U EI 60 C/U
	6.0 mm thick by 210 mm long	110 mm Ø x 250 mm long	EI 180 C/U

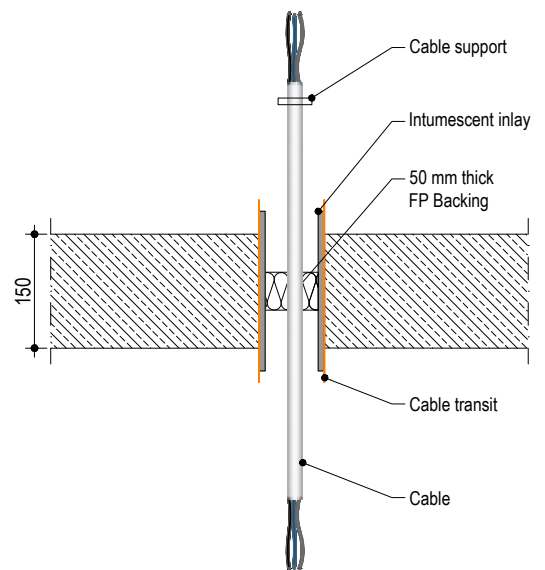
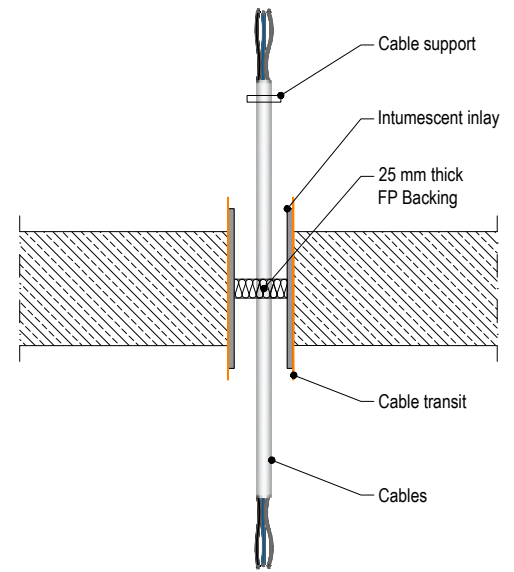
Tab.3.1. Knauf FP Service Transit friction fitted into floor





Services	Inlay size	Transit size	Classification
Up to Ø 35 mm bundle of cables up to Ø 14 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	EI 240
Up to Ø 35 mm bundle of cables up to Ø 21 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	E 240 EI 180
Up to Ø 35 mm bundle of cables up to Ø 35 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	E 240 EI 60
Up to Ø 50 mm bundle of cables up to Ø 21 mm	2.0 mm thick by 210 mm long	63 mm Ø x 250 mm long	E 240 EI 180
Up to Ø 50 mm bundle of cables up to Ø 50 mm	2.0 mm thick by 210 mm long	63 mm Ø x 250 mm long	E 240 EI 60
Up to Ø 80 mm bundle of cables up to Ø 14 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	EI 240
Up to Ø 80 mm bundle of cables up to Ø 21 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	E 240 EI 180
Up to Ø 80 mm bundle of cables up to Ø 50 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	E 240 EI 60
Up to Ø 80 mm bundle of cables up to Ø 80 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	E 90 EI 60
Up to Ø 100 mm bundle of cables up to Ø 21 mm	4.5 mm thick by 210 mm long	110 mm Ø x 250 mm long	EI 180
Up to Ø 100 mm bundle of cables up to Ø 50 mm	4.5 mm thick by 210 mm long	4.5 mm thick by 210 mm long	E 180 EI 60
Up to Ø 100 mm bundle of cables up to Ø 80 mm	4.5 mm thick by 210 mm long	110 mm Ø x 250 mm long	E 90 EI 60
Empty filled at mid-depth with 50 mm deep plug of Mineral Bio Wool	All inlay sizes specified above	All transit sizes specified above	E 240 EI 180
Up to Ø 32mm plastic pipes in bundle, empty or with penetrating bundle of cables up to Ø 21 mm			E 120 C/U EI 60 C/U
	6.0 mm thick by 210 mm long	110 mm Ø x 250 mm long	EI 180 C/U

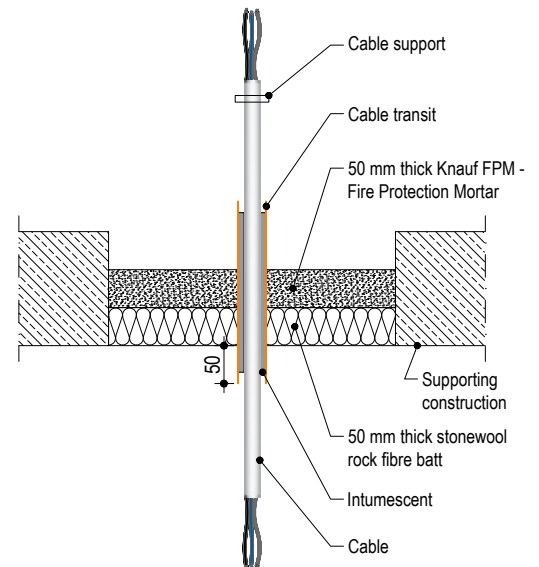
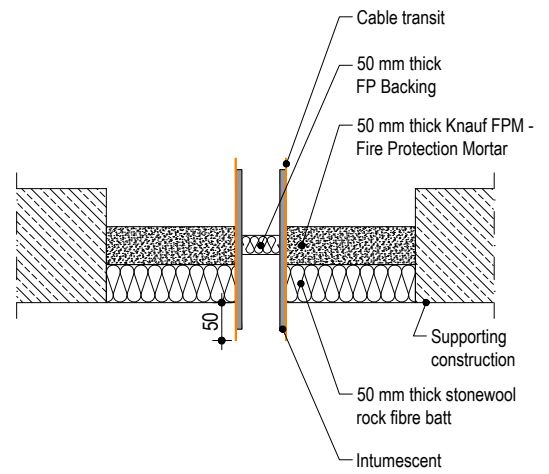
Tab.3.2. Knauf FP Service Transit in minimum 20 mm oversize aperture fitted with Knauf FPA Acrylic



› **Penetration seals, in 50 mm thick Knauf FPM – fire protection mortar seals (with 50 mm stone wool backer) in concrete/masonry floors**

**Penetration Seal:** Cables and conduits fitted with 250 mm long Knauf FP Service Transit, central within the seal. Spaces around cables and conduits within the device are sealed with 50 mm deep Mineral Bio Wool installed centrally. Min. separation between transits and between transits and the edges of the board seal (a1, a2, a3) = 30 mm, min.

Services	Inlay size	Transit size	Classification
Up to Ø 35 mm bundle of cables up to Ø 14 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	EI 240
Up to Ø 35 mm bundle of cables up to Ø 21 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	E 240 EI 180
Up to Ø 35 mm bundle of cables up to Ø 35 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	E 240 EI 60
Up to Ø 50 mm bundle of cables up to Ø 21 mm	2.0 mm thick by 210 mm long	63 mm Ø x 250 mm long	EI 180
Up to Ø 50 mm bundle of cables up to Ø 50 mm	2.0 mm thick by 210 mm long	63 mm Ø x 250 mm long	E 180 EI 60
Up to Ø 50 mm bundle of cables up to Ø 80 mm	2.0 mm thick by 210 mm long	63 mm Ø x 250 mm long	E 90 EI 60
Up to Ø 80 mm bundle of cables up to Ø 21 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	E 240 EI 120
Up to Ø 80 mm bundle of cables up to Ø 50 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	E 240 EI 60
Up to Ø 80 mm bundle of cables up to Ø 80 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	E 90 EI 60
Up to Ø 100 mm bundle of cables up to Ø 21 mm	4.5 mm thick by 210 mm long	110 mm Ø x 250 mm long	EI 120
Up to Ø 100 mm bundle of cables up to Ø 50 mm	4.5 mm thick by 210 mm long	4.5 mm thick by 210 mm long	E 120 EI 60
Up to Ø 100 mm bundle of cables up to Ø 80 mm	4.5 mm thick by 210 mm long	110 mm Ø x 250 mm long	E 90 EI 60
Empty filled at mid-depth with 50 mm deep plug of Mineral Bio Wool	All inlay sizes specified above	All transit sizes specified above	E 240 EI 180
Up to Ø 32mm plastic pipes in bundle, empty or with penetrating bundle of cables up to Ø 21 mm			E 120 C/U EI 60 C/U
	6.0 mm thick by 210 mm long	110 mm Ø x 250 mm long	EI 120 C/U



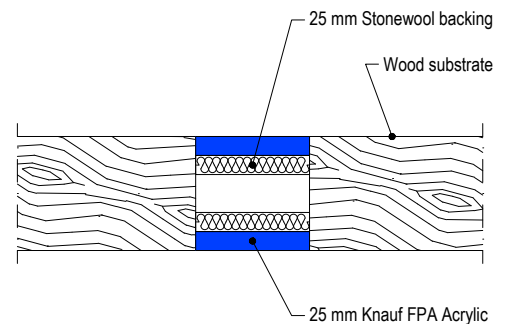
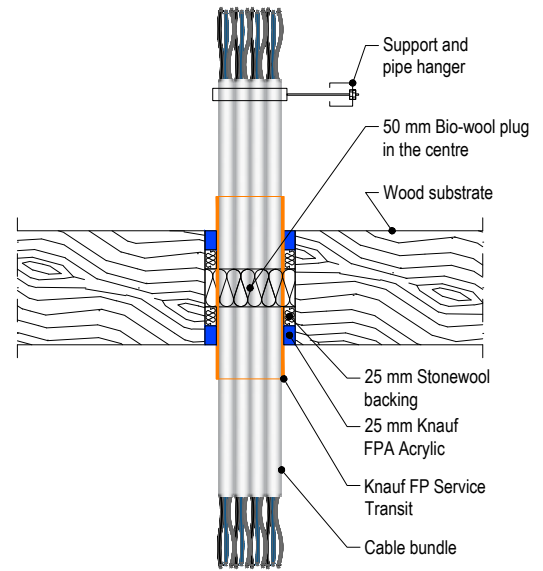
# PENETRATION SEALS | TIMBER FLOOR CONSTRUCTIONS

WITH FLOOR THICKNESS OF MINIMUM 150 MM

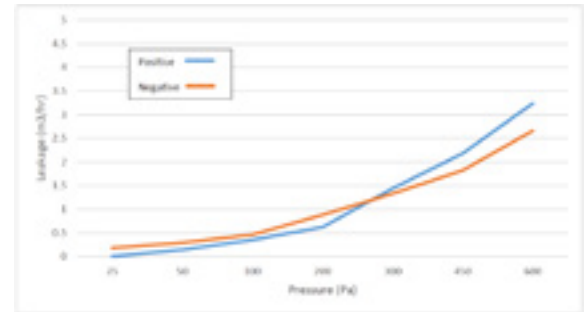
## > Penetration seals in timber floors

**Penetration Seal:** Cables fitted with minimum 250 mm long Knauf FP Service Transit central within the floor. The annular space around the Service Transit is sealed with Knauf FPA Acrylic, minimum 25 mm deep to both sides of the floor backed with Stonewool (minimum 33kg/m<sup>3</sup> density), minimum 25 mm deep. Spaces around cables within the device are sealed with 50 mm deep Mineral Bio Wool installed centrally. Min. separation between seals (a2) = 30 mm, min. Minimum separation between transit and supporting construction (a1) = 10 mm. Maximum aperture size is Ø 220mm.

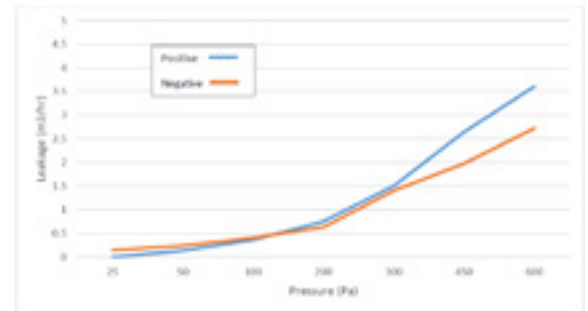
Services	Inlay size	Transit size	Classification
Up to Ø 35 mm bundle of cables up to Ø 21 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	EI 120
Up to Ø 35 mm bundle of cables up to Ø 35 mm	1.5 mm thick by 210 mm long	40 mm Ø x 250 mm long	E 120 EI 60
Up to Ø 50 mm bundle of cables up to Ø 21 mm	2.0 mm thick by 210 mm long	63 mm Ø x 250 mm long	EI 120
Up to Ø 50 mm bundle of cables up to Ø 50 mm	2.0 mm thick by 210 mm long	63 mm Ø x 250 mm long	E 120 EI 60
Up to Ø 80 mm bundle of cables up to Ø 21 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	EI 120
Up to Ø 80 mm bundle of cables up to Ø 50 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	E 120 EI 60
Up to Ø 80 mm bundle of cables up to Ø 80 mm	4.0 mm thick by 210 mm long	90 mm Ø x 250 mm long	E 90 EI 60
Up to Ø 100 mm bundle of cables up to Ø 21 mm	4.5 mm thick by 210 mm long	110 mm Ø x 250 mm long	EI 120
Up to Ø 100 mm bundle of cables up to Ø 50 mm	4.5 mm thick by 210 mm long	4.5 mm thick by 210 mm long	E 120 EI 60
Up to Ø 100 mm bundle of cables up to Ø 80 mm	4.5 mm thick by 210 mm long	110 mm Ø x 250 mm long	E 90 EI 60
Empty filled at mid-depth with 50 mm deep plug of Mineral Bio Wool	All inlay sizes specified above	All transit sizes specified above	EI 120
Up to Ø 32mm plastic pipes in bundle, empty or with penetrating bundle of cables up to Ø 21 mm			E 120 C/U EI 60 C/U
	6.0 mm thick by 210 mm long	110 mm Ø x 250 mm long	EI 120 C/U



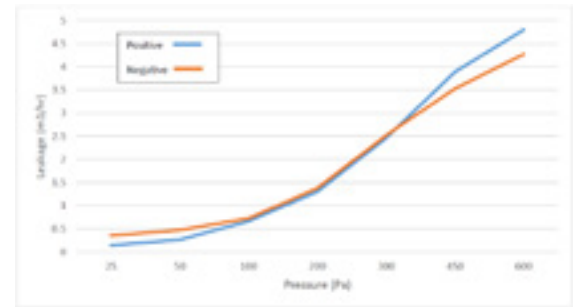
Product tested	110mm Knauf FP Service Transit with Bio wool seal no services		
Summary of testing procedure			Result
	Pressure (Pa)	Leakage (m <sup>3</sup> /h)	Leakage (m <sup>3</sup> /m <sup>2</sup> /h)
Results under negative chamber pressure	25	0.18	N/A
	50	0.29	N/A
	100	0.46	N/A
	200	0.88	N/A
	300	1.33	N/A
	450	1.82	N/A
	600	2.66	N/A
Results under positive chamber pressure	25	0.08	N/A
	50	0.14	N/A
	100	0.35	N/A
	200	0.62	N/A
	300	1.44	N/A
	450	2.18	N/A
	600	3.24	N/A



Product tested	110mm Knauf FP Service Transit with single 12mm cable through Bio wool seal		
Summary of testing procedure			Result
	Pressure (Pa)	Leakage (m <sup>3</sup> /h)	Leakage (m <sup>3</sup> /m <sup>2</sup> /h)
Results under negative chamber pressure	25	0.14	N/A
	50	0.24	N/A
	100	0.40	N/A
	200	0.63	N/A
	300	1.40	N/A
	450	1.97	N/A
	600	2.72	N/A
Results under positive chamber pressure	25	0.05	N/A
	50	0.13	N/A
	100	0.36	N/A
	200	0.75	N/A
	300	1.50	N/A
	450	2.64	N/A
	600	3.6	N/A

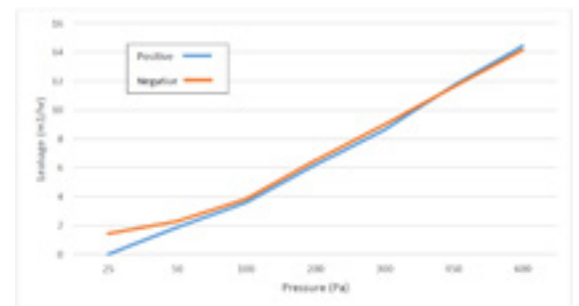


Product tested	110mm Knauf FP Service Transit with 50mm bundle 12mm cables through Bio wool seal		
Summary of testing procedure			Result
	Pressure (Pa)	Leakage (m <sup>3</sup> /h)	Leakage (m <sup>3</sup> /m <sup>2</sup> /h)
Results under negative chamber pressure	25	0.35	N/A
	50	0.47	N/A
	100	0.72	N/A
	200	1.38	N/A
	300	2.52	N/A
	450	3.53	N/A
	600	4.27	N/A
Results under positive chamber pressure	25	0.14	N/A
	50	0.26	N/A
	100	0.66	N/A
	200	1.30	N/A
	300	2.46	N/A
	450	3.89	N/A
	600	4.80	N/A



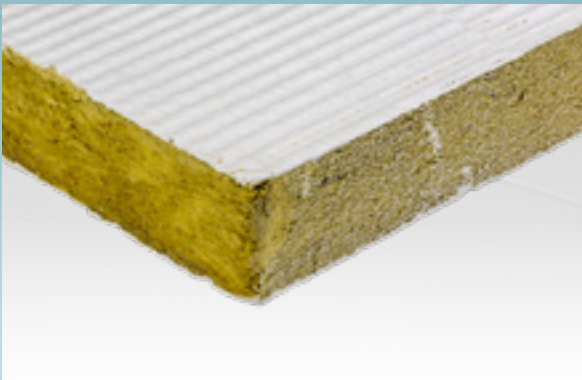
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Product tested	110mm Knauf FP Service Transit with 80mm bundle 12mm cables through Bio wool seal		
Summary of testing procedure			Result
	Pressure (Pa)	Leakage (m <sup>3</sup> /h)	Leakage (m <sup>3</sup> /m <sup>2</sup> /h)
Results under negative chamber pressure	25	1.43	N/A
	50	2.29	N/A
	100	3.84	N/A
	200	6.51	N/A
	300	9.0	N/A
	450	11.6	N/A
	600	14.15	N/A
Results under positive chamber pressure	25	1.43	N/A
	50	1.87	N/A
	100	3.59	N/A
	200	6.19	N/A
	300	8.63	N/A
	450	11.7	N/A
	600	14.43	N/A



# KNAUF FPC PANEL

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Knauf FPC Panel has been designed to maintain the fire resistance of separating walls and floors where they are breached by single or multiple building services. The panel consists of a stone wool core, sealed with Knauf FPC Coating on 1 or both faces.

Selection of the panel coated on 1 or both faces is determined by installation considerations and fire resistance requirements. When installed on site, Knauf FPC Panel should be used with Knauf FPA Acrylic for sealing around service penetrations and the adjacent separating construction.

## Properties:

- › Classified for all types of constructions with or without building service penetrations
- › Simple and very quick to install
- › Permanently flexible - will accommodate movements during fire and smaller movements in the construction it has been fitted within
- › Halogen free with added fungicides
- › Fire resistance up to EI240
- › ETA 21/0047
- › EAD 350141-00-1104

**Supporting constructions:****Flexible walls:**

The wall must have a minimum thickness of 75 mm and comprise steel studs or timber studs\*) lined on both faces with minimum 1 layer of 12.5 mm thick boards.

**Rigid walls:**

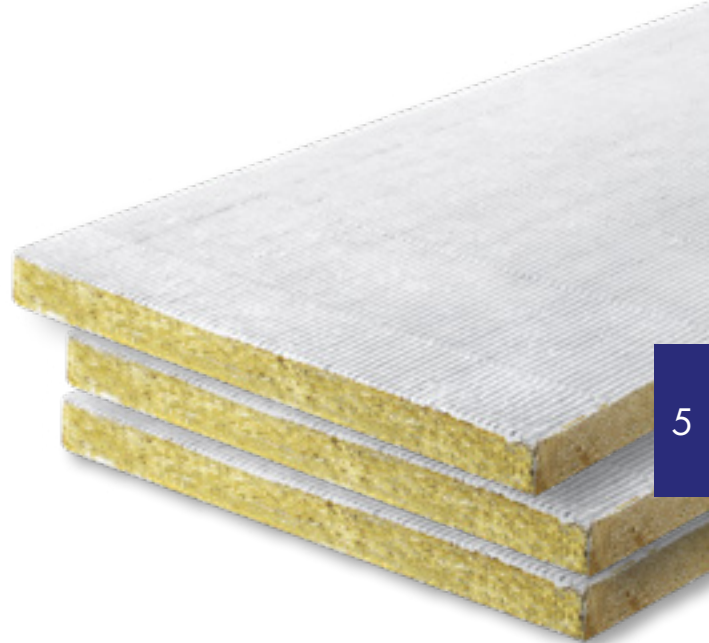
The wall must have a minimum thickness of 75 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650kg/m<sup>3</sup>.

**Rigid floors:**

The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 650kg/m<sup>3</sup>.

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.

\*) Timber studs: no part of the penetration seal may be closer than 100 mm to a stud, and minimum 100 mm of insulation of class A1 or A2 according to EN 13501-1 must be provided within the cavity between the penetration seal and the stud.



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**Installation Instructions**

1. Before installing Knauf FPC Panel ensure that the surface of all service penetrations and surrounding construction is free from all loose contaminants, dust and grease.
2. Knauf FPC Coating and Knauf FPA Acrylic are water based, so in cases where corrosion protection is a problem, some metals may require a barrier between the seal and the surface prior to this installation.
3. Select the type and number of panels to meet the required fire classification using the drawings on this document.
4. When fitting panels into drywalls the coated side of the panel should be flush with the surface of the wall on both sides. In seals wider than 2400mm, uninterrupted separating studs will be required at 2400mm centers or less.
5. When fitting double layer 60mm thick panels in masonry or concrete constructions, the panels should be flush with the surface of the construction on both sides to maximize the fire resistance. If this is not possible, there should be an air gap of at least 30mm between the panels.
6. When fitting single layer panels in masonry or concrete constructions, the panel can be positioned to either side of the construction or anywhere in between.
7. When installing Knauf FPC Panel in hollow floor slabs or boards, fire seals specified as single layer panels should be installed from the soffit side of the floor assuming there is sufficient thickness of concrete below the void to follow the installation guide. Where this is not the case, tubular voids should be filled with stone wool normally the same thickness as the depth of the floor slab. Alternatively, simply fire seal on both sides.
8. Cut the required panel(s) to suit the aperture dimensions and type and size of service penetration(s). All exposed and cut edges of the panels can be sealed with Knauf FPC Coating or Knauf FPA Acrylic prior to fitting which will act as an adhesive and ensure a smoke tight seal.
9. All joints, gaps or imperfections in the installed seal must be filled with Knauf FPA Acrylic on both sides.
10. Knauf FPC Panel can be over-painted with most emulsion or alkyd (gloss) paints.

# PENETRATION SEALS | RIGID WALL CONSTRUCTIONS

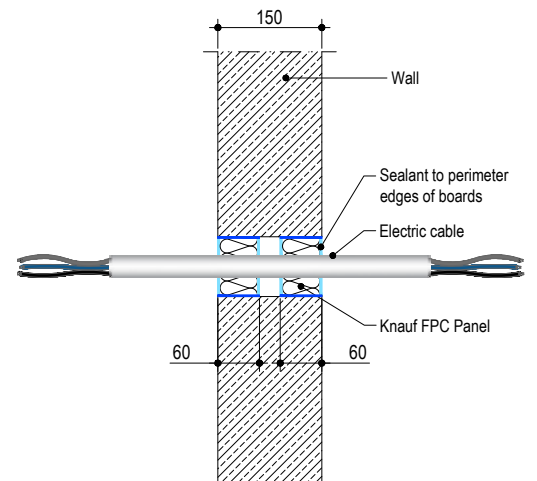
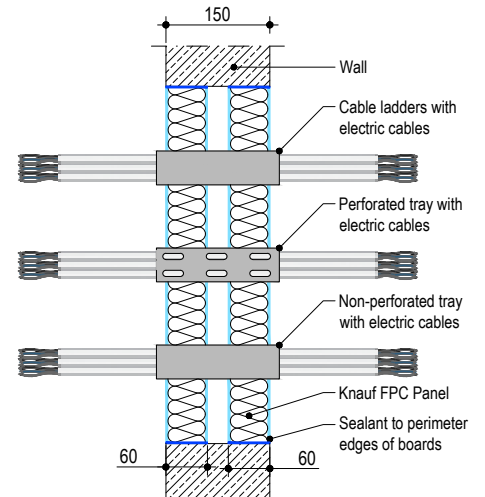
WITH WALL THICKNESS OF MINIMUM 150 MM

## > Cable penetration seal with 2x 60 mm thick Knauf FPC panel 2-S

Penetration Seal: Cables fitted at any position within the aperture, with 60 mm Knauf FPC panel 2-S to both sides of the wall.

Services	Classification
None (blank), at max. 1200 x 1200 mm	EI 240
-	E 240, EI 180
Single electrical cables up to 21 mm Ø	E 240, EI 180
Single or bundled electrical cables up to 21 mm Ø, with or without trays	E 240, EI 180
Electrical cables up to 80 mm Ø (single, bundled and on trays)	E 180, EI 60
Cables up to 21mm Ø in tied bundles up to 100mm Ø	E 180, EI 120
Steel cable trays & ladders	E 180, EI 60
Plastic conduits up to 16 mm Ø	EI 180 C/U, EI 180 C/C

Double side penetration seal with cables

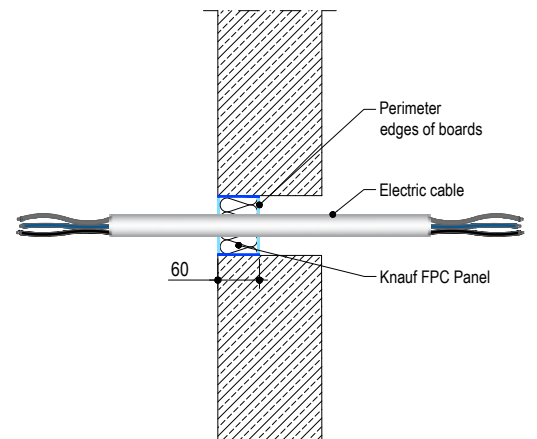


## > Cable penetration seal with 1x 60 mm thick Knauf FPC panel 2-S

Penetration Seal: Cables (single) fitted at any position within the aperture, with Knauf FPC panel 2-S positioned to either face of the wall (or anywhere in between).

Services	Maximum aperture	Classification
-	As section 2. 5)	E 240, EI 90
Single electrical cables up to Ø 21 mm	70 x 70 mm	EI 240
Single A1 cable = 5 x 1.5 mm <sup>2</sup> core HD603.3 electrical cable with PVC insulation, PVC sheath and Ø 14 mm		
Single A2 cable = 5 x 1.5 mm <sup>2</sup> core HD22.4 electrical cable with EPR insulation, PO sheath and Ø 11.2-14.4 mm		
Single A3 cable = 5 x 1.5 mm <sup>2</sup> core HD604.5 electrical cable with XLPE insulation, EVA sheath and Ø 13 mm		

Single side penetration seal with cables in minimum 150 mm thick walls





Services	Maximum aperture	Classification
-	As section 2. 5)	E 120, EI 90
Single electrical cables up to Ø 21 mm		

Single side penetration seal with cables in minimum 75 mm thick walls

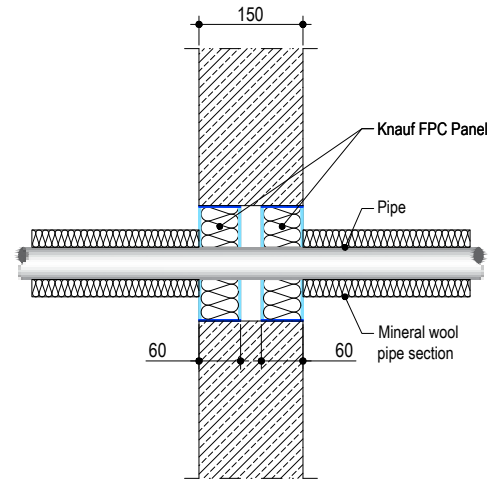
### > Pipe penetration seal with 2x 60 mm thick Knauf FPC panel 2-S

Penetration Seal: 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 60 mm Knauf FPC panel to both sides of the wall.

Services	Maximum aperture	Insulation	Classification
Mild or stainless steel pipe			
Ø 40 mm/1.5-14.2 mm wall	1200 x 1200 mm  As section 2. 5)	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 240 C/U
Ø 40 mm/1.5-14.2 mm wall			E 240 C/U, EI 180 C/U
Ø 40 mm/1.5-14.2 mm wall		30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, EI 90 C/U
Ø 50 mm/1.7-14.2 mm wall			
Ø 60 mm/1.7-14.2 mm wall			
Ø 75 mm/2.2-14.2 mm wall			
Ø 90 mm/2.5-14.2 mm wall			
Ø 100 mm/2.7-14.2 mm wall			
Ø 115 mm/3.0-14.2 mm wall			
Ø 165 mm/3.9-14.2 mm wall			
Ø 180 mm/4.2-14.2 mm wall			
Ø 200 mm/4.6-14.2 mm wall			
Ø 219 mm/5.0-14.2 mm wall			

Services	Maximum aperture	Insulation	Classification
Alupex composite			
Ø 16 mm/2.25 mm wall	1200 x 1200 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 240 C/U
Ø 16 mm/2.25 mm wall	As section 2. 5)		E 240 U/C EI 180 U/C
Copper pipe			
Up to Ø 54 mm Copper or steel pipe 0.9-14.2 mm wall	As section 2. 5)	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, EI 120 C/U

Double side penetration seal with pipes

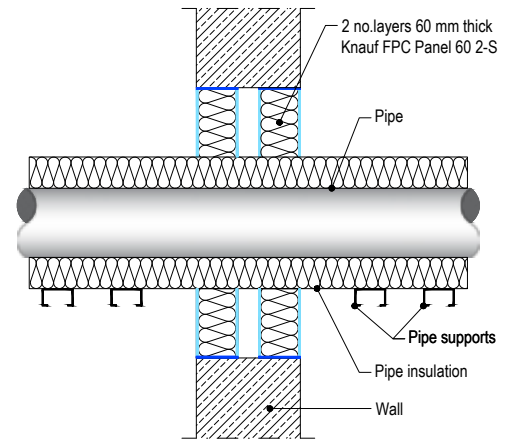


› **Pipe penetration seal with 2x Knauf FPC panel 2-S**

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture, with 60 mm Knauf FPC Panel 2-S to both sides of the wall. Minimum separation between penetration seals and seal edges of 30 mm in minimum 150 mm thick walls.

Services	Insulation	Classification
<b>Mild or stainless steel pipe</b>		
Ø 40 mm/1.0-14.2 mm wall	20 mm thick stone, mineral wool 80 kg/m <sup>3</sup>  30-80 mm thick stone, mineral wool min. 80 kg/m <sup>3</sup>	E 240 C/U, EI 180 C/U
Ø 40 mm/1.0-14.2 mm wall		
Ø 50 mm/1.2-14.2 mm wall		
Ø 60 mm/1.4-14.2 mm wall		
Ø 75 mm/1.6-14.2 mm wall		
Ø 90 mm/1.9-14.2 mm wall		
Ø 100 mm/2.1-14.2 mm wall		
Ø 115 mm/2.4-14.2 mm wall		
Ø 140 mm/2.9-14.2 mm wall		
Ø 165 mm/3.4-14.2 mm wall		
Ø 180 mm/3.6-14.2 mm wall		
Ø 200 mm/4.0-14.2 mm wall		
Ø 219 mm/4.3-14.2 mm wall		
Ø 250 mm/5.0-14.2 mm wall		
Ø 300 mm/5.9-14.2 mm wall		
Ø 324 mm/6.35-14.2 mm wall		

Double side penetration seal with pipes



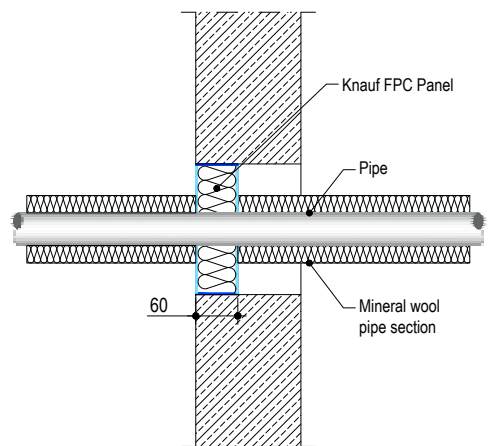
› **Pipe penetration seal with 1x 60 mm thick Knauf FPC panel 2-S**

Penetration Seal: 1000 mm (min.)\* LI (Local Interrupted), CI (Continuous Interrupted) or CS (continuous sustained) insulated metallic and composite pipes (single) fitted at any position within the aperture, with 60 mm Knauf FPC panel to one side of the wall.

\*600 mm long insulation required for Alupex pipes

Services	Maximum aperture	Insulation	Classification
Up to Ø 12 mm Copper pipe 0.9-14.2 mm wall	70 x 70 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 240 C/U
Up to Ø 54 mm Copper pipe 0.9-14.2 mm wall	115 x 115 mm		E 240 C/U, EI 120 C/U
Ø 75 mm Alupex composite pipe Ø 7.5 mm	200 x 200 mm	30 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 120 C/C
Up to Ø 54 mm Copper pipe 0.9-14.2 mm wall	As section 2.5)	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, EI 90 C/U
Up to Ø 75 mm Alupex composite pipe Ø 7.5 mm			E 120 C/C, EI 90 C/C
Ø 325 mm Steel pipe 6.35-14.2 mm wall			E 120 C/U, EI 90 C/U

Single side penetration seal with cables in minimum 150 mm thick walls



Services	Maximum aperture	Insulation	Classification
Mild or stainless steel pipe			
Ø 40 mm/1.5-14.2 mm wall Ø 40 mm/1.5-14.2 mm wall Ø 50 mm/1.7-14.2 mm wall Ø 60 mm/1.9-14.2 mm wall Ø 75 mm/2.2-14.2 mm wall Ø 90 mm/2.5-14.2 mm wall Ø 100 mm/2.7-14.2 mm wall Ø 115 mm/3.0-14.2 mm wall Ø 140 mm/3.5-14.2 mm wall Ø 165 mm/3.9-14.2 mm wall Ø 180 mm/4.2-14.2 mm wall Ø 200 mm/4.6-14.2 mm wall Ø 219 mm/5.0-14.2 mm wall	280 x 280 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>  30 mm Stone wool insulation 80 kg/m <sup>3</sup>	Ei 240 C/U
Ø 40 mm/1.5-14.2 mm wall Ø 50 mm/1.7-14.2 mm wall Ø 60 mm/1.9-14.2 mm wall Ø 75 mm/2.2-14.2 mm wall Ø 90 mm/2.5-14.2 mm wall Ø 100 mm/2.7-14.2 mm wall Ø 115 mm/3.0-14.2 mm wall Ø 140 mm/3.5-14.2 mm wall Ø 165 mm/3.9-14.2 mm wall Ø 180 mm/4.2-14.2 mm wall Ø 200 mm/4.6-14.2 mm wall Ø 219 mm/5.0-14.2 mm wall	As section 2. 5)	20 mm Stone wool insulation 80 kg/m <sup>3</sup>  30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, Ei 90 C/U

Single side penetration seal with cables in minimum 150 mm thick walls

Services	Maximum aperture	Insulation	Classification
Up to Ø 54 mm Copper or steel pipe 0.9-14.2 mm wall	As section 2. 5)	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 120 C/U, Ei 90 C/U
Up to Ø 75 mm Alupex composite pipe 7.5 mm wall		30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 120 C/C, Ei 90 C/C
Ø 325 mm Steel pipe			E 120 C/U, Ei 90 C/U

Single side penetration seal with pipes in minimum 75 mm thick walls

Services	Maximum aperture	Insulation	Classification
Mild or stainless steel pipe			
Ø 40 mm/1.5-14.2 mm wall Ø 50 mm/1.7-14.2 mm wall Ø 60 mm/1.9-14.2 mm wall Ø 75 mm/2.2-14.2 mm wall Ø 90 mm/2.5-14.2 mm wall Ø 100 mm/2.7-14.2 mm wall Ø 115 mm/3.0-14.2 mm wall Ø 140 mm/3.5-14.2 mm wall Ø 165 mm/3.9-14.2 mm wall Ø 180 mm/4.2-14.2 mm wall Ø 200 mm/4.6-14.2 mm wall Ø 219 mm/5.0-14.2 mm wall	As section 2. 5)	20 mm Stone wool insulation 80 kg/m <sup>3</sup>  30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 120 C/U, Ei 90 C/U

› **Pipe penetration seal with 1x Knauf FPC panel 2-S**

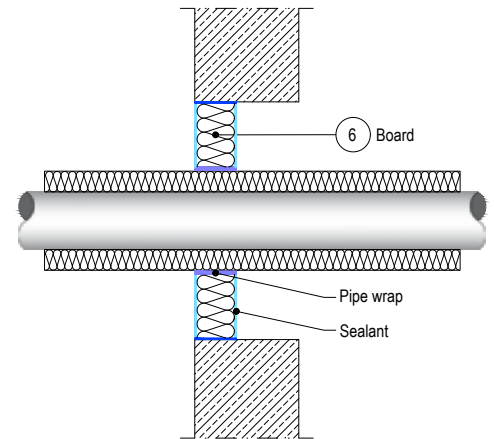
Penetration Seal: CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture, with 60 mm Knauf FPC panel 2-S to either side of the wall (or anywhere in between). Knauf Firewraps are required to be fitted around combustible pipe insulation.

Services	Wrap	Insulation	Classification
Mild or stainless steel pipe			
Ø 165 mm/ 4.5-14.2 mm wall	50 x 1.8 mm Knauf Firewrap fitted centrally	9-25 mm elastomeric insulation min. class B-s3, d0	E 120 U/C, E 120 C/U, E 120 C/C, EI 45 U/C, EI 45 C/U, EI 45 C/C
Ø 40-219 mm	Not required	30 mm stone wool 80 kg/m <sup>3</sup>	E 240 U/C, E 240 C/U, E 240 C/C, EI 60 U/C, EI 60 C/U, EI 60 C/C
Ø 40-219 mm		30-50 mm stone wool min. 80 kg/m <sup>3</sup>	E 180 U/C, E 180 C/U, E 180 C/C, EI 60 U/C, EI 60 C/U, EI 60 C/C
Ø 40-325 mm		50 mm stone wool min. 80 kg/m <sup>3</sup>	E 180 U/C, E 180 C/U, E 180 C/C, EI 60 U/C, EI 60 C/U, EI 60 C/C

Single side penetration seal with pipes in minimum 150 mm thick walls

Services	Wrap	Insulation	Classification
Mild or stainless steel pipe			
Ø 165 mm/ 4.5-14.2 mm wall	50 x 1.8 mm Knauf Firewrap fitted centrally	9-25 mm elastomeric insulation min. class B-s3, d0	E 120 U/C, E 120 C/U, E 120 C/C, EI 45 U/C, EI 45 C/U, EI 45 C/C
Ø 40-219 mm	Not required	30-50 mm stone wool min. 80 kg/m <sup>3</sup>	E 120 U/C, E 120 C/U, E 120 C/C, EI 60 U/C, EI 60 C/U, EI 60 C/C
Ø 40-325 mm		50 mm stone wool min. 80 kg/m <sup>3</sup>	E 120 U/C, E 120 C/U, E 120 C/C, EI 60 U/C, EI 60 C/U, EI 60 C/C

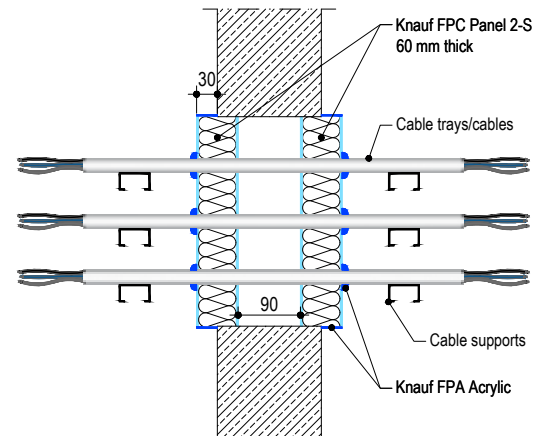
Single side penetration seal with pipes in minimum 75 mm thick walls



› **Knauf FPC panel 60 mm 2-S penetration seal (protruding) blank and with cables, in rigid wall min. 150 mm thick**

Penetration Seal: Cables fitted at any position within the aperture, with 60 mm Knauf FPC panel 2-S to both sides of the wall. Boards to be separated by minimum 90 mm.

Services	Maximum aperture	Classification
-	600 mm wide x 600 mm high	E 240, EI 180
Single or bundled electrical cables up to Ø 21 mm, with or without trays		E 240, EI 120
Electrical cables up to Ø 80 mm (single, bundled and on trays)		E 240, EI 60
Cables up to Ø 21 mm in tied bundles up to Ø 100mm		EI 240
Steel cable trays & ladders		E 240, EI 180
Non-Sheathed wires up to Ø 17 mm		E 240, EI 180
Non-Sheathed wires up to Ø 24 mm		E 240, EI 90



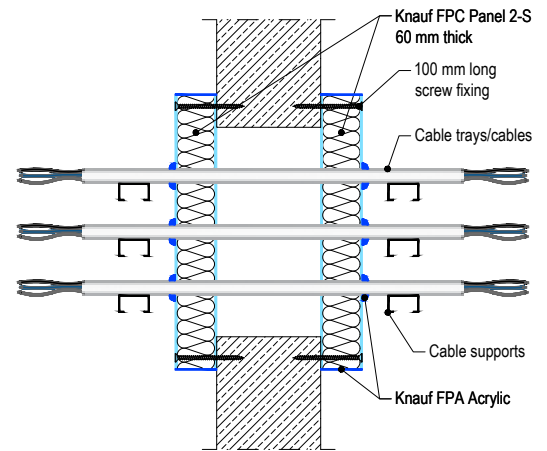
Two side penetration seal with cables

### › Knauf FPC panel 60 mm 2-S penetration seal (pattress) blank and with cables, in rigid wall min. 150 mm thick

**Penetration Seal:** Cables fitted at any position within the aperture, with 60 mm Knauf FPC panel 2-S to both sides of the wall. Boards to be pattress fixed with 100 mm steel screws and penny washers at 350 mm centres and with a minimum 50 mm overlap around the opening.

Services	Maximum aperture	Classification
-	600 mm wide x 600 mm high	E 240, EI 180
Single or bundled electrical cables up to Ø 50 mm, with or without trays		E 240, EI 90
Single or bundled electrical cables up to Ø 80 mm (single, bundled and on trays)		E 240, EI 60
Cables up to Ø 21 mm in tied bundles up to Ø 100mm		EI 240
Steel cable trays & ladders		E 240, EI 180
Non-Sheathed wires up to Ø 24 mm		E 240, EI 120

Two side penetration seal with cables

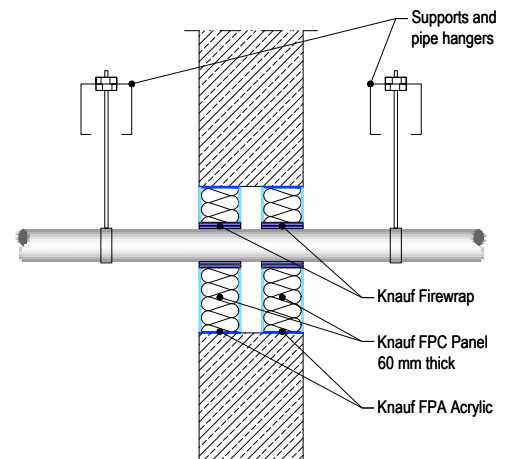


### › Penetration seal with 2x Knauf FPC panel 2-S

**Penetration Seal:** Plastic pipes fitted at any position within the aperture, with 60 mm Knauf FPC Panel 2-S to both sides of the wall. Knauf Firewraps are required to be fitted around pipes. Min. 30 mm separation between pipes in minimum 150 mm thick walls.

Services	Wrap	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Up to Ø 32 mm/1.0-2.4 mm wall	-	EI 240 U/C
Up to Ø 40 mm/1.9-3.0 mm wall	50 x 1.8 mm	
Up to Ø 110 mm/2.7-6.6 mm wall	50 x 3.6 mm	
Up to Ø 125 mm/4.7-7.4 mm wall	50 x 7.2 mm	
Up to Ø 160 mm/4.0-9.5 mm wall	50 x 10.8 mm	
Up to Ø 200 mm/4.9-11.9 mm wall	75 x 10.8 mm	EI 180 C/C
Up to Ø 315 mm/7.7-12.1 mm wall	75 x 18 mm	EI 120 C/C
Up to Ø 400 mm/9.8-15.3 mm wall	75 x 28.8 mm	EI 120 C/C
Up to Ø 32 mm, wall thickness 1.0-2.4 mm in pipe bundles up to Ø 107 mm <sup>1)</sup>	50 x 3.6 mm	EI 240 U/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Up to Ø 40 mm/2.4-4.6 mm wall	50 x 1.8 mm	EI 240 U/C
Up to Ø 110 mm/3.4-10.0 mm wall	50 x 3.6 mm	
Up to Ø 125 mm/3.9-7.4 mm wall	50 x 7.2 mm	
Up to Ø 160 mm/4.9-9.5 mm wall	50 x 10.8 mm	
Up to Ø 200 mm/4.9-18.2 mm wall	75 x 10.8 mm	
Up to Ø 315 mm/28.6 mm wall	75 x 18 mm	E 180 C/C, EI 120 C/C
Up to Ø 400 mm/36.3 mm wall	75 x 28.8 mm	EI 120 C/C
Up to Ø 32 mm, wall thickness 2.0-4.4 mm in pipe bundles up to Ø 107 mm <sup>1)</sup>	50 x 3.6 mm	EI 240 C/U

Double side penetration seal with pipes



Services	Wrap	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Up to Ø 40 mm/1.8-5.5 mm wall	50 x 1.8 mm	EI 240 U/C
Up to Ø 110 mm/2.7-10.0 mm wall	50 x 3.6 mm	EI 240 C/C
Up to Ø 125 mm/3.1-11.4 mm wall	50 x 7.2 mm	
Up to Ø 160 mm/4.9-14.6 mm wall	50 x 10.8 mm	EI 180 C/C
Up to Ø 200 mm/4.9-18.2 mm wall	75 x 10.8 mm	
Up to Ø 32 mm, wall thickness 1.8-4.4 mm in pipe bundles up to Ø 107 mm <sup>1)</sup>	50 x 3.6 mm	EI 240 C/U

Double side penetration seal with pipes

<sup>1)</sup> PVC, PE and PP pipes can be mixed in the same bundle.

## PENETRATION SEALS | RIGID FLOOR CONSTRUCTIONS

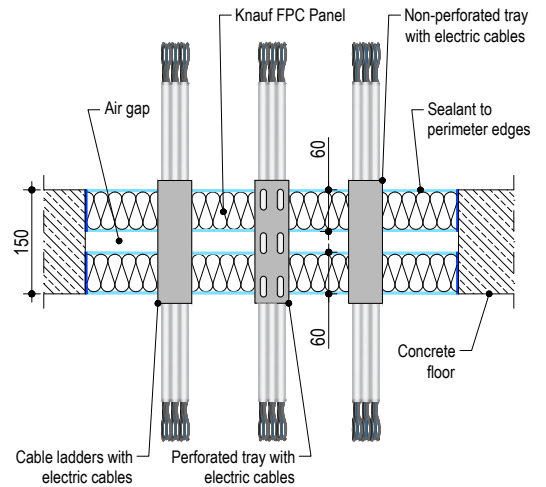
WITH FLOOR THICKNESS OF MINIMUM 150 MM

### > Cable penetration seal with 2x Knauf FPC panel 2-S

Penetration Seal: Cables fitted at any position within the aperture, with 60 mm Knauf FPC panel 2-S to both sides of the floor.

Services	Maximum aperture	Classification
-	1200 x 600 mm	EI 180
-	2400 mm x 1200 mm	E 180, EI 120
Electrical cables up to Ø 21 mm (single, bundled and on trays)		EI 120
Electrical cables up to Ø 80 mm (single, bundled and on trays)		E 120, EI 60
Cables up to Ø 21 mm in tied bundles up to Ø 100mm		EI 120
Steel cable trays & ladders		E 120, EI 60
Non-sheathed wires up to Ø 24 mm		E 180, EI 45
Plastic conduits up to Ø 16 mm		E 120 C/U, E 120 C/C, EI 90 C/U, EI 90 C/C

Double side penetration seal with pipes

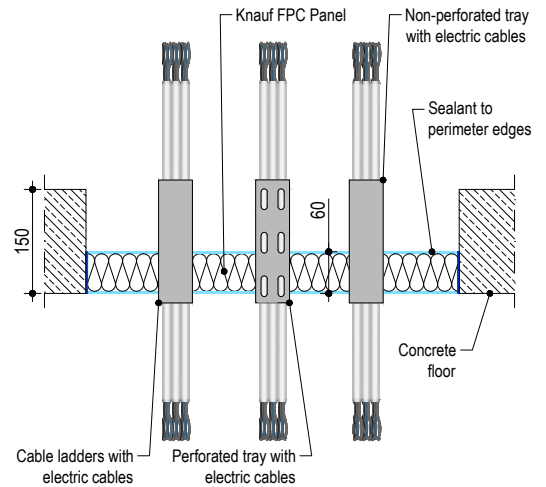


### > Cable penetration seal with 1x Knauf FPC panel 2-S

Penetration Seal: Cables fitted at any position within the aperture, with Knauf FPC panel 2-S positioned to either face of the floor (or anywhere in between).

Services	Maximum aperture	Classification
-	1200 x 600 mm	E 240, EI 120
-	2400 x 1200 mm	E 120, EI 90
Single electrical cables up to 21 mm Ø		E 120, EI 30
Single electrical cables up to 21 mm Ø	600 x 1200 mm	E 240, EI 30
Electrical cables up to Ø 21 mm (single, bundled and on trays)	2400 x 1200 mm	E 90, EI 45
Electrical cables up to Ø 80 mm (single, bundled and on trays)		E 90, EI 30
Cables up to Ø 21 mm in tied bundles up to Ø 100mm		EI 45
Steel cable trays & ladders		EI 45
Non-sheathed wires up to Ø 17 mm		E 45, EI 30
Non-sheathed wires up to Ø 24 mm		E 45, EI 20
Plastic conduits up to Ø 16 mm		EI 45 C/U, EI 45 C/C
Steel or copper conduit up to Ø 16 mm		E 45 C/U, EI 15 C/U

Single side penetration seal with cables



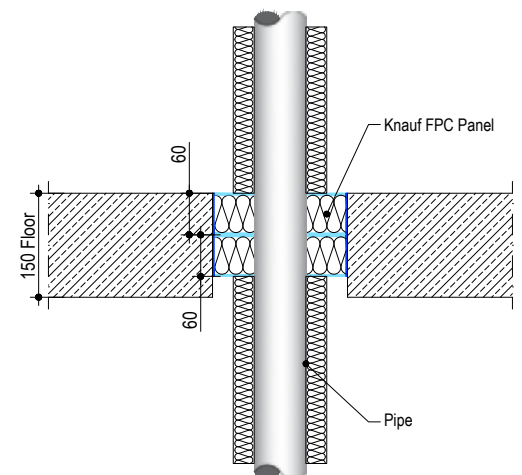
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### > Pipe penetration seal with 2x Knauf FPC panel 2-S

Penetration Seal: 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 2 layers of 60 mm Knauf FPC panel 2-S together within the floor.

Services	Maximum aperture	Insulation	Classification
Mild or stainless steel pipe			
Ø 40 mm/1.5-14.2 mm wall	1200 x 600 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 180 C/U
Ø 40 mm/1.5-14.2 mm wall	280 x 280 mm		EI 240 C/U
Ø 40 mm/1.5-14.2 mm wall	2400 x 1200 mm	30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 180 C/U, EI 120 C/U
Ø 40 mm/1.5-14.2 mm wall			E 180 C/U, EI 60 C/U
Ø 50 mm/1.7-14.2 mm wall			
Ø 60 mm/1.8-14.2 mm wall			
Ø 75 mm/2.1-14.2 mm wall			
Ø 90 mm/2.3-14.2 mm wall			
Ø 100 mm/2.5-14.2 mm wall			
Ø 115 mm/2.8-14.2 mm wall			
Ø 140 mm/3.2-14.2 mm wall			
Ø 165 mm/3.6-14.2 mm wall			
Ø 180 mm/3.9-14.2 mm wall			
Ø 200 mm/4.2-14.2 mm wall			
Ø 219 mm/4.5-14.2 mm wall			

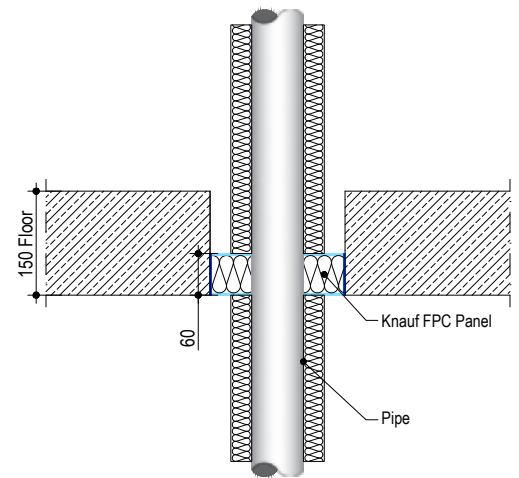
Two layer penetration seal with pipes



› **Pipe penetration seal with 1x Knauf FPC panel 2-S**

Penetration Seal: 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 60 mm Knauf FPC panel 2-S to either side of the floor (or anywhere in between).

Services	Maximum aperture	Insulation	Classification
Up to Ø 12 mm Copper pipe 0.9-14.2 mm wall	1200 x 600 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, EI 45 C/U
Up to Ø 54 mm Copper pipe 0.9-14.2 mm wall	1200 x 600 mm		E 240 C/U
	2400 x 1200 mm		E 120 C/U
Ø 114 mm mild or stainless steel pipe 11-14.2 mm wall	600 x 1200 mm		E 240 C/C, EI 20 C/C
	2400 x 1200 mm		E 120 C/C, EI 20 C/C



Services	Maximum aperture	Insulation	Classification
Mild or stainless steel pipe			
Ø 40 mm/1.5-14.2 mm wall	600 x 1200 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, EI 60 C/U
Ø 40 mm/1.5-14.2 mm wall		30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, EI 90 C/U
Ø 50 mm/1.7-14.2 mm wall			
Ø 60 mm/1.8-14.2 mm wall			
Ø 75 mm/2.1-14.2 mm wall			
Ø 90 mm/2.3-14.2 mm wall			
Ø 100 mm/2.5-14.2 mm wall			
Ø 115 mm/2.8-14.2 mm wall			
Ø 140 mm/3.2-14.2 mm wall			
Ø 165 mm/3.6-14.2 mm wall			
Ø 180 mm/3.9-14.2 mm wall			
Ø 200 mm/4.2-14.2 mm wall			
Ø 219 mm/4.5-14.2 mm wall			
Ø 40 mm/1.5-14.2 mm wall	2400 mm wide by 1200 mm high	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 120 C/U, EI 60 C/U
Ø 40 mm/1.5-14.2 mm wall		30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 120 C/U, EI 90 C/U
Ø 50 mm/1.7-14.2 mm wall			
Ø 60 mm/1.8-14.2 mm wall			
Ø 75 mm/2.1-14.2 mm wall			
Ø 90 mm/2.3-14.2 mm wall			
Ø 100 mm/2.5-14.2 mm wall			
Ø 115 mm/2.8-14.2 mm wall			
Ø 140 mm/3.2-14.2 mm wall			
Ø 165 mm/3.6-14.2 mm wall			
Ø 180 mm/3.9-14.2 mm wall			
Ø 200 mm/4.2-14.2 mm wall			
Ø 219 mm/4.5-14.2 mm wall			



Services	Maximum aperture	Insulation (minimum)	Classification			
Geberit Mepla MLC (PE-Xb/Aluminium/PE-HD pipe)						
Ø 16 mm/2.25 mm wall	75 x 75 mm	500 mm long, 20 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/C, EI 180 C/C			
Ø 16 mm/2.25 mm wall						
Ø 20 mm/2.5 mm wall						
Ø 26 mm/3.0 mm wall						
Ø 32 mm/3.0 mm wall						
Ø 40 mm/3.5 mm wall						
Ø 50 mm/4.0 mm wall						
Ø 63 mm/4.5 mm wall						
Ø 75 mm/4.7 mm wall						
Ø 16 mm/2.25 mm wall				600 x 1200 mm	500 mm long, 20 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/C, EI 90 C/C
Ø 20 mm/2.5 mm wall						
Ø 26 mm/3.0 mm wall						
Ø 32 mm/3.0 mm wall						
Ø 40 mm/3.5 mm wall						
Ø 50 mm/4.0 mm wall						
Ø 63 mm/4.5 mm wall						
Ø 75 mm/4.7 mm wall						
Ø 16 mm/2.25 mm wall	2400 x 1200 mm	500 mm long, 20 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 120 C/C, EI 90 C/C			
Ø 20 mm/2.5 mm wall						
Ø 26 mm/3.0 mm wall						
Ø 32 mm/3.0 mm wall						
Ø 40 mm/3.5 mm wall						
Ø 50 mm/4.0 mm wall						
Ø 63 mm/4.5 mm wall						
Ø 75 mm/4.7 mm wall						

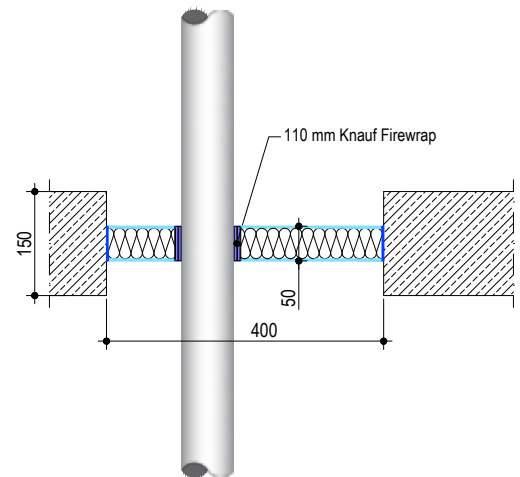
Single side penetration seal with pipes

### › Pipe penetration seal with 1x Knauf FPC panel 2-S

**Penetration Seal:** Combustible pipes fitted at any position within the aperture, with 50 mm Knauf FPC panel 2-S at mid-depth of the floor. Knauf Firewraps are required to be fitted around combustible pipe insulation. Maximum aperture size 2400 mm x 1200 mm.

Services	Wrap	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1		
Ø 110 mm/ 3.4mm wall	50 x 3.6 mm Knauf Firewrap	EI 90 U/C, EI 90 C/C

Central penetration seal with pipes

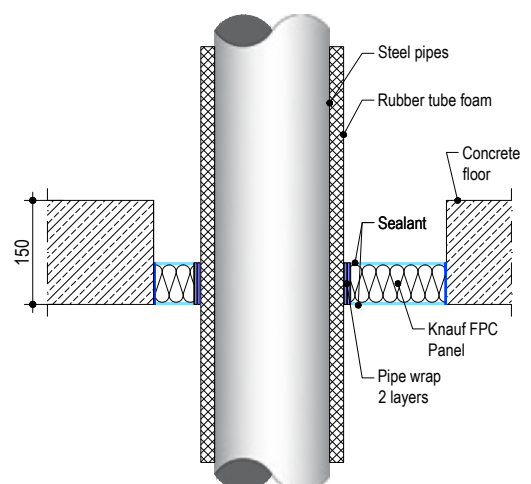


### › Pipe penetration seal with 1x Knauf FPC panel 2-S

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture, with 60 mm Knauf FPC panel 2-S to either side of the floor (or anywhere in between). Knauf Firewraps are required to be fitted around combustible pipe insulation. Maximum aperture size 2400 mm x 1200 mm.

Services	Wrap	Insulation	Classification
Mild or stainless steel pipe			
Ø 165 mm/ 4.5-14.2 mm wall	50 x 3.6 mm Knauf Firewrap fitted at bottom of seal	13 mm elastomeric insulation min. class B-s3, d0	E 90 C/U, EI 45 C/U
		19 mm elastomeric insulation min. class B-s3, d0	EI 90 C/U
	Not required	25-40 mm stone wool 80 kg/m <sup>3</sup>	E 90 C/U, EI 60 C/U

Single side penetration seal with pipes

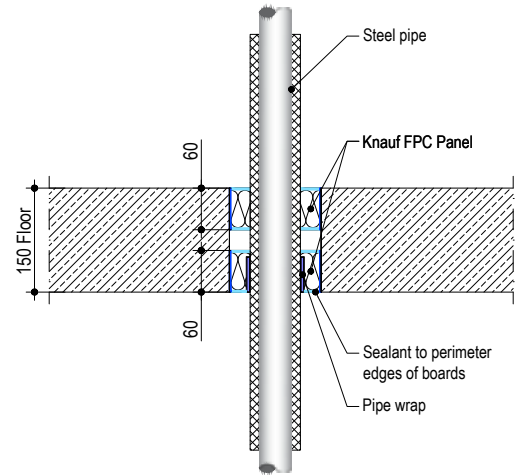


> **Pipe penetration seal with 2x Knauf FPC panel 2-S**

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture, with 60 mm Knauf FPC panel 2-S to both sides of the floor. Knauf Firewraps are required to be fitted around combustible pipe insulation at the soffit. Maximum aperture size 2400 mm x 1200 mm.

Services	Wrap	Insulation	Classification
Mild or stainless steel pipe			
Ø 40 mm/ 1-14.2 mm wall	50 x 1.8 mm Knauf Firewrap	13 mm elastomeric insulation min. class B-s3, d0	180 C/U, EI 120 C/U

Double side penetration seal with pipes

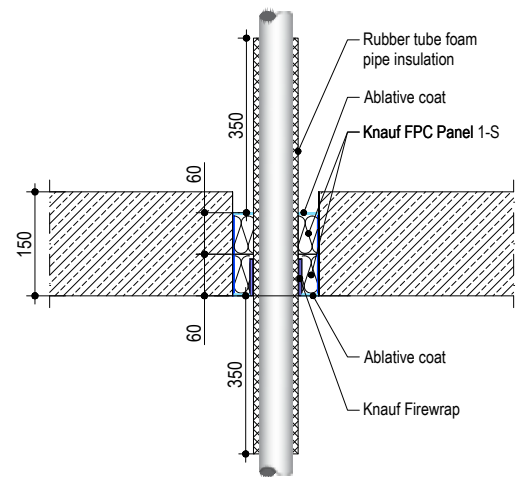


> **Pipe penetration seal with 2x Knauf FPC panel 2-S (back to back)**

Penetration Seal: CS (Continuous Sustained) insulated metallic and composite pipes fitted at any position within the aperture, with two layers of 60 mm Knauf FPC panel 1-S installed together to either side of the floor (or anywhere in between). Knauf Firewraps are required to be fitted around combustible pipe insulation at the bottom of the seal. Maximum aperture size 2400 mm x 1200 mm.

Services	Wrap	Insulation	Classification
Copper pipe			
Ø 12-54 mm/1.0-1.2 mm wall	50 x 3.6 mm Knauf Firewrap fitted to both sides of the seal	9-13 mm elastomeric insulation min. class B-s3, d0	E240 C/C, EI 60 C/C
Ø 12-54 mm/1.0-1.2 mm wall		13-25 mm elastomeric insulation min. class B-s3, d0	E 180 C/C, EI 45 C/C
Geberit Mepla MLC (PE-Xb/Aluminium/PE-HD pipe)			
Ø 16 mm/2.25 mm wall	50 x 3.6 mm Knauf Firewrap fitted to both sides of the seal	9 mm elastomeric insulation min. class B-s3, d0	EI 120 C/C
Ø 20 mm/2.5 mm wall			
Ø 26 mm/3.0 mm wall			
Ø 32 mm/3.0 mm wall			
Ø 40 mm/3.5 mm wall			
Ø 50 mm/4.0 mm wall			
Ø 63 mm/4.5 mm wall			
Ø 75 mm/4.7 mm wall		13-25 mm elastomeric insulation min. class B-s3, d0	E 60 C/C, EI 45 C/C
Ø 16 mm/2.25 mm wall			
Ø 20 mm/2.5 mm wall			
Ø 26 mm/3.0 mm wall			
Ø 32 mm/3.0 mm wall			
Ø 40 mm/3.5 mm wall			
Ø 50 mm/4.0 mm wall			
Ø 63 mm/4.5 mm wall			
Ø 75 mm/4.7 mm wall			

Back to back penetration seal with pipes



# PENETRATION SEALS | TIMBER FLOOR CONSTRUCTIONS

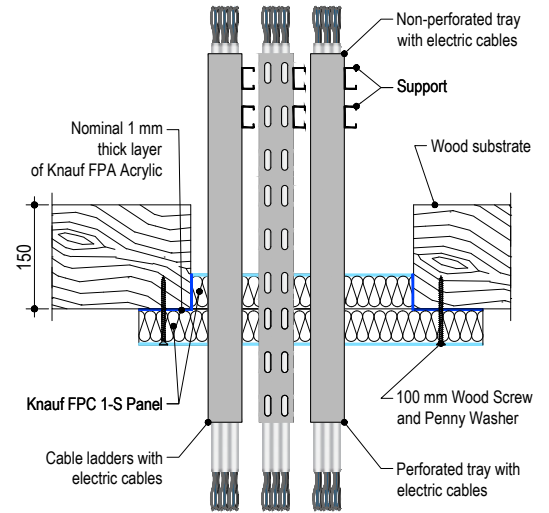
WITH FLOOR THICKNESS OF MINIMUM 150 MM

## > Cable penetration seal with 2x Knauf FPC Panel 1-S

**Penetration Seal:** Cables fitted at any position within the aperture, with 2 layers of 50 mm Knauf FPC Panel 1-S within the floor with the coated sides downwards. The external board layer has a minimum 100 mm overlap all around the aperture.

Services	Maximum aperture	Classification
Electrical cables up to Ø 21 mm (single, bundled and on trays)	1200 mm wide x 600 mm high	E 90, EI 45
Electrical cables up to Ø 50 mm (single, bundled and on trays)		E 90, EI 60
Electrical cables up to Ø 80 mm (single, bundled and on trays)		
Cables up to Ø 21 mm in tied bundles up to Ø 100mm		
Steel cable trays & ladders		E 90, EI 30
Non-sheathed wires up to Ø 24 mm		
PE-X pipe-in-pipe up to Ø 25 mm / 1.0 mm wall	EI 90 C/C	

Back to back penetration seal with cables

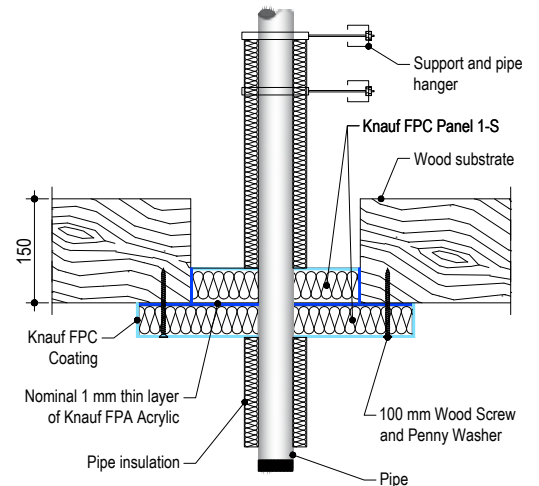


## > Pipe penetration seal with 2x Knauf FPC Panel 1-S

**Penetration Seal:** 500 mm (min.)\* LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes fitted at any position within the aperture, with 2 layers of 50 mm Knauf FPC Panel 1-S within the floor with the coated sides downwards. The external board layer has a minimum 100 mm overlap all around the aperture.

Services	Maximum aperture	Insulation, minimum thickness and density	Classification
Mild or stainless steel pipe			
Ø 60 mm	1200 mm x 600 mm	20 mm glass or stone wool insulation 75 kg/m <sup>3</sup>	E 90 C/U, EI 60 C/U
Ø 273 mm		25 mm glass or stone wool insulation 75 kg/m <sup>3</sup>	E 90 C/U, EI 60 C/U
Copper or steel pipes			
Ø 15 mm	1200 mm x 600 mm	20 mm glass or stone wool insulation 75 kg/m <sup>3</sup>	EI 90 C/C
Ø 54 mm			
Alupex pipes			
Ø 16 mm	1200 mm x 600 mm	20 mm glass or stone wool insulation 75 kg/m <sup>3</sup>	E 90 C/C, EI 60 C/C
Ø 75 mm		25 mm glass or stone wool insulation 75 kg/m <sup>3</sup>	

Back to back penetration seal with pipes



# PENETRATION SEALS | FLEXIBLE OR RIGID WALL CONSTRUCTIONS

## WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 75 MM

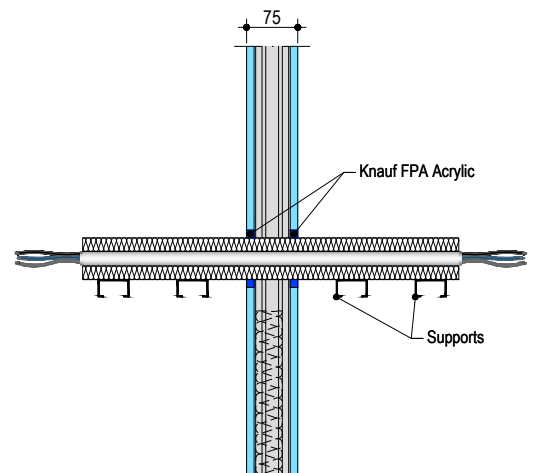
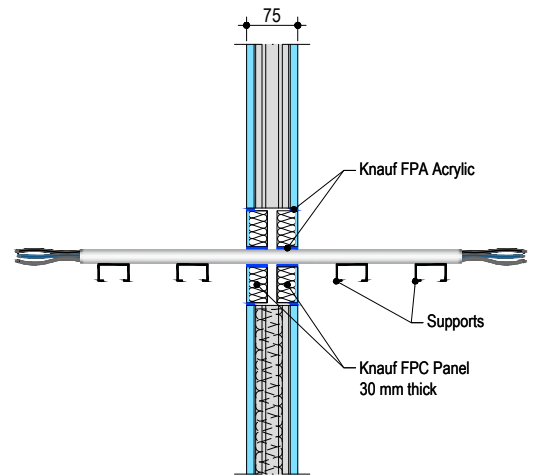
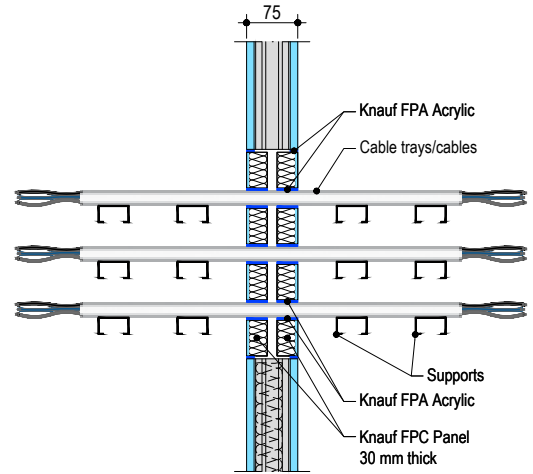
### > Cable penetration seal with 2x Knauf FPC panel 30 1-S

Penetration Seal: Cables fitted at any position within the aperture, with 30 mm Knauf FPC panel 1-S to both sides of the wall. Minimum 30 mm separation between pipes.

Services	Maximum aperture	Classification
Electrical cables up to Ø 21 mm (single, bundled and on trays)	1200 mm wide x 600 mm high	EI 45
Electrical cables up to Ø 80 mm (single, bundled and on trays)		E 45, EI 30
Cables including telecoms up to Ø 21 mm in tied bundles up to Ø 100mm		
Steel cable trays & ladders		
Unsheathed wires up to Ø 24 mm		E 45, EI 20
Plastic conduits maximum Ø 32 mm	EI 45	

Services	Maximum aperture	Insulation	Classification
Mild or stainless steel pipe			
Ø 4 mm/0.7-14.2 mm wall	1200 mm wide x 600 mm high	-	EI 45 C/U
Ø 22 mm/2.0-14.2 mm wall			E 45 C/U, EI 30 C/U
Ø 40 mm/1.0-14.2 mm wall		20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 45 C/U
Ø 40 mm/1.0-14.2 mm wall		30 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 45 C/U
Ø 50 mm/1.7-14.2 mm wall			
Ø 60 mm/1.8-14.2 mm wall			
Ø 75 mm/2.1-14.2 mm wall			
Ø 90 mm/2.3-14.2 mm wall			
Ø 100 mm/2.5-14.2 mm wall			
Ø 115 mm/2.8-14.2 mm wall			
Ø 140 mm/3.2-14.2 mm wall			
Ø 165 mm/3.6-14.2 mm wall			
Ø 180 mm/3.9-14.2 mm wall			
Ø 200 mm/4.2-14.2 mm wall			
Ø 219 mm/4.5-14.2 mm wall			
Ø 250 mm/5.0-14.2 mm wall			
Ø 300 mm/5.9-14.2 mm wall			
Ø 324 mm/6.35-14.2 mm wall			

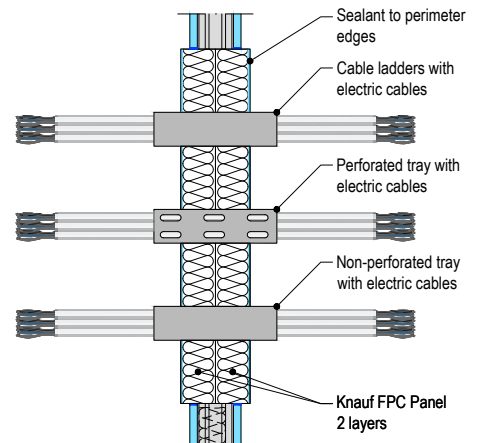
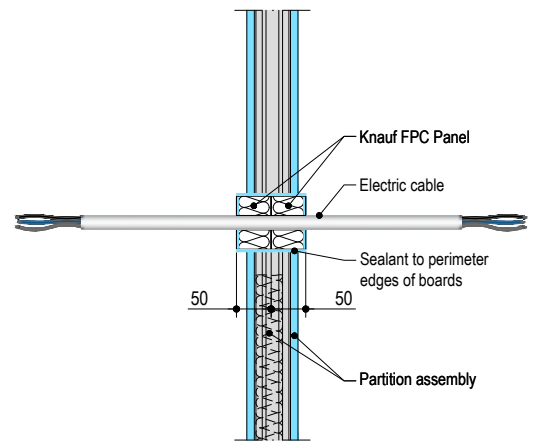
Double side penetration seal with cables



> **Cable penetration seal with 2x Knauf FPC Panel 1-S**

**Penetration Seal:** Cables fitted at any position within the aperture, with 50 mm Knauf FPC Panel 1-S to both sides of the wall.

Services	Maximum aperture	Classification
-	As section 2. 5)	EI 60
Single electrical cables up to Ø 21 mm		E 60, EI 45
Electrical cables up to Ø 80 mm (single, bundled and on trays)		EI 60
Cables up to Ø 21 mm in tied bundles up to Ø 100mm		EI 60 C/U
Steel cable trays & ladders		E 60 C/U, EI 45 C/U
Steel conduit up to Ø 16 mm		E 60, EI 30
Copper conduit up to Ø 16 mm		EI 60 C/U, EI 60 C/C
Unsheathed wires up to Ø 24 mm		
Plastic conduits up to Ø 16 mm		



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# PENETRATION SEALS | FLEXIBLE OR RIGID WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 100 MM

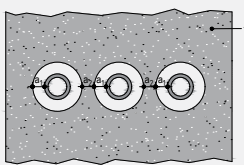
## > Cable penetration seal with 2x Knauf FPC panel 1-S

**Penetration Seal:** Cables fitted at any position within the aperture, with 50 mm Knauf FPC panel 1-S to both sides of the wall.

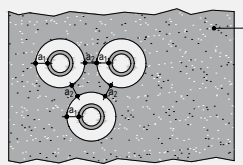
**Note:** Insulated metal pipes may also be included within the same seal as cables subject to minimum 100 mm separation. See separate classification for pipes.

Services	Maximum aperture	Classification
-	As section 2. 5)	EI 120
Single electrical cables up to Ø 21 mm		E 120, EI 60
Electrical cables up to Ø 80 mm (single, bundled and on trays)		EI 60
Cables up to Ø 21 mm in tied bundles up to Ø 100mm		
Steel cable trays & ladders		EI 60 C/U
Steel conduit up to Ø 16 mm		
Copper conduit up to Ø 16 mm		E 60 C/U, EI 45 C/U
Unsheathed wires up to Ø 24 mm		E 60, EI 30
Plastic conduits up to Ø 16 mm		EI 60 C/U, EI 60 C/C

Configuration 1

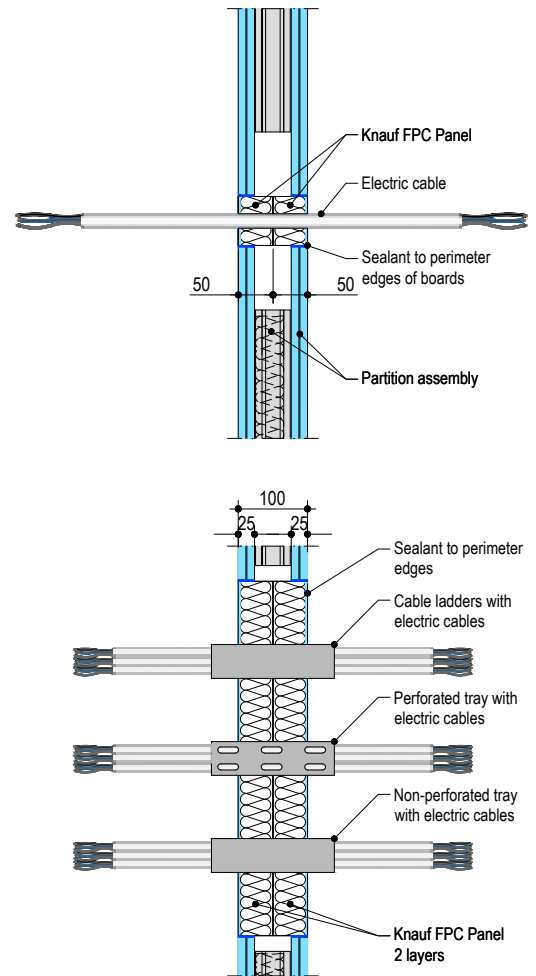


Configuration 2



Key

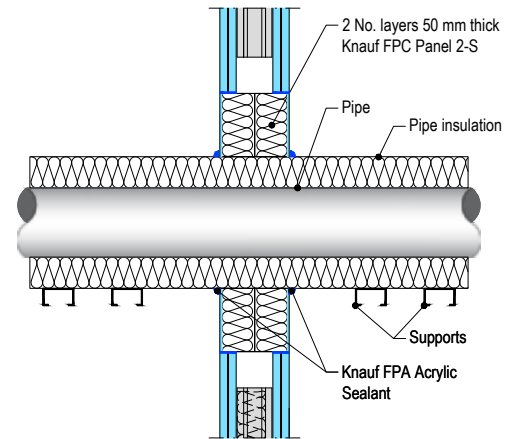
- 1 Supporting construction
- a1 Pipe / top edge of seal separation
- a2 Pipe / side edge of seal separation
- a3 Pipe / pipe separation



### › Pipe penetration seal with 2x Knauf FPC panel 1-S

**Penetration Seal:** CS insulated metallic pipes fitted at any position within the aperture, with 50 mm Knauf FPC panel 1-S to both sides of the wall. Minimum separation between penetration seals and seal edges of 30 mm.

Services	Insulation	Classification
Mild or stainless steel pipe		
Ø 40 mm/1.0-14.2 mm wall	20 mm thick stone, mineral wool 80 kg/m <sup>3</sup>	EI 120 C/U
Ø 40 mm/1.0-14.2 mm wall		
Ø 50 mm/1.2-14.2 mm wall		
Ø 60 mm/1.4-14.2 mm wall		
Ø 75 mm/1.6-14.2 mm wall		
Ø 90 mm/1.9-14.2 mm wall		
Ø 100 mm/2.1-14.2 mm wall		
Ø 115 mm/2.4-14.2 mm wall		
Ø 140 mm/2.9-14.2 mm wall		
Ø 165 mm/3.4-14.2 mm wall		
Ø 180 mm/3.6-14.2 mm wall		
Ø 200 mm/4.0-14.2 mm wall		
Ø 219 mm/4.3-14.2 mm wall		
Ø 250 mm/5.0-14.2 mm wall		
Ø 300 mm/5.9-14.2 mm wall		
Ø 324 mm/6.35-14.2 mm wall		
PEX pipe in pipe system		
Ø 15 mm x 2.5 mm wall inner / Ø 25mm outer	-	EI 90 C/C
Mild or stainless steel pipe		
Ø 4 mm	-	EI 120 C/U
Ø 5-22 mm	-	E 120 C/U, EI 60 C/U
Copper, mild or stainless steel pipe		
Up to Ø 6 mm/0.7-14.2 mm wall	-	E 120 C/C, EI 60 C/C
Up to Ø 15 mm/0.7-7.5 mm wall	20 mm thick glass or stone wool min. 75 kg/m <sup>3</sup>	EI 60 C/C
Ø 16-54 mm/0.7-14.2 mm wall		E 60 C/C, EI 45 C/C
Up to Ø 54 mm/0.7-14.2 mm wall	40 mm thick glass or stone wool min. 75 kg/m <sup>3</sup>	EI 60 C/C
Alupex pipe		
Ø 16-20 mm/2.0 mm wall	-	EI 120 C/C
Ø 16 mm/2.0-2.25 mm wall	20 mm thick glass or stone wool min. 75 kg/m <sup>3</sup>	E 120 C/C, EI 90 C/C
Ø 16-75 mm	25-60 mm thick glass or stone wool min. 75 kg/m <sup>3</sup>	E 120 C/C, EI 90 C/C
PVC-U <sup>1)</sup> pipe		
Ø 6 mm	-	EI 120 U/C
Ø 7-32 mm		EI 60 U/C
Ø 32 mm		EI 90 U/C
PE <sup>2)</sup> pipe		
Ø 20 mm/2.0 mm wall	-	E 120 U/C, EI 90 U/C
Ø 21-32 mm/2.0-3.0 mm wall		EI 60 U/C
Ø 32 mm/3.0 mm wall		EI 90 U/C
PP pipe		
Ø 20 mm/2.2 mm wall	-	E 120 U/C, EI 60 U/C
Up to Ø 32 mm/1.8 mm wall		



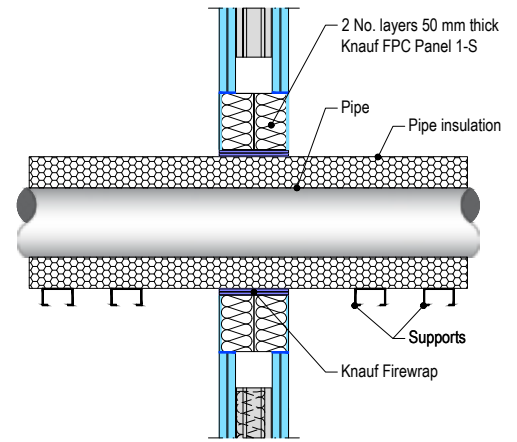
<sup>1)</sup> PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1  
<sup>2)</sup> PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1

› Pipe penetration seal with 2x Knauf FPC panel 1-S

Penetration Seal: CS insulated metallic pipes fitted at any position within the aperture, with 50 mm Knauf FPC panel 1-S to both sides of the wall. Minimum separation between penetration seals and seal edges of 30 mm. Knauf Firewraps are required to be fitted around the pipe insulation.

Services	Insulation	Knauf Firewrap	Classification
Mild or stainless steel pipe			
Ø 40 mm/1.0-14.2 mm wall	32-50 mm thick Elastomeric insulation minimum class B-s3, d0 or PE Foam insulation	3 layers 50 x 1.8 mm	EI 90 C/U
Ø 50 mm/1.2-14.2 mm wall			
Ø 60 mm/1.4-14.2 mm wall			
Ø 75 mm/1.6-14.2 mm wall			
Ø 90 mm/1.9-14.2 mm wall			
Ø 100 mm/2.1-14.2 mm wall			
Ø 115 mm/2.4-14.2 mm wall			
Ø 140 mm/2.9-14.2 mm wall			
Ø 165 mm/3.4-14.2 mm wall			
Ø 180 mm/3.6-14.2 mm wall			
Ø 200 mm/4.0-14.2 mm wall			
Ø 219 mm/4.3-14.2 mm wall			
Ø 250 mm/5.0-14.2 mm wall			
Ø 300 mm/5.9-14.2 mm wall			
Ø 324 mm/6.35-14.2 mm wall			

Double side penetration seal with cables

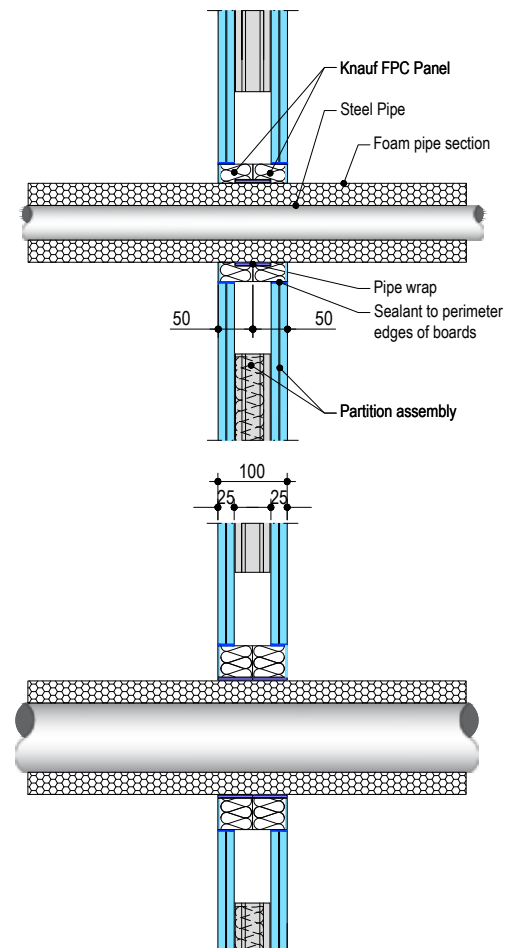


› Pipe penetration seal with 2x Knauf FPC panel 1-S

Penetration Seal: CS insulated metallic pipes fitted at any position within the aperture, with 50 mm Knauf FPC panel 1-S to both sides of the wall. Knauf Firewraps are required to be fitted around the pipe insulation.

Services	Wrap	Insulation	Classification
Mild or stainless steel pipe			
Up to Ø 40 mm/1.0-14.2 mm wall	50 x 1.8 mm Knauf Firewrap fitted centrally	13 mm elastomeric insulation minimum class B-s3, d0 or PE Foam insulation	EI 120 U/C, EI 120 U/U, EI 120 C/U, EI 120 C/C
Up to Ø 40 mm/1.0-14.2 mm wall	2 off 50 x 3.6 mm Knauf Firewrap, one fitted flush to each face of seal	13 – 32 mm elastomeric insulation minimum class B-s3, d0 or PE Foam insulation	E 120 U/C, E 120 U/U, E 120 C/U, E 120 C/C, EI 60 U/C, EI 60 U/U, EI 60 C/U, EI 60 C/C
Ø 50 mm/1.3-14.2 mm wall			
Ø 60 mm/1.6-14.2 mm wall			
Ø 75 mm/2.0-14.2 mm wall			
Ø 90 mm/2.4-14.2 mm wall			
Ø 100 mm/2.7-14.2 mm wall			
Ø 115 mm/3.1-14.2 mm wall			
Ø 140 mm/3.8-14.2 mm wall			
Ø 165 mm/4.5-14.2 mm wall			

Two layer penetration seal with pipes

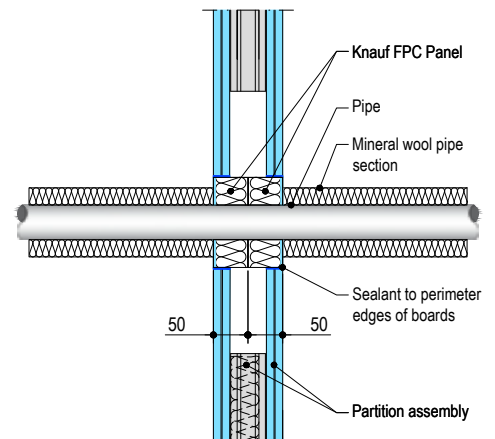




### > Pipe penetration seal with 2x Knauf FPC panel 1-S

Penetration Seal: 500 mm (min.)\* LI (Local Interrupted) or CI (Continuous Interrupted) insulated or uninsulated metallic and composite pipes (single) fitted at any position within the aperture, with 50 mm Knauf FPC panel 1-S to both sides of the wall.

Services	Insulation (minimum thickness and density)	Classification
Copper pipe up to $\varnothing$ 54 mm/1-14.2 mm wall	20 mm stone wool 80 kg/m <sup>3</sup>	EI 120 C/C
Mild or stainless steel pipe $\varnothing$ 114 mm/ 11 mm wall	-	E 90 C/U, EI 20 C/U
Mild or stainless steel pipe		
$\varnothing$ 40 mm/1.0-14.2 mm wall	20 mm stone wool 80 kg/m <sup>3</sup>	EI 120 C/U
$\varnothing$ 40 mm/1.0-14.2 mm wall	30 mm stone wool 80 kg/m <sup>3</sup>	E 120 C/U, EI 90 C/U
$\varnothing$ 50 mm/1.2-14.2 mm wall		
$\varnothing$ 60 mm/1.4-14.2 mm wall		
$\varnothing$ 75 mm/1.7-14.2 mm wall		
$\varnothing$ 90 mm/2.0-14.2 mm wall		
$\varnothing$ 100 mm/2.2-14.2 mm wall		
$\varnothing$ 115 mm/2.5-14.2 mm wall		
$\varnothing$ 140 mm/3.0-14.2 mm wall		
$\varnothing$ 165 mm/3.5-14.2 mm wall		
$\varnothing$ 180 mm/3.8-14.2 mm wall		
$\varnothing$ 200 mm/4.2-14.2 mm wall		
$\varnothing$ 219 mm/4.5-14.2 mm wall		
Alupex pipe		
$\varnothing$ 16 mm/2.25 mm wall	20 mm stone wool 80 kg/m <sup>3</sup>	EI 120 C/C
$\varnothing$ 20 mm/2.5 mm wall		EI 60 C/C
$\varnothing$ 26 mm/3.0 mm wall		
$\varnothing$ 32 mm/3.0 mm wall		
$\varnothing$ 40 mm/3.5 mm wall		
$\varnothing$ 50 mm/4.0 mm wall		
$\varnothing$ 63 mm/4.5 mm wall		
$\varnothing$ 75 mm/4.7 mm wall		

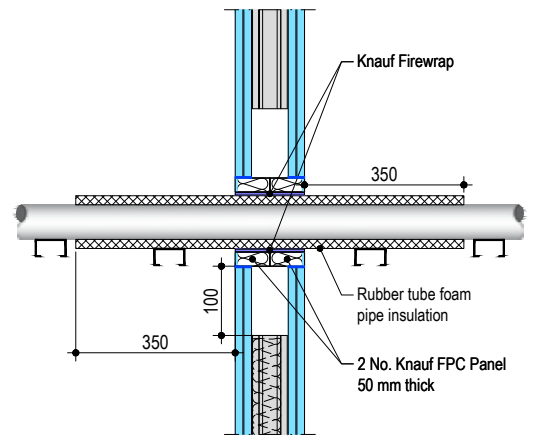


› **Pipe penetration seal with 2x Knauf FPC Panel 1-S**

Penetration Seal: LS (Local Sustained) or CS (Continuous Sustained) insulated metallic and composite pipes fitted at any position within the aperture, with 50 mm Knauf FPC Panel 1-S to both sides of the wall. Knauf Firewraps are required to be fitted around the pipe to both sides of the seal.

Services	Wrap	Insulation	Classification
Mild or stainless steel pipe			
Ø 16 mm/1.0 mm wall	50 x 1.8 mm Knauf Firewrap fitted to both sides of the seal	15 mm phenolic foam insulation (CS)	EI 90 C/U
Ø 16-273 mm/1.0-14.2 mm wall		25-100 mm phenolic foam insulation (CS)	
Copper pipe			
Ø 12 mm/1 mm wall	50 x 3.6 mm Knauf Firewrap fitted to both sides of the seal	9 mm elastomeric insulation minimum class B-s3, d0 or PE Foam insulation (LS and CS)	EI 120 C/C
Ø 12-54 mm/1-1.2 mm wall		9-13 mm elastomeric insulation minimum class B-s3, d0 or PE Foam insulation (LS and CS)	E 120 C/C, EI 90 C/C
Ø 12-54 mm/1-1.2 mm wall		13-25 mm elastomeric insulation minimum class B-s3, d0 or PE Foam insulation (LS and CS)	E 120 C/C, EI 60 C/C
Alupex pipe			
Ø 16 mm/2.25 mm wall	50 x 3.6 mm Knauf Firewrap fitted to both sides of the seal	9-25 mm elastomeric insulation minimum class B-s3, d0 or PE Foam insulation	EI 120 C/C
Ø 20 mm/2.5 mm wall			
Ø 26 mm/3 mm wall			
Ø 32 mm/3 mm wall			
Ø 40 mm/3.5 mm wall			
Ø 50 mm/4 mm wall			
Ø 63 mm/4.5 mm wall			
Ø 75 mm/4.7 mm wall			
Ø 25 mm/2.5 mm wall	13 mm polyethylene foam with plastic sheaving	E 90 C/C, EI 60 C/C	

Two layer penetration seal with pipes



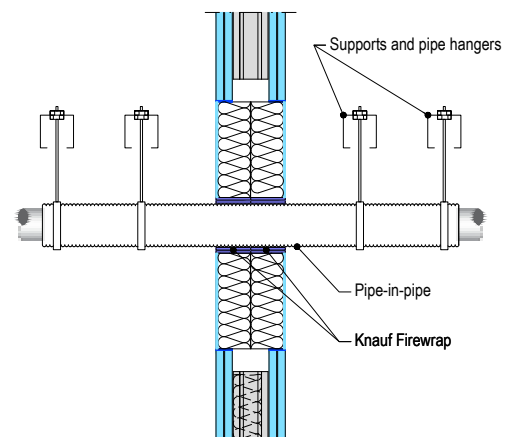
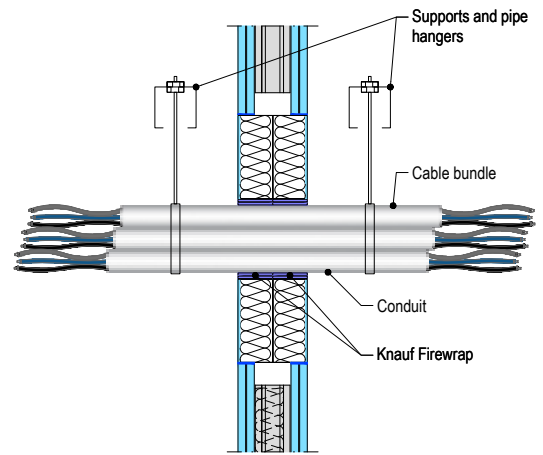
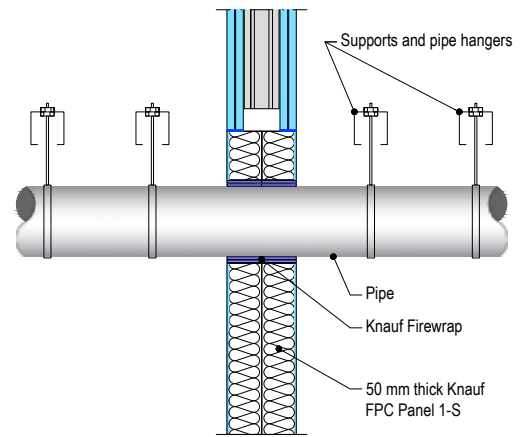
Services	Outer diameter including insulation	Pipe wrap	Pipe insulation	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1				
Maximum Ø 160 mm pipe	Maximum Ø 68 mm	50 x 3.6 mm Knauf Firewrap fitted to both sides of the seal	9-50 mm Elastomeric insulation minimum class B-s3, d0 or PE Foam insulation	EI 60 C/C
	Maximum Ø 178 mm	50 x 10.8 mm Knauf Firewrap fitted to both sides of the seal		
	Maximum Ø 260 mm	50 x 18.0 mm Knauf Firewrap fitted to both sides of the seal		
PP pipe according to EN 1852-1: 2009				
Maximum Ø 160 mm pipe	Maximum Ø 68 mm	50 x 3.6 mm Knauf Firewrap fitted to both sides of the seal	9-50 mm Elastomeric insulation minimum class B-s3, d0 or PE Foam insulation	EI 60 C/C
	Maximum Ø 178 mm	50 x 10.8 mm Knauf Firewrap fitted to both sides of the seal		
	Maximum Ø 260 mm	50 x 18.0 mm Knauf Firewrap fitted to both sides of the seal		

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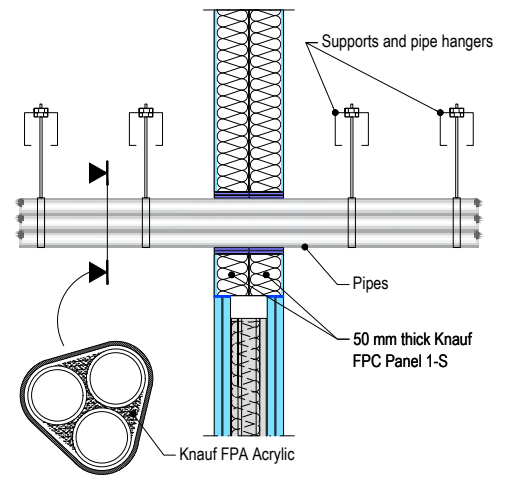
### › Knauf Firewrap penetration seal for plastic pipes, in 2x Knauf FPC Panel 1-S, in flexible or rigid walls

**Penetration Seal:** Combustible pipes sealed with Knauf Firewrap, to both sides of the wall. Minimum separation between penetration seals and seal edges of 30 mm. (Configuration 1 & 2).

Services	Wraps (both sides)	Permitted configuration for seal separation	Classification
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1 and PVC-C according to EN 1566-1			
Diameter up to 40 mm, wall thickness 1.9 – 3.0 mm	50 x 1.8 mm (1 layer)	1 & 2	EI 120 U/U, EI 120 C/U, EI 120 U/C, EI 120 C/C
Diameter up to 110 mm, wall thickness 2.7 - 6.6 mm	50 x 3.6 mm (2 x 1.8 layer)		E 120 U/C, E 120 C/C EI 90 U/C, EI 90 C/C
Diameter up to 125 mm, wall thickness 3.7 – 7.4 mm	50 x 5.4 mm (3 x 1.8 layer)		
Diameter up to 160 mm, wall thickness 9.5 mm	50 x 7.2 mm (4 x 1.8 layer)		E 90 U/C, E 90 C/C EI 60 U/C, EI 60 C/C
Diameter up to 160 mm, wall thickness 4.0-9.5 mm	50 x 10.8 mm (6 x 1.8 layer)		
Diameter up to 200 mm, wall thickness 4.9-11.9 mm	50 x 10.8 mm (6 x 1.8 layer)		EI 90 C/C
Diameter up to 315 mm, wall thickness 7.7-12.1 mm	50 x 18 mm (10 x 1.8 layers)		
Diameter up to 400 mm, wall thickness 9.8-15.3 mm	50 x 28.8 mm (16 x 1.8 layers)		E 120 U/C, EI 90 U/C
Diameter up to 110 mm, wall thickness 2.7–6.6 mm, fully or partially filled conduits with cables up to 14 mm diameter	50 x 3.6 mm (2 x 1.8 layers)		
Diameter up to 32 mm Ø, wall thickness 1.5-2.4 mm with or without cables up to 14 mm Ø, in pipe bundles up to 110 mm Ø <sup>1)</sup>	50 x 3.6 mm (2 x 1.8 layers)		EI 90 U/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Diameter up to 40 mm, wall thickness 2.4 – 3.7 mm	50 x 1.8 mm (1 layer)	1 & 2	EI 120 U/U, EI 120 C/U, EI 120 U/C, EI 120 C/C
Diameter up to 110 mm, wall thickness 4.2 - 10 mm	50 x 3.6 mm (2 x 1.8 layer)		E 120 U/C, E 120 C/C EI 90 U/C, EI 90 C/C
Diameter up to 125 mm, wall thickness 4.8 – 12 mm	50 x 5.4 mm (3 x 1.8 layer)		
Diameter up to 160 mm, wall thickness 14.6 mm	50 x 7.2 mm (4 x 1.8 layer)		E 90 U/C, E 90 C/C EI 60 U/C, EI 60 C/C
Diameter up to 160 mm, wall thickness 4.9-14.6 mm	50 x 10.8 mm (6 x 1.8 layer)		
Diameter up to 200 mm, wall thickness 6.2-18.2 mm	50 x 10.8 mm (6 x 1.8 layer)		EI 90 C/C
Diameter up to 315 mm, wall thickness 18.7 mm	50 x 18 mm (10 x 1.8 layers)		
Diameter up to 400 mm, wall thickness 23.7 mm	50 x 28.8 mm (16 x 1.8 layers)		EI 60 C/C
Diameter up to 110 mm, wall thickness 4.2–10 mm, fully or partially filled conduits with cables up to 14 mm diameter	50 x 3.6 mm (2 x 1.8 layers)		
Diameter up to 40 mm Ø, wall thickness 2.0-3.7 mm with or without cables up to 14 mm Ø, in pipe bundles up to 110 mm Ø <sup>1)</sup>	50 x 3.6 mm (2 x 1.8 layers)		EI 90 U/C



Services	Wraps (both sides)	Permitted configuration for seal separation	Classification
PP pipe according to EN 1852-1: 2009			
Diameter up to 40 mm, wall thickness 1.8 – 5.5 mm	50 x 1.8 mm (1 layer)	1 & 2	EI 120 U/U, EI 120 C/U, EI 120 U/C, EI 120 C/C
Diameter up to 110 mm, wall thickness 2.7 - 15.1 mm	50 x 3.6 mm (2 x 1.8 layer)		EI 90 U/U, EI 90 C/U, EI 90 U/C, EI 90 C/C
Diameter up to 125 mm, wall thickness 3.1 – 17.1 mm	50 x 5.4 mm (3 x 1.8 layer)		E 120 U/C, E 120 C/C
Diameter up to 160 mm, wall thickness 21.9 mm	50 x 7.2 mm (4 x 1.8 layer)		EI 90 U/C, EI 90 C/C
Diameter up to 160 mm, wall thickness 4.9-21.9 mm	50 x 10.8 mm (6 x 1.8 layer)		EI 60 U/C, EI 60 C/C
Diameter up to 200 mm, wall thickness 4.9-18.2 mm	50 x 10.8 mm (6 x 1.8 layer)		EI 90 C/C
Diameter up to 315 mm, wall thickness 28.6 mm	50 x 18 mm (10 x 1.8 layers)		EI 60 C/C
Diameter up to 110 mm, wall thickness 2.7–15.1 mm, fully or partially filled conduits with cables up to 14 mm diameter	50 x 3.6 mm (2 x 1.8 layers)		E 120 U/C, EI 90 U/C
Diameter up to 40 mm Ø, wall thickness 1.8-2.0 mm with or without cables up to 14 mm Ø, in pipe bundles up to 110 mm Ø <sup>1)</sup>	50 x 3.6 mm (2 x 1.8 layers)		EI 90 U/C
Uponor Wirsbo PEX double pipe in pipe system according to ISO 15875			
Diameter up to 54 mm/4.0 mm wall thickness (outer pipe), 28 mm diameter/0.4 mm wall thickness (inner pipe)	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 C/C
Diameter up to 25 mm pipes, wall thickness 0.6 mm, in bundles up to 50 mm	50 x 3.6 mm (2 x 1.8 layers)		EI 90 C/C
Uponor Decibel pipe according to EN 1451-1			
50 mm diameter/2.0 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 90 U/U
75-110 mm diameter/2.6-3.8 mm wall thickness			EI 90 U/C
BluePower Multilayer pipe according to EN 1451-1			
32-50 mm diameter/1.8 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 90 U/U
75-110 mm diameter/3.4 mm wall thickness			EI 90 C/U
125-160 mm diameter/3.9-4.9 mm wall thickness			50 x 10.8 mm (6 x 1.8 layers)
Rehau Raupiano Plus PP-DD according to DIN 4102			
40-50 mm diameter/1.8-2.7 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/U
75-110 mm diameter/2.7 mm wall thickness			50 x 7.2 mm (4 x 1.8 layers)
125 mm diameter/3.9 mm wall thickness	50 x 10.8 mm (6 x 1.8 layers)		
160 mm diameter/3.9 mm wall thickness			



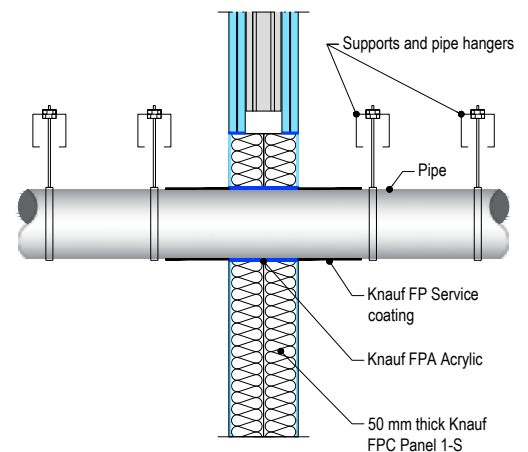
Services	Wraps (both sides)	Permitted configuration for seal separation	Classification
Polo-Kal NG Poloplast PP-MV according to DIN 4102			
32-50 mm diameter/2.0-3.4 mm wall thickness	50 x 3.6 mm (2 x 1.8 layer)	1 & 2	EI 120 U/U
75-110 mm diameter/3.4 mm wall thickness			
125 mm diameter/3.9 mm wall thickness	50 x 7.2 mm (4 x 1.8 layers)		EI 120 U/C
160 mm diameter/4.9 mm wall thickness	50 x 10.8 mm (6 x 1.8 layers)		
Aquatherm Green SDR9 MF PP-RP according to ISO 21003			
32 mm diameter/3.0 mm wall thickness	50 x 1.8 mm (1 x 1.8 layer)	1 & 2	E 120 C/C, EI 90 C/C
40-50 mm diameter/5.6-12.3 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)		
63-110 mm diameter/12.3 mm wall thickness			
Wavin SiTech + PP-M B according to EN 13501-1			
32-50 mm diameter/1.8-3.4 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	E 120 U/U, EI 90 U/U
75-110 mm diameter/3.4 mm wall thickness			E 120 U/C, EI 60 U/C
Gilbert Silent PP according to DIN 4102			
32-50 mm diameter/1.8-3.4 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/U
75-110 mm diameter/3.4 mm wall thickness			EI 120 U/C

<sup>1)</sup> PVC, PE and PP pipes can be mixed in the same bundle.

### › Knauf FP Service coating penetration seal for steel pipes, in 2x Knauf FPC Panel 1-S, in flexible or rigid walls

**Penetration Seal:** Metallic pipes with Knauf FP Service coating fitted at any position within the aperture, with 50 mm Knauf FPC Panel 1-S to both sides of the wall. Minimum separation between penetration seals and seal edges of 30 mm. (Configuration 1 & 2).

Services	Insulation, minimum	Classification
Mild or stainless steel pipe		
Maximum Ø 63 mm	Knauf FP Service coating, 750-micron DFT extending 200 mm from both faces of the Knauf FPC Panel fire seal	EI 120 C/C
	Knauf FP Service coating, 1500-micron DFT extending 200 mm from both faces of the Knauf FPC Panel fire seal	E 90 C/U, EI 60 C/U
Maximum Ø 114 mm	Knauf FP Service coating, 1000-micron DFT extending 200 mm from both faces of the Knauf FPC Panel fire seal	E 120 C/U, EI 45 C/U



› Cable penetration seal with 1x Knauf FPC panel 50 2-S in framed aperture

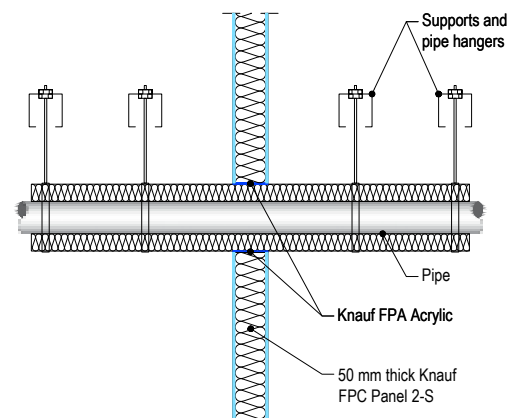
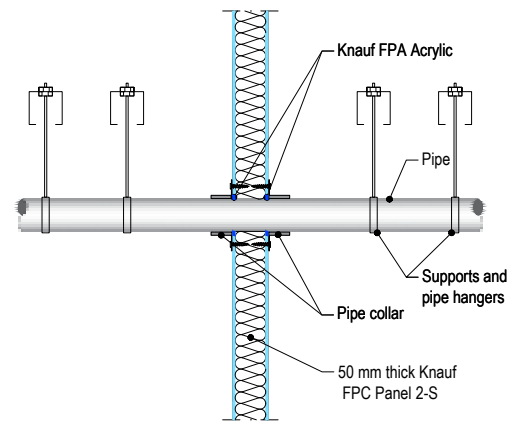
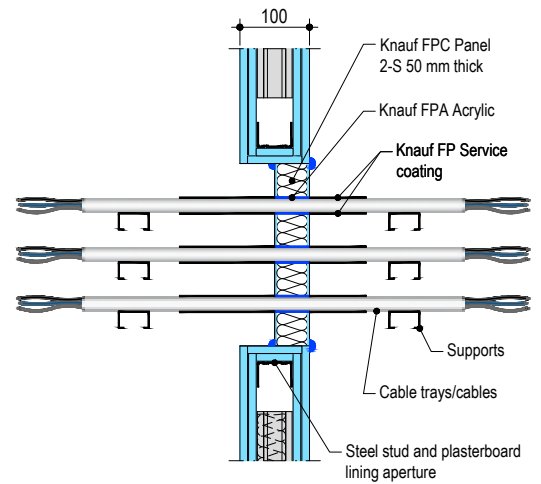
**Penetration Seal:** Services fitted at any position within the aperture, with 50 mm Knauf FPC Panel 2-S positioned to either face of the wall (or anywhere in between). Minimum 30 mm separation between pipes. Knauf Firecollars fixed with 50mm pigtail screws. Cables and cable trays coated 150mm each side of FR Board with nominally 300-m WFT Knauf FP Service coating. In rigid wall constructions the wall thickness can be minimum 75 mm.

Services	Maximum aperture	Classification
Electrical cables up to Ø 80 mm (single, bundled and on trays)	1200 mm wide x 600 mm high	Ei 60
Cables up to Ø 21 mm in tied bundles up to Ø 100mm		
Perforated Steel cable trays & ladders		E 60, Ei 45
Unperforated steel cable trays		
Unsheathed wires up to Ø 24 mm		

Services	Maximum aperture	Insulation CS	Classification
Mild or stainless steel pipe			
Ø 40 mm/1.0-14.2 mm wall	1200 mm wide x 600 mm high	30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 90 C/U, Ei 60 C/U
Ø 40 mm/1.0-14.2 mm wall			
Ø 50 mm/1.7-14.2 mm wall			
Ø 60 mm/1.8-14.2 mm wall			
Ø 75 mm/2.1-14.2 mm wall			
Ø 90 mm/2.3-14.2 mm wall			
Ø 100 mm/2.5-14.2 mm wall			
Ø 115 mm/2.8-14.2 mm wall			
Ø 140 mm/3.2-14.2 mm wall			
Ø 165 mm/3.6-14.2 mm wall			
Ø 180 mm/3.9-14.2 mm wall			
Ø 200 mm/4.2-14.2 mm wall			
Ø 219 mm/4.5-14.2 mm wall			
Ø 250 mm/5.0-14.2 mm wall			
Ø 300 mm/5.9-14.2 mm wall			
Ø 324 mm/6.35-14.2 mm wall			

Services	Maximum aperture	Insulation CS	Classification
Copper pipe maximum Ø 54 mm	1200 mm wide x 600 mm high	20-40 mm glass or stone wool insulation min. 75 kg/m <sup>3</sup>	E 60 C/C, Ei 30 C/C
Alupex pipe maximum Ø 16 mm/2.25 mm wall		20 mm glass or stone wool insulation min. 75 kg/m <sup>3</sup>	E60 C/C, Ei 45 C/C
Alupex pipe maximum Ø 75 mm/4.6 mm wall		25 mm glass or stone wool insulation min. 75 kg/m <sup>3</sup>	Ei 60 C/C

Services	Maximum aperture	Insulation LI or CI	Classification
Copper pipe maximum Ø 54 mm	1200 mm wide x 600 mm high	Min. 500 mm length, min. 20 mm thick glass or stone wool insulation 75 kg/m <sup>3</sup>	E 60 C/C, Ei 45 C/C



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Services	Maximum aperture	Insulation CS	Classification
Copper pipe			
Maximum 54 mm diameter	Maximum Ø 110 mm/ 50 mm high	9-25 mm elastomeric insulation min. class B-s3, d0 or PE Foam insulation	E 60 C/C, EI 30 C/C
Alupex pipe			
Maximum 16 mm diameter, wall thickness 2.25 mm	Maximum Ø 40 mm/ 50 mm high	9 mm elastomeric insulation min. class B-s3, d0 or PE Foam insulation	EI 60 C/C
Maximum 75 mm diameter, wall thickness 2.25-4.6 mm	Maximum Ø 110 mm/ 50 mm high		E 60 C/C, EI 45 C/C
Maximum 75 mm diameter, wall thickness 2.25-4.6 mm	Ø 125 mm/ 60mm high	25 mm elastomeric insulation min. class B-s3, d0 or PE Foam insulation	EI 60 C/C

Services	Collar Inlay	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1		
Ø 32 mm, wall thickness 1.9 mm	30 x 3.0 mm	E 90 U/C, EI 45 U/C
Ø 40 mm, wall thickness 1.9 mm		
Ø 50 mm, wall thickness 3.7-6.6 mm		
Ø 55 mm, wall thickness 3.7-6.6 mm	30 x 3.2 mm	E 90 U/C, EI 30 U/C
Ø 63 mm, wall thickness 3.7-6.6 mm	30 x 3.6 mm	
Ø 75 mm, wall thickness 3.7-6.6 mm	30 x 4.2 mm	
Ø 82 mm, wall thickness 3.7-6.6 mm	30 x 4.6 mm	
Ø 90 mm, wall thickness 3.7-6.6 mm	30 x 5.0 mm	
Ø 110 mm, wall thickness 2.7-6.6 mm	30 x 6.0 mm	
Ø 32 mm	50 x 3.0 mm	E 120 U/C, EI 60 U/C
Ø 40 mm		
Ø 50 mm		
Ø 55 mm	50 x 3.2 mm	E 90 U/C, EI 60 U/C
Ø 63 mm	50 x 3.6 mm	
Ø 75 mm	50 x 4.2 mm	
Ø 82 mm	50 x 4.6 mm	
Ø 90 mm	50 x 5.0 mm	
Ø 110 mm	50 x 6.0 mm	
Ø 125 mm	60 x 9.0 mm	
Ø 140 mm	60 x 11.5 mm	
Ø 160 mm	60 x 15.0 mm	

Services	Collar Inlay	Classification
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		
Ø 32 mm, wall thickness 3.4-10.0 mm	30 x 3.0 mm	E 60 U/C, EI 45 U/C
Ø 40 mm, wall thickness 3.4-10.0 mm		
Ø 50 mm, wall thickness 3.4-10.0 mm		
Ø 55 mm, wall thickness 3.4-10.0 mm		
Ø 63 mm, wall thickness 3.4-10.0 mm		
Ø 75 mm, wall thickness 3.4-10.0 mm		
Ø 82 mm, wall thickness 3.4-10.0 mm		
Ø 90 mm, wall thickness 3.4-10.0 mm		
Ø 110 mm, wall thickness 3.4-10.0 mm		
Ø 32 mm	50 x 3.0 mm	E 120 U/C, 60 U/C
Ø 40 mm		
Ø 50 mm		
Ø 55 mm	50 x 3.2 mm	E 90 C/C, EI 60 C/C
Ø 63 mm		
Ø 75 mm		
Ø 82 mm		
Ø 90 mm		
Ø 110 mm		
Ø 125 mm	60 x 9.0 mm	EI 60 C/C
Ø 140 mm	60 x 11.5 mm	
Ø 160 mm	60 x 15.0 mm	

Services	Collar Inlay	Classification
PP pipe according to EN 1852-1: 2009		
Ø 32 mm	50 x 3.0 mm	EI 60 C/C
Ø 40 mm		
Ø 50 mm		
Ø 55 mm		
Ø 63 mm		
Ø 75 mm		
Ø 82 mm		
Ø 90 mm		
Ø 110 mm		
Ø 125 mm		
Ø 140 mm		
Ø 160 mm	60 x 15.0 mm	



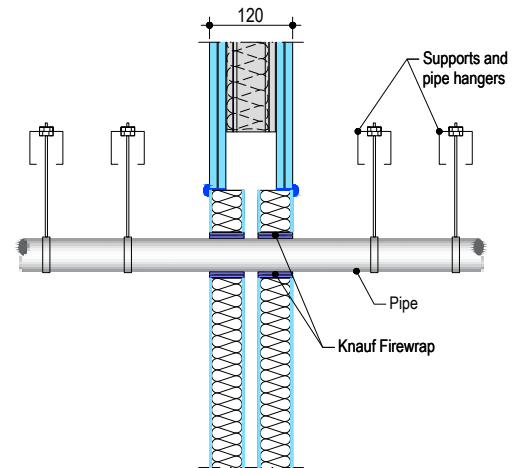
# PENETRATION SEALS | FLEXIBLE OR RIGID WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 120 MM

## > Plastic pipe penetration seal with 2x Knauf FPC Panel 2-S

Penetration Seal: Pipes fitted at any position within the aperture, with 60 mm Knauf FPC Panel 2-S to both sides of the wall. Minimum 30 mm separation between pipes.

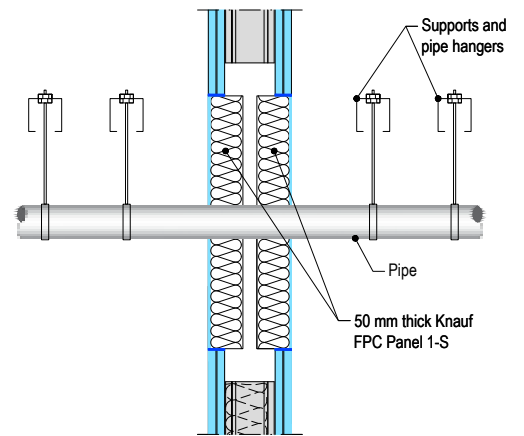
Services	Wraps (both sides)	Permitted configuration for seal separation	Classification
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1 and PVC-C according to EN 1566-1			
Up to Ø 40 mm, wall thickness 1.9-3.0 mm	50 x 3.6 mm (2 x 1.8 layer)	1 & 2	EI 120 C/C
Up to Ø 110 mm, wall thickness 2.7-6.6 mm			
Up to Ø 160 mm, wall thickness 4.0-9.5 mm			
PE pipe according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Diameter up to 40 mm, wall thickness 2.4-4.6 mm	50 x 1.8 mm (1 x 1.8 layer)	1 & 2	EI 120 C/C
Diameter up to 110 mm, wall thickness 3.4-10.0 mm	50 x 3.6 mm (2 x 1.8 layer)		
Diameter up to 160 mm, wall thickness 4.9-14.6 mm	50 x 10.8 mm (6 x 1.8 layer)		
PP pipe according to EN 1852-1: 2009			
Diameter up to 40 mm, wall thickness 1.8-5.5 mm	50 x 1.8 mm (1 x 1.8 layer)	1 & 2	EI 120 C/C
Diameter up to 110 mm, wall thickness 2.7-10.0 mm	50 x 3.6 mm (2 x 1.8 layer)		
Diameter up to 160 mm, wall thickness 4.9-14.6 mm	50 x 10.8 mm (6 x 1.8 layer)		



> **Metallic pipe penetration seal with 2x Knauf FPC Panel 1-S**

**Penetration Seal:** Metallic pipes fitted at any position within the aperture, with 50 mm Knauf FPC Panel 1-S to both sides of the wall. Minimum separation between penetration seals and seal edges of 30 mm. (Configuration 1 & 2).

Services	Insulation	Permitted configuration for seal separation	Classification
Mild or stainless steel pipe			
Maximum 63 mm diameter	None	1 & 2	E 120 C/U, EI 30 C/U
63-324 mm diameter			E 120 C/U, EI 20 C/U
Copper, mild or stainless steel pipe			
12 mm diameter /0.7-6.0 mm wall thickness	None	1 & 2	E 120 C/C, EI 30 C/C
12-54 mm diameter			E 120 C/C, EI 15 C/C
Alupex pipe			
Maximum 75 mm diameter	None	1 & 2	E 120 C/C, EI 20 C/C



5

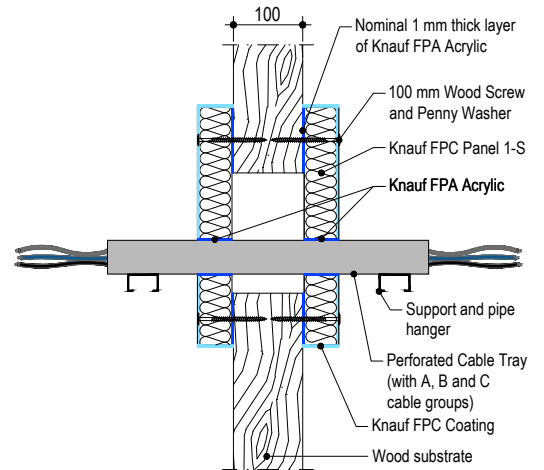
# PENETRATION SEALS | TIMBER WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 100 MM

## > Knauf FPC Panel 50 mm 1-S penetration seal (pattress) with cables

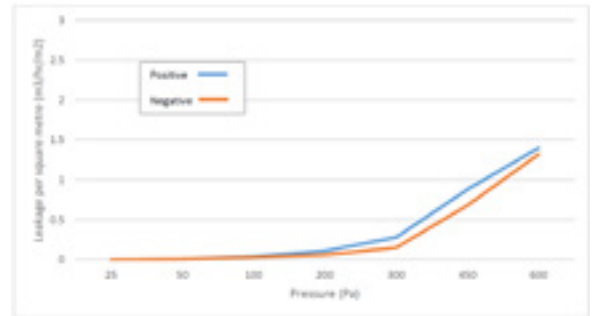
**Penetration Seal:** Cables fitted at any position within the aperture, with 50 mm Knauf FPC Panel 1-S to both sides of the wall. Boards to be pattress fixed with 100 mm wood screws and penny washers at 300 mm centres and with a minimum 100 mm overlap around the opening.

Services	Maximum aperture	Classification
Electrical cables up to 21 mm Ø (single, bundled and on trays)	1200 mm x 600 mm	E 120, EI 90
Electrical cables up to 50 mm Ø (single, bundled and on trays)		



5

Product tested	1200mm high x 600mm wide Knauf FPC Panel 50mm 2-S		
Summary of testing procedure			Result
	Pressure (Pa)	Leakage (m <sup>3</sup> /h)	Leakage (m <sup>3</sup> /m <sup>2</sup> /h)
Results under negative chamber pressure	25	0.00	0.00
	50	0.01	0.01
	100	0.02	0.03
	200	0.04	0.06
	300	0.11	0.15
	450	0.49	0.68
	600	0.95	1.32
Results under positive chamber pressure	25	0.00	0.00
	50	0.01	0.01
	100	0.03	0.04
	200	0.08	0.11
	300	0.20	0.28
	450	0.63	0.88
	600	1.01	1.40



# KNAUF FIRE PROTECTION MORTAR



Knauf Fire Protection Mortar is a dry white powder consisting of inorganic compounds and perlite. When mixed with water the compounds form a highly thermally insulating fire seal to prevent the spread of fire and smoke through openings in fire rated walls and floors, including openings formed to accommodate building service penetrations.

Knauf Fire Protection Mortar expands by up to 1% by hydraulic action during curing ensuring a very tight seal around service penetrations and the surrounding construction.

Knauf Fire Protection Mortar has a rapid setting time and is easy to sand or drill after cure. The compound dries to an off-white colour which may be painted if required.

## Properties:

- › Classified in walls and floors of concrete, brick, gypsum etc
- › Suitable for cables, bundled cables, cable racks, cable trays, steel, copper, alupex, plastic pipes and air ventilation ducts
- › High degree of mechanical resistance; the seal is load bearing without reinforcement
- › Nearly unlimited storage time
- › No priming necessary prior to application in most building material substrates however metal services in contact with the seal must be corrosion protected
- › Certified according to ETA 21/0071
- › EAD 350454-00-1104

**Supporting constructions:****Flexible walls:**

The wall must have a minimum thickness of 100 mm and comprise steel studs or timber studs\*) lined on both faces with minimum 2 layers of 12.5 mm thick boards.

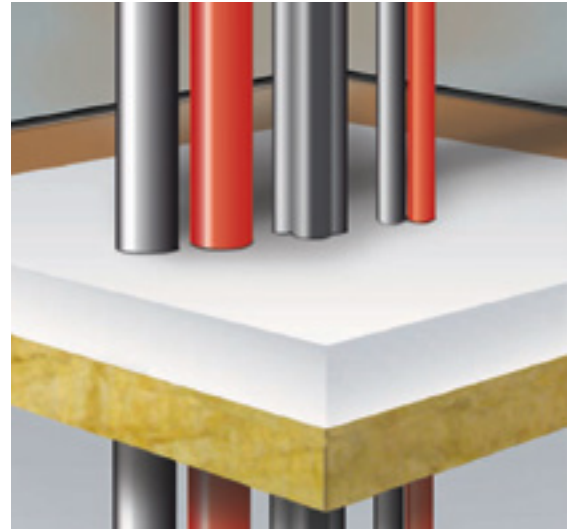
**Rigid walls:**

The wall must have a minimum thickness of 100 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m<sup>3</sup>.

**Rigid floors:**

The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m<sup>3</sup>.

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.



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**Installation Instructions**

1. Ensure the faces of the aperture opening are free of dust and any other contaminants. The faces may be moistened for better adhesion.
2. If the mortar seal is required to be load bearing, please see instructions in the Technical Data Sheet.
3. Bare metal pipes passing through the seal must be protected against corrosion using a suitable primer/protection system.
4. When sealing drywalls the mortar should be flush with the surface of the wall on both sides.
5. When sealing masonry or concrete constructions, the seal can be positioned to either side of the construction or anywhere in between.
6. When installing Knauf Fire Protection Mortar in hollow floor slabs or boards, level the fire seal with the soffit side. Ensure there is sufficient thickness of concrete below the void for the depth of mortar. Where this is not the case, tubular voids should be filled with stone wool normally the same thickness as the depth of the floor slab. Alternatively, simply fire seal on both sides.
7. Install a stone wool shutter board where is necessary to achieve the required thickness of mortar (see the drawings on pages 2-19). Make sure that this achieves a very tight seal - any small openings should be sealed with Knauf FPA Acrylic.
8. Pour clean water into a suitable mixing vessel and add the mortar to obtain the required consistency. Mix steadily at low speed and ensure that any lumps of powder are fully dispersed. Always add the mortar to the water, do not reverse this mixing process. For different mix ratios and drying times, please refer to the Technical Data Sheet.
9. Once the desired consistency is achieved pour or trowel the mortar onto the shutter board making sure that it flows into all corners and around services. Apply a firm pressure to the mortar to eliminate any trapped air bubbles. Build up to the required depth.

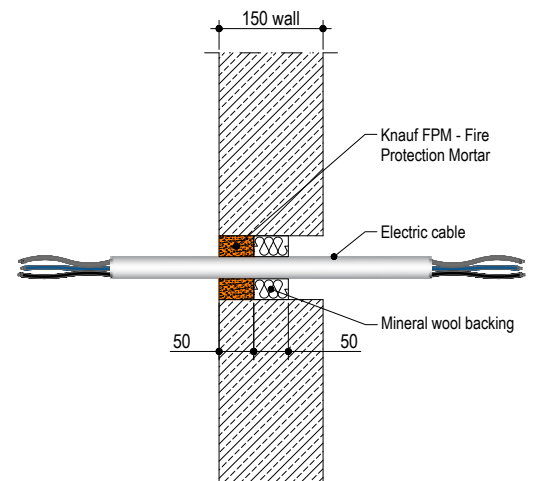
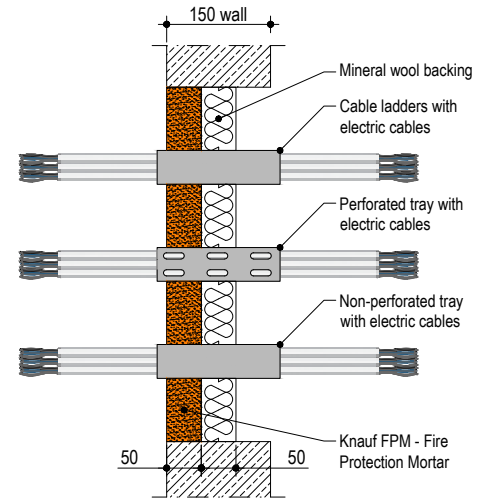
# PENETRATION SEALS | RIGID WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 150 MM

## > Cable penetration seal with 50 mm deep Knauf FPM backed with mineral fibre board

Penetration Seal: Cables fitted at any position within the aperture (min. separation 25 mm from seal edges), with 50 mm Knauf FPM to either side of the wall (or at any position in between), backed with 50 mm stone wool board 150 kg/m<sup>3</sup>.

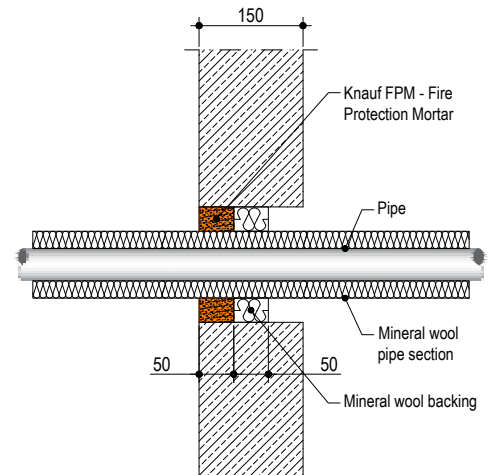
Services	Maximum aperture	Classification
-	2400 mm wide x 1200 mm high	E 180, EI 120
Single electrical cables up to Ø 21 mm	80 x 80 mm	E 180, EI 60
Single electrical cables up to Ø 21 mm	80 x 80 mm	E 240, EI 60
Electrical cables up to Ø 21 mm (single, bundled and on trays)	2400 mm wide x 1200 mm high	E 180, EI 60
Electrical cables up to Ø 50 mm (single, bundled and on trays)		E 180, EI 45
Electrical cables up to Ø 80 mm (single, bundled and on trays)		E 120, EI 45
Telecommunication cables up to Ø 21 mm (single or bundles up to Ø 100 mm)		E 180, EI 90
Steel cable trays & ladders		E 180, EI 60
Non-sheathed wires up to Ø 17 mm		E 180, EI 45
Non-sheathed wires up to Ø 24 mm		E 180, EI 30
Copper conduits up to Ø 16 mm		E 180 C/U, EI 30 C/U
Steel conduits up to Ø 16 mm		E 180 C/U, EI 60 C/U
PVC conduits up to Ø 16 mm		E 180 C/U, E 180 C/C, EI 60 C/U, EI 60 C/C



## > Pipe penetration seal with 50 mm deep Knauf FPM backed with mineral fibre board

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture (min. separation 30 mm from seal edges), with 50 mm Knauf FPM - fire protection mortar to either sides of the wall (or any position in between), backed with 50 mm stone wool 150 kg/m<sup>3</sup>.

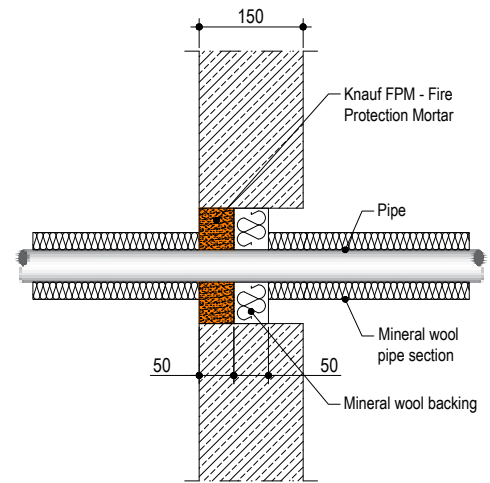
Services	Maximum aperture	Insulation (minimum)	Classification
Steel pipe Ø 219/5-14.2 mm wall	2400 mm wide x 1200 mm high	30 mm stone wool 80 kg/m <sup>3</sup>	E 120 C/U, EI 90 C/U



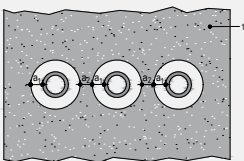
### > Pipe penetration seal with 50 mm deep Knauf FPM backed with mineral fibre board

Penetration Seal: LI (Local Interrupted) or CI insulated metallic and composite pipes (single) fitted at any position within the aperture (min. separation 30 mm from seal edges, with 50 mm Knauf FPM to either sides of the wall (or any position in between), backed with 50 mm stone wool 150 kg/m<sup>3</sup>.

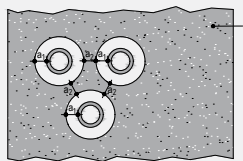
Services	Maximum aperture	Insulation	Classification
Copper pipe up to Ø 12 mm/ 0.9-5 mm wall	70 x 70 mm	1000 mm long, 20 mm stone wool 80 kg/m <sup>3</sup>	EI 240 C/C
Copper pipe up to Ø 54 mm/ 1.0-14.2 mm wall	115 x 115 mm	1000 mm long, 20 mm stone wool 80 kg/m <sup>3</sup>	E 240 C/C, EI 120 C/C
Copper pipe up to Ø 54 mm/ 1.0-14.2 mm wall	2400 mm wide x 1200 mm high	1000 mm long, 20 mm stone wool 80 kg/m <sup>3</sup>	E 180 C/C, EI 120 C/C
75 mm Alupex composite pipe with 7.5 mm wall		600 mm long, 32 mm Elastomeric insulation minimum class B-s3,d0	EI 60 C/C
Mild or stainless steel pipe			
Ø 40 mm/1.5-14.2 mm wall	100 x 100 mm	1000 mm long, 20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 240 C/U
Ø 40 mm/1.5-14.2 mm wall	2400 mm wide x 1200 mm high	1000 mm long, 30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 180 C/U, EI 120 C/U
Ø 40 mm/1.5-14.2 mm wall			
Ø 50 mm/1.7-14.2 mm wall			
Ø 60 mm/1.9-14.2 mm wall			
Ø 75 mm/2.2-14.2 mm wall			
Ø 90 mm/2.5-14.2 mm wall			
Ø 100 mm/2.7-14.2 mm wall			
Ø 115 mm/3.0-14.2 mm wall			
Ø 140 mm/3.5-14.2 mm wall			
Ø 165 mm/3.9-14.2 mm wall			
Ø 180 mm/4.2-14.2 mm wall			
Ø 200 mm/4.6-14.2 mm wall			
Ø 219 mm/5.0-14.2 mm wall			



Configuration 1



Configuration 2



Key

1 Supporting construction

a1 Pipe / top edge of seal separation

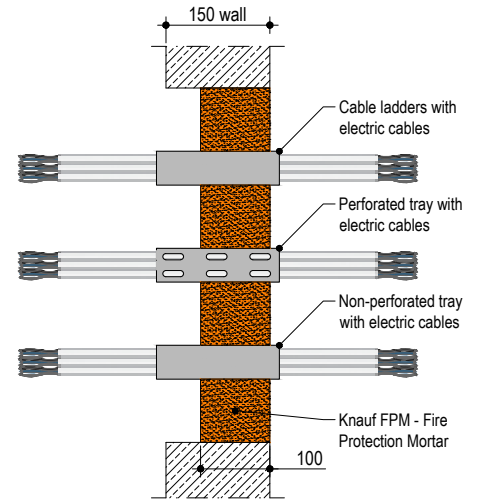
a2 Pipe / side edge of seal separation

a3 Pipe / pipe separation

➤ **Cable penetration seal with 100 mm deep Knauf FPM**

**Penetration Seal:** Cables fitted at any position within the aperture (min. separation 25 mm from seal edges), with 100 mm Knauf FPM to either side of the wall (or at any position in between).

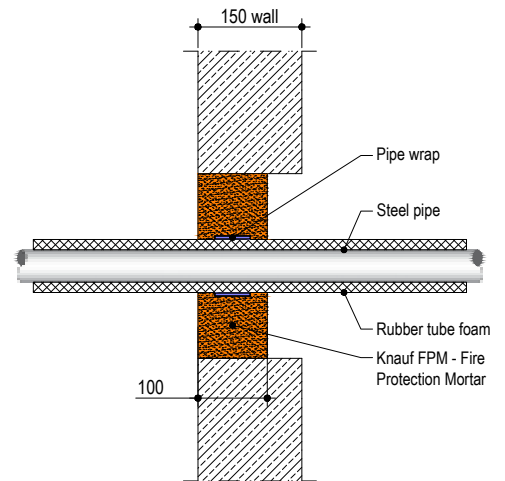
Services	Maximum aperture	Classification
-	2400 mm wide x 1200 mm high	EI 240
Electrical cables up to Ø 21 mm (single, bundled and on trays)		E 240, EI 60
Electrical cables up to Ø 80 mm (single, bundled and on trays)		EI 120
Cables up to Ø 21 mm in tied bundles up to Ø 100mm		E 120, EI 60
Steel cable trays & ladders		E 180 C/U, EI 30 C/U
Non-sheathed cables up to Ø 24 mm		E 180 C/U, EI 60 C/U
Copper conduits up to Ø 16 mm		EI 240 C/U, EI 240 C/C
Steel conduits up to Ø 16 mm		
PVC conduits up to Ø 16 mm		



➤ **Pipe penetration seal with 100 mm deep Knauf FPM**

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture (min. separation 10 mm from seal edges), with 100 mm Knauf FPM to either side of the wall. Knauf Firewrap are required to be centrally within the seal for pipes with combustible insulation. Maximum seal size 2400 mm wide x 1200 mm high.

Services	Wrap	Insulation	Classification
Copper pipe			
Ø 40 mm/1.5-14.2 mm wall	1 off 50 x 3.6mm Knauf Firewrap, fitted central	13 mm Elastomeric insulation minimum class B-s3,d0	EI 240 C/U
Ø 165 mm/4.5-14.2 mm wall		9 mm Elastomeric insulation minimum class B-s3,d0	E 240 C/U, EI 30 C/U
Ø 40 mm/1.5-14.2 mm wall	1 off 50 x 1.8mm Knauf Firewrap, fitted central	13 - 19 mm Elastomeric insulation minimum class B-s3,d0	E 240 C/U, EI 60 C/U
Ø 50 mm/1.6-14.2 mm wall			
Ø 60 mm/1.7-14.2 mm wall			
Ø 75 mm/1.9-14.2 mm wall			
Ø 90 mm/2.0-14.2 mm wall			
Ø 100 mm/2.1-14.2 mm wall			
Ø 115 mm/2.3-14.2 mm wall			
Ø 140 mm/2.6-14.2 mm wall			
Ø 165 mm/2.8-14.2 mm wall			



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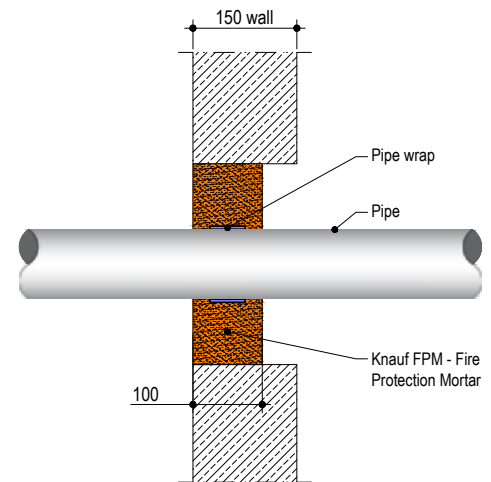


Services	Wrap	Insulation	Classification
Mild or stainless steel pipe			
Ø 40 mm/1.5-14.2 mm wall	1 off 50 x 3.6mm Knauf Firewrap, fitted central	13-25 mm Elastomeric insulation minimum class B-s3,d0	E 180 C/U, EI 60 C/U
Ø 50 mm/1.8-14.2 mm wall			
Ø 60 mm/2.0-14.2 mm wall			
Ø 75 mm/2.3-14.2 mm wall			
Ø 90 mm/2.7-14.2 mm wall			
Ø 100 mm/2.9-14.2 mm wall			
Ø 115 mm/3.3-14.2 mm wall			
Ø 140 mm/3.9-14.2 mm wall			
Ø 165 mm/4.5-14.2 mm wall			

### > Pipe penetration seal with 100 mm deep Knauf FPM

**Penetration Seal:** Plastic pipes fitted at any position within the aperture (min. separation 10 mm from seal edges), with min. 100 mm Knauf FPM - Fire Protection Mortar to either side of the wall. Knauf Firewraps are required to be centrally within the seal. Maximum seal size 2400 mm wide x 1200 mm high.

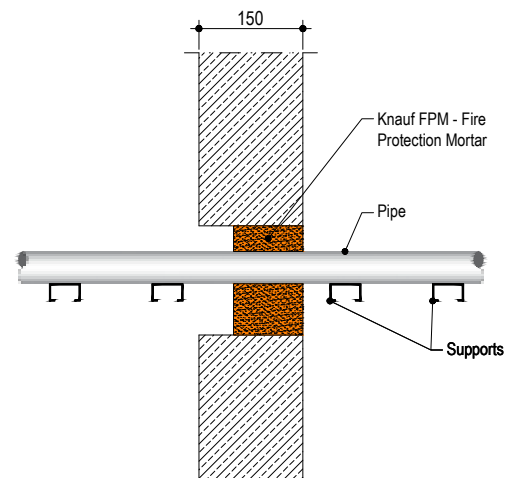
Services	Wrap	Insulation	Classification
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1, PVC-C according to EN 1566-1			
Ø 315 mm/9.2 mm wall	1 off 75 x 18 mm Knauf Firewrap, fitted central	-	EI 120 C/C



### > Pipe penetration seal with 100 mm deep Knauf FPM

**Penetration Seal:** Combustible pipes sealed with Knauf FPM, to either side of the wall. Minimum separation between pipes of 30 mm (a3) and from seal edges 30 mm (a1 & a2). Maximum seal size 2400 mm wide x 1200 mm high.

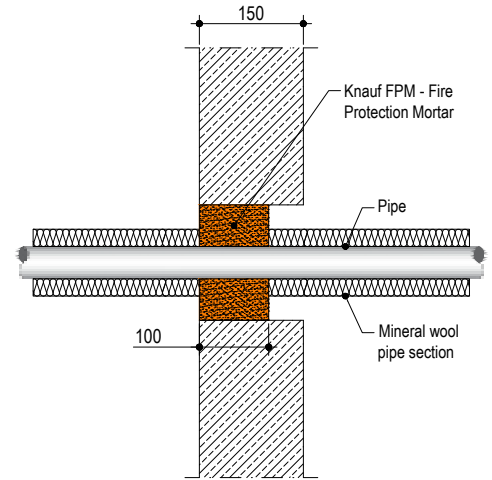
Services	Seal depth	Permitted configuration for seal separation	Classification
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1, PVC-C according to EN 1566-1			
Up to Ø 32 mm, wall thickness 1.6 – 2.4 mm	100 mm	1 & 2	EI 120 U/C, C/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Up to Ø 32 mm, wall thickness 1.8 – 3.0 mm	100 mm	1 & 2	EI 120 U/C, C/C
PP pipe according to EN 1852-1: 2009			
Up to Ø 32 mm, wall thickness 1.9 – 4.4 mm	100 mm	1 & 2	EI 120 U/C, C/C



› **Pipe penetration seal with 100 mm deep Knauf FPM**

Penetration Seal: 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture (min. separation 20 mm from seal edges, with 100 mm Knauf FPM to either sides of the wall (or any position in between)

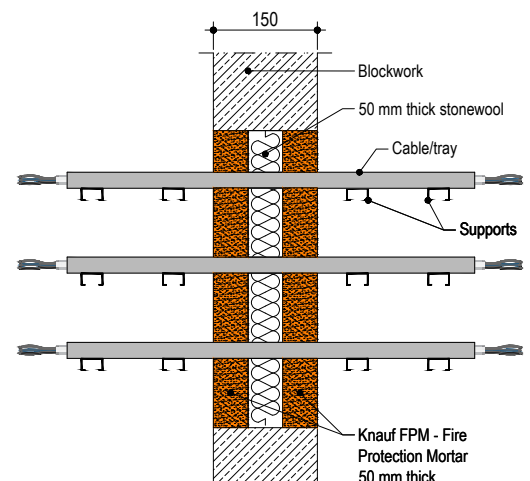
Services	Maximum aperture	Insulation	Classification
Mild or stainless steel pipe			
Ø 40 mm/1.5-14.2 mm wall	2400 mm wide x 1200 mm high	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 240 C/U
Ø 40 mm/1.5-14.2 mm wall			
Ø 50 mm/1.7-14.2 mm wall			
Ø 60 mm/1.9-14.2 mm wall			
Ø 75 mm/2.2-14.2 mm wall			
Ø 90 mm/2.5-14.2 mm wall			
Ø 100 mm/2.7-14.2 mm wall		30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, EI 120 C/U
Ø 115 mm/3.0-14.2 mm wall			
Ø 140 mm/3.5-14.2 mm wall			
Ø 165 mm/3.9-14.2 mm wall			
Ø 180 mm/4.2-14.2 mm wall			
Ø 200 mm/4.6-14.2 mm wall			
Ø 219 mm/5.0-14.2 mm wall			



› **Pipe penetration seal with 50 mm deep Knauf FPM to both faces**

Penetration Seal: Cables fitted with Knauf FPM to both sides of the wall, backed with stone wool insulation board 150kg/m<sup>3</sup>. Maximum seal size of 2400 mm wide x 1200 mm high and minimum separation between cables and the edge of the seal of 30 mm.

Services	Mortar depth	Backing	Insulation	Classification
Blank seals	Min. 50 mm	Min. 50 mm Stone wool 150 kg/m <sup>3</sup>	-	EI 240
Electric cables up to Ø 80 mm, single or in a bundle				E 240 EI 60
Steel cable trays and ladders up to 500 mm wide				EI 60
Telecoms cables up to Ø 21 mm, single or in a bundle up to Ø 100 mm				E 240 EI 120
Unsheathed wire up to Ø 24 mm				



# PENETRATION SEALS | RIGID FLOOR CONSTRUCTIONS

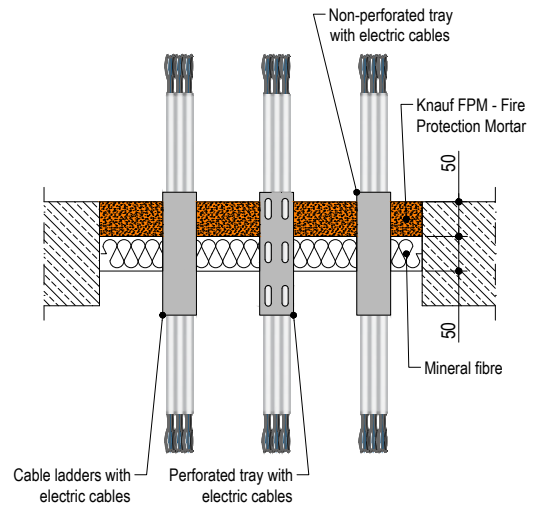
WITH FLOOR THICKNESS OF MINIMUM 100 MM

## > Cable penetration seal with 50 mm deep Knauf FPM backed with mineral fibre board

**Penetration Seal:** Cables fitted at any position within the aperture (min. separation 30 mm from seal edges), with 50 mm Knauf FPM flush with the top of the floor, backed with 50 mm stone wool 150 kg/m<sup>3</sup>.

Services	Maximum aperture	Classification
-	2400 mm wide x 1200 mm high	EI 180
Single* electrical cables up to Ø 21 mm		E 180, EI 90
Electrical cables up to Ø 21 mm (single, bundled and on trays)		E 180, EI 60
Electrical cables up to Ø 80 mm (single, bundled and on trays)		E 90, EI 45
Cables up to Ø 21 mm in tied bundles up to Ø 100mm		EI 180
Steel cable trays & ladders		E 90, EI 60
Non-sheathed cables up to Ø 17 mm		E 180, EI 60
Non-sheathed cables up to Ø 24 mm		E 180, EI 30
PVC conduits up to Ø 16 mm		EI 180 C/U, EI 180 C/C

\*To be separated by at least 30 mm

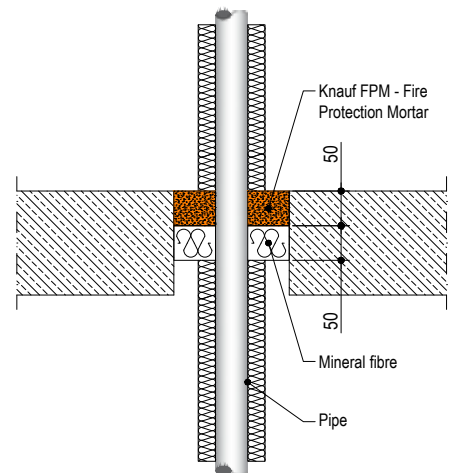


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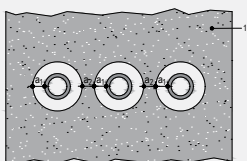
## > Pipe penetration seal with 50 mm deep Knauf FPM backed with mineral fibre board

**Penetration Seal:** 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture (min. separation 30 mm from seal edges, with 50 mm Knauf FPM flush with the top of floor, backed with 50 mm stone wool 150 kg/m<sup>3</sup>

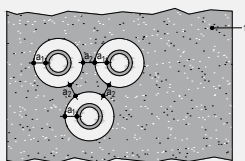
Services	Maximum aperture	Insulation	Classification
Copper pipe up to Ø 12 mm / 1.0-5.0 mm wall	70 x 70 mm	20 mm stone wool 80 kg/m <sup>3</sup>	EI 240 C/C
Copper pipe up to Ø 54 mm / 1.0-14.2 mm wall	115 x 115 mm		E 240 C/C, EI 180 C/C
Copper pipe up to Ø 54 mm / 1.0-14.2 mm wall	2400 mm wide x 1200 mm high		EI 180 C/C



Configuration 1



Configuration 2



Key

- 1 Supporting construction
- a1 Pipe / top edge of seal separation
- a2 Pipe / side edge of seal separation
- a3 Pipe / pipe separation

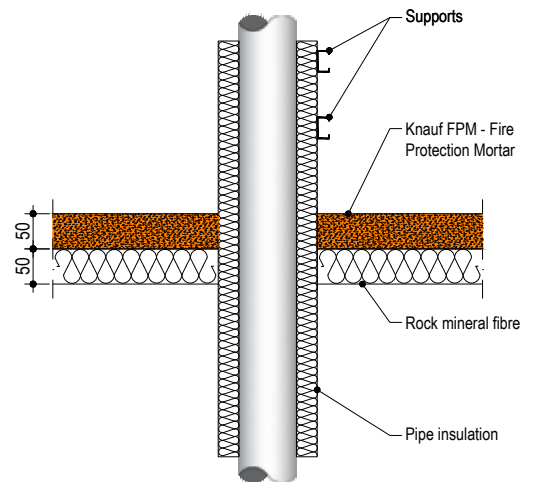
Services	Maximum aperture	Insulation	Classification
Mild or stainless steel pipe			
Ø 40 mm/1.0-14.2 mm wall	280 x 280 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 240 C/U
Ø 40 mm/1.0-14.2 mm wall		30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, EI 90 C/U
Ø 50 mm/1.2-14.2 mm wall			
Ø 60 mm/1.4-14.2 mm wall			
Ø 75 mm/1.7-14.2 mm wall			
Ø 90 mm/2.0-14.2 mm wall			
Ø 100 mm/2.2-14.2 mm wall			
Ø 115 mm/2.5-14.2 mm wall			
Ø 140 mm/3.0-14.2 mm wall			
Ø 165 mm/3.5-14.2 mm wall			
Ø 180 mm/3.8-14.2 mm wall			
Ø 200 mm/4.2-14.2 mm wall			
Ø 219 mm/4.5-14.2 mm wall			
Mild or stainless steel pipe			
Ø 40 mm/1.0-14.2 mm wall	2400 mm x 1200 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 180 C/U
Ø 40 mm/1.0-14.2 mm wall		30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 180 C/U, EI 90 C/U
Ø 50 mm/1.2-14.2 mm wall			
Ø 60 mm/1.4-14.2 mm wall			
Ø 75 mm/1.7-14.2 mm wall			
Ø 90 mm/2.0-14.2 mm wall			
Ø 100 mm/2.2-14.2 mm wall			
Ø 115 mm/2.5-14.2 mm wall			
Ø 140 mm/3.0-14.2 mm wall			
Ø 165 mm/3.5-14.2 mm wall			
Ø 180 mm/3.8-14.2 mm wall			
Ø 200 mm/4.2-14.2 mm wall			
Ø 219 mm/4.5-14.2 mm wall			

5

### > Pipe penetration seal with 50 mm deep Knauf FPM backed with mineral fibre board

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture, with 50 mm Knauf FPM, backed with 50 mm stone wool 140 kg/m<sup>3</sup> positioned at any height within the depth of the floor. Minimum separation between penetration seals and seal edges of 30 mm (configuration 1 & 2). Maximum aperture size 1200 x 2400 mm.

Services	Insulation	Classification
Mild or stainless steel pipe		
Ø 40 mm/1.0-14.2 mm wall	20 mm thick stone, mineral wool min. 80 kg/m <sup>3</sup>  30-80 mm thick stone, mineral wool min. 80 kg/m <sup>3</sup>	EI 180 C/U (EI 240 C/U)*
Ø 40 mm/1.0-14.2 mm wall		
Ø 50 mm/1.2-14.2 mm wall		
Ø 60 mm/1.4-14.2 mm wall		
Ø 75 mm/1.6-14.2 mm wall		
Ø 90 mm/1.9-14.2 mm wall		
Ø 100 mm/2.1-14.2 mm wall		
Ø 115 mm/2.4-14.2 mm wall		
Ø 140 mm/2.9-14.2 mm wall		
Ø 165 mm/3.4-14.2 mm wall		
Ø 180 mm/3.6-14.2 mm wall		
Ø 200 mm/4.0-14.2 mm wall		
Ø 219 mm/4.3-14.2 mm wall		
Ø 250 mm/5.0-14.2 mm wall		
Ø 300 mm/5.9-14.2 mm wall		
Ø 324 mm/6.35-14.2 mm wall		
PEX pipe in pipe system		
Ø 15 mm x 2.5 mm wall inner/Ø 25 mm outer	-	EI 180 C/C (EI 240 C/C)*

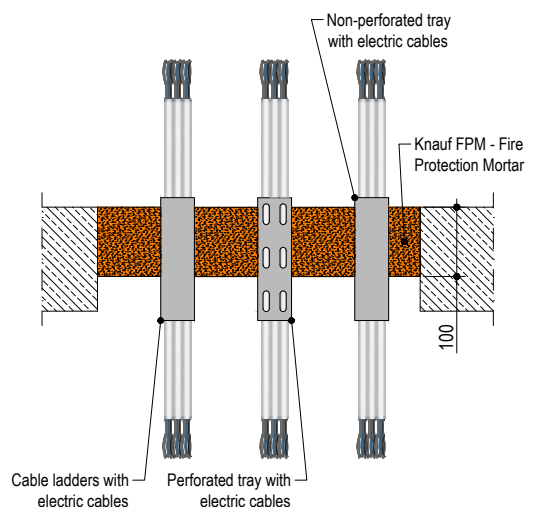


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### > Cable penetration seal with 100 mm deep Knauf FPM

**Penetration Seal:** Cables fitted at any position within the aperture (min. separation 30 mm from seal edges), with 100 mm Knauf FPM - fire protection mortar flush with the top of the floor

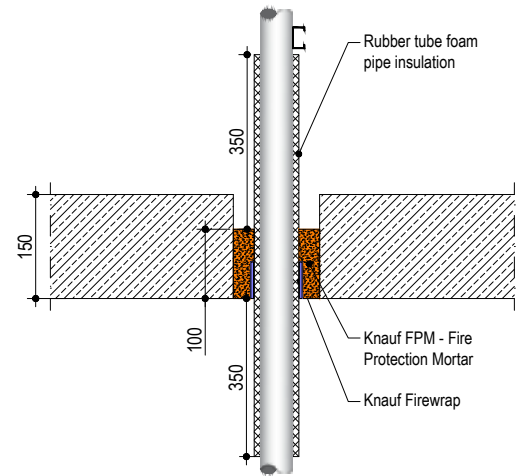
Services	Maximum aperture	Classification
-	2400 mm wide x 1200 mm high	EI 240
Electrical cables up to Ø 50 mm (single, bundled and on trays)		E 180, EI 60
Electrical cables up to Ø 80 mm (single, bundled and on trays)		E 120, EI 60
Cables up to Ø 21 mm in tied bundles up to Ø 100mm		E 180, EI 120
Steel cable trays & ladders		E 120, EI 60
Non-sheathed cables up to Ø 17 mm		E 180, EI 90
Non-sheathed cables up to Ø 24 mm		E 180, EI 20
PVC conduits up to Ø 16 mm		EI 180 C/U, EI 180 C/C



> **Pipe penetration seal with 100 mm deep Knauf FPM**

Penetration Seal: CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture (min. separation 25 mm from seal edges and 30 mm from other services), with 100 mm Knauf FPM at any position within the floor. Knauf Firewraps are required to be fitted around combustible pipe insulation. Max. seal size 1200 x 2400 mm.

Services	Wrap	Insulation	Classification
Copper pipe			
Ø 12 mm/1.0 mm wall	50 x 3.6 mm Knauf Firewrap fitted to the soffit	9 mm Elastomeric insulation minimum class B-s3,d0	EI 240 C/U
Ø 12-54 mm/1.0-1.2 mm wall		13-25 mm Elastomeric insulation minimum class B-s3,d0	E 240 C/C, EI 60 C/C
Geberit Mepla MLC (PE-Xb/Aluminium/PE-HD pipe)			
Ø 16 mm/2.25 mm wall	50 x 3.6 mm Knauf Firewrap fitted to the soffit	9 mm Elastomeric insulation minimum class B-s3,d0	EI 240 C/C
Ø 16 mm/2.25 mm wall			
Ø 20 mm/2.5 mm wall			
Ø 26 mm/3.0 mm wall			
Ø 32 mm/3.0 mm wall			
Ø 40 mm/3.5 mm wall			
Ø 50 mm/4.0 mm wall		9-13 mm Elastomeric insulation minimum class B-s3,d0	E 240 C/C, EI 90 C/C
Ø 63 mm/4.5 mm wall			
Ø 75 mm/4.7 mm wall			
Ø 16 mm/2.25 mm wall			
Ø 20 mm/2.5 mm wall			
Ø 26 mm/3.0 mm wall			
Ø 32 mm/3.0 mm wall			
Ø 40 mm/3.5 mm wall			
Ø 50 mm/4.0 mm wall	13-25 mm Elastomeric insulation minimum class B-s3,d0	E 180 C/C, EI 90 C/C	
Ø 63 mm/4.5 mm wall			
Ø 75 mm/4.7 mm wall			
Ø 75 mm/4.7 mm wall			

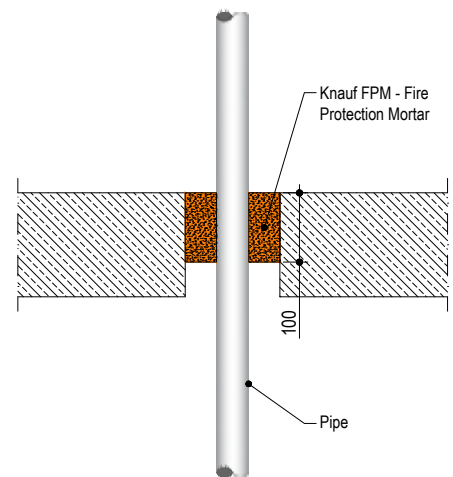
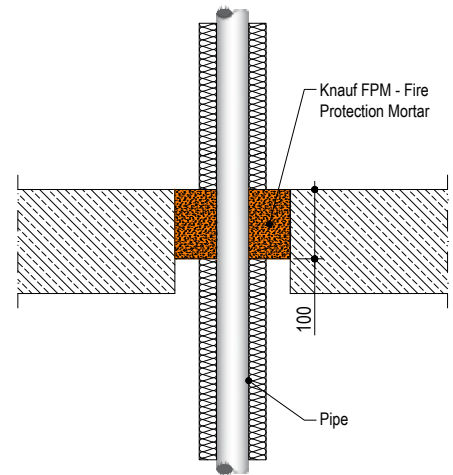


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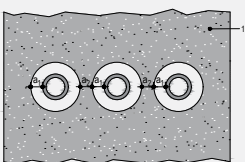
› **Pipe penetration seal with Knauf FPM**

Penetration Seal: 1000 mm (min.)\* LI (Local Interrupted) or CI (Continuous Interrupted) insulated and non-insulated metallic and composite pipes fitted at any position within the aperture (min. separation 30 mm from seal edges), with Knauf FPM - Fire Protection Mortar to either surface of the floor or anywhere between. Maximum seal size as section 1200 x 2400 mm.

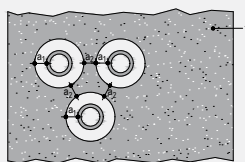
Services	Maximum aperture	Insulation	Classification
Up to Ø 16 mm steel pipe 1.5-7 mm wall	100 mm	-	E 240 C/C, EI 120 C/C
Up to Ø 63.5 mm steel pipes 1.6-14.2 mm wall	150 mm		E 180 C/U, EI 90 C/U
Up to Ø 12 mm Copper and steel pipes 0.7-1.5 mm wall	120 mm		E 240 C/C, EI 180 C/C
Up to Ø 54 mm Copper pipe 1.5-14.2 mm wall	100 mm		E 120 C/C, EI 20 C/C
75 mm Alupex composite pipe with 4.6 mm wall		E 240 U/C, EI 20 U/C	
<b>Mild or stainless steel pipe</b>			
Ø 40 mm/1.5-14.2 mm wall	100 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 240 C/U
Ø 40 mm/1.5-14.2 mm wall		30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, EI 120 C/U
Ø 50 mm/1.7-14.2 mm wall			
Ø 60 mm/1.8-14.2 mm wall			
Ø 75 mm/2.1-14.2 mm wall			
Ø 90 mm/2.3-14.2 mm wall			
Ø 100 mm/2.5-14.2 mm wall			
Ø 115 mm/2.8-14.2 mm wall			
Ø 140 mm/3.2-14.2 mm wall			
Ø 165 mm/3.6-14.2 mm wall			
Ø 180 mm/3.9-14.2 mm wall			
Ø 200 mm/4.2-14.2 mm wall			
Ø 219 mm/4.5-14.2 mm wall			



Configuration 1



Configuration 2

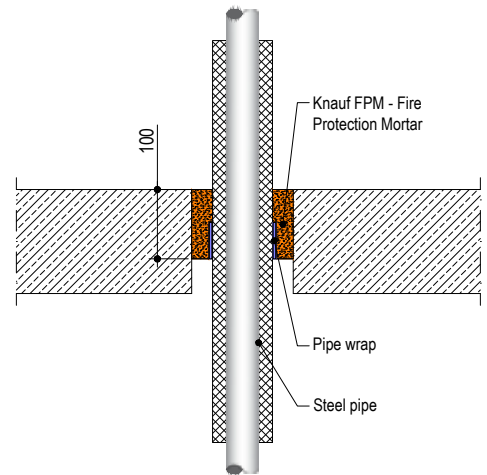


- Key
- 1 Supporting construction
  - a1 Pipe / top edge of seal separation
  - a2 Pipe / side edge of seal separation
  - a3 Pipe / pipe separation

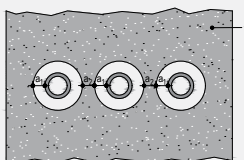
› **Pipe penetration seal with 100 mm deep Knauf FPM**

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges and 30 mm from other services), with 100 mm Knauf FPM to the top surface of the floor. Knauf Firewraps are required to be fitted around combustible pipe insulation. Maximum seal size 2400 mm x 1200 mm.

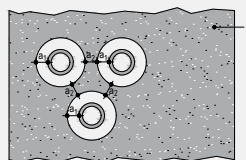
Services	Wrap	Insulation	Classification
Mild or stainless steel pipe			
Ø 40 mm/1.5-14.2 mm wall	1 off 50 x 1.8 mm Knauf Firewrap, fitted at soffit	13 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	EI 180 C/U
Ø 40 mm/1.5-14.2 mm wall		13 - 19 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	E 180 C/U, EI 120 C/U
Ø 50 mm/1.6-14.2 mm wall			
Ø 60 mm/1.7-14.2 mm wall			
Ø 75 mm/1.9-14.2 mm wall			
Ø 90 mm/2.0-14.2 mm wall			
Ø 100 mm/2.1-14.2 mm wall			
Ø 115 mm/2.3-14.2 mm wall			
Ø 140 mm/2.6-14.2 mm wall			
Ø 165 mm/2.8-14.2 mm wall			



Configuration 1



Configuration 2



Key

1 Supporting construction

a1 Pipe / top edge of seal separation

a2 Pipe / side edge of seal separation

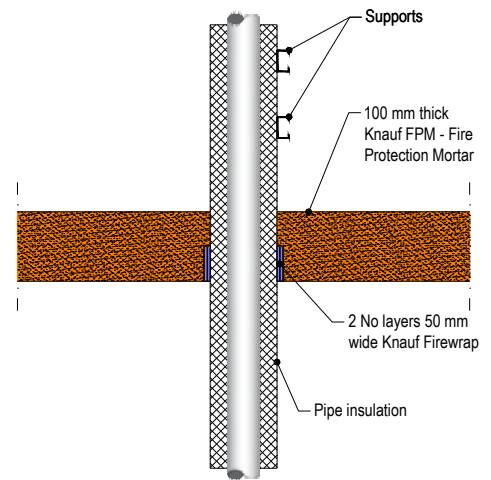
a3 Pipe / pipe separation



### > Pipe penetration seal with 100 mm deep Knauf FPM

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes sealed with Knauf Firewraps, fitted at any position within the aperture, with 100 mm Knauf FPM Seal. Minimum separation between penetration seals and seal edges of 30 mm (Configuration 1 & 2).

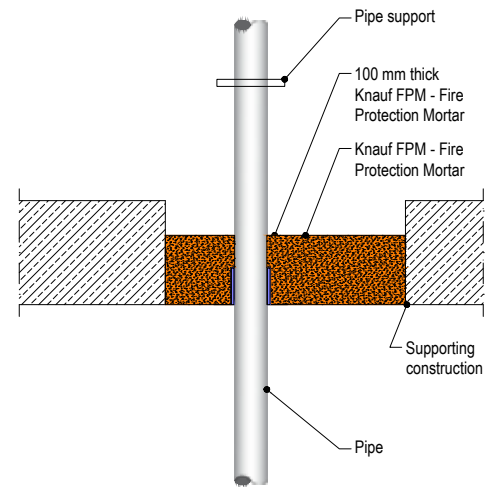
Services	Insulation	Knauf Fire-wrap	Classification
Mild or stainless steel pipe			
Ø 40 mm/1.0-14.2 mm wall	25 mm thick Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	50 x 3.6 mm (2 x 1.8 layer)	Ei 240 C/U
Ø 40 mm/1.0-14.2 mm wall			
Ø 50 mm/1.2-14.2 mm wall			
Ø 60 mm/1.4-14.2 mm wall			
Ø 75 mm/1.6-14.2 mm wall			
Ø 90 mm/1.9-14.2 mm wall			
Ø 100 mm/2.1-14.2 mm wall			
Ø 115 mm/2.4-14.2 mm wall			
Ø 140 mm/2.9-14.2 mm wall			
Ø 165 mm/3.4-14.2 mm wall			
Ø 180 mm/3.6-14.2 mm wall			
Ø 200 mm/4.0-14.2 mm wall			
Ø 219 mm/4.3-14.2 mm wall			
Ø 250 mm/5.0-14.2 mm wall			
Ø 300 mm/5.9-14.2 mm wall			
Ø 324 mm/6.35-14.2 mm wall			
Ø 40 mm/1.0-14.2 mm wall	25-50mm thick Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	50 x 5.4 mm (3 x 1.8 layer)	Ei 120 C/U
Ø 50 mm/1.2-14.2 mm wall			
Ø 60 mm/1.4-14.2 mm wall			
Ø 75 mm/1.6-14.2 mm wall			
Ø 90 mm/1.9-14.2 mm wall			
Ø 100 mm/2.1-14.2 mm wall			
Ø 115 mm/2.4-14.2 mm wall			
Ø 140 mm/2.9-14.2 mm wall			
Ø 165 mm/3.4-14.2 mm wall			
Ø 180 mm/3.6-14.2 mm wall			
Ø 200 mm/4.0-14.2 mm wall			
Ø 219 mm/4.3-14.2 mm wall			
Ø 250 mm/5.0-14.2 mm wall			
Ø 300 mm/5.9-14.2 mm wall			
Ø 324 mm/6.35-14.2 mm wall			



> **Pipe penetration seal with 100 mm deep Knauf FPM**

**Penetration Seal:** Plastic pipes fitted at any position within the aperture, with 100 mm Knauf FPM to the either surface of the floor or anywhere between. Knauf Firewrap are required to be fitted to the bottom of the seal, as indicated below. Minimum separation between penetration seals and seal edges of 30 mm (Configuration 1 & 2).

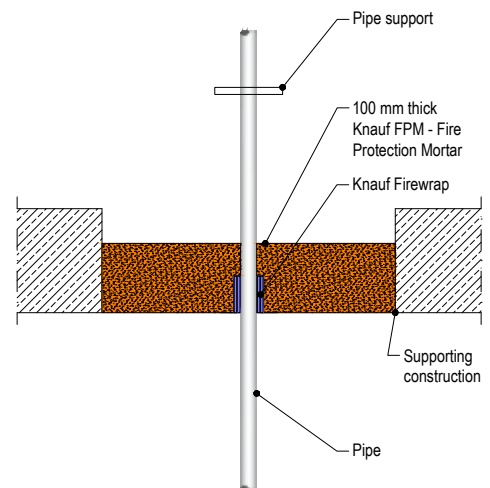
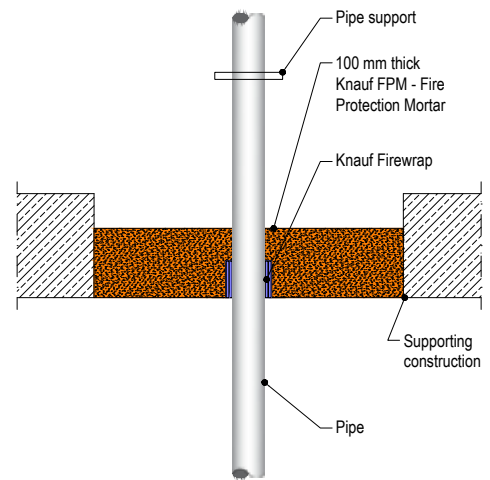
Services	Wrap	Maximum aperture	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1			
Up to Ø 40 mm/1.8-3.7 mm wall	50 x 1.8 mm	2400 x 1200 mm	E 180 U/U, EI 120 U/U
Up to Ø 110 mm/3.0-6.6 mm wall	50 x 3.6 mm		EI 240 U/C
Up to Ø 125 mm/3.5-7.4 mm wall	50 x 7.2 mm		EI 120 U/C
Up to Ø 160 mm/4.5 mm wall	50 x 10.8 mm		EI 240 C/C
Up to Ø 160 mm / 4.5-9.5 mm wall			EI 90 C/C
Up to Ø 110 mm/ 2.7-6.6 mm wall, containing up to Ø 90mm bundle of up to Ø 14 mm telecom cables	50 x 3.6 mm		EI 120 U/C
PP pipe according to EN 1451-1			
Up to Ø 40 mm/1.8-4.4 mm wall	-	2400 x 1200 mm	EI 120 U/C
Up to Ø 40 mm/1.8-5.5 mm wall	50 x 1.8 mm		EI 120 U/U
Up to Ø 50 mm/2.5-5.5 mm wall	50 x 3.6 mm		EI 240 C/C
Up to Ø 75 mm/3.5-5.5 mm wall	50 x 3.6 mm		EI 240 U/C
Up to Ø 110 mm/2.7-6.3 mm wall	50 x 3.6 mm		
Up to Ø 125 mm/3.4-11.4 mm wall	50 x 7.2 mm		
Up to Ø 160 mm/4.9-14.6 mm wall	50 x 10.8 mm		EI 60 U/C
Up to Ø 110 mm/ 3.4-6.3 mm wall, containing up to Ø 90 mm bundle of up to Ø 14 mm telecom cables	50 x 3.6 mm		
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Up to Ø 40 mm/2.0-4.4 mm wall	-	2400 x 1200 mm	EI 120 U/C
Up to Ø 40 mm/2.4-3.7 mm wall	50 x 1.8 mm		EI 240 U/U
Up to Ø 110 mm/3.4-10.0 mm wall	50 x 3.6 mm		EI 120 U/C
Up to Ø 125 mm/3.9-11.4 mm wall	50 x 7.2 mm		EI 240 U/C
Up to Ø 160 mm/4.9-14.6 mm wall	50 x 10.8 mm		EI 120 U/C
Up to Ø 250 mm/7.8 mm wall	75 x 12.6 mm		EI 180 C/C
Up to Ø 110 mm/ 2.7-10.0 mm wall, containing up to Ø 90mm bundle of up to Ø 14 mm telecom cables	50 x 3.6 mm		E 120 U/C, EI 60 U/C



## > Pipe penetration seal with 100 mm deep Knauf FPM

**Penetration Seal:** Plastic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges and from other services), with min. 100 mm Knauf FPM – Fire Protection Mortar to either surface of the floor or anywhere between. Knauf Firewraps are required to be fitted to the bottom of the seal, as indicated below. Maximum seal size as section 2400 mm x 1200 mm.

Services	Wrap	Permitted configuration for seal separation	Classification
PVC-U pipes according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1			
160 mm diameter / 9.5 mm wall	50 x 10.8 mm (6 x 1.8 layers)	1 & 2	EI 90 U/C
PEX pipe in pipe systems according to ISO 15875			
Maximum 54 mm diameter / 0.4 mm wall thickness (outer pipe), 28 mm diameter / 4.0 mm wall thickness (inner pipe)	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 C/C
Rehau Raupiano Plus PP-DD according to DIN 4102			
40-50 mm diameter / 1.8-2.7 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/U
75-110 mm diameter / 2.7 mm wall thickness			EI 120 U/C
125 mm diameter / 3.1 mm wall thickness	50 x 7.2 mm (4 x 1.8 layers)		E 240 U/C, EI 120 U/C
160 mm diameter / 3.9 mm wall thickness	50 x 10.8 mm (6 x 1.8 layers)		EI 120 U/C
Polo-Kal NG Poloplast PP-MV according to DIN 4102			
32-110 mm diameter / 3.4 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 180 U/C
125 mm diameter / 3.9 mm wall thickness	50 x 7.2 mm (4 x 1.8 layers)		EI 240 U/C
160 mm diameter / 4.3 mm wall thickness	50 x 10.8 mm (6 x 1.8 layers)		
Aquatherm Green SDR9 MF PP-RP according to ISO 21003			
32 mm diameter / 3.6 mm wall thickness	50 x 1.8 mm (1 x 1.8 layer)	1 & 2	EI 240 C/C
40-50 mm diameter / 5.6-12.3 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)		
63-110 mm diameter / 12.3 mm wall thickness			
Wavin SiTech + PP-M B according to EN 13501-1			
32-50 mm diameter / 1.8-3.4 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/U
75-110 mm diameter / 3.4 mm wall thickness			EI 120 U/C
Gilbert Silent PP according to DIN 4102			
32-50 mm diameter / 1.8-3.4 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/U
75-110 mm diameter / 3.4 mm wall thickness			EI 120 U/C

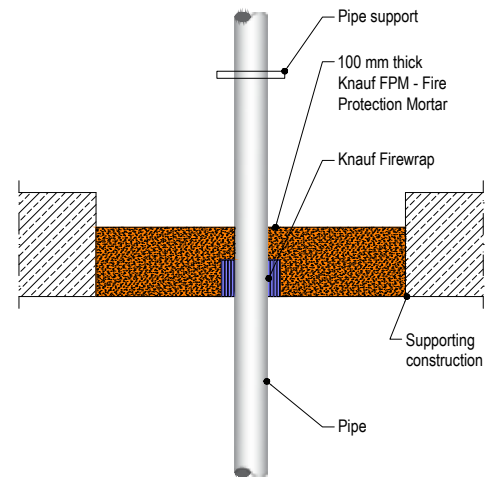


Services	Wrap	Permitted configuration for seal separation	Classification
BluePower Multilayer pipes according to EN 1451-1			
32-50 mm diameter	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 240 U/U
75-110 mm diameter			EI 120 U/C
125 mm diameter/3.9 mm wall thickness	50 x 7.2 mm (4 x 1.8 layers)		
160 mm diameter/4.9 mm wall thickness	50 x 10.8 mm (6 x 1.8 layers)		EI 240 U/C
Uponor Decibel pipes according to EN 14366			
32-50 mm diameter	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/U
75-110 mm diameter			EI 120 U/C

### > Pipe penetration seal with Knauf FPM

Penetration Seal: Plastic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges and from other services), with Knauf FPM - Fire Protection Mortar to either surface of the floor or anywhere between. Knauf Firewraps are required to be fitted to the bottom of the seal, as indicated below. Maximum seal size as section 2400 mm x 1200 mm.

Services	Wrap	Permitted configuration for seal separation	Min. mortar depth and floor thickness	Classification
PVC-U pipes according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1				
Ø 41 mm, wall thickness 1.8-3.7 mm to Ø 125 mm, wall thickness 4.8-7.4 mm	50 x 7.2 mm (4 x 1.8 layers)	1 & 2	150 mm	EI 60 U/U
Ø 125 mm / 7.4 mm wall				EI 120 U/U
Ø 126 mm, wall thickness 4.8-7.4 mm to Ø 160 mm, wall thickness 9.5 mm	75 x 10.8 mm (6 x 1.8 layers)	1		E 120 U/U, EI 30 U/U
Ø 160 mm / 9.5 mm wall	50 x 7.2 mm (4 x 1.8 layers)			EI 120 U/C, EI 120 C/C
Ø 160 mm / 4.5-9.5 mm wall thickness	75 x 10.8 mm (6 x 1.8 layers)	1 & 2	120 mm	EI 120 C/C
Ø 161 mm, wall thickness 4.5-9.5 mm to Ø 200 mm, wall thickness 4.9-11.9 mm				EI 120 C/C
Ø 200 mm / 4.9-11.9 mm wall thickness				EI 240 C/C
Ø 201 mm, wall thickness 4.9-11.9 mm to Ø 315 mm, wall thickness 7.7 mm	75 x 18 mm (10 x 1.8 layers)	1		EI 120 C/C
Ø 315 mm / 7.7 mm wall thickness				EI 90 C/C
Ø 161 mm, wall thickness 4.5-9.5 mm to Ø 315 mm, wall thickness 7.7-12.1 mm				75 x 28.8 mm (16 x 1.8 layers)
Ø 315 mm / 12.1 mm wall thickness				
Ø 315 mm, wall thickness 7.7-12.1 mm to Ø 400 mm, wall thickness 15.3 mm				
Ø 400 mm / 15.3 mm wall thickness	75 x 28.8 mm (16 x 1.8 layers)	1 & 2		

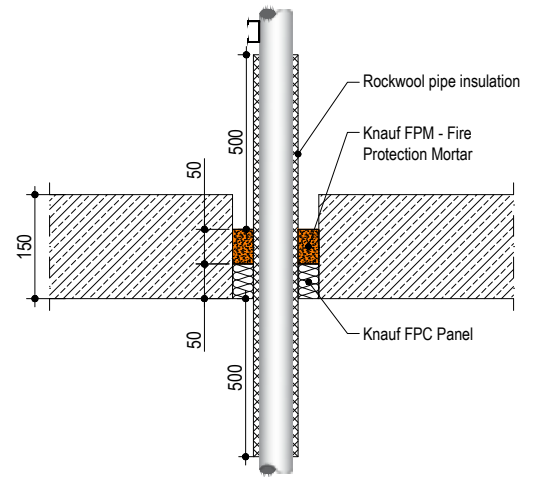


Services	Wrap	Permitted configuration for seal separation	Min. mortar depth and floor thickness	Classification
PP pipes according to EN 1451-1				
Ø 41 mm, wall thickness 1.8-5.5 mm to Ø 160 mm, wall thickness 4.9-14.6 mm	75 x 10.8 mm (6 x 1.8 layers)	1 & 2	150 mm	EI 120 U/C
Ø 160 mm / 14.6 mm wall	75 x 7.2 mm (4 x 1.8 layers)			EI 240 U/U
Ø 161 mm, wall thickness 4.9-14.6 mm to Ø 200 mm, wall thickness 4.9-18.2 mm	75 x 10.8 mm (6 x 1.8 layers)		120 mm	EI 240 C/C
Ø 201 mm, wall thickness 4.9-18.2 mm to Ø 315 mm, wall thickness 7.7 mm	75 x 18 mm (10 x 1.8 layers)	N/A	150 mm	EI 180 C/C
Ø 201 mm, wall thickness 4.9-18.2 mm to Ø 315 mm, wall thickness 7.7-28.6 mm				EI 60 C/C
Ø 315 mm / 7.7 mm wall				EI 180 C/C
Ø 315 mm / 7.7-28.6 mm wall		1		EI 60 C/C
Ø 315 mm, wall thickness 7.7-28.6 mm to Ø 400 mm, wall thickness 22.7 mm	1 & 2			
Ø 400 mm / 22.7 mm wall thickness				
PE pipes according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1				
Diameter 126 mm, wall thickness 3.9-11.4 mm to diameter 160 mm, wall thickness 14.6	75 x 18 mm (10 x 1.8 layers)	N/A		E 240 U/U, EI 120 U/U
160 mm diameter / 14.6 mm wall	75 x 7.2 mm (4 x 1.8 layers)	1 & 2	150 mm	E 240 U/U, EI 120 U/U
Diameter 161 mm, wall thickness 4.9-14.6 mm to diameter 200 mm, wall thickness 6.2-18.2 mm	75 x 10.8 mm (6 x 1.8 layers)			EI 120 C/C
200 mm diameter / 6.2-18.2 mm wall thickness			120 mm	EI 240 C/C
Diameter 161 mm, wall thickness 4.9-14.6 mm to diameter 315 mm, wall thickness 9.7-18.7 mm	75 x 18 mm (10 x 1.8 layers)	N/A	150 mm	EI 60 C/C

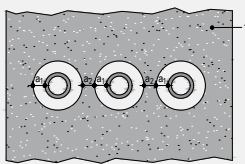
> **Pipe penetration seal with 50 mm deep Knauf FPM**

Penetration Seal: CI (Continuous Interrupted) or LI (Local Interrupted) insulated composite pipes (single) fitted at any position within the aperture (min. separation 10 mm from seal edges, with 50 mm Knauf FPM flush with the top of floor, backed with 50 mm stone wool 150 kg/m<sup>3</sup>).

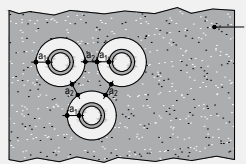
Services	Maximum aperture	Insulation	Classification
Ø 16 mm/2.25 mm wall	135 x 135 mm	500 mm long, minimum 20 mm Stone wool insulation minimum 80 kg/m <sup>3</sup>	EI 240 C/C
Ø 16 mm/2.25 mm wall			E 240 C/C, EI 180 C/C
Ø 20 mm/2.5 mm wall			
Ø 26 mm/3.0 mm wall			
Ø 32 mm/3.0 mm wall			
Ø 40 mm/3.5 mm wall			
Ø 50 mm/4.0 mm wall			
Ø 63 mm/4.5 mm wall			
Ø 75 mm/4.7 mm wall			
Ø 16 mm/2.25 mm wall	2400 mm x 1200 mm	500 mm long, minimum 20 mm Stone wool insulation minimum 80 kg/m <sup>3</sup>	EI 180 C/C
Ø 20 mm/2.5 mm wall			
Ø 26 mm/3.0 mm wall			
Ø 32 mm/3.0 mm wall			
Ø 40 mm/3.5 mm wall			
Ø 50 mm/4.0 mm wall			
Ø 63 mm/4.5 mm wall			
Ø 75 mm/4.7 mm wall			



Configuration 1



Configuration 2

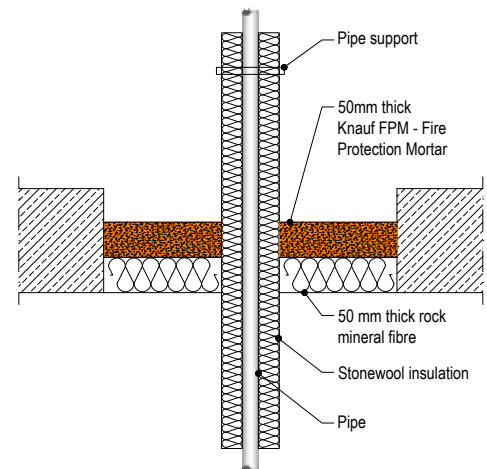


- Key
- 1 Supporting construction
  - a1 Pipe / top edge of seal separation
  - a2 Pipe / side edge of seal separation
  - a3 Pipe / pipe separation

### > Pipe penetration seal with 50 mm deep Knauf FPM

**Penetration Seal:** CS (Continuous Sustained) insulated metal pipes, uninsulated metal pipes and composite with Knauf FPM, to either side of the floor, backed with stone wool board 150 kg/m<sup>3</sup>. Minimum separation from pipes to seal edges of 30 mm (a1 & a2). Maximum seal size 2400 x 1200 mm.

Services	Maximum aperture	Insulation	Classification
Copper or steel pipe			
Ø 12-54 mm/0.7-14.2 mm wall	2400 mm x 1200 mm	Minimum 20-80 mm Stone wool insulation minimum 80 kg/m <sup>3</sup>	E 180 C/C, EI 120 C/C
Ø 6 mm/0.7-3.0 mm wall			E 180 C/C, EI 120 C/C
Ø 7-15 mm/0.9-7.5 mm wall		-	E 180 C/C, EI 30 C/C
Ø 16-54mm/1.2-14.2mm wall		-	E 180 C/C
Steel pipe			
Ø 4-16 mm/1.0-8.0 mm wall	2400 mm x 1200 mm	-	EI 180 C/U
Ø 17-324 mm/6.35-14.2 mm wall			E 180 C/U, EI 20 C/U
Alupex pipe			
Ø 16-20 mm/2.0 mm wall	2400 mm x 1200 mm	-	EI 180 C/C
Ø 75mm/4.6mm wall			E 180 C/C, EI 30 C/C
Ø 16 mm/2.25 mm wall		20 mm glass- or stone wool insulation minimum 75 kg/m <sup>3</sup>	EI 180 C/C
Ø 16-75 mm/2.25-4.6 mm wall		25-50 mm glass- or stone wool insulation minimum 75 kg/m <sup>3</sup>	EI 120 C/C

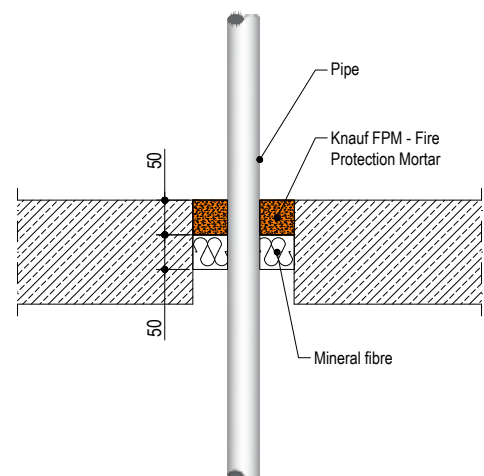


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### > Pipe penetration seal with 50 mm deep Knauf FPM

**Penetration Seal:** Plastic pipes (single) fitted at any position within the aperture (min. separation 30 mm from seal edges and 30 mm from other services), with 50 mm Knauf FPM flush with the top of floor, backed with 50 mm stone wool

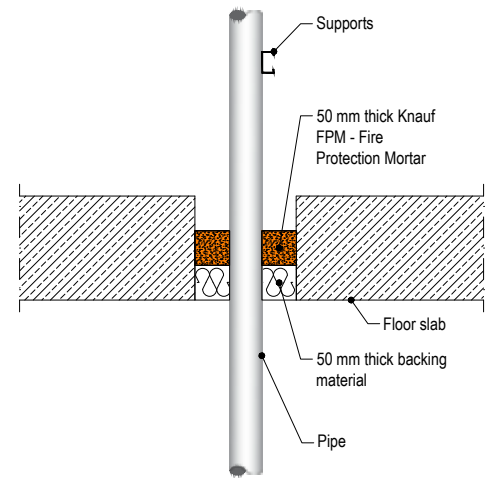
Services	Wrap	Maximum aperture	Classification
Ø 40 mm/3 mm wall PP pipe according to EN 1451-1	-	2400 x 1200 mm	EI 120 C/C
Ø 40 mm /4 mm wall PE pipe according to EN 1519-1, EN 12201-2 and EN 12006-1\$, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Ø 110 mm /4.3 mm wall PE pipe according to EN 1519-1, EN 12201-2 and EN 12006-1\$, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1	50 x 1.8 mm		EI 60 C/C



> **Pipe penetration seal with 50 mm deep Knauf FPM**

Penetration Seal: Combustible pipes sealed with Knauf FPM, to either side of the floor, backed with stone wool board 150 kg/m<sup>3</sup>. Minimum separation between pipes of 30 mm (a3) and from seal edges 30 mm (a1 & a2). Maximum seal size 2400 x 1200 mm.

Services	Seal Depth	Permitted configuration for seal separation	Classification
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1^, PVC-C according to EN 1566-1			
Ø 16 mm, wall thickness 1.6 – 3.4 mm, to Ø 40 mm, wall thickness 1.9-3.0 mm	50 mm	1 & 2 between all specified pipes	EI 120 U/C, CC



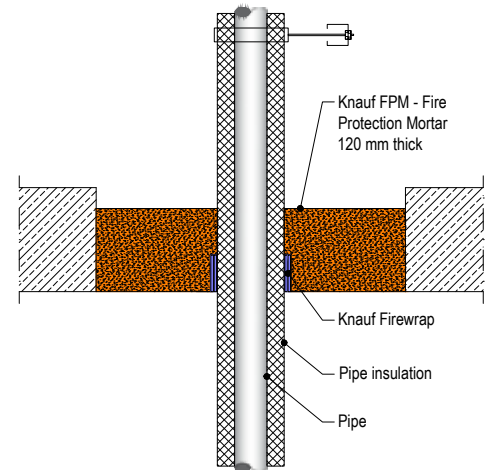
**PENETRATION SEALS | RIGIT FLOOR CONSTRUCTIONS**

WITH FLOOR THICKNESS OF MINIMUM 120 MM

> **Pipe penetration seal with 120 mm deep Knauf FPM**

Penetration Seal: CS insulated plastic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges and 30 mm from other services), with min. 120 mm Knauf FPM - Fire Protection Mortar to either surface of the floor or anywhere between. Knauf Firewraps are required to be fitted around combustible pipe insulation to the bottom of the seal, as indicated below. Maximum seal size as section 2400 x 1200 mm.

Services	Outer diameter including insulation	Pipe wrap	Pipe insulation	Classification
PE pipes according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1				
Maximum 160 mm diameter pipe	Max. Ø 68 mm	50 x 3.6 mm (2 x 1.8 layers)	9-50 mm Elastomeric insulation minimum class B-s3,d0 or foil faced phenolic foam insulation	EI 240 C/C
	Max. Ø 178 mm	75 x 10.8 mm (6 x 1.8 layers)		EI 120 C/C
	Max. Ø 260 mm	75 x 18.0 mm (10 x 1.8 layers)		
PP pipes according to EN 1852-1: 2009				
Maximum 160 mm diameter pipe	Max. Ø 68 mm	50 x 3.6 mm (2 x 1.8 layers)	9-50 mm Elastomeric insulation minimum class B-s3,d0 or foil faced phenolic foam insulation	E 240 C/C, EI 180 C/C
	Max. Ø 178 mm	75 x 10.8 mm (6 x 1.8 layers)		EI 240 C/C
	Max. Ø 260 mm	75 x 18.0 mm (10 x 1.8 layers)		EI 120 C/C





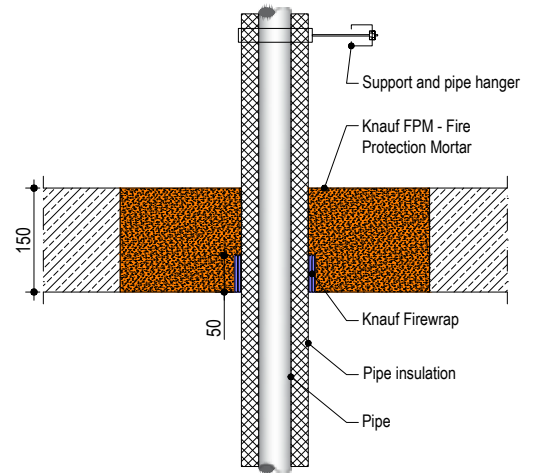
# PENETRATION SEALS | RIGID FLOOR CONSTRUCTIONS

WITH FLOOR THICKNESS OF MINIMUM 150 MM

## > Pipe penetration seal with 150 mm deep Knauf FPM

Penetration Seal: CS insulated metallic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges and 30 mm from other services), with min. 150 mm Knauf FPM to either surface of the floor or anywhere between. Knauf Firewraps are required to be fitted around combustible pipe insulation. Maximum seal size as section 2400 x 1200 mm.

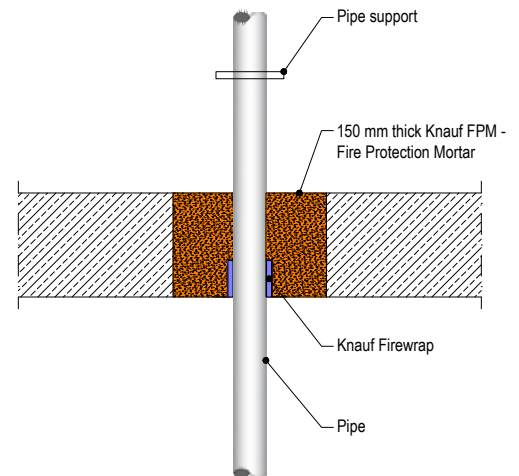
Services	Wrap	Maximum aperture	Classification
Mild or stainless steel pipes			
12 mm diameter/ 1.0 mm wall	1 off 50 x 1.8 mm Knauf Firewrap, fitted at soffit	9 mm PE foam insulation	EI 180 C/U
Maximum 76 mm diameter/ 1.5-14.2 mm wall	2 off 50 x 1.8 mm Knauf Firewrap, fitted at soffit	9-30 mm PE foam insulation	E 180 C/U EI 60 C/U



## > Cable penetration seal with 150 mm deep Knauf FPM

Penetration Seal: Plastic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges and from other services), with 150 mm Knauf FPM to either surface of the floor or anywhere between. Knauf Firewraps are required to be fitted to the bottom of the seal, as indicated below. Maximum seal size as section 2400 x 1200 mm.

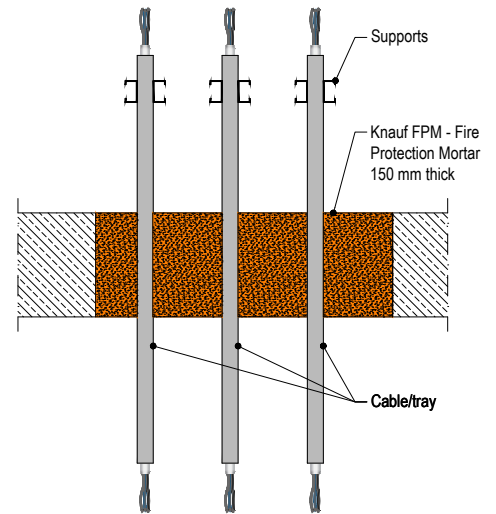
Services	Wrap	Permitted configuration for seal separation	Classification
PVC-U pipes according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1			
Up to Ø 40 mm / 1.8-3.7 mm wall	50 x 1.8	1 & 2	EI 120 U/U
Up to Ø 125 mm / 4.8-7.4 mm wall	50 x 7.2 mm		EI 60 U/U
Up to Ø 160 mm / 9.5 mm wall	75 x 7.2 mm		E 120 U/U, EI 30 U/U
PP pipes according to EN 1451-1			
Up to Ø 40 mm / 1.8-5.5 mm wall	50 x 1.8	1 & 2	EI 120 U/U
Up to Ø 125 mm / 11.4 mm wall	50 x 7.2 mm		EI 240 U/U
Up to Ø 160 mm / 14.6 mm wall	75 x 7.2 mm		EI 240 U/U
PE pipes according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Up to Ø 40 mm / 2.4-3.7 mm wall	50 x 1.8	1 & 2	EI 240 U/U
Up to Ø 110 mm / 3.4-10 mm wall	75 x 5.4 mm		
Up to Ø 125 mm / 11.4 mm wall	50 x 7.2 mm		
Up to Ø 160 mm / 4.9-14.6 mm wall	75 x 7.2 mm		EI 120 U/U



> **Cable penetration seal with 150 mm deep Knauf FPM**

Penetration Seal: Cables fitted with Knauf FPM to either side of floor. Maximum seal size of 1200 x 2400 mm and minimum separation between cables and the edge of the seal of 30 mm.

Services	Mortar depth	Backing	Insulation	Classification
Blank seals	Min. 150 mm	-	-	EI 240
Electric cables up to Ø 21 mm, single or in a bundle				E 240 EI 120
Steel cable trays and ladders up to 500 mm wide				E 240 EI 90
Electric cables Ø 22-50 mm, single or in a bundle				E 90 EI 60
Electric cables Ø 51-80 mm, single or in a bundle.				EI 120
Unsheathed wire up to Ø 24 mm				



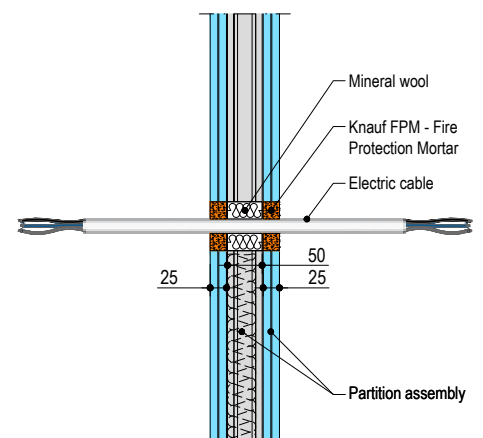
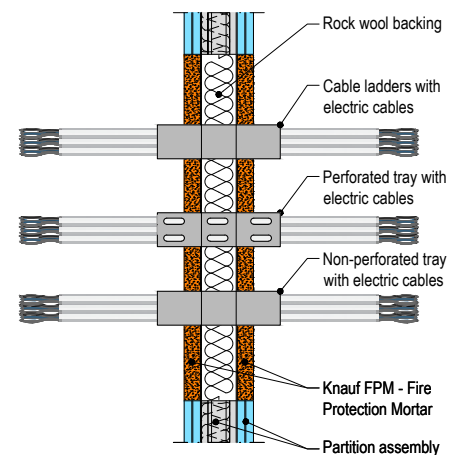
PENETRATION SEALS | FLEXIBLE AND RIGID WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 100 MM

> **Cable penetration seal with 25 mm deep Knauf FPM to both faces backed with 50 mm mineral fibre board**

Penetration Seal: Cables fitted at any position within the aperture (min. separation 25 mm from seal edges), with 25 mm Knauf FPM to both sides of the wall, backed with 50 mm stone wool board 150 kg/m<sup>3</sup>.

Services	Maximum aperture	Classification
-	2400 mm wide x 1200 mm high	EI 120
Single electrical cables up to Ø 21 mm (min. 100 separation from other services)		E 120, EI 90
Electrical cables up to Ø 80 mm (single, bundled and on trays)		E 120, EI 60
Cables up to Ø 21 mm in tied bundles up to Ø 100mm		
Steel cable trays & ladders		E 120 C/U, EI 60 C/U
Steel conduits up to Ø 16 mm		
Copper conduits up to Ø 16 mm		E 120, EI 45
Unsheathed wires up to Ø 24 mm		
PVC conduits up to Ø 16 mm		EI 120 C/U, EI 120 C/C

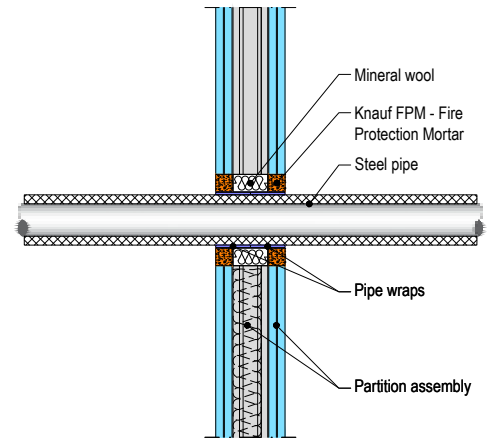


› **Pipe penetration seal with 25 mm deep Knauf FPM to both faces backed with 50 mm mineral fibre board**

**Penetration Seal:** CS insulated metallic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges), with min. 25 mm Knauf FPM to both sides of the wall, backed with min. 1 x 50 mm or 2 x 25 mm stone wool board min. 150 kg/m<sup>3</sup> or min. 50 mm Knauf FPM - Fire Protection Mortar to both sides of the wall without backing\*. Knauf Firewraps are required to be fitted to both faces of the seal.

\*Maximum seal size of 2400 mm wide x 1200 mm high.

Services	Wrap	Insulation	Classification
Mild or stainless steel pipe			
Ø 40 mm/1.0-14.2 mm wall	2 off 50 x 3.6 mm Knauf Firewrap, one fitted flush to each face of seal	13 mm Elastomeric insulation minimum class B-s3,d0 or PE Foam insulation	EI 120 C/U
Ø 40 mm/1.0-14.2 mm wall			E 120 C/U, EI 60 C/U
Ø 50 mm/1.3-14.2 mm wall			
Ø 60 mm/1.6-14.2 mm wall			
Ø 75 mm/2.0-14.2 mm wall			
Ø 90 mm/2.4-14.2 mm wall			
Ø 100 mm/2.7-14.2 mm wall			
Ø 115 mm/3.1-14.2 mm wall			
Ø 140 mm/3.8-14.2 mm wall			
Ø 165 mm/4.5-14.2 mm wall			



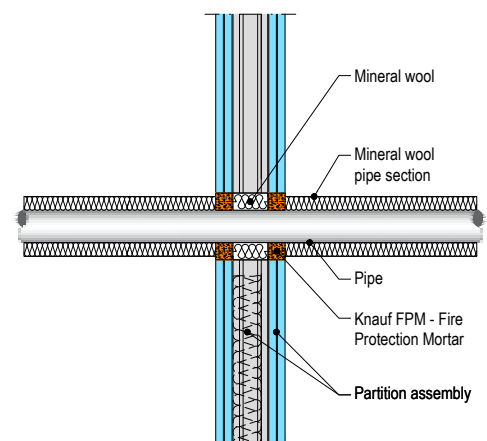
› **Pipe penetration seal with 25 mm deep Knauf FPM to both faces backed with 50 mm mineral fibre board**

**Penetration Seal:** 500 mm (min.)\* LI or CI insulated metallic (and composite) pipes (single) fitted at any position within the aperture (min. separation 30 mm from seal edges and from other services), with 25 mm Knauf FPM to both sides of the wall backed with 50 mm stone wool board 150 kg/m<sup>3</sup>. Max. seal size 2400 mm wide x 1200 mm high.

\*Minimum 600 mm long insulation required for Alupex pipe.

Services	Insulation	Classification
Copper pipe up to Ø 54 mm/1-14.2 mm wall	20 mm stone wool 80 kg/m <sup>3</sup>	EI 120 C/C
Alupex composite pipe Ø 75 mm/7.5 mm wall	600 mm length of 25 mm FP Backing	EI 60 U/U, EI 60 U/C, EI 60 C/U, EI 60 C/C

Services	Insulation	Classification
Mild or stainless steel pipe		
Ø 40 mm/1.0-14.2 mm wall	30 mm stone wool 80 kg/m <sup>3</sup>	EI 120 C/U
Ø 40 mm/1.0-14.2 mm wall		E 120 C/U, EI 90 C/U
Ø 50 mm/1.2-14.2 mm wall		
Ø 60 mm/1.4-14.2 mm wall		
Ø 75 mm/1.7-14.2 mm wall		



Services	Insulation	Classification
Mild or stainless steel pipe		
Ø 90 mm/2.0-14.2 mm wall	30 mm stone wool 80 kg/m <sup>3</sup>	E 120 C/U, EI 90 C/U
Ø 100 mm/2.2-14.2 mm wall		
Ø 115 mm/2.5-14.2 mm wall		
Ø 140 mm/3.0-14.2 mm wall		
Ø 165 mm/3.5-14.2 mm wall		
Ø 180 mm/3.8-14.2 mm wall		
Ø 200 mm/4.2-14.2 mm wall		
Ø 219 mm/4.5-14.2 mm wall		

› **Pipe penetration seal with 25 mm deep Knauf FPM to both faces backed with 50 mm mineral fibre board**

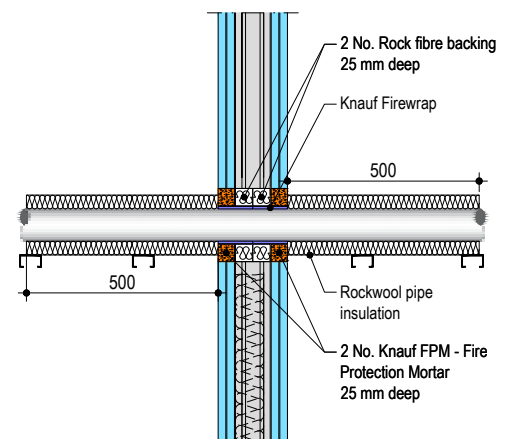
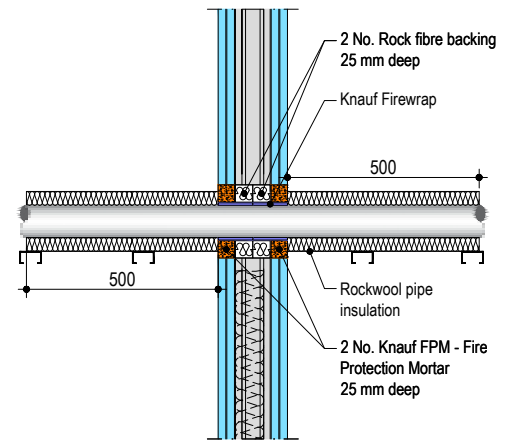
Penetration Seal: 500 mm (min.)\* LI or CI insulated metallic (and composite) pipes fitted at any position within the aperture (min. separation 30 mm from seal edges), with min. 25 mm Knauf FPM to both sides of the wall backed with min. 1 x 50 mm or 2 x 25 mm stone wool board min. 150 kg/m<sup>3</sup>. Maximum seal size as section 2400 mm wide x 1200 mm high

Services	Insulation	Classification
Alupex pipes		
Ø 16 mm/2.25 mm wall	Minimum 20 mm stone wool, minimum 80 kg/m <sup>3</sup>	EI 120 C/C
Ø 20 mm/2.5 mm wall		
Ø 26 mm/3.0 mm wall		
Ø 32 mm/3.0 mm wall		
Ø 40 mm/3.5 mm wall		
Ø 50 mm/4.0 mm wall		
Ø 63 mm/4.5 mm wall		
Ø 75 mm/4.7 mm wall		

› **Pipe penetration seal with 25 mm deep Knauf FPM to both faces backed with 50 mm mineral fibre board**

Penetration Seal: 500 mm (min.)\* LI or CI insulated metallic (and composite) pipes fitted at any position within the aperture (min. separation 30 mm from seal edges), with min. 25 mm Knauf FPM to both sides of the wall backed with min. 1 x 50 mm or 2 x 25 mm stone wool board min. 150 kg/m<sup>3</sup>. Maximum seal size as section 2400 mm wide x 1200 mm long.

Services	Wrap	Insulation	Classification
Copper pipe			
Ø 12-54 mm/1-1.2 mm wall	50 x 3.6 mm Knauf Firewrap fitted to both sides of the seal	9-25 mm Elastomeric insulation minimum class B-s3,d0 or PE Foam insulation	EI 120 C/C

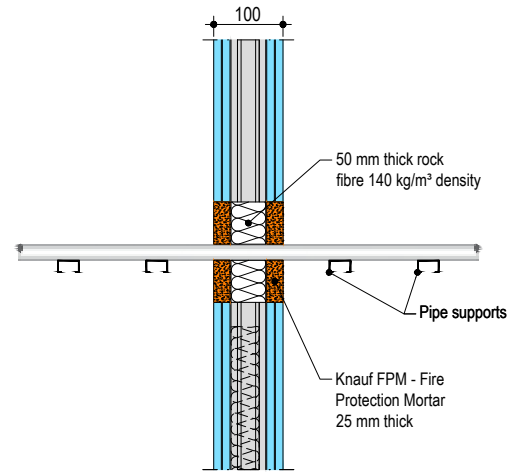


Services	Wrap	Insulation	Classification
Alupex pipes			
Ø 16 mm/2.25 mm wall	50 x 3.6 mm Knauf Firewrap fitted to both sides of the seal	9-25 mm Elastomeric insulation minimum class B-s3,d0 or PE Foam insulation	EI 120 C/C
Ø 20 mm/2.5 mm wall			
Ø 26 mm/3.0 mm wall			
Ø 32 mm/3.0 mm wall			
Ø 40 mm/3.5 mm wall			
Ø 50 mm/4.0 mm wall			
Ø 63 mm/4.5 mm wall			
Ø 75 mm/4.7 mm wall			

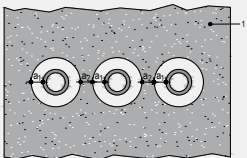
› **Pipe penetration seal with 25 mm deep Knauf FPM to both faces backed with 50 mm mineral fibre board**

**Penetration Seal:** Combustible pipes sealed with Knauf FPM, to both sides of the wall, backed with stone wool board 140 kg/m³. Minimum separation between pipes of 30 mm (a3) and from seal edges 30 mm (a1 & a2). Maximum seal size 2400 mm wide x 1200 mm high.

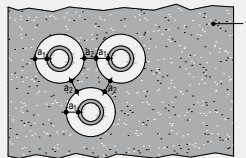
Services	Seal Depth	Permitted configuration for seal separation	Classification
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1, PVC-C according to EN 1566-1			
Up to Ø 32 mm, wall thickness 1.6 – 2.4 mm	25 mm	1 & 2 between all specified pipes	EI 120 U/C, C/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Up to Ø 32 mm, wall thickness 1.8 – 3.0 mm	25 mm	1 & 2 between all specified pipes	EI 120 U/C, C/C
PP pipe according to EN 1852-1: 2009			
Up to Ø 32 mm, wall thickness 1.9 – 4.4 mm	25 mm	1 & 2 between all specified pipes	EI 120 U/C, C/C



Configuration 1



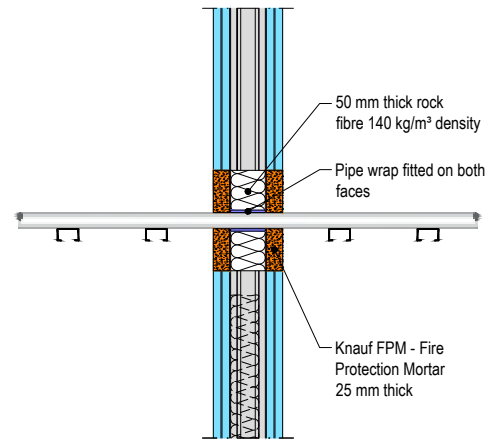
Configuration 2



- Key
- 1 Supporting construction
  - a1 Pipe / top edge of seal separation
  - a2 Pipe / side edge of seal separation
  - a3 Pipe / pipe separation

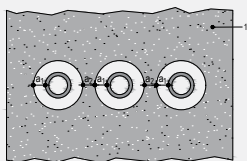
› **Pipe penetration seal with 25 mm deep Knauf FPM – Fire Protection Mortar to both faces backed with 50 mm mineral fibre board**

Penetration Seal: Combustible pipes sealed with Knauf Firewraps, installed into Knauf FPM – Fire Protection Mortar seals. Minimum separation between penetration seals and seal edges of 30 mm. Minimum seal size as section 2400 mm wide x 1200 mm high.

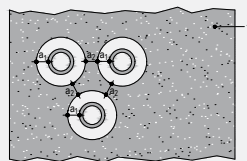


Services	Wraps (both sides)	Permitted configuration for seal separation	Classification
PVC-U pipes according to EN 1329-1, EN 1452-2 and EN 1453-1 and PVC-C according to EN 1566-1			
Diameter up to 40 mm, wall thickness 3.0 – 4.3 mm	50 x 1.8 mm (1 layer)	1 & 2 between PVC-U/PVC-C, PE/ABS/SAN+PVC and PP pipes in any combination	E 120 U/C, E 120 C/U, EI 60 U/C, EI 60 C/C
Diameter up to 110 mm, wall thickness 2.7 - 6.6 mm	50 x 3.6 mm (2 x 1.8 layers)		E 120 U/C, E 120 C/C, EI 90 U/C, EI 90 C/C
Diameter up to 125 mm, wall thickness 3.7 – 7.4 mm	50 x 5.4 mm (3 x 1.8 layer)		EI 120 U/C, EI 120 C/C
Diameter up to 160 mm, wall thickness 3.2 - 9.5 mm	50 x 7.2 mm (4 x 1.8 layers)		EI 60 U/C, EI 60 C/C
PE pipes according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Diameter up to 40 mm, wall thickness 3.2 – 3.7 mm	50 x 1.8 mm (1 layer)	1 & 2 between PVC-U/PVC-C, PE/ABS/SAN+PVC and PP pipes in any combination	EI 120 U/C, EI 120 C/C
Diameter up to 110 mm, wall thickness 4.2 - 10 mm	50 x 3.6 mm (2 x 1.8 layers)		EI 60 U/C, EI 60 C/C
Diameter up to 125 mm, wall thickness 12 mm	50 x 5.4 mm (3 x 1.8 layer)		EI 120 U/C, EI 120 C/C
Diameter up to 160 mm, wall thickness 4.9 – 12.0 mm	50 x 7.2 mm (4 x 1.8 layers)		E 120 U/C, E 120 C/C
Diameter up to 160 mm, wall thickness 12.0 mm			EI 90 U/C, EI 90 C/C
PP pipes according to EN 1852-1: 2009			
Diameter up to 40 mm, wall thickness 4.0 – 5.5 mm	50 x 1.8 mm (1 layer)	1 & 2 between PVC-U/PVC-C, PE/ABS/SAN+PVC and PP pipes in any combination	EI 120 U/C, EI 120 C/C
Diameter up to 110 mm, wall thickness 6.6 mm	50 x 3.6 mm (2 x 1.8 layers)		E 120 U/C, E 120 C/C, EI 90 U/C, EI 90 C/C
Diameter up to 125 mm, wall thickness 17.1 mm	50 x 5.4 mm (3 x 1.8 layer)		E 120 U/C, E 120 C/C, EI 90 U/C, EI 90 C/C
Diameter up to 160 mm, wall thickness 4.0 - 21.9 mm	50 x 7.2 mm (4 x 1.8 layers)		E 120 U/C, E 120 C/C
Diameter up to 160 mm, wall thickness 21.9 mm			EI 60 U/C, EI 60 C/C

Configuration 1



Configuration 2



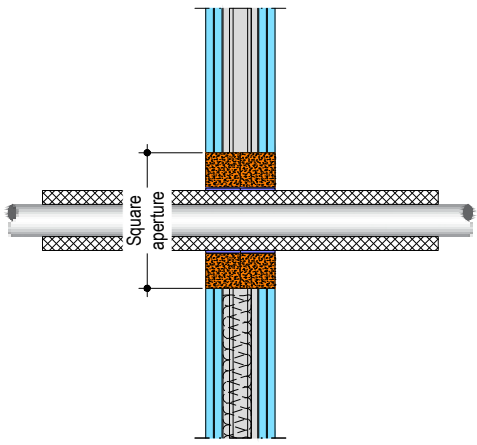
- Key
- 1 Supporting construction
  - a1 Pipe / top edge of seal separation
  - a2 Pipe / side edge of seal separation
  - a3 Pipe / pipe separation

› **Pipe penetration seal with 50 mm deep Knauf FPM to both faces**

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges), 50 mm Knauf FPM to both sides of the wall without backing\*. Knauf Firewrap are required to be fitted to both faces of the seal.

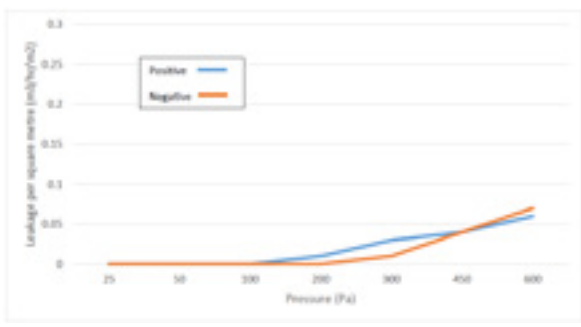
\* Maximum seal size of 2400 mm wide x 1200 mm high.

Services	Wrap	Insulation	Classification
Mild or stainless steel pipe			
Ø 40 mm/1.0-14.2 mm wall	2 off 50 x 3.6 mm Knauf Firewrap, one fitted flush to each face of seal	13 -32 mm Elastomeric insulation minimum class B-s3,d0 or PE Foam insulation	E 120 C/U, EI 60 C/U
Ø 50 mm/1.3-14.2 mm wall			
Ø 60 mm/1.6-14.2 mm wall			
Ø 75 mm/2.0-14.2 mm wall			
Ø 90 mm/2.4-14.2 mm wall			
Ø 100 mm/2.7-14.2 mm wall			
Ø 115 mm/3.1-14.2 mm wall			
Ø 140 mm/3.8-14.2 mm wall			
Ø 165 mm/4.5-14.2 mm wall			

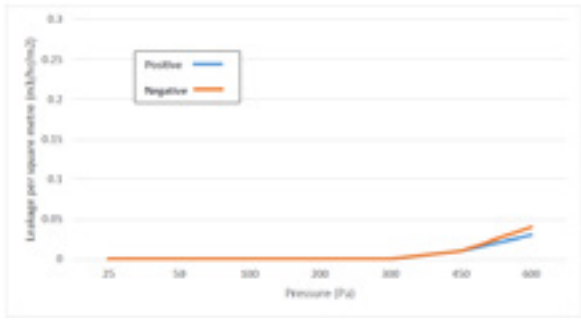


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Product tested	1200 mm high x 600 mm wide x 50 mm deep Knauf FPM		
Summary of testing procedure			Result
	Pressure (Pa)	Leakage (m <sup>3</sup> /h)	Leakage (m <sup>3</sup> /m <sup>2</sup> /h)
Results under negative chamber pressure	25	0.00	0.00
	50	0.00	0.00
	100	0.00	0.00
	200	0.00	0.00
	300	0.01	0.01
	450	0.03	0.04
Results under positive chamber pressure	600	0.05	0.07
	25	0.00	0.00
	50	0.00	0.00
	100	0.00	0.00
	200	0.01	0.01
	300	0.02	0.03
450	0.03	0.04	
600	0.04	0.06	



Product tested	600 mm high x 600 mm wide x 100 mm deep Knauf FPM – Fire Protection Mortar inc. 110 mm plastic pipe with 2no layers 50 mm x 1.8 mm Knauf Firewrap cast to one face in centre of seal		
Summary of testing procedure			Result
	Pressure (Pa)	Leakage (m <sup>3</sup> /h)	Leakage (m <sup>3</sup> /m <sup>2</sup> /h)
Results under negative chamber pressure	25	0.00	0.00
	50	0.00	0.00
	100	0.00	0.00
	200	0.00	0.00
	300	0.00	0.00
	450	0.01	0.01
Results under positive chamber pressure	600	0.03	0.04
	25	0.00	0.00
	50	0.00	0.00
	100	0.00	0.00
	200	0.00	0.00
	300	0.00	0.00
450	0.01	0.01	
600	0.02	0.03	



# KNAUF FPG PLATE

5



Knauf FPG plate is a preformed self-adhesive intumescent plate, used to reinstate the fire resistance performance of flexible wall constructions when punctured with plastic wall boxes.

It is used where the walls have been provided with apertures for the penetration of conduits and cables into socket boxes, on one or both sides of the wall.

### Properties:

- > Wall boxes can be fitted back to back
- > Up to 120 minutes of both integrity and insulation resistance
- > Quick and easy to install
- > Can be used on insulated and uninsulated walls
- > Tested with a wide range of cables and conduits interconnected between boxes
- > Tested with empty conduits between boxes for future cable transits
- > ETA 21/0042
- > EAD 350141-00-1104

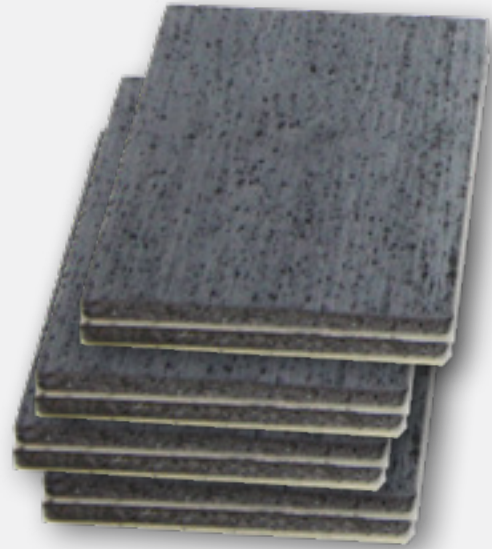


### Supporting constructions:

#### Flexible walls:

The wall must have a minimum thickness of 75 mm and comprise steel studs or timber studs\*) lined on both faces with minimum 1 layer of 12.5 mm thick board.

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.



5

### Installation Instructions

1. Wall boxes should be installed according to the Manufacturer's Instructions.
2. The aperture around the wall box should be as tightly fitting as possible and any gaps filled with plaster filler.
3. Before installing Knauf FPG plate ensure that the surfaces are clean and sound, free from dirt, grease and other contamination.
4. Remove the backing paper from the back of the pad.
5. Fit into place inside at the base of the socket box.
6. The pad must not obstruct cable entry.



# PENETRATION SEALS | FLEXIBLE WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 75 MM

## > Cable penetration seal with 4.0 mm thick Knauf FPG plate in socket boxes back to back

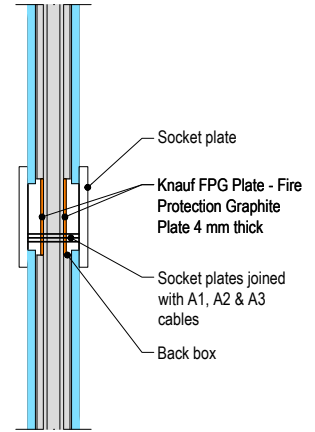
Penetration Seal: Cables installed within socket boxes with Knauf FPG plate adhered to back face within the socket box.

Services	Socket box	Knauf FPG plate	Position	Aperture mm	Classification
Cables up to Ø 14mm	UK standard double socket box, 145mm wide x 85mm high x 35mm deep, each with up to 25mm hole cut to accept the cables	110mm wide x 60mm high x 4mm thick, fitted lining the back of the back box	Back to back – 1 fitted to each face	134 wide x 73 High	EI 30

Double side penetration seal with cables in socket boxes

\*Fixed directly to studs or with steel plate between studs.

^Aperture shall be as tightly fitting as possible and infilled with building plaster.

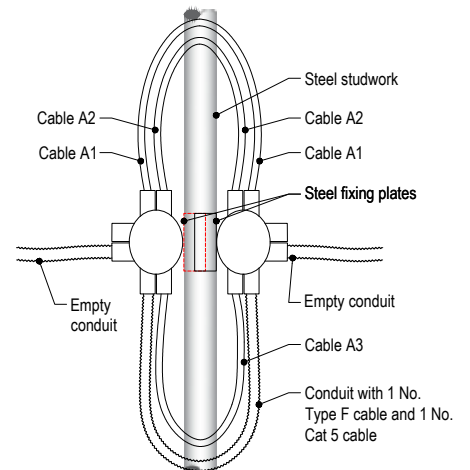
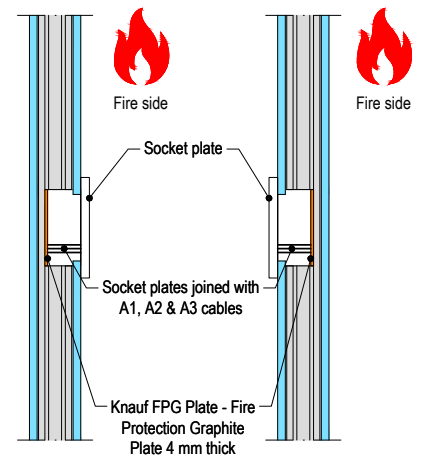


## > Cable penetration seal with 4.0 mm thick Knauf FPG plate in socket boxes side by side, with one fitted each face

Penetration Seal: Cables installed within socket boxes with Knauf FPG plate adhered to back face within the socket box.

Services	Socket box	Knauf FPG plate	Position	Aperture mm	Classification
Cables up to Ø 14mm	Elko 3012 S57/100 1223789 red standard box	45mm wide x 45mm high x 4mm thick, fitted lining the back of the socket box	Adjacent each side of stud – 1 fitted to each face	74mm Ø	E 60, EI 45
Plastic conduits with or without cables					

Double side penetration seal with cables in socket boxes



# PENETRATION SEALS | FLEXIBLE WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 100 MM

## > Cable penetration seal with 3.8 mm thick Knauf FPG plate in socket box

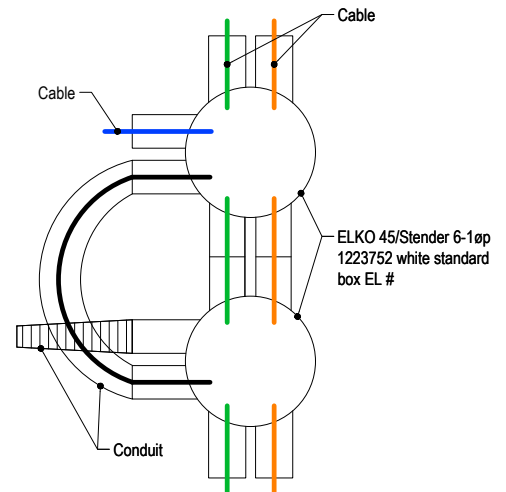
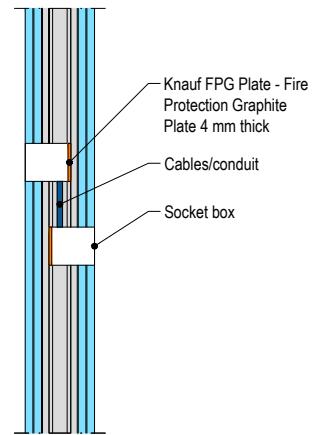
Penetration Seal: Cables installed within socket boxes with Knauf FPG plate adhered to back face within the socket box.

Services	Socket box *	Knauf FPG plate mm	Aperture mm	Classification
Cables up to Ø 14 mm	ELKO 45/Stender 6-1 øp 1223752 white standard box EL #	59 Ø x 3.8	73-74 Ø^	EI 60
Plastic conduit Ø 22 mm, with or without cables	or ELKO 3012 S57/100 1223789 #	46 x 46 x 3.8		

Double side penetration seal with cables in socket boxes

\*Fixed directly to studs or with steel plate between studs.

^Aperture shall be as tightly fitting as possible and infilled with building plaster.

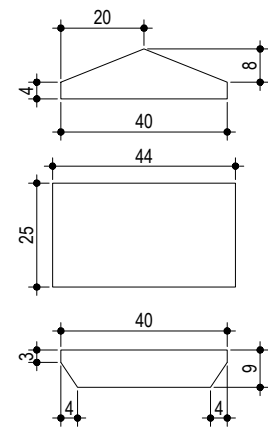
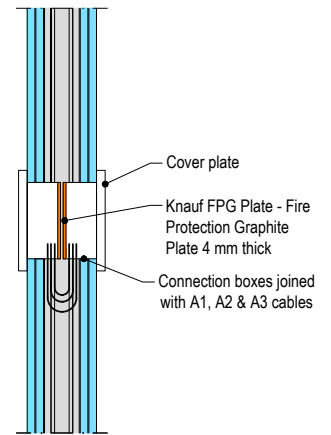


> Cable penetration seal with 4.0 mm thick Knauf FPG plate in socket boxes back to back

Penetration Seal: Cables installed within socket boxes with Knauf FPG plate adhered to back face within the socket box.

Services	Socket box*	Knauf FPG plate	Position	Aperture mm	Classification
Cables up to Ø 14mm	Schneider Electric Ref. IMT 36316 connection box, Ø 100mm cover plate with Ø 70mm x 48mm deep back box	3no. Knauf FPG plate, each fitted lining the back of the socket box	Back to back – 1 fitted to each face, fixed to the stud	Ø 70mm	E 90, EI 60

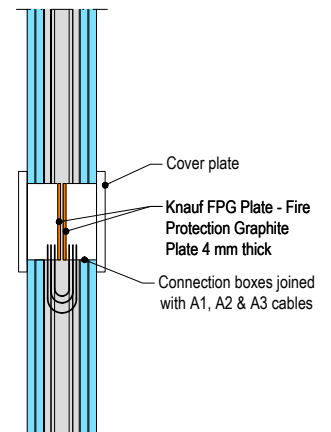
Double side penetration seal with cables in socket boxes  
\*Fixed to studs with steel plate



> Cable penetration seal with 4.0 mm thick Knauf FPG plate in socket boxes back to back

Penetration Seal: Cables installed within socket boxes with Knauf FPG plate adhered to back face within the socket box.

Services	Socket box*	Knauf FPG plate	Position	Aperture mm	Classification
Cables up to Ø 14mm	Rutab 8 connection/ junction box, Ø 100 mm cover plate with Ø 80mm x 47 mm deep back box	57 mm wide by 74 mm high, fitted lining the back of the back box	Back to back – 1 fitted to each face	Ø 80 mm	EI 90
	Schneider Electric IMT 36190 connection box, Ø 100 mm cover plate with Ø 52 mm x 44 mm deep back box	30 mm wide by 30 mm high, fitted lining the back of the back box		Ø 52 mm	EI 120
	Schneider Electric TED26 IMT 36263 connection box, with 83 mm Ø x 47 mm deep back box	66 mm wide by 52 mm high, fitted lining the back of the back box		Ø 83 mm	
	Schneider Electric TED A26 IMT 36256 connection box, with Ø 72mm x 37 mm deep back box	46 mm wide by 46 mm high, fitted lining the back of the back box		Ø 72 mm	EI 90
	Elko 4038 1225422 connection box, with Ø 50mm x 40 mm deep back box	30 mm wide by 30 mm high, fitted lining the back of the back box		Ø 50 mm	



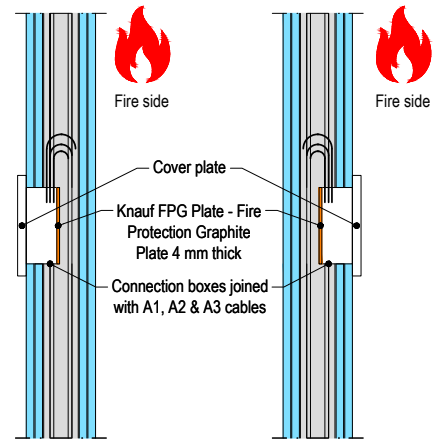
Double side penetration seal with cables in socket boxes  
\*Fixed to studs with steel plate

› **Cable penetration seal with 4.0 mm thick Knauf FPG plate in socket boxes side by side of stud**

Penetration Seal: Cables installed within socket boxes with Knauf FPG plate adhered to back face within the socket box.

Services	Socket box*	Knauf FPG plate	Position	Aperture mm	Classification
Cables up to Ø 14mm	ABB AU60.1 Ref. 2TK-A001744G1/122008 connection box, Ø 100 mm cover plate with Ø 70 mm x 55 mm deep back box	44 mm wide x 44 mm high x 4 mm thick, fitted lining the back of the socket box	Adjacent each side of stud – 1 fitted to each face	Ø 70 mm	EI 60

Double side penetration seal with cables in socket boxes  
\*Fixed to studs with steel plate

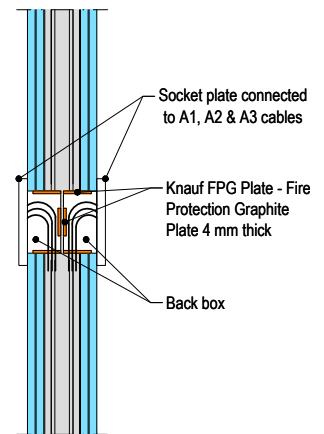


› **Cable penetration seal with 4.0 mm thick Knauf FPG plate in socket box**

Penetration Seal: Cables installed within socket boxes with Knauf FPG plate adhered to back face and socket walls within the socket box.

Services	Socket box	Knauf FPG plate	Position	Aperture mm	Classification
Cables up to Ø 14mm	<i>Fuga Forfrådåse 1M</i> socket ref: 504DA020	4no. 25 mm x 15 mm fitted on socket walls and 1no. 25 mm x 7 mm fitted lining the back of the socket	Back to back – 1 fitted to each face, fixed to the stud	Ø 52 mm	EI 120
	<i>Fuga Air Forfrådåse 1M</i> socket ref: 504D30100	4no. 25 mm x 15 mm fitted on socket walls and 1no. 20 mm x 20 mm fitted lining the back of the socket			EI 90

Double side penetration seal with cables in socket boxes

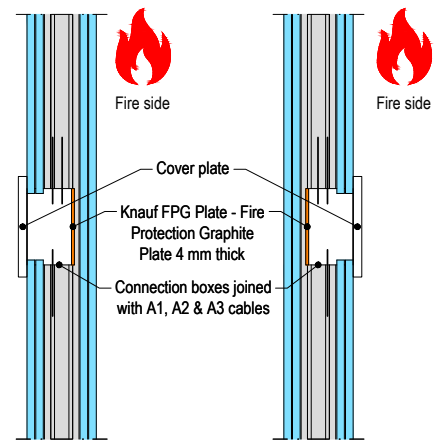


› Cable penetration seal with 4.0 mm thick Knauf FPG plate in socket box

Penetration Seal: Cables installed within socket boxes with Knauf FPG plate adhered to back face within the socket box.

Services	Socket box*	Knauf FPG plate	Position	Aperture mm	Classification
Cables up to Ø 14mm	Schneider Electric IMT 36193 connection box, 70 mm wide x 70 mm high x 70 mm deep	45 mm wide x 45 mm high, fitted lining the back of the inside of the socket box	Adjacent each side of stud – 1 fitted to each face	Ø 70 mm	EI 45
	Schneider Electric IMT 36200 connection box, 70 mm wide x 70 mm high x 70 mm deep				EI 60
	Schneider Electric IMT 36356 connection box, 70 mm wide x 70 mm high x 58 mm deep				
	Etman ETM337S connection box, 70mm wide x 70mm high x 60mm deep	72mm Ø		EI 45	
	Etman ETM001S connection box, 70mm wide x 70mm high x 56mm deep			EI 60	
Etman ETM616S connection box, 90mm wide x 71 mm high x 60mm deep	65mm wide x 45mm high, fitted lining the back of the inside of the socket box	92mm wide x 72mm high oval diameter	EI 45		

Double side penetration seal with cables in socket boxes  
\*Fixed to studs with steel plate

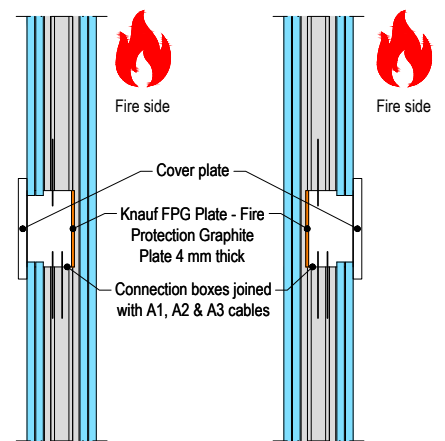


› Cable penetration seal with 4.0 mm thick Knauf FPG plate in socket box

Penetration Seal: Cables installed within socket boxes with Knauf FPG plate adhered to back face within the socket box.

Services	Socket box*	Knauf FPG plate	Position	Aperture mm	Classification
Cables up to Ø 14mm	Schneider Electric IMT 36192 connection box, 70 mm wide x 70 mm high x 58 mm deep	45 mm wide x 45 mm high, fitted lining the back of the inside of the socket box	Adjacent each side of stud – 1 fitted to each face	Ø 70 mm	EI 60
	Schneider Electric IMT 36205 connection box, 70 mm wide x 140 mm high x 57 mm deep	2no. 55 mm wide x 45 mm high, (1 no. piece fitted either side of separator, lining the back of the inside of the socket box)			
	Elko 3011 connection box, 70 mm wide x 140 mm high x 57 mm deep				
	Etman ETM611S Flush mounting Big Wall box # 24mm, 71 mm wide x 142mm high x 70mm deep	2no. 40mm wide x 110mm high, fitted lining the back of the inside of the socket box		72mm Ø	E 60, EI 45
Etman ETM614S connection box, 70mm wide x 90mm high x 60mm deep	45mm wide x 65mm high, fitted lining the back of the inside of the socket box	72mm wide x 92mm high oval diameter	EI 45		

Double side penetration seal with cables in socket boxes  
\*Fixed to studs with steel plate

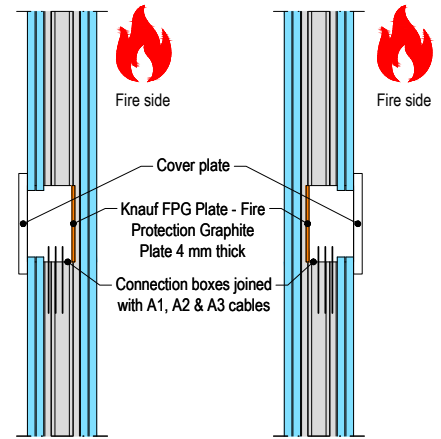


› **Cable penetration seal with 4.0 mm thick Knauf FPG plate in socket box**

Penetration Seal: Cables installed within socket boxes with Knauf FPG plate adhered within the socket box.

Services	Socket box	Knauf FPG plate	Position	Aperture mm	Classification
Cables up to Ø 14mm	Schneider Electric 55/94 2 IØp connection box, 70 mm wide x 140 mm high x 57 mm deep*	2no. 55 mm wide x 45 mm high, (1no. piece fitted either side of separator, lining the back of the inside of the socket box)	Adjacent each side of stud – 1 fitted to each face	140 mm x 70 mm (with rounded edges)	EI 60
	Schneider Electric IMT 36030 connection box, 80 mm wide x 144 mm high x 55 mm deep	8no. 20 mm wide x 35 mm high pieces, lining the back and sides of the inside of the socket box	Adjacent – one fitted on each face - surface mounted on plasterboard	140 mm x 75 mm (with rounded edges)	EI 30
	Elko 4545 connection box, 80 mm wide x 144 mm high x 55 mm deep				EI 45
	Etman ETM750S connection box, 71 mm wide x 71 mm high x 48 mm deep*	50mm wide x 40mm high, fitted lining the back of the inside of the socket box	Adjacent each side of stud – 1 fitted to each face	62mm Ø	EI 60
	Etman ETM751S connection box, 71 mm wide x 71 mm high x 48 mm deep*				
	Etman ETM395S junction box, 83mm wide x 94mm high x 60mm deep*	50mm wide x 70mm high, fitted lining the back of the inside of the socket box	Adjacent each side of stud – 1 fitted to each face	83mm Ø	EI 60
Etman ETM394S junction box, 83mm wide x 94mm high x 60mm deep*	2no. 50mm wide x 70mm high, fitted lining the back of the inside of the socket box				

Double side penetration seal with cables in socket boxes  
\*Fixed to studs with steel plate

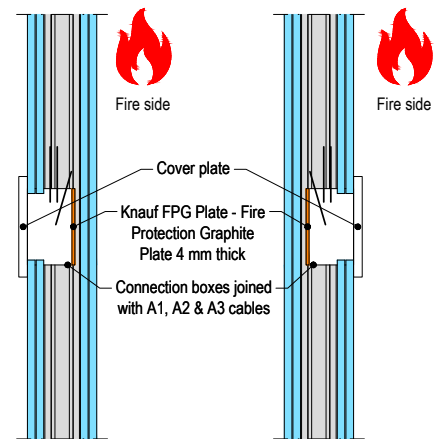


› **Cable penetration seal with 4.0 mm thick Knauf FPG plate in socket box**

Penetration Seal: Cables installed within socket boxes with Knauf FPG plate adhered to back face within the socket box.

Services	Socket box*	Knauf FPG plate	Position	Aperture mm	Classification
Cables up to Ø 14mm	Elko 4040 connection box, 70 mm wide x 70 mm high x 70 mm deep	45 mm wide x 45 mm high, fitted lining the back of the inside of the socket box	Adjacent each side of stud – 1 fitted to each face	Ø 70 mm	EI 60
	Etman ETM338S connection box, 70mm wide x 70mm high x 60mm deep	50mm wide x 45mm high, fitted lining the back of the inside of the socket box		72mm Ø	EI 45

Double side penetration seal with cables in socket boxes  
\*Fixed to studs with steel plate

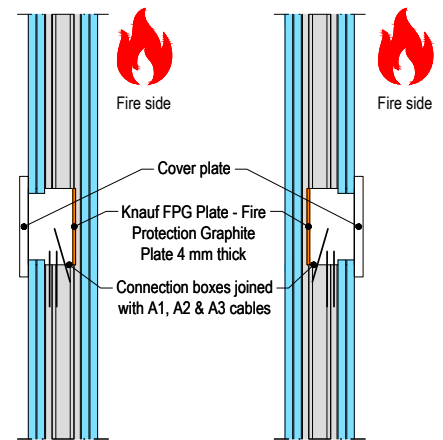


› Cable penetration seal with 4.0 mm thick Knauf FPG plate in socket box

Penetration Seal: Cables installed within socket boxes with Knauf FPG plate adhered to back face within the socket box.

Services	Socket box*	Knauf FPG plate	Position	Aperture mm	Classification
Cables up to Ø 14mm	Schneider Electric IMT 36029 connection box, 70mm wide x 90mm high x 57mm deep	44mm wide x 60mm high, fitted lining the back of the inside of the socket box	Adjacent each side of stud – 1 fitted to each face	91 mm x 71 mm (with rounded edges)	EI 60
	Schneider Electric IMT 36006 connection box, 70mm wide x 70mm high x 70mm deep	45mm wide x 45mm high, fitted lining the back of the inside of the socket box		70mm Ø	

Double side penetration seal with cables in socket boxes  
\*Fixed to studs with steel plate

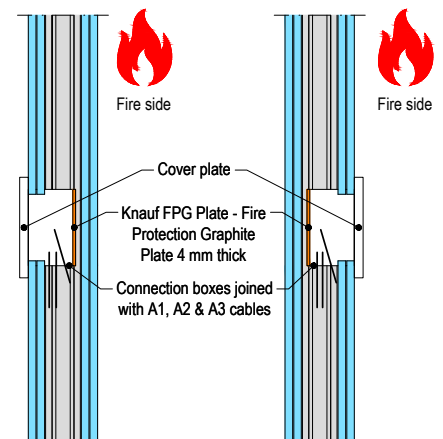


› Cable penetration seal with 4.0 mm thick Knauf FPG plate in socket box

Penetration Seal: Cables installed within socket boxes with Knauf FPG plate adhered to back face within the socket box.

Services	Socket box*	Knauf FPG plate	Position	Aperture mm	Classification
Cables up to Ø 14mm	Schneider Electric IMT 36016 connection box, 70mm wide x 70mm high x 58mm deep	45mm wide x 45mm high, fitted lining the back of the inside of the socket box	Adjacent each side of stud – 1 fitted to each face	70mm Ø	EI 60
	Elko 4045 connection box, 70mm wide x 90mm high x 57mm deep	45mm wide x 60mm high, fitted lining the back of the inside of the socket box		91 mm x 71 mm (with rounded edges)	
	Etman ETM663S connection box, 70mm wide x 142mm high x 45mm deep	40mm wide x 110mm high, fitted lining the back of the inside of the socket box		72mm wide x 92mm high oval diameter	

Double side penetration seal with cables in socket boxes  
\*Fixed to studs with steel plate

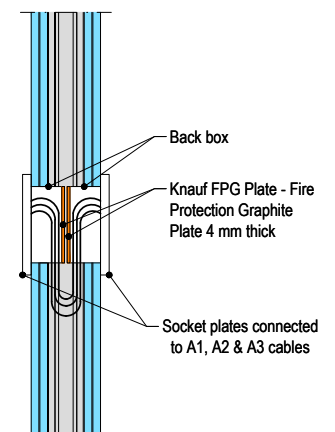


› Cable penetration seal with 4.0 mm thick Knauf FPG plate in socket box

Penetration Seal: Cables installed within socket boxes with Knauf FPG plate adhered to back face within the socket box.

Services	Socket box	Knauf FPG plate	Position	Aperture mm	Classification
Cables up to Ø 14 mm	Rutab 3 connections junction box "Article No. 1426102"	Ø 65mm with 10mm trimmed off 2no. parallel edges	Back to back – 1 fitted to each face	Ø 75 mm	E 120, EI 90

Double side penetration seal with cables in socket boxes



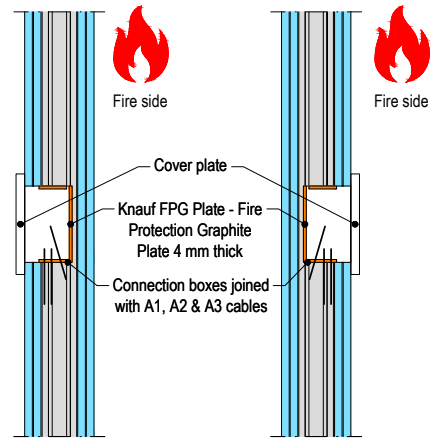


› **Cable penetration seal with 4.0 mm thick Knauf FPG plate in socket box**

Penetration Seal: Cables installed within socket boxes with Knauf FPG plate adhered to back face and socket walls within the socket box.

Services	Socket box	Knauf FPG plate	Position	Aper- ture mm	Classifi- cation
Cables up to Ø 14mm	Schneider Electric 60/46 connection box, no. 1223281, 70 mm wide x 70 mm high x 65 mm deep	5no. 20 mm wide x 50 mm high pieces, lining the back and sides of the inside of the socket box	1 fitted to each face (side by side), mounted in the plasterboard - 0mm between each socket	71 mm x 71 mm	E 90, EI 45

Double side penetration seal with cables in socket boxes

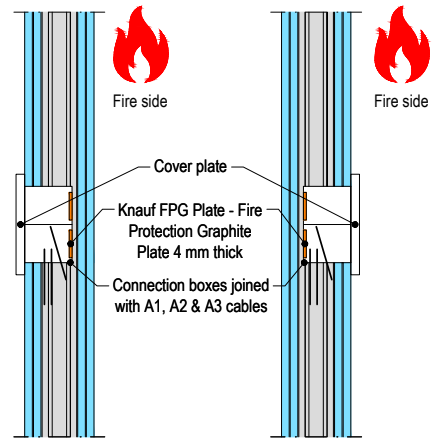


› **Cable penetration seal with 4.0 mm thick Knauf FPG plate in socket box**

Penetration Seal: Cables installed within socket boxes with Knauf FPG plate adhered to back face and socket walls within the socket box.

Services	Socket box	Knauf FPG plate	Position	Aper- ture mm	Classifi- cation
Cables up to Ø 14mm	Etman ETM611 S double connection box, 72mm wide x 142mm high x 60mm deep	2no. 40mm wide x 50mm high, fitted lining the back of the inside of the socket box	Adjacent each side of stud – 1 fitted to each face	72mm x 142mm	EI 45

Double side, double flush penetration seal with cables in socket boxes

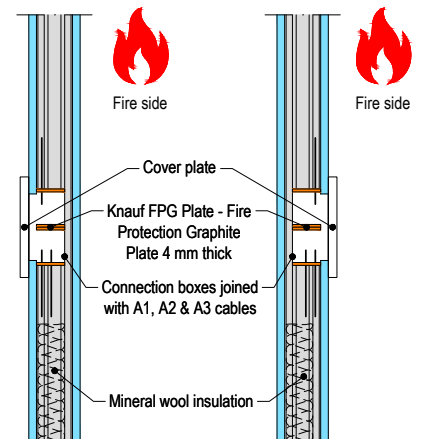


› **Cable penetration seal with 4.0 mm thick Knauf FPG plate in socket box**

Penetration Seal: Cables installed within socket boxes with Knauf FPG plate adhered to back face and socket walls within the socket box.

Services	Socket box	Knauf FPG plate	Position	Aper- ture mm	Classifi- cation
Cables up to Ø 14mm	Etman ETM546S multibox 90-degree entries connection box, 70mm wide x 60mm high	4no. 20mm wide x 40mm high, fitted lining the sides of the inside of the socket box	1 fitted to each face (side by side), mounted in the plasterboard - 0mm between each socket	72mm Ø	E 90, EI 45

Double side penetration seal with cables in Multiboxes

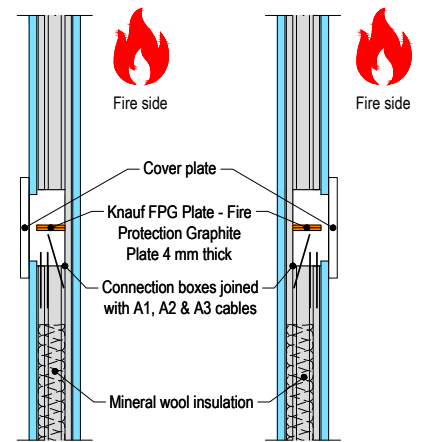


> **Cable penetration seal with 4.0 mm thick Knauf FPG plate in socket box**

Penetration Seal: Cables installed within socket boxes with Knauf FPG plate adhered to back face within the socket box.

Services	Socket box	Knauf FPG plate	Position	Aper- ture mm	Classifi- cation
Cables up to 14mm diameter	<i>Etman ETM220S</i> multibox connection box, 70mm x 60mm deep	3no. 20mm wide x 40mm high, fitted lining the back and sides of the inside of the socket box	1 fitted to each face (side by side), mounted in the plaster-board - 0mm between each socket	72mm Ø	EI 60

Double side penetration seal with cables in Multiboxes

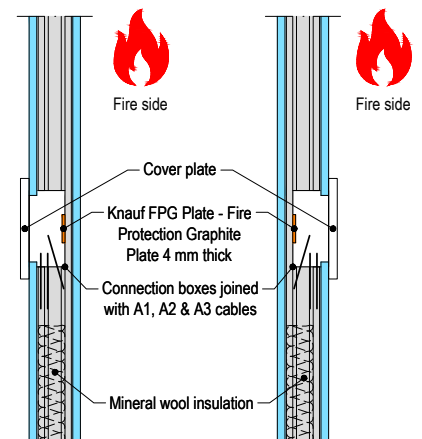


> **Cable penetration seal with 4.0 mm thick Knauf FPG plate in socket box**

Penetration Seal: Cables installed within socket boxes with Knauf FPG plate adhered to back face within the socket box.

Services	Socket box	Knauf FPG plate	Position	Aper- ture mm	Classifi- cation
Cables up to 14mm diameter	<i>Etman ETM548S</i> multibox connection box, 90mm x 70mm x 58mm deep	40mm wide x 50mm high, fitted lining the back of the inside of the socket box	1 fitted to each face (side by side), mounted in the plaster-board - 0mm between each socket	92mm x 72mm	EI 30

Double side penetration seal with cables in Multiboxes





# KNAUF FIRE PROTECTION FOAM



The fire protection foam is particularly well-suited for fast and flexible closure of small and medium-sized through penetration firestop systems. A packaging unit with six cartridges of Knauf Fire protection foam - FPF, twelve mixing nozzles, six pairs of gloves, as well as one roll of duct tape, is delivered. The duct tape is outstandingly suited as form work for Knauf Fire protection foam - FPF. Through use of the new cordless DynamicMax dispensing gun multiple cartridges can be quickly and conveniently processed in succession.

After the end of the reaction, the permanently elastic structure of the penetration seal enables easy retroactive-installation. Retroactive installations can simply be poked through the existing foam. Gaps that occur due to removal of cables or pipes can easily be refilled with the Knauf Fire protection foam - FPF.

## Properties:

- › Sealing for window fittings
- › Sealing for door fittings
- › Filling free spaces, cracks, gaps and pipe penetrations
- › Sealing roof, wall and floor joints
- › Thermal insulation
- › Acoustic insulation
- › Certified according to ETA 21/0994
- › EAD 350141-00-1106

### Supporting constructions:

#### Flexible walls:

The wall must have a minimum thickness of 150 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m<sup>3</sup>.

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.

The System Knauf FP Foam may be used to provide a linear joint seal in and between rigid walls.



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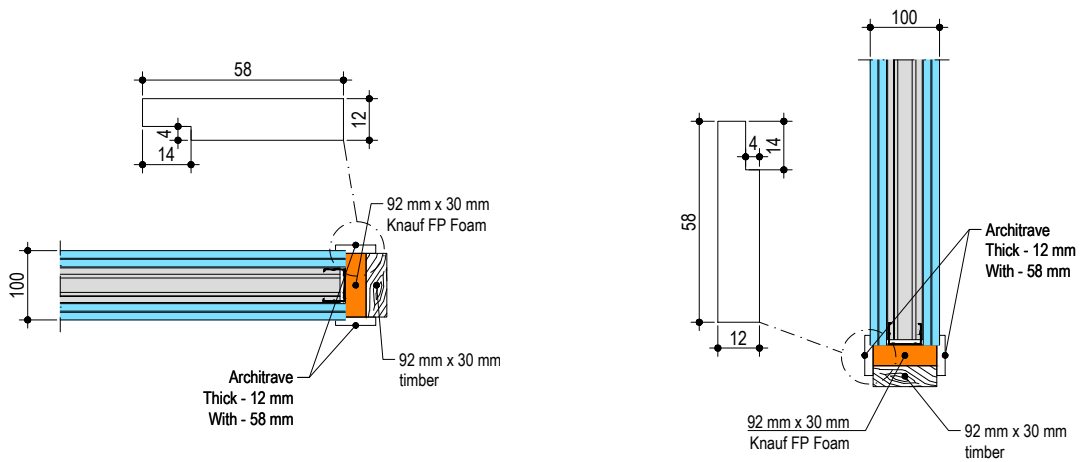
### Installation Instructions

1. Read the Safety Data Sheet before use and use the recommended personal protective equipment.
2. Remove all loose debris, any contaminants such as grease and oil from the surfaces to be sealed.
3. Moisture is necessary to ensure a fast and even curing of the foam. Spray surfaces with water to moisten them when foam is applied (a spray bottle for plants can be used). This is especially important in warm and dry areas.
4. The tin must be shaken well 15-20 times before use. Attach the gun to the tin but do not overtighten or activate the release valve.
5. The tin should be turned upside down for foam application so that the gun is under the tin.
6. Depending on the joint orientation and size, best results will be obtained by building up multiple layers from the bottom, thus allowing each individual layer to part cure. Do not attempt to insert excessive wet foam as rapid expansion will cause wasteful overspill of curing foam in the joint and may apply pressure to soft materials and push them out of position. Foam extrusion can be controlled by depressing the trigger on the gun more or less or reducing the pressure on the valve.
7. Once the gap or joint is completely filled, excessive overspill should be removed by cutting with a knife or similar.
8. After sealing the foam should be covered by a substrate resistant to mechanical damage and UV-radiation.

# LINEAR JOINT AND GAP SEALS | FLEXIBLE AND RIGID WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 100 MM AND TIMBER SUBSTRATES AND ARCHITRAVES

5



## > Linear joint or gap seals, vertically or horizontally orientated without backing materials

Joint Seal: Protecta FR Foam minimum 92 mm depth of the wall, joint widths up to 30 mm

Substrate	Depth (mm)	Facing	Classification
Flexible or rigid wall / Timber	Minimum 92 min.	Linear seals in flexible or rigid walls against wooden door frames covered with architraves on both sides*	E 60 - V - X - F - W 30
			EI 45 - V - X - F - W 30
			EI 60 - T - X - F - W 30

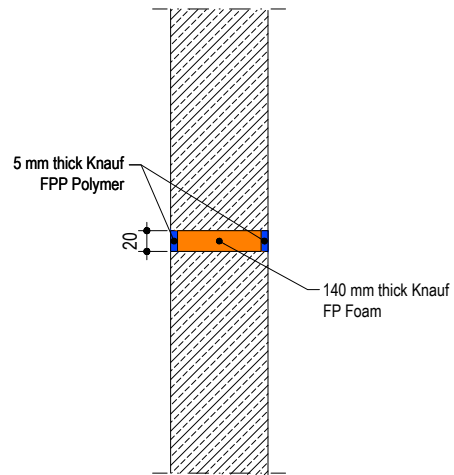
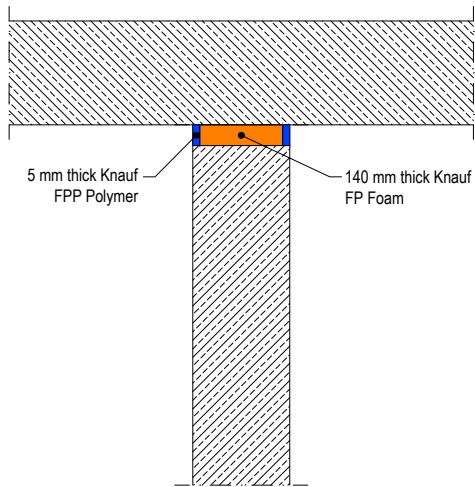
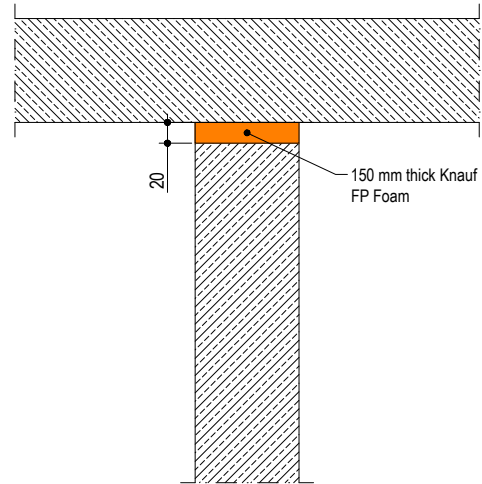
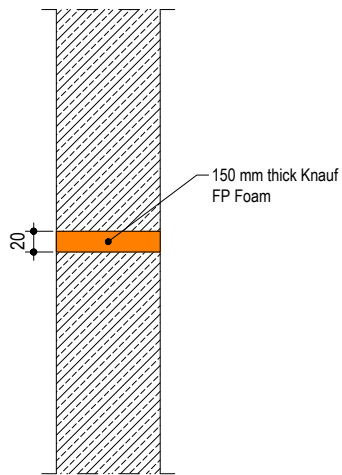
\*This classification does not relate to fire resisting doorsets which must be classified separately



# LINEAR JOINT AND GAP SEALS | RIGID WALL CONSTRUCTIONS

WITH WALL THICKNESS OF MINIMUM 150 MM

5



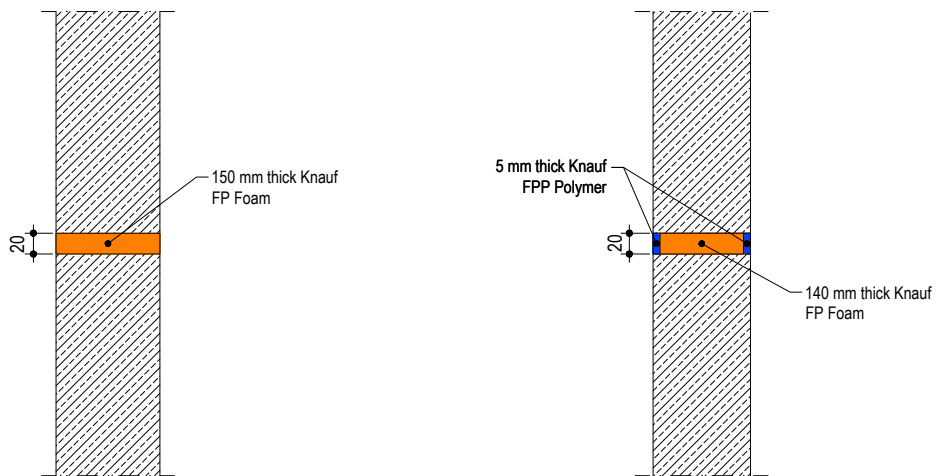
## > Linear joint or gap seal, horizontally oriented

Joint Seal: Seal for horizontal gaps in walls and joint between head of wall and floor soffit.

Wall sealed to full depth or minimum 150 mm if wall is of greater depth.

Substrate	Depth (mm)	Facing	Classification
Masonry/ concrete	140 min.	5 mm Knauf FPP - fire protection polymer to both faces	EI 240 - H - X - F - W 20
	150 min.	-	EI 180 - H - X - F - W 20





> **Linear joint or gap seal, vertically oriented**

**Penetration Seal:** Seal for vertical gaps in walls and joint between walls. Wall sealed to full depth or minimum 150 mm if wall is of greater depth.

Substrate	Depth (mm)	Facing	Classification
Masonry/ concrete	140 min.	5 mm Knauf FPP - fire protection polymer to both faces	EI 240 - V - X - F - W 20
	150 min.	-	EI 60 - V - X - F - W 20

# KNAUF SYSTEM FIRESTOP-F

5



The Knauf Fire protection foam - FPF system restores the fire resistance in areas of walls and floors where cables and pipes penetrate the component.

Mixed penetration seal or cable penetration seal up to EI 120 for rigid walls, rigid floors and flexible walls. Through penetration firestop system for electrical, telecommunication and optical fibre cables, conduits, as well as flammable and non-flammable pipes.

### Specially suited for:

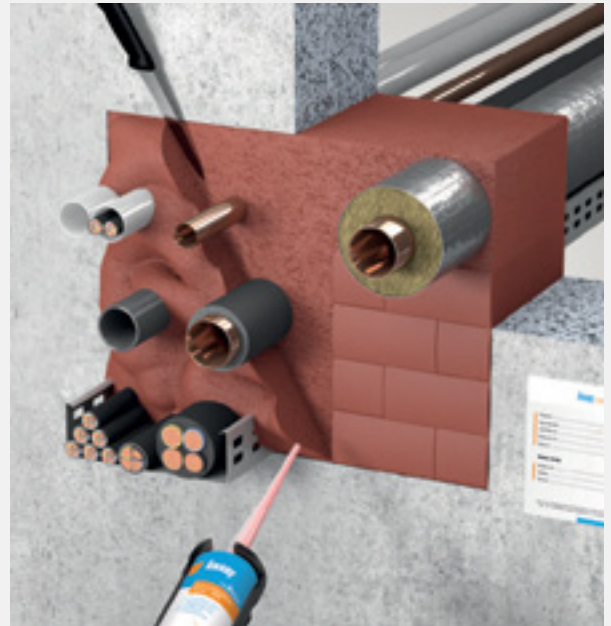
- › Fast and easy sealing of component openings,
- › Openings with many penetrating elements,
- › Openings that are difficult to access or

### Application:

- › For mixed penetration seals up to EI 90
- › For cable penetration seals up to EI 120
- › For pipe penetration seals up to EI 120

### General Instructions

- › The cables, control lines, or conduits must be fastened on the cable trays and cable ladders or in support devices in accordance with the technical rules.
- › The cable support systems (cable trays and ladders) and the associated supports or fastenings must be made of steel and fastened on both sides of the through penetration firestop systems in such a manner that in the event of fire, additional mechanical stress cannot act on the through penetration firestop systems over the period of time specified by the required fire resistance class. In this regard the technical rules and specifications provided by the manufacturer of the cable support system and of the fastening system must be complied with.
- › The pipe support systems and their fastenings must be made of steel and fastened on both sides of the through penetration firestop systems in such a manner that in the event of fire, additional mechanical stress cannot act on the through penetration firestop systems over the period of time specified in the required fire resistance class. In this regard the technical rules and specifications provided by the manufacturer of the support system or of the fastening system must be complied with.
- › Cable trays and ladders may optionally be routed through the through penetration firestop system.
- › Conduits must be plugged with mineral wool on the ends so that it is smoke gas tight, or it must be sealed with Knauf Fire protection foam - FPF.



- › The total cross section area of the penetrating elements based on the area of through penetration firestop system must not exceed 60 %.
- › The first support of the cables, cable trays or ladders or conduits must be mounted maximum 200 mm in front of the through penetration firestop system for wall and floor installation (maximum distance in floors only required top-side).
- › The first support of the pipes must be mounted maximum 750 mm in front of the through penetration firestop system for wall installation and 1200 mm for floor installation (maximum distance in floors only required top-side).

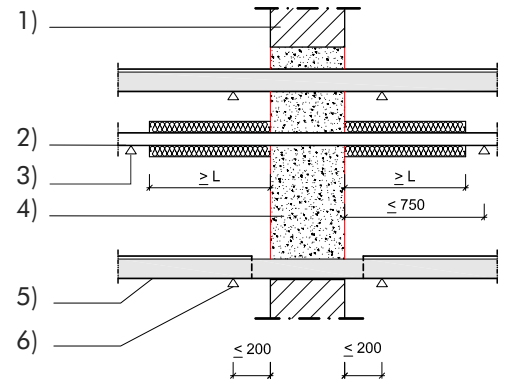


# PENETRATION SEALS | KNAUF SYSTEM FIRESTOP-F

## > Permissible install locations of the through penetration firestop system

<b>Components</b>	Rigid wall: Aerated concrete, concrete, reinforced concrete, masonry	Flexible wall: Timber or steel studs lined on both sides	Rigid floor: Aerated concrete, concrete, reinforced concrete
<b>Minimum thickness</b>	100 mm		150 mm
<b>Classification of the component</b>	EN 13501-2		
<b>Fire resistance classification*</b>	EI 60 EI 90		
<b>Minimum seal thickness*</b>	144 mm 200 mm		
<b>Maximum opening size</b>	W x H 450 x 500 [mm]	W x H 450 x 450 [mm]	
<b>Fire resistance classification*</b>	EI 60 EI 90 EI 120		
<b>Minimum seal thickness*</b>	100 mm / 144 mm 144 mm / 200 mm 200 mm / 250 mm		
<b>Maximum opening size</b>	270 x 270 [mm] Ø 300 mm		

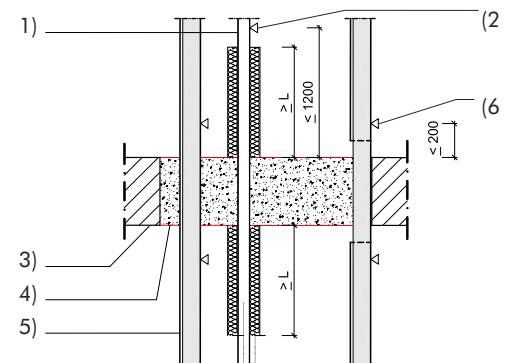
\*The required seal thickness depending on the fire resistance classification and the penetrating element that is routed through is specified in the fire resistance classification tables.



Support of pipes and cables/cable support systems in walls

### Legend

1. Rigid wall
2. Pipes
3. First support of pipes
4. Knauf Fire protection foam
5. Cables/cable support systems, conduits
6. First support of the cables/cable support systems, conduits



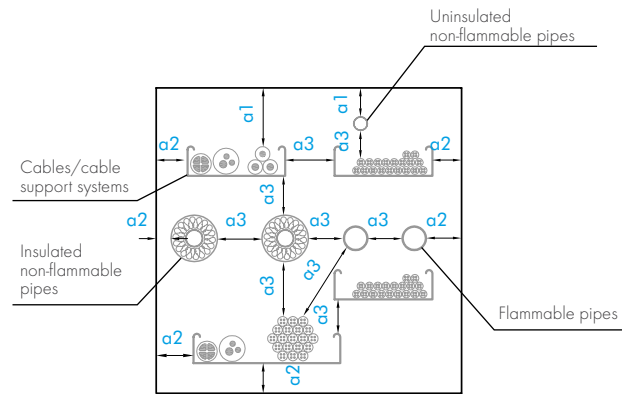
Support of pipes and cables/cable support systems in floors

### Legend

1. Pipes
2. First support of pipes
3. Rigid floor
4. Knauf Fire protection foam - FPF
5. Cables/cable support systems, conduits
6. First support of the cables/cable support systems, conduits

> **Minimum working clearances mixed penetration seal**

Penetrating elements	a1	a2	a3	
Cables, cable support systems and conduits	50 mm	0 mm	Cables / cable support systems and conduits, horizontal Cables / cable support systems and conduits, vertical Uninsulated non-flammable pipes Other penetrating elements	0 mm 50 mm 60 mm 50 mm
Non-flammable pipes insulated with mineral wool	0 mm	0 mm	Non-flammable pipes insulated with mineral wool Uninsulated non-flammable pipes Other penetrating elements	0 mm 60 mm 50 mm
Non-flammable pipes insulated with AF/Armaflex	35 mm	35 mm	Non-flammable pipes, insulated with AF/Armaflex (thickness > 9 mm) Non-flammable pipes, insulated with AF/Armaflex (thickness 9 mm) Uninsulated non-flammable pipes Other penetrating elements	35 mm 50 mm 60 mm 50 mm
Uninsulated non-flammable pipes	35 mm	35 mm	Uninsulated non-flammable pipes Other penetrating elements	60 mm 60 mm
Flammable pipes	50 mm	50 mm	Flammable pipes Uninsulated non-flammable pipes Other penetrating elements	50 mm 60 mm 50 mm
Between two through penetration firestop systems of this approval				100 mm



**Legend**

- a1:** Penetrating element - top edge of aperture
- a2:** Penetrating element - lower or lateral edge of aperture
- a3:** Penetrating element - penetrating element

> **Minimum working clearances cable penetration seal**

Penetrating elements	a1	a2	a3	
Cables, cable support systems and conduits	0 mm	0 mm	Cables, cable support systems and conduits	0 mm
Between two through penetration firestop systems of this approval				100 mm

› **Fire resistance classifications – mixed penetration seal**

Max. dimensions (W x H) 450 x 500 [mm] in flexible wals or rigid walls with a thickness of ≥ 100 mm.

Max. dimensions (W x H) 450 x 450 [mm] in rigid floors with a thickness of ≥ 150 mm.

Penetrating elements		Minimum seal thickness of the mixed penetratio seal	
		144 mm	200 mm
Cables/ Cable trays and ladders	Sheathed electrical cables, telecommunication cables, optical fibre cables up to a maximum outer Ø of 80 mm Tied cable bundles up to a max. outer Ø of 100 mm consisting of sheathed electrical cables, telecommunication cables, optical fibre cables with a maximum outer Ø of 21 mm	Wall: E 120 / EI 60 Floor: E 60 / EI 60	Wall / floor: E 120 / EI 90
	Non-sheathed electrical cables up to a maximum outer Ø of 24 mm	Wall: E 120 / EI 45 Floor: E 60 / EI 30	Wall and floor: E 120 / EI 60
Conduits *	Conduits / pipes of steel up to a maximum outer Ø of 16 mm with or without cables	Wall: E 120-U/C / EI 60-U/C Floor: E 60-U/C / EI 60-U/C	Wall and floor: E 120-U/U EI 90-U/U
	Conduits / pipes of plastic up to a maximum outer Ø of 40 mm or bundles of plastic conduits with a maximum outer Ø of 80 mm (max. outer Ø of an individual conduit 40 mm), in each case with or without cables	Wall: E 120-U/C / EI 90-U/C Floor: E 60-U/C / EI 60-U/C	Wall and floor: E 120-U/U EI 120-U/U
Pipes **	Non-flammable pipes insulated with mineral wool up to a maximum outer Ø of 54 mm	Wall: E 120-C/U / EI 90-C/U Floor: E 60-C/U / EI 60-C/U	Wall and floor: E 120-C/U EI 90-C/U
	Uninsulated non-flammable pipes up to a maximum outer Ø of 28 mm	Wall: E 120-C/U / EI 60-C/U Floor: E 60-C/U / EI 60-C/U	Wall and floor: E 120-C/U EI 90-C/U
	Non-flammable pipes insulated with AF/Armaflex (insulation thickness > 9 mm) up to a maximum outer Ø of 88.9 mm	Wall: E 120-C/U / EI 90-C/U Floor: E 60-C/U / EI 60-C/U	Wall and floor: E 120-C/U EI 120-C/U
	Non-flammable pipes insulated with AF/Armaflex (insulation thickness 9 mm) up to a maximum outer Ø of 54 mm	Wall: E 120-C/U / EI 90-C/U Floor: E 60-C/U / EI 60-C/U	Wall and floor: E 120-C/U EI 90-C/U
	Flammable pipes up to a maximum outer Ø of 50 mm	Wall: E 120-U/C / EI 120-U/C Floor: E 60-U/C / EI 60-U/C	Wall and floor: E 120-U/U EI 120-U/U

\* Beginning and end must be sealed smoke gas tight with Knauf Fire protection foam - FPF or mineral wool.

\*\* See the pipe diagrams for the permissible insulation thicknesses.

## › Fire resistance classifications – cable penetration seal

Max. dimensions (W x H) 270 x 270 [mm] or  $\leq \varnothing 300$  mm in flexible walls or rigid walls with a thickness  $\geq 100$  mm or in rigid floors with a thickness  $\geq 150$  mm.

Penetrating elements		Minimum seal thickness of the mixed penetratio seal			
		100 mm	144 mm	200 mm	250 mm
Cables/ Cable trays and ladders	Sheathed electrical cables, telecommunication cables, optical fibre cables up to a maximum outer diameter of 21 mm	E 120 EI 60	E 120 EI 90	E 120 Wall: EI 90 / EI 120 <sup>2)</sup> Floor: EI 120	E 120 EI 120
	Sheathed electrical cables, telecommunication cables, optical fibre cables up to a maximum outer diameter of 21 mm < $\varnothing \leq 50$ mm	Wall: E 120 / EI 45 EI 60 <sup>1)</sup>	E 120 EI 60	E 120 EI 90 / EI 120 <sup>2)</sup>	
	Sheathed electrical cables, telecommunication cables, optical fibre cables up to a maximum outer diameter of 50 mm < $\varnothing \leq 80$ mm	-		E 120 EI 90 / EI 120 <sup>2)</sup>	E 120 EI 90 / EI 120 <sup>2)</sup>
	Tied cable bundles up to a max. outer diameter of 100 mm consisting of sheathed electrical cables, telecommunication cables, optical fibre cables with a maximum outer diameter of 21 mm	-		E 120 Wall: EI 90 Floor: EI 90 / EI 120 <sup>2)</sup>	E 120 Wall: EI 90 Floor: EI 120
	Non-sheathed electrical cables up to a maximum outer diameter of 24 mm	-	E 120 Wall: EI 45 Floor: EI 30	E 120 Wall: EI 90 Floor: EI 60	E 120 Wall: EI 90 Floor: EI 60
Conduits *	Conduits / pipes of steel up to a maximum outer diameter of 16 mm with or without cables	-	E 120-U/C EI 60-U/C	E 120-U/U Wall: EI 120-U/U Floor: EI 90-U/U	E 120-U/U EI 120-U/U
	Conduits / pipes of plastic up to a maximum outer diameter of 40 mm or bundles of plastic conduits with a maximum outer diameter of 80 mm (max. outer diameter of an individual conduit 40 mm), in each case with or without cables	-	E 120-U/C EI 120-U/C	E 120-U/U EI 120-U/U	

\* Beginning and end must be sealed smoke gas tight with Knauf Fire protection foam - FPF or mineral wool.

<sup>1)</sup> A minimum 20 mm thick bead of Knauf Fire protection foam - FPF over a length of at least 30 mm on both sides must be provided around the penetrating elements and cable support systems that are routed through.

<sup>2)</sup> The cables, cable bundles and cable support systems must be wrapped on both sides of the seal with Knauf Fire protection Wrap.

# KNAUF FPC COATING



Knauf Fire Protection Coating - FPC spray grade, is an ablative sealant coating designed to enhance, seal and fire protect mineral fibres.

Mineral fibres coated with Knauf Fire Protection Coating are designed to prevent the spread of fire and smoke through openings in fire rated walls and floors, also where openings are formed to allow the installation of multiple building services. The system will also maintain the acoustic design performance.

## Properties:

- › Simple and very quick to install
- › Easy to retrofit additional building services after installation
- › Permanently flexible - will accommodate movements during fire and smaller movements in the construction it has been fitted within
- › Suitable for most surfaces, including concrete, bricks, masonry, steel, wood, gypsum, glass, plastics and most non-porous surfaces
- › May be used in unlimited lengths in walls with heights up to 1200 mm and in floors with widths up to 120 mm



**Supporting constructions:****Flexible walls:**

The wall must have a minimum thickness of 100 mm and comprise steel studs or timber studs\*) lined on both faces with minimum 2 layers of 12.5 mm thick boards.

**Rigid walls:**

The wall must have a minimum thickness of 150 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m<sup>3</sup>.

**Rigid floors:**

The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m<sup>3</sup>.

\*) Timber studs: no part of the penetration seal may be closer than 100mm to a stud, and minimum 100mm of insulation of class A1 or A2 according to EN 13501-1 must be provided within the cavity between the penetration seal and the stud.



5

**Installation Instructions**

1. Before installing the stonewool core, please ensure that the surface of all surrounding constructions is free from all loose contaminants, dust and grease. The stonewool should be dry and sound, and any large loose pieces should be brushed off before spraying.
2. Knauf Fire Protection Coating is water based, so in cases where corrosion protection is a problem, some metals may require a barrier between the seal and the surface prior to this installation.
3. Select the type of stonewool core and friction fit into the seal according to the fire resistance table on page 1. To secure high density stonewool boards, please seal between the stonewool and the surface of all surrounding constructions on both sides with Knauf FPA Acrylic which will act as an adhesive.
4. When fitting stonewool boards into gypsum walls the side of the boards should be flush with the surface of the gypsum on both sides.
5. When fitting double layer stonewool boards in masonry or concrete constructions, the boards should be flush with the surface of the construction on both sides to maximize the fire resistance. If this is not possible, there should be an air gap of at least 30mm between the boards.
6. When fitting single layer stonewool in masonry or concrete constructions, it can be positioned to either side of the construction or anywhere in between.
7. When installing stonewool in hollow floor slabs, fire seals should be installed from the soffit side of the floor assuming there is sufficient thickness of concrete below the void. Where this is not the case, tubular voids should be filled with stone wool normally the same thickness as the depth of the floor slab.
8. Spray apply Knauf Fire Protection Coating to the stonewool according to the fire resistance table on page 1. Spraying pressures will depend on the type of pump and nozzle used approximately 1700 to 2300 psi using a 25 to 35 thou' tip. Apply the coating in smooth strokes and with the minimum of overspray to achieve an even film thickness and consistent drying across the stonewool.
9. The required wet film thickness (WFT) is usually achieved when the surface is to a satisfactory proper white finish when dry.
10. Overspray can increase drying times. Drying times will be dependent on film thickness, ambient temperature and humidity and may be reduced by using drying ovens and/or fans.
11. Knauf Fire Protection Coating can be over-painted with most emulsion or alkyd (gloss) paints.

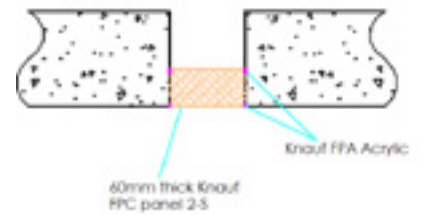
# LINEAR JOINT AND GAP SEALS | RIGID FLOOR CONSTRUCTIONS

WITH FLOOR THICKNESS OF MINIMUM 150 MM

› **Linear joint or gap seal, between floor slabs or between floor slab and wall with coating to the both faces of seal**

Joint Seal: 60mm thick Knauf FPC panel 60 2-S friction fitted at any position fully within the cavity and sealed at the joint and along the top and bottom edges with Knauf FPA Acrylic.

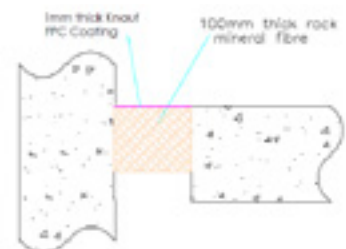
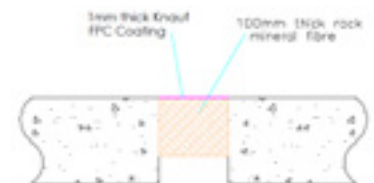
Substrate	Depth (mm)	Backing	Classification
masonry/ concrete	1 mm WFT min. both sides	60 mm stone wool, mineral fibre batt	E 240 – H – X – F – W30-120 EI 120 – H – X – F – W30-120



› **Linear joint or gap seal, between floor slabs or between floor slab and wall with coating to the top face of seal only**

Joint Seal: 100mm thick Stone wool, mineral fibre insulation friction fitted at least 50 mm above the soffit and coated on the top face with Knauf FPC Coating.

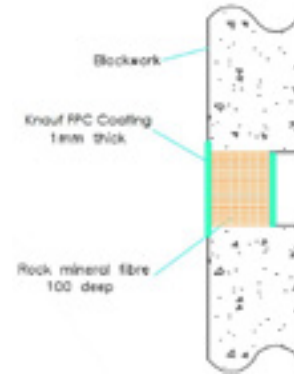
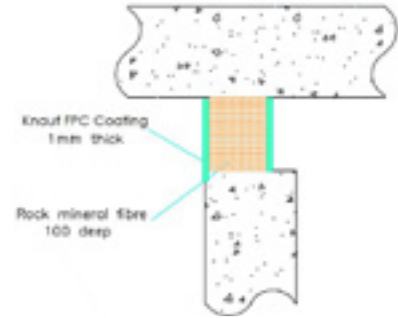
Substrate	Depth (mm)	Backing	Classification
masonry/ concrete	1 mm WFT min. both sides	100 mm stone wool, min- eral fibre min. 33 kg/m <sup>3</sup>	E 240 – H – X – F – W120 EI 180 – H – X – F – W120



› **Linear joint or gap seal, between the head of walls (min. 150 mm thick) and the soffit of floor slabs or in walls (min. 150 mm thick) with coating to both faces**

**Joint Seal:** 100mm thick Stone wool, mineral fibre insulation compression fitted to either face of the wall or at any position in between and coated on both faces with Knauf FPC Coating.

Substrate	Depth (mm)	Backing	Classification
masonry/ concrete	1.2 mm WFT min. both faces overlapped by 15 mm onto wall surface	100 mm stone wool, mineral fibre min. 35 kg/m <sup>3</sup> , compressed into gap by 40%	E 240 – T – X – F – W120 EI 180 – T – X – F – W120





# SYSTEMS FIRE PROTECTIVE



# KNAUF FIREPAINT



## Knauf Firepaint Steel

Knauf Firepaint Steel is a one component, solventborne, physically drying intumescent coating for passive fire protection of structural steel against cellulosic fires. It is suitable for in-shop and on-site applications. Knauf Firepaint Steel received European Technical Approval.

### > Primers:

#### **For carbon steel surfaces:** Knauf Firepaint Primer K1

Knauf Firepaint Primer K1 is a very quick-drying anticorrosive primer/finish pigmented with zinc phosphate as anticorrosive inhibiting pigment.

Knauf Firepaint Primer is used as a single/double coat anticorrosive primer (or finish - to put directly) for steel structures, general steel work and a multitude of applications for heavy and light steel industry, where quick drying properties are required. It is for general use, in exterior and interior steel surfaces. Suitable for protec-

tion of steel in mild to medium atmospheric corrosive environments.

#### **For galvanized surfaces:** Knauf Firepaint Primer K2

Knauf Firepaint Primer K2 is a two-component epoxy paint. It cures to a flexible, well adhering coating with good abrasion and impact resistance. Contains zinc phosphate.

As a primer for on hot dipped galvanized surfaces, aluminium and stainless steel in moderately corrosive environments. Knauf Firepaint Primer K2 is also suited when roughening of the surface is not possible.

#### **Top coat:** Knauf Firepaint Finish

Knauf Firepaint Finish is a finishing coat based on acrylic resin and nonchlorinated plasticizer for optimum gloss and colour retention. Physically drying. Resistant to salt water, splashes of aliphatic hydrocarbons and animal and vegetable oils.

Knauf Firepaint Finish is used as an interior and exterior finishing coat in Knauf Firepaint systems in moderately to severely corrosive environment.

#### Thinners:

##### Knauf Firepaint Finish Thinner AL

##### Knauf Firepaint Finish Thinner EP

Knauf Paint is produced and supplied in such a way that thinning is normally not necessary provided the paint is properly mixed/stirred.

However, if the paint is to be applied in a low film thickness (for instance as a „sealer coat“) or if the paint has become too thick, e.g. in cold weather, the Knauf Thinners indicated on the product data sheet may be added to obtain a consistency most suitable for application. As a general rule, thinning should be kept at

a minimum as the quality of the paint work will suffer from too liberal thinning.

#### Properties

- Easy application
- Easy to work with
- Cost effective - high volume solids and quick drying
- Off-site and on-site application by airless spray.
- Suitable for indoor and outdoor use
- Matt white finish.
- Wide range of primers and topcoats.

#### Storage

Knauf Firepaint Steel shall be stored in dry, shaded areas. The recommended storage conditions are between 5°C and 40°C. The shelf life may vary depending on the storage conditions. At 25°C it is 12 months from

date of manufacture. The shelf life may be reduced if the products are stored outside Knauf's recommended storage conditions. The products must be re-inspected before use in case the shelf life is exceeded.

#### Scope of application

Knauf Firepaint Steel is used as reactive coating system to fire protect beams and columns made of structural steel to achieve a fire resistance duration in accordance with EN 13501-2.

The product is approved on the basis of Approval testing in accordance with EN 13381-8:2010 and ETAG 018.

Knauf Firepaint Steel is intended to fire protect various sizes of open sections (H and I) and square and circular hollow columns for up to a fire resistance classification, in the design temperatures range of 350°C to 750°C.

Knauf Firepaint Steel is intended for the following applications:

- As intumescent fire protection for internal and external structural steel. Suitable for open beams and columns and hollow sections
- As a repair and touch-up coating for damaged areas of freshly applied Knauf Firepaint Steel.
- Applied in up to 1500 µm dry film thickness per coat (equivalent to 2000 µm wet film thickness).
- As intumescent fire protection for internal and external structural steel beams and columns (acc. to ETA):
  - open H- or I-sections - up to R 240
  - circular hollow sections - up to R 240
  - rectangular hollow sections - up to R 300

# KNAUF FIREPAINT STEEL



Knauf Firepaint Steel is a one component, solventborne, physically drying intumescent coating for passive fire protection of structural steel against cellulosic fires. It is suitable for in-shop and onsite applications. Knauf Firepaint Steel received European Technical Approval.

#### **Knauf Firepaint Steel is intended for:**

- › As a repair and touch-up coating for damaged areas of freshly applied Knauf Firepaint Steel.
- › Applied in up to 1500 µm dry film thickness per coat (equivalent to 2000 µm wet film thickness).
- › As intumescent fire protection for internal and external structural steel beams and columns (acc. to ETA):
  - › open H- or I-sections - up to R 240
  - › circular hollow sections - up to R 240
  - › rectangular hollow sections - up to R 300

#### **Scope of application**

Knauf Firepaint Steel is used as reactive coating system to fire protect beams and columns made of structural steel to achieve a fire resistance duration in accordance with EN 13501-2. The product is approved on the basis of Approval testing in accordance with EN 13381-8:2010 and ETAG 018. Knauf Firepaint Steel is intended to fire protect various sizes of open sections (H and I) and square and circular hollow columns for up to a fire resistance classification, in the design temperatures range of 350°C to 750°C.



## Application conditions

The surface temperature must always be 3°C above dew point and the maximum relative humidity should not exceed 85% during the application. The area where Knauf Firepaint Steel is applied must be well ventilated and proper air circulation shall be secured for optimal drying. For applications under warm conditions special attention shall be given to avoid solvent entrapment due to application of high dry film thicknesses per coat. For optimum drying in these conditions it is generally recommended to apply several thinner coats to obtain the specified dry film thickness (e.g. apply 2 coats of 750 µm each instead of 1500µm in a single coat). For applications outdoors at warm conditions, direct sunlight exposure can be avoided to prevent skinning of the paint that will result in longer overall drying times due to solvent entrapment; if direct sunlight cannot be avoided a lower DFT per coat may be beneficial for the drying time of the complete coating system. It is recommended that the products in all situations are protected from condensation and water during application and drying. Knauf Firepaint Steel are relatively high viscosity materials and normally they are supplied showing a false body effect. Prior to application the material has to be stirred shortly in order to homogenise the material and break the false body effect to ensure good flow during the application. Excessive stirring should be avoided as this may cause increased solvent evaporation.

## Application guidelines

### Surface preparation

#### Carbon steel

Cleaning and degreasing. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. When the surface is dry, perform abrasive blasting to minimum Sa 2½ according to ISO 8501-1. In case oxidation has occurred between blasting and application of the primer, then the surface should be reblasted and primed. Under restrictions St3 steel can be accepted. Degrease and high pressure water wash the substrate, prior to the St3 cleaning. Special care shall be taken to avoid polishing of the surface. Power tools such as chipping hammers, needle guns and power rotary wire brushes will provide acceptable roughness for proper adhesion of the primer. It is not acceptable that any mill scale is present on the cleaned surface. For steel prepared to St3, use primer Knauf Firepaint primer K1. Afterwards apply Knauf Firepaint Steel and the possible topcoat as per the normal instructions. The St3 preparation is generally only recommended for repair of small areas.

#### Galvanised steel

Cleaning and degreasing. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. When surface is dry, perform either light abrasive sweep blasting to a uniform rough surface or roughen the surface by mechanical means. Afterwards, apply one coat of primer Knauf Firepaint Primer K2 at maximum DFT of 100 micron. After priming and before application of Knauf Firepaint Steel, remove oil and grease etc. with suitable detergent. Salt and other contaminants shall be removed by (high pressure) fresh water cleaning. Leave the surface drying for sufficient time to ensure full evaporation of water, prior to application of Knauf Firepaint Steel. Knauf must be consulted in all cases of doubt about the suitability for overcoating of the primer. Cases where Knauf should be consulted include (but not limited to): surface contamination, damages and defects, unknown primer preapplied, non-approved primer and exceeded dry film thickness of primer.



### Primers

Only Knauf-approved primers can be used in combination with Knauf Firepaint Steel. Knauf Firepaint Steel must under no circumstances be applied directly to the steel surface. Knauf Firepaint Steel shall be applied within the minimum and maximum overcoating intervals of the primer specified. Please consult the datasheet of the relevant primer. The maximum dry film thickness of the primer recommended by Knauf shall not be exceeded as this could influence the performance during a fire.

# STEEL STRUCTURES | STEEL BEAMS

## > H- or I-section beams | Resistance to fire period of 30 minutes

Section factor m <sup>-1</sup>	Thickness (mm) required - only intumescent coating				
	450°	500°	550°	600°	650°
58	0,220	0,220	0,220	0,220	0,220
60	0,220	0,220	0,220	0,220	0,220
65	0,220	0,220	0,220	0,220	0,220
70	0,220	0,220	0,220	0,220	0,220
75	0,220	0,220	0,220	0,220	0,220
80	0,220	0,220	0,220	0,220	0,220
85	0,220	0,220	0,220	0,220	0,220
90	0,220	0,220	0,220	0,220	0,220
95	0,220	0,220	0,220	0,220	0,220
100	0,220	0,220	0,220	0,220	0,220
105	0,239	0,220	0,220	0,220	0,220
110	0,257	0,220	0,220	0,220	0,220
115	0,275	0,220	0,220	0,220	0,220
120	0,294	0,220	0,220	0,220	0,220
125	0,312	0,220	0,220	0,220	0,220
130	0,330	0,220	0,220	0,220	0,220
135	0,349	0,220	0,220	0,220	0,220
140	0,367	0,220	0,220	0,220	0,220
145	0,385	0,227	0,220	0,220	0,220
150	0,404	0,247	0,220	0,220	0,220
155	0,422	0,267	0,220	0,220	0,220
160	0,440	0,288	0,220	0,220	0,220
165	0,459	0,308	0,220	0,220	0,220
170	0,477	0,328	0,220	0,220	0,220
175	0,495	0,348	0,220	0,220	0,220
180	0,514	0,369	0,220	0,220	0,220
185	0,532	0,389	0,220	0,220	0,220
190	0,550	0,409	0,220	0,220	0,220
195	0,569	0,430	0,220	0,220	0,220
200	0,587	0,450	0,220	0,220	0,220
205	0,605	0,470	0,220	0,220	0,220
210	0,624	0,491	0,221	0,220	0,220
215	0,642	0,511	0,248	0,220	0,220
220	0,660	0,531	0,276	0,220	0,220
225	0,679	0,552	0,303	0,220	0,220
230	0,697	0,572	0,330	0,220	0,220
235	0,715	0,592	0,357	0,220	0,220
240	0,734	0,613	0,385	0,220	0,220
245	0,752	0,633	0,412	0,220	0,220
250	0,770	0,653	0,439	0,220	0,220
255	0,789	0,673	0,467	0,220	0,220
260	0,807	0,694	0,494	0,220	0,220
265	0,825	0,714	0,521	0,249	0,220
270	0,844	0,734	0,549	0,287	0,220
275	0,862	0,755	0,576	0,326	0,220
280	0,880	0,775	0,603	0,364	0,220
285	0,899	0,795	0,631	0,402	0,232
290	0,917	0,816	0,658	0,440	0,277
295	0,935	0,836	0,685	0,478	0,322
300	0,955	0,856	0,713	0,517	0,368
305	0,978	0,877	0,740	0,555	0,413
310	1,000	0,897	0,767	0,593	0,458
315	1,022	0,917	0,795	0,631	0,503
320	1,045	0,938	0,822	0,670	0,549
325	1,067	0,958	0,849	0,708	0,594
330	1,089	0,978	0,876	0,746	0,639

> H- or I-section beams | Resistance to fire period of 45 minutes

Section factor m <sup>1</sup>	Thickness (mm) required - only intumescent coating				
	450°	500°	550°	600°	650°
58	0,246	0,220	0,220	0,220	0,220
60	0,255	0,220	0,220	0,220	0,220
65	0,278	0,220	0,220	0,220	0,220
70	0,301	0,234	0,220	0,220	0,220
75	0,324	0,253	0,220	0,220	0,220
80	0,347	0,271	0,220	0,220	0,220
85	0,370	0,290	0,225	0,220	0,220
90	0,393	0,308	0,243	0,220	0,220
95	0,416	0,327	0,261	0,220	0,220
100	0,440	0,345	0,278	0,220	0,220
105	0,463	0,364	0,296	0,220	0,220
110	0,486	0,382	0,314	0,236	0,220
115	0,509	0,401	0,332	0,254	0,220
120	0,532	0,419	0,349	0,273	0,220
125	0,555	0,438	0,367	0,291	0,220
130	0,578	0,456	0,385	0,309	0,220
135	0,601	0,475	0,402	0,328	0,220
140	0,624	0,493	0,420	0,346	0,220
145	0,647	0,512	0,438	0,364	0,220
150	0,670	0,530	0,456	0,382	0,228
155	0,693	0,549	0,473	0,401	0,250
160	0,716	0,567	0,491	0,419	0,272
165	0,739	0,586	0,509	0,437	0,294
170	0,762	0,604	0,526	0,456	0,316
175	0,786	0,623	0,544	0,474	0,338
180	0,809	0,641	0,562	0,492	0,360
185	0,832	0,660	0,580	0,511	0,382
190	0,855	0,678	0,597	0,529	0,404
195	0,878	0,697	0,615	0,547	0,426
200	0,901	0,715	0,633	0,566	0,448
205	0,924	0,734	0,650	0,584	0,470
210	0,948	0,752	0,668	0,602	0,493
215	0,980	0,771	0,686	0,620	0,515
220	1,012	0,789	0,704	0,639	0,537
225	1,044	0,808	0,721	0,657	0,559
230	1,077	0,826	0,739	0,675	0,581
235	1,109	0,845	0,757	0,694	0,603
240	1,141	0,863	0,774	0,712	0,625
245	1,173	0,882	0,792	0,730	0,647
250	1,205	0,900	0,810	0,749	0,669
255	1,237	0,919	0,828	0,767	0,691
260	1,269	0,937	0,845	0,785	0,713
265	1,301	0,962	0,863	0,803	0,735
270	1,334	0,989	0,881	0,822	0,757
275	1,366	1,017	0,898	0,840	0,779
280	1,398	1,045	0,916	0,858	0,801
285	1,430	1,072	0,934	0,877	0,823
290	1,462	1,100	0,953	0,895	0,845
295	1,494	1,128	0,976	0,913	0,867
300	1,526	1,156	0,998	0,932	0,889
305	1,558	1,183	1,020	0,950	0,911
310	1,591	1,211	1,042	0,970	0,933
315	1,623	1,239	1,064	0,990	0,954
320	1,655	1,266	1,087	1,010	0,974
325	1,687	1,294	1,109	1,030	0,993
330	1,719	1,322	1,131	1,050	1,013

› H- or I-section beams | Resistance to fire period of 60 minutes

Section factor m <sup>-1</sup>	Thickness (mm) required - only intumescent coating				
	450°	500°	550°	600°	650°
58	0,430	0,307	0,246	0,220	0,220
60	0,449	0,319	0,254	0,220	0,220
65	0,497	0,349	0,276	0,223	0,220
70	0,545	0,379	0,297	0,252	0,220
75	0,593	0,408	0,318	0,270	0,220
80	0,641	0,438	0,339	0,288	0,231
85	0,689	0,468	0,361	0,306	0,249
90	0,736	0,497	0,382	0,325	0,267
95	0,784	0,527	0,403	0,343	0,286
100	0,832	0,557	0,424	0,361	0,304
105	0,880	0,587	0,446	0,379	0,323
110	0,928	0,616	0,467	0,398	0,341
115	0,970	0,646	0,488	0,416	0,359
120	1,009	0,676	0,509	0,434	0,378
125	1,047	0,706	0,531	0,452	0,396
130	1,086	0,735	0,552	0,471	0,415
135	1,125	0,765	0,573	0,489	0,433
140	1,164	0,795	0,594	0,507	0,451
145	1,203	0,825	0,616	0,525	0,470
150	1,242	0,854	0,637	0,544	0,488
155	1,281	0,884	0,658	0,562	0,507
160	1,320	0,914	0,679	0,580	0,525
165	1,358	0,944	0,701	0,598	0,543
170	1,397	0,978	0,722	0,617	0,562
175	1,436	1,012	0,743	0,635	0,580
180	1,475	1,046	0,764	0,653	0,599
185	1,514	1,080	0,786	0,671	0,617
190	1,553	1,115	0,807	0,690	0,635
195	1,592	1,149	0,828	0,708	0,654
200	1,630	1,183	0,849	0,726	0,672
205	1,669	1,217	0,871	0,744	0,691
210	1,708	1,251	0,892	0,763	0,709
215	1,747	1,286	0,913	0,781	0,727
220	1,786	1,320	0,934	0,799	0,746
225	1,825	1,354	0,961	0,817	0,764
230	1,862	1,388	0,993	0,836	0,783
235	1,896	1,422	1,025	0,854	0,801
240	1,930	1,457	1,057	0,872	0,819
245	1,964	1,491	1,089	0,890	0,838
250	1,999	1,525	1,121	0,909	0,856
255	2,033	1,559	1,153	0,927	0,875
260	2,067	1,593	1,185	0,945	0,893
265	2,101	1,628	1,217	0,976	0,911
270	2,135	1,662	1,249	1,007	0,930
275	2,169	1,696	1,282	1,038	0,950
280	2,203	1,730	1,314	1,069	0,978
285	2,237	1,764	1,346	1,100	1,007
290	2,272	1,799	1,378	1,131	1,035
295	2,306	1,833	1,410	1,162	1,063
300	2,340	1,864	1,442	1,193	1,091
305	2,374	1,893	1,474	1,224	1,119
310	2,408	1,922	1,506	1,254	1,148
315	2,442	1,951	1,538	1,285	1,176
320	2,476	1,980	1,570	1,316	1,204
325	2,510	2,009	1,602	1,347	1,232
330	2,544	2,038	1,634	1,378	1,260

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› H- or I-section beams | Resistance to fire period of 90 minutes

Section factor m <sup>-1</sup>	Thickness (mm) required - only intumescent coating				
	450°	500°	550°	600°	650°
58	1,209	0,946	0,592	0,444	0,343
60	1,236	0,966	0,619	0,462	0,356
65	1,303	1,018	0,686	0,509	0,390
70	1,370	1,069	0,753	0,555	0,423
75	1,437	1,121	0,820	0,602	0,457
80	1,504	1,173	0,887	0,649	0,490
85	1,571	1,224	0,951	0,695	0,524
90	1,638	1,276	0,996	0,742	0,557
95	1,705	1,327	1,040	0,788	0,591
100	1,772	1,379	1,085	0,835	0,624
105	1,839	1,431	1,129	0,882	0,658
110	1,944	1,482	1,174	0,928	0,691
115	2,058	1,534	1,219	0,973	0,725
120	2,172	1,585	1,263	1,017	0,758
125	2,286	1,637	1,308	1,060	0,792
130	2,400	1,689	1,353	1,104	0,825
135	2,514	1,740	1,397	1,148	0,859
140	2,628	1,792	1,442	1,191	0,892
145	2,742	1,843	1,486	1,235	0,926
150	2,856	1,923	1,531	1,279	0,965
155	2,970	2,007	1,576	1,322	1,012
160	3,084	2,092	1,620	1,366	1,059
165	3,198	2,176	1,665	1,410	1,106
170	-	2,345	1,709	1,453	1,152
175	-	2,430	1,754	1,497	1,199
180	-	2,514	1,799	1,541	1,246
185	-	2,599	1,843	1,584	1,293
190	-	2,683	1,905	1,628	1,339
195	-	2,767	1,971	1,672	1,386
200	-	2,852	2,037	1,715	1,433
205	-	2,936	2,103	1,759	1,480
210	-	3,021	2,169	1,803	1,526
215	-	3,105	2,234	1,846	1,573
220	-	3,190	2,300	1,896	1,620
225	-	-	2,366	1,945	1,666
230	-	-	2,432	1,995	1,713
235	-	-	2,497	2,045	1,760
240	-	-	2,563	2,095	1,807
245	-	-	2,629	2,145	1,853
250	-	-	2,695	2,194	1,891
255	-	-	2,760	2,244	1,929
260	-	-	2,826	2,294	1,967
265	-	-	2,892	2,344	2,005
270	-	-	2,958	2,394	2,044
275	-	-	3,083	2,443	2,082
280	-	-	3,288	2,493	2,120
285	-	-	3,492	2,543	2,158
290	-	-	3,697	2,593	2,196
295	-	-	3,901	2,643	2,234
300	-	-	-	2,692	2,272
305	-	-	-	2,742	2,310
310	-	-	-	2,792	2,349
315	-	-	-	2,842	2,387
320	-	-	-	2,892	2,425
325	-	-	-	2,941	2,463
330	-	-	-	2,991	2,501

> H- or I-section beams | Resistance to fire period of 120 minutes

Section factor m <sup>-1</sup>	Thickness (mm) required - only intumescent coating				
	450°	500°	550°	600°	650°
58	1,847	1,467	1,222	1,057	0,804
60	1,956	1,500	1,249	1,082	0,842
65	2,248	1,584	1,318	1,144	0,936
70	2,539	1,667	1,386	1,206	0,998
75	2,830	1,750	1,454	1,268	1,057
80	3,121	1,834	1,523	1,330	1,116
85	-	2,019	1,591	1,392	1,175
90	-	2,230	1,659	1,454	1,234
95	-	2,441	1,728	1,516	1,292
100	-	2,652	1,796	1,578	1,351
105	-	2,863	1,882	1,640	1,410
110	-	3,074	2,045	1,702	1,469
115	-	-	2,207	1,764	1,528
120	-	-	2,369	1,826	1,587
125	-	-	2,531	1,921	1,645
130	-	-	2,693	2,040	1,704
135	-	-	2,855	2,158	1,763
140	-	-	3,017	2,276	1,822
145	-	-	3,180	2,394	1,899
150	-	-	-	2,512	1,993
155	-	-	-	2,630	2,087
160	-	-	-	2,748	2,182
165	-	-	-	2,867	2,276
170	-	-	-	2,985	2,370
175	-	-	-	3,103	2,465
180	-	-	-	3,221	2,559
185	-	-	-	-	2,653
190	-	-	-	-	2,748
195	-	-	-	-	2,842
200	-	-	-	-	2,936
205	-	-	-	-	3,031
210	-	-	-	-	3,125
215	-	-	-	-	3,219
220	-	-	-	-	-
225	-	-	-	-	-
230	-	-	-	-	-

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# STEEL STRUCTURES | STEEL COLUMNS

## > H- or I-section columns | Resistance to fire period of 30 minutes

Section factor m <sup>-1</sup>	Thickness (mm) required - only intumescent coating				
	450°	500°	550°	600°	650°
60	0,221	0,221	0,221	0,221	0,221
65	0,221	0,221	0,221	0,221	0,221
70	0,221	0,221	0,221	0,221	0,221
75	0,221	0,221	0,221	0,221	0,221
80	0,221	0,221	0,221	0,221	0,221
85	0,221	0,221	0,221	0,221	0,221
90	0,221	0,221	0,221	0,221	0,221
95	0,221	0,221	0,221	0,221	0,221
100	0,221	0,221	0,221	0,221	0,221
105	0,221	0,221	0,221	0,221	0,221
110	0,222	0,221	0,221	0,221	0,221
115	0,251	0,221	0,221	0,221	0,221
120	0,280	0,221	0,221	0,221	0,221
125	0,310	0,221	0,221	0,221	0,221
130	0,339	0,221	0,221	0,221	0,221
135	0,369	0,223	0,221	0,221	0,221
140	0,398	0,242	0,221	0,221	0,221
145	0,427	0,261	0,221	0,221	0,221
150	0,450	0,280	0,221	0,221	0,221
155	0,474	0,299	0,221	0,221	0,221
160	0,498	0,317	0,221	0,221	0,221
165	0,521	0,336	0,226	0,221	0,221
170	0,545	0,355	0,240	0,221	0,221
175	0,569	0,374	0,254	0,221	0,221
180	0,593	0,393	0,268	0,221	0,221
185	0,616	0,412	0,281	0,221	0,221
190	0,640	0,434	0,295	0,221	0,221
195	0,664	0,462	0,309	0,221	0,221
200	0,687	0,490	0,322	0,221	0,221
205	0,711	0,518	0,336	0,228	0,221
210	0,735	0,546	0,350	0,247	0,221
215	0,758	0,574	0,363	0,266	0,221
220	0,782	0,601	0,377	0,285	0,221
225	0,806	0,629	0,391	0,304	0,221
230	0,830	0,657	0,405	0,323	0,221
235	0,853	0,685	0,418	0,342	0,221
240	0,877	0,713	0,446	0,361	0,221
245	0,901	0,740	0,482	0,380	0,221
250	0,924	0,768	0,518	0,398	0,221
255	0,948	0,796	0,555	0,417	0,221
260	0,972	0,824	0,591	0,449	0,231
265	0,996	0,852	0,627	0,487	0,334
270	1,019	0,880	0,663	0,524	0,429
275	1,043	0,907	0,699	0,562	0,467
280	1,067	0,935	0,735	0,599	0,505
285	1,090	0,963	0,771	0,637	0,544
290	1,114	0,991	0,807	0,675	0,582
295	1,177	1,019	0,844	0,712	0,621
300	1,314	1,046	0,880	0,750	0,659
305	1,452	1,074	0,916	0,787	0,698
310	1,590	1,102	0,952	0,825	0,736
315	1,728	1,130	0,988	0,862	0,775
320	1,866	1,284	1,024	0,900	0,813
325	2,004	1,437	1,060	0,937	0,851
330	2,142	1,590	1,096	0,975	0,890
335	2,280	1,743	1,144	1,012	0,928
340	2,418	1,896	1,332	1,050	0,967
345	2,473	1,957	1,408	1,065	0,982

› H- or I-section columns | Resistance to fire period of 45 minutes

Section factor m <sup>-1</sup>	Thickness (mm) required - only intumescent coating				
	450°	500°	550°	600°	650°
60	0,224	0,221	0,221	0,221	0,221
65	0,224	0,221	0,221	0,221	0,221
70	0,224	0,221	0,221	0,221	0,221
75	0,283	0,221	0,221	0,221	0,221
80	0,357	0,221	0,221	0,221	0,221
85	0,426	0,225	0,221	0,221	0,221
90	0,456	0,278	0,221	0,221	0,221
95	0,486	0,332	0,221	0,221	0,221
100	0,516	0,385	0,232	0,221	0,221
105	0,546	0,430	0,268	0,221	0,221
110	0,576	0,455	0,303	0,221	0,221
115	0,606	0,479	0,339	0,241	0,221
120	0,636	0,504	0,375	0,267	0,221
125	0,666	0,529	0,410	0,292	0,221
130	0,696	0,553	0,438	0,318	0,223
135	0,726	0,578	0,461	0,343	0,245
140	0,756	0,602	0,485	0,369	0,266
145	0,786	0,627	0,508	0,394	0,288
150	0,816	0,651	0,531	0,420	0,309
155	0,846	0,676	0,555	0,444	0,331
160	0,876	0,700	0,578	0,468	0,352
165	0,906	0,725	0,602	0,492	0,374
170	0,936	0,750	0,625	0,516	0,395
175	0,966	0,774	0,648	0,540	0,417
180	0,997	0,799	0,672	0,565	0,442
185	1,027	0,823	0,695	0,589	0,469
190	1,057	0,848	0,718	0,613	0,495
195	1,087	0,872	0,742	0,637	0,522
200	1,117	0,897	0,765	0,661	0,548
205	1,174	0,922	0,789	0,685	0,575
210	1,252	0,946	0,812	0,709	0,601
215	1,331	0,971	0,835	0,733	0,628
220	1,409	0,995	0,859	0,757	0,654
225	1,488	1,020	0,882	0,781	0,681
230	1,567	1,044	0,905	0,805	0,707
235	1,645	1,069	0,929	0,830	0,734
240	1,724	1,093	0,952	0,854	0,760
245	1,802	1,118	0,975	0,878	0,787
250	1,881	1,189	0,999	0,902	0,813
255	1,960	1,301	1,022	0,926	0,840
260	2,038	1,414	1,046	0,950	0,866
265	2,117	1,527	1,069	0,974	0,893
270	2,195	1,640	1,092	0,998	0,920
275	2,274	1,753	1,116	1,022	0,946
280	2,353	1,866	1,192	1,046	0,973
285	2,431	1,978	1,351	1,070	0,999
290	2,533	2,091	1,509	1,095	1,026
295	2,652	2,204	1,667	1,119	1,052
300	2,771	2,317	1,826	1,241	1,079
305	2,890	2,430	1,984	1,449	1,105
310	3,010	2,552	2,142	1,656	1,149
315	3,129	2,679	2,300	1,864	1,406
320	3,248	2,806	2,459	2,072	1,662
325	3,367	2,932	2,590	2,279	1,919
330	3,486	3,059	2,720	2,479	2,176
335	3,606	3,186	2,850	2,613	2,433
340	3,725	3,313	2,980	2,746	2,574
345	3,773	3,363	3,032	2,799	2,624

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› H- or I-section columns | Resistance to fire period of 60 minutes

Section factor m <sup>1</sup>	Thickness (mm) required - only intumescent coating				
	450°	500°	550°	600°	650°
60	0,535	0,413	0,224	0,221	0,221
65	0,535	0,413	0,224	0,221	0,221
70	0,535	0,413	0,224	0,221	0,221
75	0,575	0,447	0,281	0,221	0,221
80	0,624	0,482	0,351	0,233	0,221
85	0,674	0,516	0,421	0,290	0,221
90	0,724	0,550	0,450	0,347	0,221
95	0,773	0,585	0,478	0,405	0,264
100	0,823	0,619	0,506	0,440	0,313
105	0,872	0,653	0,533	0,464	0,363
110	0,922	0,687	0,561	0,488	0,413
115	0,972	0,722	0,589	0,513	0,441
120	1,021	0,756	0,616	0,537	0,465
125	1,071	0,790	0,644	0,561	0,488
130	1,121	0,825	0,672	0,586	0,511
135	1,176	0,859	0,699	0,610	0,534
140	1,234	0,893	0,727	0,634	0,557
145	1,291	0,927	0,755	0,658	0,580
150	1,348	0,962	0,782	0,683	0,603
155	1,405	0,996	0,810	0,707	0,626
160	1,462	1,030	0,838	0,731	0,650
165	1,520	1,065	0,865	0,756	0,673
170	1,577	1,099	0,893	0,780	0,696
175	1,634	1,137	0,921	0,804	0,719
180	1,691	1,209	0,948	0,829	0,742
185	1,748	1,280	0,976	0,853	0,765
190	1,806	1,352	1,004	0,877	0,788
195	1,863	1,423	1,031	0,902	0,811
200	1,920	1,495	1,059	0,926	0,834
205	1,977	1,567	1,087	0,950	0,858
210	2,035	1,638	1,114	0,974	0,881
215	2,092	1,710	1,172	0,999	0,904
220	2,149	1,782	1,268	1,023	0,927
225	2,206	1,853	1,365	1,047	0,950
230	2,263	1,925	1,461	1,072	0,973
235	2,321	1,996	1,557	1,096	0,996
240	2,378	2,068	1,653	1,120	1,019
245	2,435	2,140	1,750	1,211	1,042
250	2,519	2,211	1,846	1,344	1,066
255	2,632	2,283	1,942	1,477	1,089
260	2,746	2,355	2,039	1,610	1,112
265	2,860	2,426	2,135	1,743	1,172
270	2,973	2,518	2,231	1,876	1,363
275	3,087	2,635	2,327	2,009	1,555
280	3,201	2,751	2,424	2,143	1,746
285	3,314	2,868	2,532	2,276	1,937
290	3,428	2,984	2,650	2,409	2,129
295	3,542	3,101	2,767	2,534	2,320
300	3,655	3,217	2,885	2,653	2,492
305	3,769	3,334	3,002	2,772	2,601
310	3,901	3,450	3,120	2,891	2,711
315	4,177	3,567	3,237	3,010	2,821
320	4,454	3,683	3,355	3,129	2,931
325	4,730	3,800	3,472	3,248	3,040
330	5,006	4,010	3,590	3,367	3,150
335	-	4,364	3,707	3,487	3,260
340	-	4,718	3,825	3,606	3,369
345	-	4,859	3,877	3,653	3,413

› H- or I-section columns | Resistance to fire period of 90 minutes

Section factor m <sup>-1</sup>	Thickness (mm) required - only intumescent coating				
	450°	500°	550°	600°	650°
60	1,459	0,889	0,659	0,562	0,480
65	1,459	0,889	0,659	0,562	0,480
70	1,459	0,889	0,659	0,562	0,480
75	1,586	0,959	0,707	0,599	0,512
80	1,745	1,045	0,767	0,646	0,551
85	1,903	1,132	0,827	0,693	0,591
90	2,062	1,230	0,887	0,740	0,630
95	2,221	1,329	0,947	0,786	0,670
100	2,380	1,427	1,007	0,833	0,709
105	2,506	1,525	1,067	0,880	0,749
110	2,594	1,623	1,127	0,927	0,788
115	2,682	1,721	1,186	0,974	0,828
120	2,770	1,819	1,246	1,021	0,867
125	2,858	1,917	1,305	1,068	0,906
130	2,946	2,016	1,365	1,114	0,946
135	3,034	2,114	1,424	1,172	0,985
140	3,122	2,212	1,484	1,235	1,025
145	3,210	2,310	1,543	1,297	1,064
150	3,298	2,408	1,603	1,360	1,104
155	3,386	2,506	1,663	1,423	1,154
160	3,474	2,604	1,722	1,486	1,227
165	3,562	2,702	1,782	1,548	1,300
170	3,650	2,800	1,841	1,611	1,373
175	3,738	2,898	1,901	1,674	1,446
180	3,826	2,996	1,960	1,736	1,519
185	4,041	3,094	2,020	1,799	1,591
190	4,386	3,192	2,079	1,862	1,664
195	4,731	3,290	2,139	1,925	1,737
200	5,075	3,388	2,198	1,987	1,810
205	-	3,486	2,258	2,050	1,883
210	-	3,583	2,317	2,113	1,955
215	-	3,681	2,377	2,175	2,028
220	-	3,779	2,436	2,238	2,101
225	-	3,896	2,560	2,301	2,174
230	-	4,247	2,745	2,364	2,247
235	-	4,597	2,930	2,426	2,320
240	-	4,948	3,115	2,519	2,392
245	-	-	3,299	2,660	2,465
250	-	-	3,484	2,802	2,577
255	-	-	3,669	2,944	2,688
260	-	-	3,854	3,086	2,800
265	-	-	4,165	3,228	2,911
270	-	-	4,489	3,369	3,023
275	-	-	4,812	3,511	3,134
280	-	-	5,135	3,653	3,246
285	-	-	-	3,795	3,357
290	-	-	-	3,966	3,469
295	-	-	-	4,170	3,580
300	-	-	-	4,374	3,692
305	-	-	-	4,578	3,803
310	-	-	-	4,781	4,101
315	-	-	-	4,985	4,673
320	-	-	-	-	-
325	-	-	-	-	-
330	-	-	-	-	-
335	-	-	-	-	-
340	-	-	-	-	-
345	-	-	-	-	-

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> H- or I-section columns | Resistance to fire period of 120 minutes

Section factor m <sup>-1</sup>	Thickness (mm) required - only intumescent coating				
	450°	500°	550°	600°	650°
60	2,960	2,220	1,473	1,081	0,866
65	2,960	2,220	1,473	1,081	0,866
70	2,960	2,220	1,473	1,081	0,866
75	3,108	2,399	1,613	1,177	0,933
80	3,292	2,562	1,789	1,318	1,017
85	3,476	2,698	1,965	1,459	1,102
90	3,661	2,835	2,140	1,599	1,211
95	3,845	2,971	2,316	1,740	1,333
100	4,000	3,108	2,483	1,881	1,456
105	4,150	3,244	2,599	2,022	1,578
110	4,300	3,381	2,715	2,163	1,700
115	4,449	3,518	2,831	2,304	1,822
120	4,599	3,654	2,947	2,445	1,945
125	4,749	3,791	3,062	2,552	2,067
130	4,899	3,957	3,178	2,653	2,189
135	5,049	4,164	3,294	2,754	2,311
140	-	4,370	3,410	2,856	2,434
145	-	4,577	3,526	2,957	2,537
150	-	4,784	3,642	3,058	2,634
155	-	4,991	3,758	3,160	2,730
160	-	-	3,882	3,261	2,827
165	-	-	4,231	3,362	2,924
170	-	-	4,579	3,463	3,020
175	-	-	4,927	3,565	3,117
180	-	-	-	3,666	3,214
185	-	-	-	3,767	3,310
190	-	-	-	3,869	3,407
195	-	-	-	4,708	3,504
200	-	-	-	-	3,601
205	-	-	-	-	3,697
210	-	-	-	-	3,794
215	-	-	-	-	-
220	-	-	-	-	-
225	-	-	-	-	-
230	-	-	-	-	-

› Circular hollow section columns | Resistance to fire period of 30 minutes

Section factor m <sup>-1</sup>	Thickness (mm) required - only intumescent coating				
	450°	500°	550°	600°	650°
45	0,256	0,256	0,256	0,256	0,256
50	0,256	0,256	0,256	0,256	0,256
55	0,256	0,256	0,256	0,256	0,256
60	0,343	0,256	0,256	0,256	0,256
65	0,440	0,256	0,256	0,256	0,256
70	0,533	0,277	0,256	0,256	0,256
75	0,622	0,359	0,256	0,256	0,256
80	0,708	0,439	0,259	0,256	0,256
85	0,791	0,515	0,332	0,256	0,256
90	0,871	0,589	0,403	0,256	0,256
95	0,949	0,661	0,471	0,312	0,256
100	1,024	0,730	0,538	0,376	0,256
105	1,096	0,796	0,602	0,437	0,258
110	1,166	0,861	0,663	0,497	0,315
115	1,233	0,924	0,723	0,555	0,370
120	1,299	0,984	0,782	0,611	0,423
125	1,362	1,043	0,838	0,665	0,475
130	1,424	1,100	0,893	0,718	0,525
135	1,483	1,155	0,946	0,769	0,574
140	1,541	1,209	0,997	0,819	0,621
145	1,597	1,261	1,047	0,867	0,667
150	1,652	1,312	1,096	0,914	0,711
155	1,705	1,361	1,143	0,960	0,755
160	1,756	1,409	1,189	1,004	0,797
165	1,806	1,455	1,234	1,048	0,838
170	1,855	1,500	1,277	1,090	0,878
175	1,902	1,544	1,320	1,131	0,917
180	1,948	1,587	1,361	1,171	0,955
185	1,993	1,629	1,401	1,210	0,992
190	2,037	1,670	1,440	1,248	1,029
195	2,079	1,709	1,479	1,285	1,064
200	2,121	1,748	1,516	1,321	1,098
205	2,161	1,785	1,552	1,356	1,132
210	2,201	1,822	1,588	1,390	1,165
215	2,239	1,858	1,622	1,424	1,197
220	2,277	1,893	1,656	1,457	1,228
225	2,314	1,927	1,689	1,489	1,258
230	2,349	1,961	1,721	1,520	1,288
235	2,384	1,993	1,753	1,551	1,317
240	2,418	2,025	1,784	1,580	1,346
245	2,452	2,056	1,814	1,610	1,374
250	2,484	2,087	1,843	1,638	1,401
255	2,516	2,117	1,872	1,666	1,428
260	2,548	2,146	1,900	1,694	1,454
265	2,578	2,174	1,928	1,720	1,479
270	2,608	2,202	1,955	1,747	1,504
275	2,637	2,230	1,981	1,772	1,529
280	2,666	2,256	2,007	1,798	1,553
285	2,694	2,283	2,032	1,822	1,577
290	2,721	2,308	2,057	1,846	1,600
295	2,748	2,333	2,082	1,870	1,622
300	2,775	2,358	2,106	1,893	1,645
305	2,800	2,382	2,129	1,916	1,666
310	2,826	2,406	2,152	1,938	1,688
315	2,850	2,429	2,174	1,960	1,709
320	2,875	2,452	2,196	1,982	1,729
325	2,899	2,474	2,218	2,003	1,749
330	2,922	2,496	2,239	2,023	1,769
335	2,945	2,518	2,260	2,044	1,788
340	2,967	2,539	2,281	2,064	1,807
345	2,990	2,559	2,301	2,083	1,826
350	3,011	2,580	2,320	2,102	1,845
355	3,033	2,600	2,340	2,121	1,863

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› Circular hollow section columns | Resistance to fire period of 45 minutes

Section factor m <sup>-1</sup>	Thickness (mm) required - only intumescent coating				
	450°	500°	550°	600°	650°
45	0,621	0,360	0,256	0,256	0,256
50	0,783	0,508	0,328	0,256	0,256
55	0,937	0,651	0,464	0,308	0,256
60	1,086	0,788	0,595	0,434	0,258
65	1,229	0,920	0,721	0,555	0,374
70	1,366	1,046	0,843	0,673	0,485
75	1,499	1,169	0,960	0,786	0,592
80	1,626	1,287	1,073	0,895	0,696
85	1,749	1,401	1,182	1,000	0,796
90	1,868	1,510	1,288	1,102	0,892
95	1,983	1,616	1,390	1,200	0,986
100	2,093	1,719	1,488	1,295	1,076
105	2,200	1,818	1,584	1,388	1,164
110	2,304	1,914	1,676	1,477	1,249
115	2,404	2,007	1,765	1,563	1,331
120	2,501	2,097	1,852	1,647	1,411
125	2,595	2,184	1,936	1,729	1,489
130	2,686	2,269	2,017	1,807	1,564
135	2,774	2,351	2,097	1,884	1,637
140	2,860	2,431	2,173	1,958	1,708
145	2,943	2,508	2,248	2,031	1,777
150	3,024	2,583	2,320	2,101	1,844
155	3,102	2,656	2,391	2,169	1,909
160	3,178	2,727	2,459	2,236	1,972
165	3,252	2,796	2,526	2,300	2,034
170	3,324	2,863	2,591	2,363	2,094
175	3,394	2,929	2,654	2,425	2,153
180	3,463	2,992	2,715	2,484	2,210
185	3,529	3,054	2,775	2,543	2,265
190	3,594	3,115	2,834	2,599	2,319
195	3,657	3,173	2,891	2,655	2,372
200	3,718	3,231	2,946	2,709	2,424
205	3,778	3,287	3,000	2,761	2,474
210	3,836	3,341	3,053	2,813	2,523
215	3,893	3,395	3,105	2,863	2,571
220	3,949	3,447	3,155	2,912	2,618
225	4,003	3,497	3,204	2,960	2,664
230	4,056	3,547	3,252	3,007	2,709
235	4,108	3,596	3,299	3,052	2,753
240	4,159	3,643	3,345	3,097	2,795
245	4,208	3,689	3,390	3,141	2,837
250	4,256	3,734	3,434	3,184	2,878
255	4,304	3,779	3,477	3,225	2,918
260	4,350	3,822	3,519	3,266	2,958
265	4,395	3,864	3,560	3,306	2,996
270	4,439	3,906	3,600	3,346	3,033
275	4,483	3,946	3,639	3,384	3,070
280	4,525	3,986	3,678	3,422	3,106
285	4,566	4,025	3,716	3,458	3,142
290	4,607	4,063	3,753	3,495	3,176
295	4,647	4,100	3,789	3,530	3,210
300	4,686	4,137	3,825	3,565	3,244
305	4,724	4,173	3,859	3,599	3,276
310	4,762	4,208	3,894	3,632	3,308
315	4,798	4,243	3,927	3,665	3,340
320	4,834	4,276	3,960	3,697	3,370
325	4,870	4,310	3,992	3,728	3,401
330	4,904	4,342	4,024	3,759	3,430
335	4,938	4,374	4,055	3,790	3,459
340	4,972	4,405	4,086	3,819	3,488
345	5,004	4,436	4,115	3,849	3,516
350	5,036	4,466	4,145	3,877	3,544
355	5,068	4,496	4,174	3,906	3,571

> Circular hollow section columns | Resistance to fire period of 60 minutes

Section factor m <sup>-1</sup>	Thickness (mm) required - only intumescent coating				
	450°	500°	550°	600°	650°
45	1,213	0,905	0,709	0,545	0,365
50	1,427	1,102	0,897	0,726	0,537
55	1,632	1,291	1,078	0,901	0,702
60	1,829	1,473	1,252	1,069	0,862
65	2,018	1,648	1,420	1,230	1,016
70	2,200	1,816	1,582	1,386	1,164
75	2,375	1,978	1,737	1,537	1,307
80	2,544	2,135	1,888	1,682	1,445
85	2,707	2,286	2,033	1,822	1,578
90	2,865	2,432	2,173	1,958	1,707
95	3,016	2,572	2,308	2,089	1,832
100	3,163	2,708	2,439	2,215	1,953
105	3,305	2,840	2,566	2,338	2,070
110	3,442	2,967	2,688	2,457	2,183
115	3,575	3,091	2,807	2,572	2,293
120	3,703	3,210	2,922	2,684	2,399
125	3,827	3,326	3,034	2,792	2,502
130	3,948	3,438	3,142	2,897	2,603
135	4,065	3,547	3,247	2,999	2,700
140	4,178	3,653	3,349	3,098	2,794
145	4,288	3,755	3,448	3,194	2,886
150	4,395	3,855	3,545	3,288	2,976
155	4,499	3,952	3,638	3,379	3,063
160	4,600	4,046	3,729	3,467	3,147
165	4,698	4,137	3,818	3,553	3,230
170	4,794	4,226	3,904	3,637	3,310
175	4,886	4,313	3,988	3,719	3,388
180	4,977	4,397	4,070	3,798	3,464
185	5,065	4,480	4,149	3,876	3,538
190	5,150	4,560	4,227	3,951	3,610
195	5,234	4,638	4,302	4,025	3,681
200	-	4,714	4,376	4,097	3,750
205	-	4,788	4,448	4,167	3,817
210	-	4,861	4,518	4,235	3,882
215	-	4,931	4,587	4,302	3,946
220	-	5,000	4,654	4,367	4,009
225	-	5,068	4,719	4,431	4,070
230	-	5,133	4,783	4,493	4,130
235	-	5,198	4,845	4,554	4,188
240	-	-	4,906	4,614	4,245
245	-	-	4,966	4,672	4,301
250	-	-	5,024	4,729	4,355
255	-	-	5,081	4,784	4,409
260	-	-	5,137	4,839	4,461
265	-	-	5,192	4,892	4,512
270	-	-	5,245	4,944	4,562
275	-	-	-	4,996	4,612
280	-	-	-	5,046	4,660
285	-	-	-	5,095	4,707
290	-	-	-	5,143	4,753
295	-	-	-	5,190	4,798
300	-	-	-	5,236	4,843
305	-	-	-	-	4,886
310	-	-	-	-	4,929
315	-	-	-	-	4,971
320	-	-	-	-	5,012
325	-	-	-	-	5,052
330	-	-	-	-	5,092
335	-	-	-	-	5,130
340	-	-	-	-	5,169
345	-	-	-	-	5,206
350	-	-	-	-	5,243
355	-	-	-	-	-

6

› **Circular hollow section columns | Resistance to fire period of 90 minutes**

Section factor m <sup>-1</sup>	Thickness (mm) required - only intumescent coating				
	450°	500°	550°	600°	650°
45	2,397	1,996	1,754	1,553	1,323
50	2,715	2,290	2,036	1,825	1,581
55	3,021	2,572	2,306	2,086	1,830
60	3,314	2,843	2,567	2,338	2,069
65	3,596	3,104	2,817	2,580	2,299
70	3,868	3,356	3,059	2,814	2,522
75	4,129	3,598	3,292	3,039	2,736
80	4,381	3,831	3,516	3,256	2,943
85	4,624	4,057	3,733	3,466	3,144
90	4,858	4,274	3,942	3,669	3,337
95	5,084	4,484	4,145	3,865	3,524
100	-	4,687	4,341	4,055	3,705
105	-	4,883	4,530	4,239	3,881
110	-	5,074	4,713	4,417	4,051
115	-	-	4,891	4,589	4,215
120	-	-	5,063	4,757	4,375
125	-	-	5,230	4,919	4,530
130	-	-	-	5,076	4,680
135	-	-	-	5,229	4,826
140	-	-	-	-	4,968
145	-	-	-	-	5,106
150	-	-	-	-	5,240
155	-	-	-	-	-
160	-	-	-	-	-
165	-	-	-	-	-
170	-	-	-	-	-

> **Circular hollow section columns | Resistance to fire period of 120 minutes**

Section factor m <sup>-1</sup>	Thickness (mm) required - only intumescent coating				
	450°	500°	550°	600°	650°
45	3,581	3,087	2,799	2,562	2,282
50	4,004	3,478	3,174	2,924	2,626
55	4,410	3,853	3,534	3,272	2,957
60	4,799	4,214	3,881	3,607	3,276
65	5,174	4,561	4,214	3,930	3,583
70	-	4,895	4,536	4,241	3,880
75	-	5,217	4,846	4,541	4,166
80	-	-	5,145	4,831	4,442
85	-	-	-	5,111	4,709
90	-	-	-	-	4,967
95	-	-	-	-	5,216
100	-	-	-	-	-
105	-	-	-	-	-
110	-	-	-	-	-
115	-	-	-	-	-
120	-	-	-	-	-



› Rectangular hollow section columns | Resistance to fire period of 30 minutes

Section factor m <sup>1</sup>	Thickness (mm) required - only intumescent coating				
	450°	500°	550°	600°	650°
50	0,230	0,230	0,230	0,230	0,230
55	0,230	0,230	0,230	0,230	0,230
60	0,230	0,230	0,230	0,230	0,230
65	0,230	0,230	0,230	0,230	0,230
70	0,230	0,230	0,230	0,230	0,230
75	0,230	0,230	0,230	0,230	0,230
80	0,230	0,230	0,230	0,230	0,230
85	0,230	0,230	0,230	0,230	0,230
90	0,302	0,230	0,230	0,230	0,230
95	0,380	0,230	0,230	0,230	0,230
100	0,456	0,230	0,230	0,230	0,230
105	0,529	0,255	0,230	0,230	0,230
110	0,602	0,320	0,230	0,230	0,230
115	0,672	0,384	0,230	0,230	0,230
120	0,741	0,446	0,230	0,230	0,230
125	0,808	0,507	0,282	0,230	0,230
130	0,873	0,567	0,337	0,230	0,230
135	0,937	0,626	0,391	0,230	0,230
140	1,000	0,683	0,445	0,230	0,230
145	1,061	0,739	0,497	0,265	0,230
150	1,121	0,794	0,548	0,311	0,230
155	1,180	0,847	0,598	0,358	0,230
160	1,237	0,900	0,647	0,403	0,230
165	1,293	0,951	0,695	0,447	0,230
170	1,348	1,002	0,742	0,491	0,254
175	1,402	1,052	0,788	0,534	0,293
180	1,455	1,100	0,834	0,576	0,332
185	1,506	1,148	0,878	0,617	0,370
190	1,557	1,195	0,922	0,658	0,407
195	1,606	1,240	0,965	0,698	0,444
200	1,655	1,285	1,008	0,737	0,480
205	1,703	1,330	1,049	0,775	0,515
210	1,749	1,373	1,090	0,813	0,550
215	1,795	1,415	1,130	0,851	0,585
220	1,840	1,457	1,169	0,887	0,619
225	1,884	1,498	1,208	0,923	0,652
230	1,927	1,539	1,246	0,959	0,685
235	1,970	1,578	1,284	0,994	0,717
240	2,012	1,617	1,320	1,028	0,749
245	2,052	1,655	1,357	1,062	0,780
250	2,093	1,693	1,392	1,096	0,811
255	2,132	1,730	1,427	1,128	0,841
260	2,171	1,766	1,462	1,161	0,871
265	2,209	1,802	1,496	1,192	0,901
270	2,246	1,837	1,529	1,224	0,930
275	2,283	1,872	1,562	1,255	0,959
280	2,319	1,906	1,594	1,285	0,987
285	2,355	1,939	1,626	1,315	1,015
290	2,390	1,972	1,658	1,344	1,042
295	2,424	2,004	1,688	1,373	1,069
300	2,458	2,036	1,719	1,402	1,096
305	2,491	2,067	1,749	1,430	1,122
310	2,524	2,098	1,778	1,458	1,148
315	2,556	2,129	1,807	1,486	1,174
320	2,588	2,159	1,836	1,513	1,199
325	2,619	2,188	1,864	1,539	1,224
330	2,650	2,217	1,892	1,566	1,248
335	2,680	2,246	1,920	1,592	1,273
340	2,709	2,274	1,947	1,617	1,297
345	2,739	2,302	1,973	1,642	1,320
350	2,768	2,329	2,000	1,667	1,343
355	2,796	2,356	2,025	1,692	1,366
360	2,824	2,383	2,051	1,716	1,389

› Rectangular hollow section columns | Resistance to fire period of 45 minutes

Section factor m <sup>-1</sup>	Thickness (mm) required - only intumescent coating				
	450°	500°	550°	600°	650°
45	0,230	0,230	0,230	0,230	0,230
50	0,230	0,230	0,230	0,230	0,230
55	0,360	0,230	0,230	0,230	0,230
60	0,490	0,232	0,230	0,230	0,230
65	0,617	0,346	0,230	0,230	0,230
70	0,740	0,457	0,251	0,230	0,230
75	0,860	0,566	0,352	0,230	0,230
80	0,976	0,672	0,451	0,239	0,230
85	1,090	0,776	0,547	0,328	0,230
90	1,201	0,877	0,641	0,415	0,230
95	1,310	0,976	0,733	0,501	0,283
100	1,415	1,073	0,824	0,584	0,360
105	1,518	1,168	0,912	0,666	0,435
110	1,619	1,260	0,999	0,746	0,509
115	1,717	1,350	1,083	0,825	0,582
120	1,813	1,439	1,166	0,902	0,653
125	1,907	1,525	1,247	0,978	0,723
130	1,998	1,610	1,327	1,052	0,791
135	2,088	1,693	1,405	1,125	0,859
140	2,176	1,774	1,482	1,196	0,925
145	2,261	1,853	1,557	1,266	0,990
150	2,345	1,931	1,630	1,335	1,054
155	2,427	2,007	1,702	1,402	1,117
160	2,507	2,082	1,773	1,469	1,178
165	2,586	2,155	1,843	1,534	1,239
170	2,663	2,227	1,911	1,598	1,299
175	2,738	2,298	1,978	1,661	1,357
180	2,812	2,367	2,043	1,722	1,415
185	2,884	2,434	2,108	1,783	1,472
190	2,955	2,501	2,171	1,843	1,527
195	3,025	2,566	2,233	1,901	1,582
200	3,093	2,630	2,294	1,959	1,636
205	3,160	2,693	2,354	2,016	1,689
210	3,225	2,754	2,413	2,071	1,741
215	3,289	2,815	2,471	2,126	1,793
220	3,352	2,874	2,528	2,180	1,843
225	3,414	2,933	2,584	2,233	1,893
230	3,475	2,990	2,639	2,285	1,942
235	3,535	3,047	2,693	2,337	1,991
240	3,593	3,102	2,747	2,387	2,038
245	3,651	3,157	2,799	2,437	2,085
250	3,707	3,210	2,851	2,486	2,131
255	3,763	3,263	2,901	2,534	2,177
260	3,817	3,314	2,951	2,582	2,222
265	3,871	3,365	3,000	2,629	2,266
270	3,923	3,415	3,049	2,675	2,309
275	3,975	3,465	3,096	2,720	2,352
280	4,026	3,513	3,143	2,765	2,395
285	4,076	3,561	3,189	2,809	2,436
290	4,125	3,608	3,235	2,852	2,477
295	4,173	3,654	3,279	2,895	2,518
300	4,221	3,699	3,323	2,937	2,558
305	4,267	3,744	3,367	2,979	2,597
310	4,313	3,788	3,410	3,020	2,636
315	4,359	3,831	3,452	3,060	2,674
320	4,403	3,874	3,493	3,100	2,712
325	4,447	3,916	3,534	3,139	2,750
330	4,490	3,958	3,574	3,178	2,786
335	4,533	3,999	3,614	3,216	2,823
340	4,575	4,039	3,653	3,254	2,859
345	4,616	4,078	3,692	3,291	2,894
350	4,656	4,117	3,730	3,328	2,929
355	4,696	4,156	3,768	3,364	2,963

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› Rectangular hollow section columns | Resistance to fire period of 60 minutes

Section factor m <sup>1</sup>	Thickness (mm) required - only intumescent coating				
	450°	500°	550°	600°	650°
50	0,577	0,316	0,230	0,230	0,230
55	0,755	0,478	0,278	0,230	0,230
60	0,929	0,635	0,424	0,230	0,230
65	1,098	0,789	0,567	0,355	0,230
70	1,262	0,938	0,706	0,484	0,278
75	1,422	1,084	0,842	0,610	0,394
80	1,578	1,227	0,975	0,734	0,508
85	1,730	1,366	1,106	0,855	0,619
90	1,878	1,502	1,233	0,973	0,729
95	2,023	1,635	1,357	1,089	0,836
100	2,163	1,764	1,479	1,202	0,941
105	2,301	1,891	1,598	1,313	1,044
110	2,435	2,015	1,715	1,422	1,145
115	2,566	2,136	1,829	1,529	1,244
120	2,694	2,254	1,941	1,633	1,342
125	2,818	2,370	2,050	1,736	1,437
130	2,940	2,483	2,158	1,837	1,531
135	3,060	2,594	2,263	1,935	1,623
140	3,176	2,703	2,366	2,032	1,714
145	3,290	2,809	2,467	2,127	1,803
150	3,402	2,913	2,566	2,221	1,890
155	3,511	3,015	2,663	2,312	1,976
160	3,617	3,115	2,758	2,402	2,060
165	3,722	3,213	2,851	2,490	2,143
170	3,824	3,309	2,943	2,577	2,224
175	3,924	3,403	3,033	2,662	2,304
180	4,022	3,495	3,121	2,746	2,383
185	4,118	3,585	3,208	2,828	2,460
190	4,212	3,674	3,293	2,909	2,536
195	4,304	3,761	3,377	2,988	2,611
200	4,395	3,847	3,459	3,066	2,684
205	4,483	3,930	3,539	3,143	2,757
210	4,570	4,013	3,619	3,218	2,828
215	4,655	4,093	3,696	3,292	2,898
220	4,739	4,173	3,773	3,365	2,967
225	4,821	4,251	3,848	3,437	3,035
230	4,901	4,327	3,922	3,507	3,102
235	4,980	4,402	3,995	3,577	3,168
240	5,058	4,476	4,066	3,645	3,233
245	5,134	4,549	4,137	3,713	3,296
250	5,209	4,620	4,206	3,779	3,359
255	5,282	4,690	4,274	3,844	3,421
260	5,354	4,759	4,341	3,908	3,482
265	-	4,827	4,407	3,971	3,542
270	-	4,894	4,471	4,034	3,602
275	-	4,959	4,535	4,095	3,660
280	-	5,024	4,598	4,155	3,718
285	-	5,087	4,660	4,215	3,774
290	-	5,150	4,721	4,273	3,830
295	-	5,211	4,781	4,331	3,885
300	-	5,272	4,840	4,388	3,940
305	-	5,331	4,898	4,444	3,993
310	-	-	4,955	4,499	4,046
315	-	-	5,012	4,554	4,098
320	-	-	5,067	4,608	4,150
325	-	-	5,122	4,661	4,201
330	-	-	5,176	4,713	4,251
335	-	-	5,229	4,764	4,300
340	-	-	5,282	4,815	4,349
345	-	-	5,334	4,865	4,397
350	-	-	-	4,915	4,444
355	-	-	-	4,964	4,491
360	-	-	-	5,012	4,537

> Rectangular hollow section columns | Resistance to fire period of 90 minutes

Section factor m <sup>-1</sup>	Thickness (mm) required - only intumescent coating				
	450°	500°	550°	600°	650°
45	1,551	1,207	0,965	0,733	0,517
50	1,812	1,445	1,187	0,939	0,708
55	2,066	1,677	1,404	1,141	0,894
60	2,313	1,903	1,616	1,338	1,077
65	2,553	2,124	1,823	1,531	1,256
70	2,787	2,339	2,025	1,719	1,432
75	3,015	2,549	2,223	1,904	1,603
80	3,238	2,754	2,416	2,085	1,772
85	3,454	2,954	2,605	2,262	1,937
90	3,665	3,149	2,790	2,435	2,099
95	3,871	3,340	2,970	2,605	2,257
100	4,072	3,527	3,147	2,771	2,413
105	4,268	3,709	3,321	2,934	2,566
110	4,460	3,888	3,490	3,094	2,716
115	4,647	4,062	3,656	3,251	2,862
120	4,829	4,233	3,819	3,404	3,007
125	5,008	4,400	3,978	3,555	3,148
130	5,182	4,563	4,134	3,703	3,287
135	5,352	4,723	4,287	3,848	3,424
140	-	4,879	4,437	3,990	3,558
145	-	5,033	4,584	4,130	3,690
150	-	5,183	4,728	4,267	3,819
155	-	5,330	4,870	4,401	3,946
160	-	-	5,008	4,533	4,071
165	-	-	5,144	4,663	4,194
170	-	-	5,278	4,790	4,315
175	-	-	-	4,916	4,433
180	-	-	-	5,039	4,550
185	-	-	-	5,159	4,665
190	-	-	-	5,278	4,778
195	-	-	-	-	4,889
200	-	-	-	-	4,998
205	-	-	-	-	5,106
210	-	-	-	-	5,211
215	-	-	-	-	5,316
220	-	-	-	-	-
225	-	-	-	-	-
230	-	-	-	-	-
235	-	-	-	-	-

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› Rectangular hollow section columns | Resistance to fire period of 120 minutes

Section factor m <sup>-1</sup>	Thickness (mm) required - only intumescent coating				
	450°	500°	550°	600°	650°
50	2,525	2,097	1,801	1,514	1,246
55	2,869	2,412	2,096	1,789	1,501
60	3,203	2,719	2,384	2,058	1,751
65	3,528	3,017	2,665	2,320	1,995
70	3,844	3,309	2,939	2,577	2,235
75	4,152	3,593	3,208	2,829	2,469
80	4,453	3,871	3,470	3,075	2,699
85	4,745	4,141	3,726	3,315	2,924
90	5,030	4,406	3,977	3,551	3,145
95	5,308	4,664	4,222	3,782	3,362
100	-	4,916	4,462	4,008	3,574
105	-	5,163	4,697	4,230	3,782
110	-	-	4,926	4,447	3,986
115	-	-	5,151	4,660	4,187
120	-	-	-	4,868	4,383
125	-	-	-	5,073	4,576
130	-	-	-	5,273	4,765
135	-	-	-	-	4,951
140	-	-	-	-	5,134
145	-	-	-	-	5,313
150	-	-	-	-	-
155	-	-	-	-	-
160	-	-	-	-	-
165	-	-	-	-	-
170	-	-	-	-	-

# KNAUF VERMIPLASTER



Vermiplaster has been developed specially for fire protection of buildings in interiors. Its task is to protect the load bearing coated construction elements in the event of a fire so that their function is maintained until the fire has been extinguished or building evacuated.

Vermiplaster consists of gypsum as a binder in combination with a special mix of lightweight aggregates and additives to ensure good machine application. Vermiplaster has been granted the European Technical Approval ETA-11/0229.

## Properties:

- › Easy machine application
- › Notably higher yield than comparable products
- › Gypsum based
- › For interior use
- › Colour white

### Field of application

- > Steel columns and beams acc. to DIN EN 1993-1-2
- > Concrete beams and supports acc. to DIN EN 1992-1-2
- > Concrete ceilings and walls acc. to DIN EN 1992-1-2
- > Trapezoid sheet metal with concrete acc. to DIN EN 1994-1-2

Vermiplaster can be used as a fire resistant coating with the following profiles and exposure to fire.

#### Profiles

- > I profiles
- > H profiles
- > L profiles
- > T profiles
- > U profiles
- > Hollow sections

#### Exposure to fire

- > 4-sided
- > 3-sided
- > 2-sided
- > 1-sided

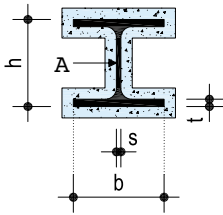
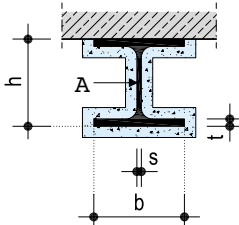
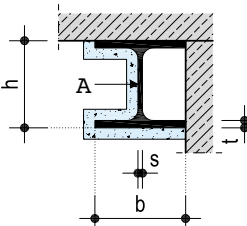
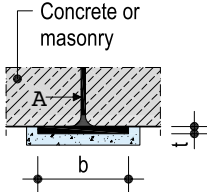
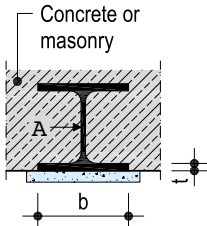


### Application

- > Reinforced-concrete ceiling / wall thickness must be  $\geq 60$  mm.
- > Reinforced-concrete beam width must be  $\geq 80$  mm
- > Application of Knauf Vermiplaster® in accordance with Knauf technical guides (System brochure P91.lv Knauf Fire resistant plaster).
- > Concrete density from  $2000 \text{ kg/m}^3$  to  $2600 \text{ kg/m}^3$
- > If the thickness of the protective plaster layer is  $\geq 36$  mm, the plaster must be additionally reinforced with steel mesh, hole size not exceeding  $15 \times 15$  mm.

# DETERMINATION OF U/A RATIOS

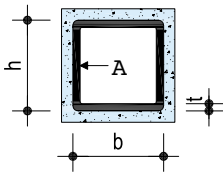
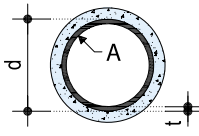
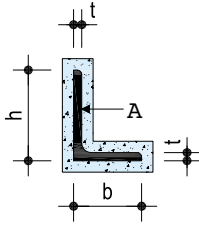
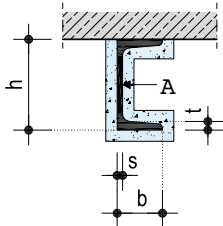
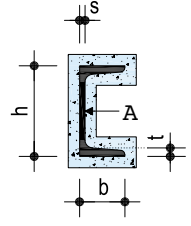
Table 1: Determine the individual U/A value from the profile individual dimensions

Construction features b, h, s and t in cm; area A in cm <sup>2</sup>	Exposure to fire	U/A m <sup>-1</sup>
<b>Beam or column</b>		
	All-sided	$\frac{4b + 2h - 2s}{2bt + (h - 2t)s} \times 100$
<b>Beam or column</b>		
	3-sided	$\frac{3b + 2h - 2s}{2bt + (h - 2t)s} \times 100$
<b>Beam or column</b>		
	3-sided corner	$\frac{2b + h - s}{2bt + (h - 2t)s} \times 100$
<b>Beam or column</b>		
	3-sided flange	$\frac{b + 2t}{bt} \times 100$
<b>Flange</b>		
	1-sided flange	Calculate complete flange thickness $\frac{b}{bt} \times 100$

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Table 1 (continued): Determine the individual U/A value from the profile individual dimensions

Construction features b, h, s and t in cm; area A in cm <sup>2</sup>	Exposure to fire	U/A m <sup>-1</sup>
<b>Hollow section, corner</b>		
	All-sided	$\frac{2b + 2h}{(2b + 2h - 4t)t} \times 100$
<b>Hollow section, round</b>		
	All-sided	$\frac{\pi d}{\pi t (d - t)} \times 100$
<b>L profile</b>		
	All-sided	$\frac{2b + 2h}{bt + ht - tt} \times 100$
<b>U profile</b>		
	3-sided	$\frac{3b + 2h - 2s}{2bt + (h - 2t)s} \times 100$
<b>U profile</b>		
	All-sided	$\frac{4b + 2h - 2s}{2bt + (h - 2t)s} \times 100$

## STEEL STRUCTURES | COLUMNS AND BEAMS

The rating of the plaster thickness of Vermiplaster required for fire resistance purposes on steel columns and beams depends on the following 3 parameters:

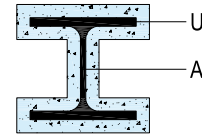
- › Ratio of the surface on which the heat acts (circumference)  $U$  to the profile cross-section area  $A$  of the steel cross-section to be protected, the so-called  $U/A$  value; it is determined in accordance with page 7 taking the installation conditions into consideration.
- › The required fire resistance class  $R$  (retention of the stability) according to building authority requirements.
- › Critical steel temperature, used when dimensioning acc. to DIN EN 1993-1-2 (determined by the structural design engineer)

Protective treatment of the steel components treated using an epoxy resin, alkyd or zinc-silicate based corrosion-proof coating is required.

### › **Minimum application layer thickness $e$**

In dependence on the  $U/A$  value, on the critical steel temperature and on the required fire resistance class.

I, H, angles, U, T profiles and hollow sections.



$U$  = Circumference exposed to fire (cm)

$A$  = Profile cross-section (cm<sup>2</sup>)

The maximum permissible  $U/A$  factor is 540 m<sup>-1</sup>

> Resistance to fire period of 30 minutes

Section factor m <sup>-1</sup>	Thickness (mm) of Vermiplaster required				
	350°	400°	450°	500°	550°
60	7	6	6	6	6
65	7	6	6	6	6
70	7	6	6	6	6
75	7	6	6	6	6
80	7	6	6	6	6
85	7	7	6	6	6
90	7	7	6	6	6
95	8	7	6	6	6
100	8	7	6	6	6
105	8	7	6	6	6
110	8	7	6	6	6
115	8	7	7	6	6
120	8	7	7	6	6
125	8	7	7	6	6
130	8	7	7	6	6
135	9	7	7	6	6
140	9	7	7	6	6
145	9	7	7	6	6
150	9	7	7	6	6
155	9	7	7	7	6
160	9	7	7	7	6
165	9	7	7	7	6
170	9	7	7	7	6
175	9	7	8	7	6
180	9	7	8	7	6
185	9	9	8	7	6
190	9	9	8	7	6
195	10	9	8	7	6
200	10	9	8	7	6
205	10	9	8	7	7
210	10	9	8	7	7
215	10	9	8	7	7
220	10	9	8	7	7
225	10	9	8	7	7
230	10	9	8	7	7
235	10	9	8	8	7
240	10	9	8	8	7
245	10	9	8	8	7
250	10	9	8	8	7
255	10	9	8	8	7
260	10	9	8	8	7
265	10	9	9	8	7
270	10	9	9	8	7
275	10	9	9	8	7
280	10	9	9	8	7
285	10	9	9	8	7
290	10	9	9	8	7
295	10	10	9	8	7

Section factor m <sup>-1</sup>	Thickness (mm) of Vermiplaster required				
	350°	400°	450°	500°	550°
300	10	10	9	8	7
305	10	10	9	8	7
310	10	10	9	8	7
315	10	10	9	8	8
320	10	10	9	8	8
325	11	11	10	8	8
330	11	11	10	8	8
335	12	12	11	9	8
340	12	12	11	9	8
345	14	13	12	10	9
350	14	13	12	10	9
355	14	13	12	11	9
360	14	13	12	11	9
365	14	13	12	11	9
370	14	13	12	11	9
375	14	13	12	11	10
380	14	13	12	11	10
385	15	13	12	11	10
390	15	13	12	11	10
395	15	13	12	11	10
400	15	13	12	11	10
405	15	14	12	11	10
410	15	14	12	11	10
415	15	14	12	11	10
420	15	14	12	11	10
425	15	14	13	11	10
430	15	14	13	11	10
435	15	14	13	11	10
440	15	14	13	11	10
445	16	14	13	12	10
450	16	14	13	12	10
455	16	14	13	12	11
460	16	14	13	12	11
465	16	14	13	12	11
470	16	14	13	12	11
475	16	14	13	12	11
480	16	14	13	12	11
485	16	14	13	12	11
490	16	14	13	12	11
495	16	14	13	12	11
500	16	14	13	12	11
505	16	14	13	12	11
510	16	14	13	12	11
515	16	14	13	12	11
520	16	14	13	12	11
525	16	15	13	12	11
530	16	15	13	12	11
535	16	15	14	12	11
540	16	15	14	12	11

> Resistance to fire period of 45 minutes

Section factor m <sup>-1</sup>	Thickness (mm) of Vermiplaster required				
	350°	400°	450°	500°	550°
60	11	10	9	8	7
65	12	10	9	8	8
70	12	10	9	8	8
75	12	11	10	9	9
80	12	11	10	9	9
85	13	12	11	10	9
90	13	12	11	10	9
95	14	12	11	10	10
100	14	12	11	10	10
105	14	13	12	11	10
110	14	13	12	11	10
115	15	13	12	11	11
120	15	13	12	11	11
125	15	14	13	12	11
130	15	14	13	12	11
135	15	14	13	12	11
140	15	14	13	12	11
145	16	14	13	12	12
150	16	14	13	12	12
155	16	15	14	13	12
160	16	15	14	13	12
165	16	15	14	13	12
170	16	15	14	13	12
175	17	15	14	13	13
180	17	15	14	13	13
185	17	16	15	14	13
190	17	16	15	14	13
195	17	16	15	14	13
200	17	16	15	14	13
205	17	16	15	14	13
210	17	16	15	14	13
215	17	16	15	14	14
220	17	16	15	14	14
225	18	16	15	14	14
230	18	16	15	14	14
235	18	17	16	15	14
240	18	17	16	15	14
245	18	17	16	15	14
250	18	17	16	15	14
255	18	17	16	15	14
260	18	17	16	15	14
265	18	17	16	15	14
270	18	17	16	15	14
275	18	17	16	15	14
280	18	17	16	15	14
285	18	17	16	16	15
290	18	17	16	16	15
295	19	18	17	16	15

Section factor m <sup>-1</sup>	Thickness (mm) of Vermiplaster required				
	350°	400°	450°	500°	550°
300	19	18	17	16	15
305	19	18	17	16	15
310	19	18	17	16	15
315	19	18	17	16	15
320	19	18	17	16	15
325	21	19	17	16	15
330	21	19	17	16	15
335	23	21	19	17	16
340	23	21	19	17	16
345	25	23	21	19	18
350	25	23	21	19	18
355	25	23	21	20	18
360	25	23	21	20	18
365	25	23	22	20	18
370	25	23	22	20	18
375	25	24	22	20	19
380	25	24	22	20	19
385	26	24	22	20	19
390	26	24	22	20	19
395	26	24	22	21	19
400	26	24	22	21	19
405	26	24	22	21	19
410	26	24	22	21	19
415	26	24	22	21	19
420	26	24	22	21	19
425	26	24	23	21	19
430	26	24	23	21	19
435	26	24	23	21	20
440	26	24	23	21	20
445	26	25	23	22	20
450	26	25	23	22	20
455	26	25	23	22	20
460	26	25	23	22	20
465	27	25	24	22	20
470	27	25	24	22	20
475	27	25	24	22	20
480	27	25	24	22	20
485	27	25	24	22	21
490	27	25	24	22	21
495	27	25	24	22	21
500	27	25	24	22	21
505	27	25	24	22	21
510	27	25	24	22	21
515	27	25	24	23	21
520	27	25	24	23	21
525	27	26	24	23	21
530	27	26	24	23	21
535	27	26	24	23	21
540	27	26	24	23	21

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> Resistance to fire period of 60 minutes

Section factor m <sup>-1</sup>	Thickness (mm) of Vermiplaster required				
	350°	400°	450°	500°	550°
60	11	10	9	8	7
65	12	10	9	8	8
70	12	10	9	8	8
75	12	11	10	9	9
80	12	11	10	9	9
85	13	12	11	10	9
90	13	12	11	10	9
95	14	12	11	10	10
100	14	12	11	10	10
105	14	13	12	11	10
110	14	13	12	11	10
115	15	13	12	11	11
120	15	13	12	11	11
125	15	14	13	12	11
130	15	14	13	12	11
135	15	14	13	12	11
140	15	14	13	12	11
145	16	14	13	12	12
150	16	14	13	12	12
155	16	15	14	13	12
160	16	15	14	13	12
165	16	15	14	13	12
170	16	15	14	13	12
175	17	15	14	13	13
180	17	15	14	13	13
185	17	16	15	14	13
190	17	16	15	14	13
195	17	16	15	14	13
200	17	16	15	14	13
205	17	16	15	14	13
210	17	16	15	14	13
215	17	16	15	14	14
220	17	16	15	14	14
225	18	16	15	14	14
230	18	16	15	14	14
235	18	17	16	15	14
240	18	17	16	15	14
245	18	17	16	15	14
250	18	17	16	15	14
255	18	17	16	15	14
260	18	17	16	15	14
265	18	17	16	15	14
270	18	17	16	15	14
275	18	17	16	15	14
280	18	17	16	15	14
285	18	17	16	16	15
290	18	17	16	16	15
295	19	18	17	16	15

Section factor m <sup>-1</sup>	Thickness (mm) of Vermiplaster required				
	350°	400°	450°	500°	550°
300	19	18	17	16	15
305	19	18	17	16	15
310	19	18	17	16	15
315	19	18	17	16	15
320	19	18	17	16	15
325	21	19	17	16	15
330	21	19	17	16	15
335	23	21	19	17	16
340	23	21	19	17	16
345	25	23	21	19	18
350	25	23	21	19	18
355	25	23	21	20	18
360	25	23	21	20	18
365	25	23	22	20	18
370	25	23	22	20	18
375	25	24	22	20	19
380	25	24	22	20	19
385	26	24	22	20	19
390	26	24	22	20	19
395	26	24	22	21	19
400	26	24	22	21	19
405	26	24	22	21	19
410	26	24	22	21	19
415	26	24	22	21	19
420	26	24	22	21	19
425	26	24	23	21	19
430	26	24	23	21	19
435	26	24	23	21	20
440	26	24	23	21	20
445	26	25	23	22	20
450	26	25	23	22	20
455	26	25	23	22	20
460	26	25	23	22	20
465	27	25	24	22	20
470	27	25	24	22	20
475	27	25	24	22	20
480	27	25	24	22	20
485	27	25	24	22	21
490	27	25	24	22	21
495	27	25	24	22	21
500	27	25	24	22	21
505	27	25	24	22	21
510	27	25	24	22	21
515	27	25	24	23	21
520	27	25	24	23	21
525	27	26	24	23	21
530	27	26	24	23	21
535	27	26	24	23	21
540	27	26	24	23	21

> Resistance to fire period of 90 minutes

Section factor m <sup>-1</sup>	Thickness (mm) of Vermiplaster required				
	350°	400°	450°	500°	550°
60	16	14	13	12	11
65	17	15	13	12	11
70	17	15	13	12	11
75	18	16	15	13	12
80	18	16	15	13	12
85	19	17	15	14	13
90	19	17	15	14	13
95	19	18	16	15	14
100	19	18	16	15	14
105	20	19	17	16	15
110	20	19	17	16	15
115	21	19	18	16	15
120	21	19	18	16	15
125	21	20	18	17	16
130	21	20	18	17	16
135	22	20	19	18	16
140	22	20	19	18	16
145	23	21	20	18	17
150	23	21	20	18	17
155	23	21	20	19	18
160	23	21	20	19	18
165	23	22	20	19	18
170	23	22	20	19	18
175	24	22	21	20	18
180	24	22	21	20	18
185	24	23	21	20	18
190	24	23	21	20	18
195	24	23	22	20	19
200	24	23	22	20	19
205	25	23	22	21	19
210	25	23	22	21	19
215	25	24	22	21	20
220	25	24	22	21	20
225	25	24	23	21	20
230	25	24	23	21	20
235	26	24	23	22	20
240	26	24	23	22	20
245	26	24	23	22	21
250	26	24	23	22	21
255	26	25	23	22	21
260	26	25	23	22	21
265	26	25	24	23	21
270	26	25	24	23	21
275	26	25	24	23	22
280	26	25	24	23	22
285	27	25	24	23	22
290	27	25	24	23	22
295	27	26	24	23	22

Section factor m <sup>-1</sup>	Thickness (mm) of Vermiplaster required				
	350°	400°	450°	500°	550°
300	27	26	24	23	22
305	27	26	25	24	22
310	27	26	25	24	22
315	27	26	25	24	23
320	27	26	25	24	23
325	28	27	26	25	23
330	28	27	26	25	23
335	30	29	27	26	24
340	30	29	27	26	24
345	32	31	29	28	26
350	32	31	29	28	26
355	32	31	29	28	27
360	32	31	29	28	27
365	33	31	30	28	27
370	33	31	30	28	27
375	33	31	30	28	27
380	33	31	30	28	27
385	33	31	30	28	27
390	33	31	30	28	27
395	33	31	30	29	27
400	33	31	30	29	27
405	33	32	30	29	27
410	33	32	30	29	27
415	33	32	30	29	28
420	33	32	30	29	28
425	33	32	30	29	28
430	33	32	30	29	28
435	33	32	30	29	28
440	33	32	30	29	28
445	33	32	31	29	28
450	33	32	31	29	28
455	33	32	31	29	28
460	33	32	31	29	28
465	33	32	31	30	28
470	33	32	31	30	28
475	33	32	31	30	28
480	33	32	31	30	28
485	33	32	31	30	28
490	33	32	31	30	28
495	33	32	31	30	28
500	33	32	31	30	28
505	34	32	31	30	29
510	34	32	31	30	29
515	34	32	31	30	29
520	34	32	31	30	29
525	34	32	31	30	29
530	34	32	31	30	29
535	34	33	31	30	29
540	34	33	31	30	29

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> Resistance to fire period of 30 minutes

Section factor m <sup>-1</sup>	Thickness (mm) of Vermiplaster required				
	350°	400°	450°	500°	550°
60	21	19	17	15	14
65	22	19	18	16	15
70	22	19	18	16	15
75	23	21	19	18	16
80	23	21	19	18	16
85	24	22	20	19	17
90	24	22	20	19	17
95	25	23	21	20	18
100	25	23	21	20	18
105	26	23	22	21	19
110	26	23	22	21	19
115	27	24	23	22	20
120	27	24	23	22	20
125	28	25	24	23	21
130	28	25	24	23	21
135	29	26	25	23	22
140	29	26	25	23	22
145	29	27	26	24	23
150	29	27	26	24	23
155	30	27	26	25	23
160	30	27	26	25	23
165	30	28	27	25	24
170	30	28	27	25	24
175	31	29	28	26	25
180	31	29	28	26	25
185	31	29	28	27	25
190	31	29	28	27	25
195	32	30	29	27	26
200	32	30	29	27	26
205	34	30	29	28	26
210	34	30	29	28	26
215	36	31	29	28	27
220	36	31	29	28	27
225	-	31	30	28	27
230	-	31	30	28	27
235	-	31	30	29	28
240	-	31	30	29	28
245	-	32	31	29	28
250	-	32	31	29	28
255	-	32	31	30	28
260	-	32	31	30	28
265	-	34	31	30	29
270	-	34	31	30	29
275	-	36	32	30	29
280	-	36	32	30	29
285	-	-	32	31	29
290	-	-	32	31	29
295	-	-	32	31	30

Section factor m <sup>-1</sup>	Thickness (mm) of Vermiplaster required				
	350°	400°	450°	500°	550°
300	-	-	32	31	30
305	-	-	33	31	30
310	-	-	33	31	30
315	-	-	35	31	30
320	-	-	35	31	30
325	-	-	35	32	31
330	-	-	35	32	31
335	-	-	35	33	32
340	-	-	35	33	32
345	-	-	35	34	33
350	-	-	35	34	33
355	-	-	36	34	33
360	-	-	36	34	33
365	-	-	-	34	33
370	-	-	-	34	33
375	-	-	-	34	33
380	-	-	-	34	33
385	-	-	-	35	33
390	-	-	-	35	33
395	-	-	-	35	33
400	-	-	-	35	33
405	-	-	-	35	33
410	-	-	-	35	33
415	-	-	-	35	34
420	-	-	-	35	34
425	-	-	-	35	34
430	-	-	-	35	34
435	-	-	-	35	34
440	-	-	-	35	34
445	-	-	-	35	34
450	-	-	-	35	34
455	-	-	-	36	34
460	-	-	-	36	34
465	-	-	-	-	34
470	-	-	-	-	34
475	-	-	-	-	34
480	-	-	-	-	34
485	-	-	-	-	34
490	-	-	-	-	34
495	-	-	-	-	34
500	-	-	-	-	34
505	-	-	-	-	35
510	-	-	-	-	35
515	-	-	-	-	35
520	-	-	-	-	35
525	-	-	-	-	35
530	-	-	-	-	35
535	-	-	-	-	35
540	-	-	-	-	35

# CONCRETE STRUCTURES | COLUMNS AND BEAMS

## > Concrete columns

### Concrete beams and columns exposed on multiple sides

For a concrete density in a range of 2025 kg/m<sup>3</sup> to 2740 kg/m<sup>3</sup> and a column width of at least 150 mm, concrete strength class at least C30/37.

#### Existing concrete thickness

Lightweight aggregate concrete, e.g. pumice concrete acc. to DIN EN 1520 or aerated concrete acc. to DIN 4223-1

Normal-weight concrete acc. to DIN EN 206-1 / DIN 1045-2 of strength classes  $\leq$  C80/95

Covers with a thickness of at least 50 mm

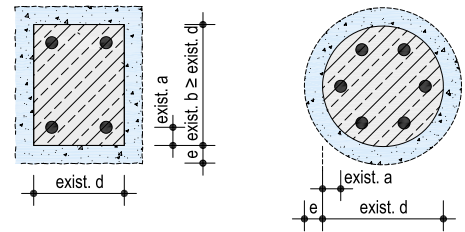
Beams and columns with a width of at least 80 mm

Beams and columns exposed on one side

Applications acc. to DIN 4102-4

The rating of the plaster thickness of MP 75 L Fire required for fire resistance purposes on concrete components is in accordance with the tables on the following pages and depends on:

- > Constructional component and loading
- > Required fire resistance class according to building authority requirements
- > Demands on the concrete thickness acc. to DIN EN 1992-1-2, section 5 for the necessary fire resistance class
- > Existing concrete thickness
- > Equivalent thickness of concrete of the ETA-11/0229



exist. a = existing concrete cover (distance between centres)

exist. b = larger existing column width

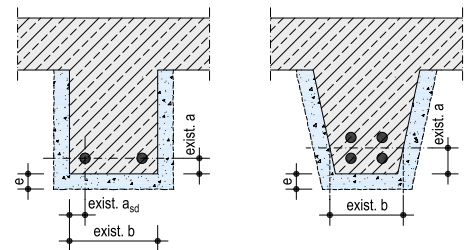
exist. d = smaller existing column width or diameter

e = thickness MP 75 L Fire

## > Concrete beams

### Procedure:

1. Observe the fields of application.
2. Determine the required concrete thickness (req. a or req. b and req. d) acc to DIN EN 1992-1-2, section 5.
3. Determine the existing concrete thickness (exist. a and exist. b or exist. d) and derive the decisive (maximum) missing concrete thickness.
4. Read off the minimum plaster layer thickness e for Vermiplaster in accordance with the missing concrete thickness from the tables on the following pages.



exist. a = existing concrete Cover (distance between centres)

exist. a<sub>sd</sub> = existing concrete cover horizontal (distance between centres)

exist. b = existing beam width in the height of the

centre of gravity of the tensile area reinforcement

e = thickness MP 75 L Fire

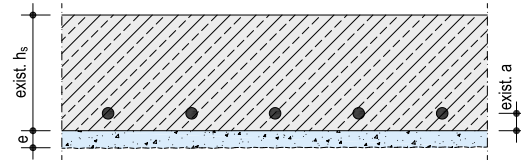


### > Ceilings and walls

1-sided exposed concrete walls and covers. For a concrete density in a range of 1910 kg/m<sup>3</sup> to 2660 kg/m<sup>3</sup> and a thickness of at least 120 mm, concrete strength class at least C25/30.

The rating of the plaster thickness of MP 75 L Fire required for fire resistance purposes on concrete components is in accordance with the tables on the following pages and depends on:

- > Constructional component and loading
- > Required fire resistance class according to building authority requirements
- > Demands on the concrete thickness acc. to DIN EN 1992-1-2, section 5 for the necessary fire resistance class
- > Existing concrete thickness
- > Equivalent thickness of concrete of the ETA-11/0229

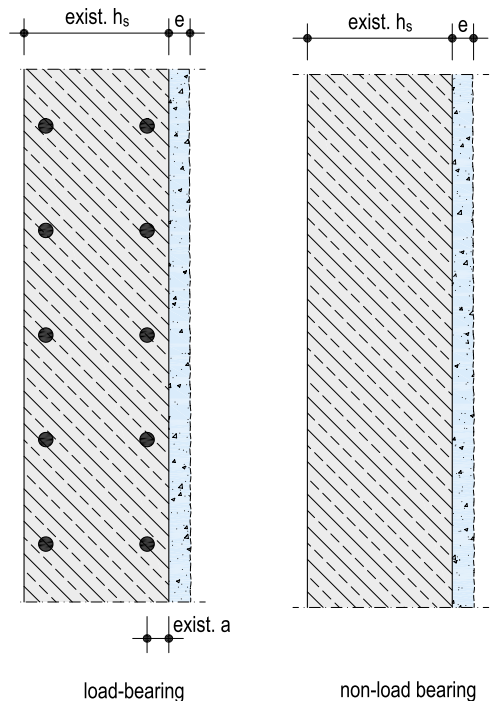


exist. a = existing concrete cover (distance between centres)  
 exist. hs = existing cover thickness  
 e = thickness MP 75 L Fire

### > Concrete walls

Procedure:

1. Observe the fields of application.
2. Determine the required thicknesses of concrete (req. a and req. hs) acc to DIN EN 1992-1-2, section 5.
3. Determine the existing concrete thickness (exist. a and exist. hs) and derive the decisive (maximum) missing concrete thickness.
4. Read off the minimum plaster layer thickness e for MP 75 L Fire in accordance with the missing concrete thickness from the tables on the following pages.



exist. a = existing concrete cover with supporting walls (distance between centres)  
 exist. hs = existing wall thickness  
 e = thickness MP 75 L Fire

# CONCRETE STRUCTURES | COLUMNS AND BEAMS

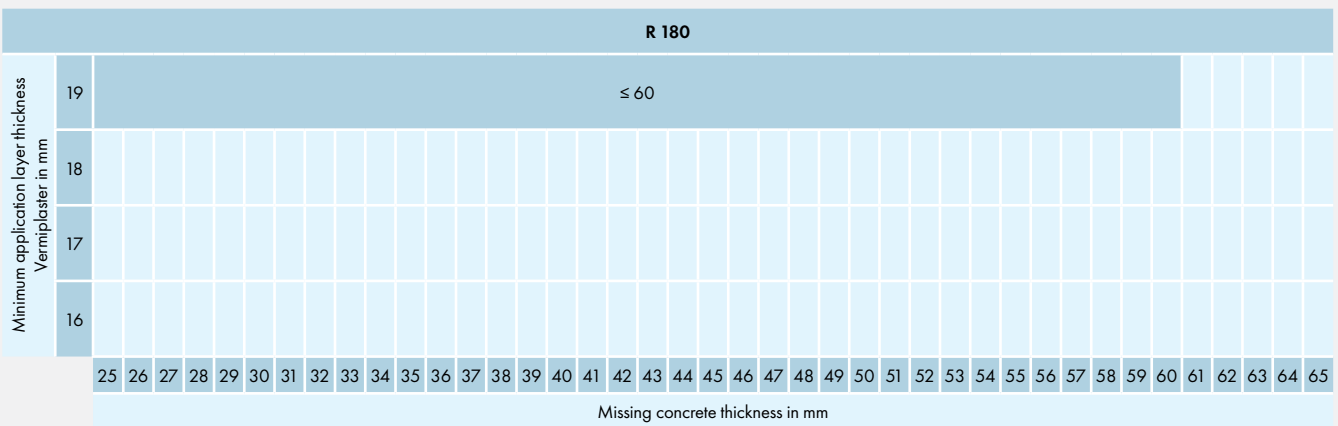
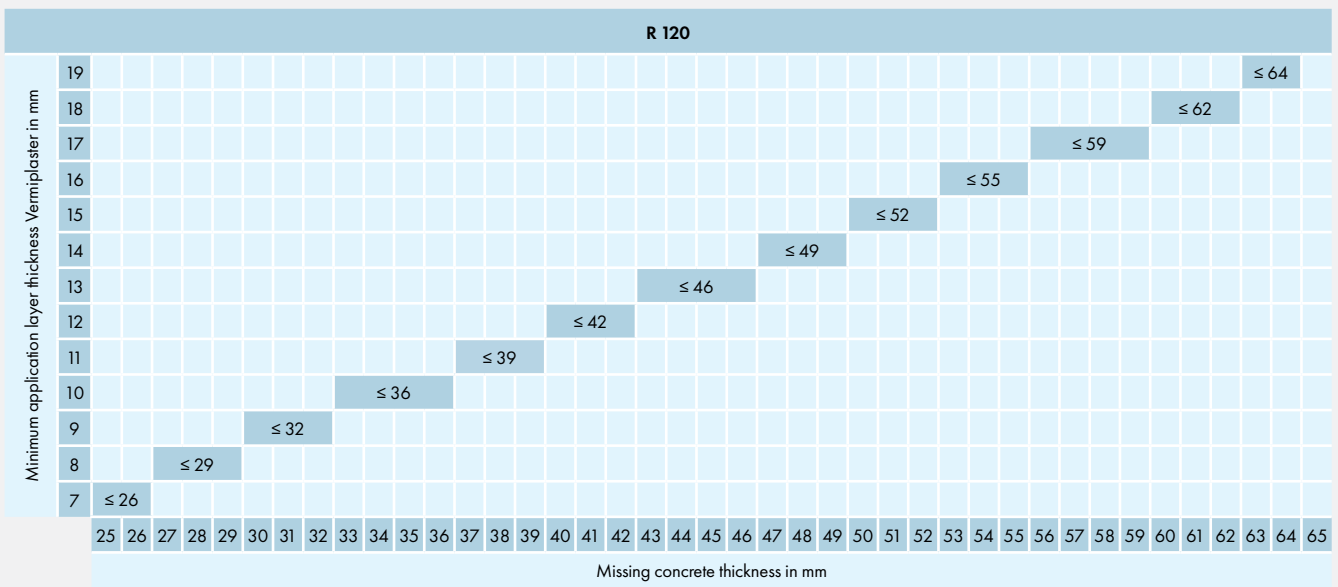
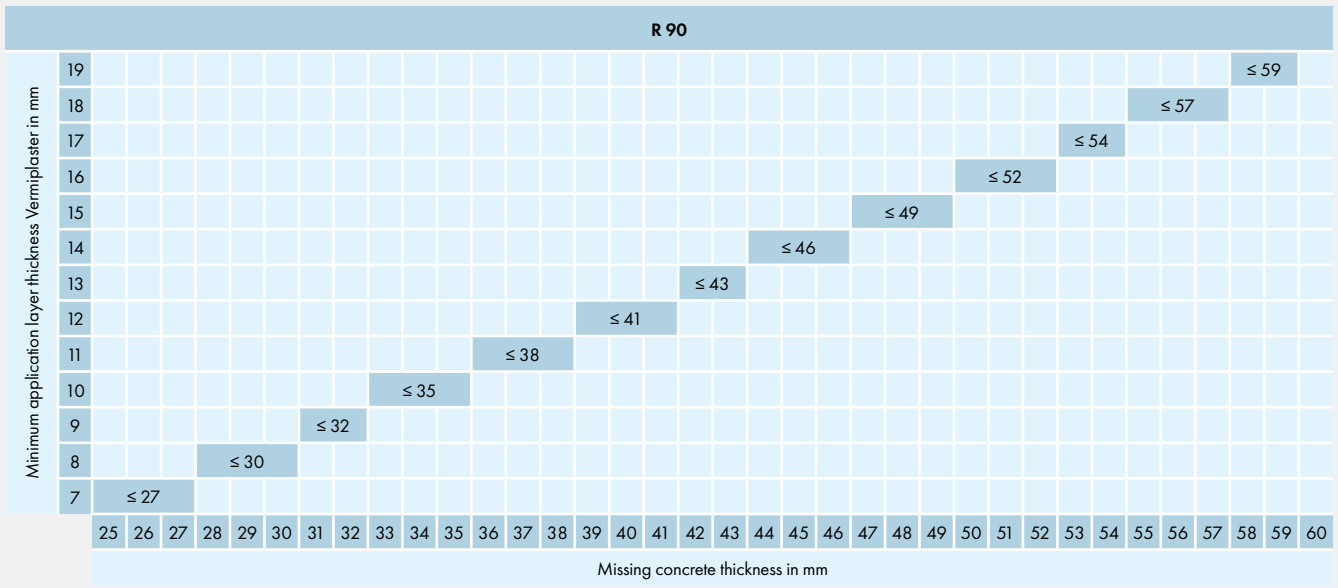
## › Minimum application layer thickness e

In dependence on the fire resistance class and missing concrete thickness

		R 30																						
Minimum application layer thickness Vermiplaster in mm	19																							
	18																							≤ 32
	17																						≤ 30	
	16																					≤ 28		
	15																					≤ 26		
	14																					≤ 25		
	13																					≤ 23		
	12																					≤ 21		
	11																					≤ 20		
	10																					≤ 18		
	9																					≤ 16		
	8																					≤ 14		
	7																					≤ 13		
		11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
		Missing concrete thickness in mm																						

		R 60																						
Minimum application layer thickness Vermiplaster in mm	19																							
	18																							≤ 45
	17																							≤ 43
	16																							≤ 41
	15																							≤ 39
	14																							≤ 38
	13																							≤ 36
	12																							≤ 34
	11																							≤ 33
	10																							≤ 31
	9																							≤ 29
	8																							≤ 27
	7																							≤ 26
		25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
		Missing concrete thickness in mm																						

6



# CONCRETE STRUCTURES | CEILINGS AND WALLS

## > Minimum application layer thickness e

In dependence on the fire resistance class and missing concrete thickness

		REI 30 / EI 30 / R 30																											
Minimum application layer thickness Vermiplaster in mm	20																											≤ 42	
	19																											≤ 41	
	18																											≤ 39	
	17																											≤ 38	
	16																											≤ 36	
	15																											≤ 35	
	14																											≤ 33	
	13																												≤ 32
	12																												≤ 31
	11																												≤ 29
		25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47					
		Missing concrete thickness in mm																											

		REI 60 / EI 60 / R 60																											
Minimum application layer thickness Vermiplaster in mm	20																											≤ 53	
	19																											≤ 51	
	18																											≤ 50	
	17																											≤ 48	
	16																											≤ 46	
	15																											≤ 44	
	14																											≤ 43	
	13																												≤ 41
	12																												≤ 39
	11																												≤ 29
		35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57					
		Missing concrete thickness in mm																											

6

		REI 90 / EI 90 / R 90																															
Minimum application layer thickness Vermiplaster in mm	20																											≤ 63					
	19																												≤ 61				
	18																												≤ 58				
	17																												≤ 56				
	16																												≤ 53				
	15																												≤ 51				
	14																													≤ 49			
	13																													≤ 46			
	12																														≤ 44		
	11																														≤ 41		
		40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67				
		Missing concrete thickness in mm																															

		REI 120 / EI 120 / R 120																													
Minimum application layer thickness Vermiplaster in mm	20																														≤ 67
	19																													≤ 64	
	18																												≤ 61		
	17																												≤ 59		
	16																												≤ 56		
	15																												≤ 53		
	14																												≤ 50		
	13																												≤ 47		
	12																												≤ 44		
	11																												≤ 42		
		40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67		
		Missing concrete thickness in mm																													

# CONCRETE STRUCTURES | CEILINGS AND WALLS

## › Minimum application layer thickness e

In dependence on the fire resistance class and missing concrete thickness

REI 180 / EI 180 / R 180		
Minimum application layer thickness Vermiplaster in mm	20	≤ 71
	19	≤ 67
	18	≤ 64
	17	≤ 61
	16	≤ 57
	15	≤ 54
	14	≤ 51
	13	≤ 47
	12	≤ 44
	11	≤ 41
Missing concrete thickness in mm		
	40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72	

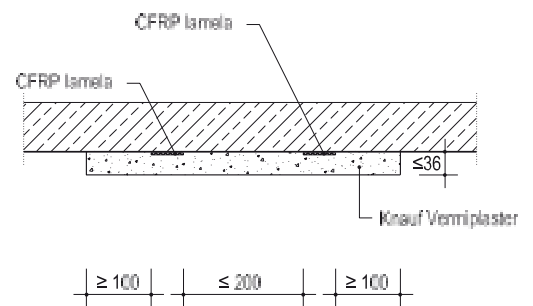
REI 240 / EI 240 / R 240		
Minimum application layer thickness Vermiplaster in mm	20	≤ 72
	19	≤ 68
	18	≤ 65
	17	≤ 61
	16	≤ 58
	15	≤ 54
	14	≤ 51
	13	≤ 47
	12	≤ 43
	11	≤ 40
Missing concrete thickness in mm		
	40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72	

6

### > Knauf Vermiplaster® fire resistant layer thickness

Fire resistance R 1) [min]	Critical glue temperature/glass transition temperature [°C]									Knauf Vermiplaster layer thickness in mm
	50	60	70	80	90	100	110	120	130	
R 30	40	35	35	30	25	20	20	20	20	20
R 45	55	45	40	40	35	30	30	25	25	25
R 60	65	55	50	45	40	35	35	30	30	30
R 90	80	70	65	60	55	50	45	40	35	35
R 120	95	85	80	70	65	60	55	50	45	45

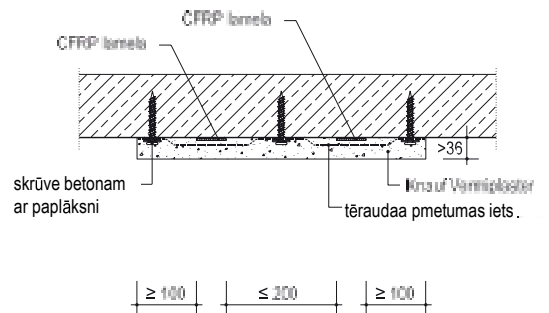
### > Protection of CFRP lamel (tape) in plane - protective layer thickness up to 36 mm



### > Protection of CFRP lamel (tape) in plane - protective layer thickness greater than 36 mm

Instructions:

- > Reinforced-concrete beam width must be  $\geq 80$  mm
- > Application of Knauf Vermiplaster in accordance with Knauf technical guides, System brochure P91.lv
- > Knauf Fire resistant plaster)
- > Concrete density from  $2000 \text{ kg/m}^3$  to  $2600 \text{ kg/m}^3$
- > If the thickness of the protective plaster layer is  $\geq 36$  mm, the plaster must be additionally reinforced with steel mesh, hole size not exceeding  $15 \times 15$  mm.



# FIREBOARD COLUMN AND BEAM ENCASEMENTS

In the event of a fire, unprotected steel profiles generally heat up quickly to the critical temperature (crit T) of about 500 °C and thus have a fire resistance of < 30 minutes. Unclad wooden beams and columns can also be rated for a loadbearing capacity when exposed to fire, but owing to the circumstances may require much larger cross-section dimensions. The increase in the fire resistance for steel profiles and/or the reduction of the cross-section dimensions with timber-framed structures can be achieved by the application of cladding with Fireboard. The increase of the temperature of the constructional components is retarded by the cladding and in the event of a fire assures the required structural loadbearing capacity for a defined period.

- Fire protection encasement of beams and columns made of steel with Fireboard up to fire resistance class F180 (three hours)
- Fire protection encasement of beams and columns made of wood with Fireboard up to fire resistance class F90 (one and a half hours).

## K252.DE FIREBOARD STEEL BEAM ENCASEMENT



- The system K252.de Knauf Fireboard Steel Beam Encasement is applied with metal grid and screw fixed cladding or without metal grid with Fireboard strips and stapled cladding. Single-layer up to F90 for U/A ratios  $\leq 300 \text{ m}^{-1}$  are possible.

## K253.DE FIREBOARD STEEL COLUMN ENCASEMENT



- The system K253.de Knauf Fireboard Steel Column Encasement is applied with metal grid and screw fixed cladding or without metal grid and stapled cladding. Single-layer up to F60 for U/A ratios  $\leq 300 \text{ m}^{-1}$  are possible.



### STEEL BEAMS AND STEEL COLUMNS WITH ENCASEMENT MADE OF FIREBOARD



Shown: Cost-effective solution with Fireboard cladding without grid

The fire resistance cladding with Fireboard is based on the fact that the encasement greatly delays the temperature increase of the steel profiles. The fire resistance to be achieved is dependant on the following factors:

- Mass of the steel profile to be heated up, designated by the profile cross-section  $A$  in  $\text{cm}^2$ .
- Surface on which the heat acts, generally the circumference of the cladding surface  $U$  in  $\text{cm}$ .
- Thickness of the Fireboard cladding.

$A$  is directly proportional and  $U$  is inversely proportional to the fire resistance. Thus the  $U/A$  factor (profile factor) of a steel construction is decisive for the

selection of the necessary cladding thickness with specification of the required fire resistance class. The maximum permissible  $U/A$  factor is  $300 \text{ m}^{-1}$ .

The following examples show a series of construction profiles commonly use in construction with formula for the  $UA$  ratio calculation.

### DETERMINATION OF U/A RATIOS (PROFILE FACTOR) FOR STEEL BEAMS AND STEEL COLUMNS

Construction features $b, h$ and $t$ in $\text{cm}$ , area $A$ in $\text{cm}^2$	Fire exposure	$U/A \text{ m}^{-1}$
Flat bar		
	4-sided	$\frac{200}{t}$
Flange		
	4-sided	$\frac{200}{t}$
	3-sided	$\frac{100}{t}$
Angle		
	4-sided	$\frac{200}{t}$

Construction features $b, h$ and $t$ in $\text{cm}$ , area $A$ in $\text{cm}^2$	Fire exposure	$U/A \text{ m}^{-1}$
Angle		
	4-sided	$\frac{2b + 2h}{A} \cdot 100$
Double angle		
	4-sided	$\frac{2b + 2h}{A} \cdot 100$
Hollow section, columns		
	4-sided	$\frac{100}{t}$
	4-sided	$\frac{4b}{A} \cdot 100$

Construction features b, h and t in cm, area A in cm <sup>2</sup>	Fire exposure	U/A m <sup>-1</sup>
Beam or column		
	4-sided	$\frac{2b + 2h}{A} \cdot 100$
	4-sided	$\frac{2b + 2h}{A} \cdot 100$
	4-sided	$\frac{2b + 2h}{A} \cdot 100$
	4-sided	$\frac{2b + 2h}{A} \cdot 100$

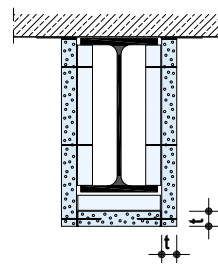
Construction features b, h and t in cm, area A in cm <sup>2</sup>	Fire exposure	U/A m <sup>-1</sup>
Beams		
	3-sided	$\frac{2h + b}{A} \cdot 100$
	3-sided	$\frac{2h + b}{A} \cdot 100$
	3-sided	$\frac{2h + b}{A} \cdot 100$

## VARIANTS OF FIREBOARD CLADDING OF STEEL BEAM CONSTRUCTIONS

Encasement made of Fireboard can be applied on a metal grid with drywall screws or without a grid by using front side and surface stapling of the Fireboard.

### > Stapled Fireboard

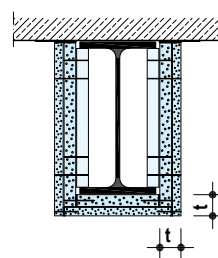
- Valid for beams with parallel flange types IPE / HEA / HEB / HEM
- Permissible span width of the cladding ≤ 600 mm (≤ 500 mm for Fireboard 15 mm)
- In case of single-layer cladding joint backing with Fireboard strips in cladding thickness but min. 20 mm, width ≥ 150 mm on the board joint
- Staple all cladding layers with steel staples acc. to DIN 18182 or alt. EN 14566 (e.g. Haubold or Popers-Senco) with backing made of Fireboard strips.



### Single layer cladding

Beam height ≤ 600 mm

- In case of single-layer cladding joint backing with Fireboard strips in cladding thickness but min. 20 mm, width ≥ 150 mm on the board joint
- Fireboard strips as backing in cladding thickness, min. 20 mm, press insertion, width ≥ 150 mm at spacing ≤ 600 mm and on the board joint



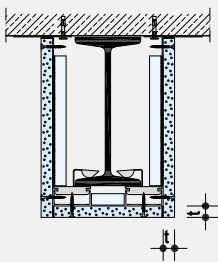
### Double layer cladding

Beam height ≤ 600 mm

- Fireboard strips as backing in cladding thickness of the largest cladding layer, min. 20 mm, press insertion, width ≥ 150 mm at spacing ≤ 600 mm

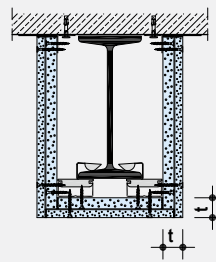
> **Fireboard screwed onto metal profiles**

- Valid for all profile shapes
- Permissible span width of the cladding  $\leq 600$  mm ( $\leq 500$  mm for Fireboard 15 mm)
- In case of single-layer cladding joint backing with Fireboard strips in cladding thickness but min. 20 mm, width  $\geq 150$  mm or with CD 60/27 profile is required



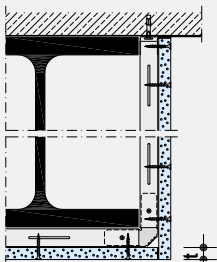
**Single layer cladding**

Beam height  $\leq 600$  mm  
Flange thickness  $\leq 16$  mm



**Double layer cladding**

Beam height  $\leq 600$  mm  
Flange thickness  $\leq 16$  mm



**Frame-metal stud framework with single-/double-layer cladding**

Beam height  $\leq 1000$  mm

- > Full length of the cladding  $\leq 3000$  mm
- > Frame-metal stud framework every  $\leq 600$  mm ( $\leq 500$  mm with Fireboard 15 mm) and on board joint to fix the corners
- > Max. frame width (distance between the vertical CD channels) with single-layer cladding  $\leq 1300$  mm and with doublelayer cladding  $\leq 1100$  mm

# FIREBOARD | GYPSUM BOARD CONSTRUCTIONS

## > R30

Project temperat. [°C]	350	400	450	500
Am/V [l/m]	Necessary thickness of the fire protection material to keep the temperature below the project temperature			
45	15	15	15	15
50	15	15	15	15
60	15	15	15	15
80	15	15	15	15
100	20	15	15	15
120	20	15	15	15
140	20	20	15	15
160	20	20	15	15
180	20	20	20	15
200	20	20	20	15
220	20	20	20	15
240	20	20	20	20
260	20	20	20	20
280	20	20	20	20
300	20	20	20	20
320	20	20	20	20
340	20	20	20	20
360	20	20	20	20
363	20	20	20	20

## > R45

Project temperat. [°C]	350	400	450	500
Am/V [l/m]	Necessary thickness of the fire protection material to keep the temperature below the project temperature			
45	20	15	15	15
50	20	15	15	15
60	20	20	15	15
80	20	20	20	20
100	20	20	20	20
120	20	20	20	20
140	20	20	20	20
160	25	20	20	20
180	25	25	20	20
200	25	25	20	20
220	25	25	20	20
240	25	25	25	20
260	25	25	25	20
280	25	25	25	20
300	25	25	25	25
320	25	25	25	25
340	25	25	25	25
360	25	25	25	25
363	25	25	25	25

6

## &gt; R60

Project temperat. [°C]	350	400	450	500
Am/V [1/m]	Necessary thickness of the fire protection material to keep the temperature below the project temperature			
45	25	20	20	15
50	25	20	20	20
60	25	25	20	20
80	25	25	25	20
100	25	25	25	25
120	25	25	25	25
140	25	25	25	25
160	30	25	25	25
180	30	25	25	25
200	30	25	25	25
220	30	30	25	25
240	30	30	25	25
260	30	30	25	25
280	30	30	25	25
300	30	30	30	25
320	30	30	30	25
340	30	30	30	25
360	30	30	30	25
363	30	30	30	25

## &gt; R90

Project temperat. [°C]	350	400	450	500
Am/V [1/m]	Necessary thickness of the fire protection material to keep the temperature below the project temperature			
45	30	30	25	25
50	30	30	30	25
60	30	30	30	30
80	35	35	30	30
100	35	35	35	30
120	35	35	35	35
140	35	35	35	35
160	35	35	35	35
180	35	35	35	35
200	35	35	35	35
220	35	35	35	35
240	40	35	35	35
260	40	35	35	35
280	40	35	35	35
300	40	35	35	35
320	40	35	35	35
340	40	40	35	35
360	40	40	35	35
363	40	40	35	35

# FIREBOARD | GYPSUM BOARD CONSTRUCTIONS

## > R120

Project temperat. [°C]	350	400	450	500
Am/V [1/m]	Necessary thickness of the fire protection material to keep the temperature below the project temperature			
45	40	35	35	30
50	40	35	35	35
60	40	40	35	35
80	40	40	40	40
100	45	40	40	40
120	45	45	40	40
140	45	45	45	40
160	45	45	45	45
180	45	45	45	45
200	45	45	45	45
220	45	45	45	45
240	45	45	45	45
260	45	45	45	45
280	45	45	45	45
300	45	45	45	45
320	45	45	45	45
340	45	45	45	45
360	50	45	45	45
363	50	45	45	45

## > R150

Project temperat. [°C]	350	400	450	500
Am/V [1/m]	Necessary thickness of the fire protection material to keep the temperature below the project temperature			
45	45	45	40	40
50	45	45	45	40
60	50	45	45	45
80	50	50	50	45
100	50	50	50	50
120	55	50	50	50
140	55	55	50	50
160	55	55	55	50
180	55	55	55	50
200	55	55	55	55
220	55	55	55	55
240	55	55	55	55
260	55	55	55	55
280	55	55	55	55
300	55	55	55	55
320	55	55	55	55
340	55	55	55	55
360	55	55	55	55
363	55	55	55	55

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## &gt; R180

Project temperat. [°C]	350	400	450	500
Am/V [1/m]	Necessary thickness of the fire protection material to keep the temperature below the project temperature			
45	55	50	50	50
50	55	55	50	50
60	55	55	55	50
80	60	60	55	55
100	60	60	60	55
120	60	60	60	60
140	65	60	60	60
160	65	60	60	60
180	65	65	60	60
200	65	65	60	60
220	65	65	65	60
240	65	65	65	60
260	65	65	65	60
280	65	65	65	65
300	65	65	65	65
320	65	65	65	65
340	65	65	65	65
360	65	65	65	65
363	65	65	65	65

## &gt; R240

Project temperat. [°C]	350	400	450	500
Am/V [1/m]	Necessary thickness of the fire protection material to keep the temperature below the project temperature			
45	70	65	65	65
50	70	70	65	65
60	75	70	70	70
80	75	75	75	70
100	80	75	75	75
120	80	80	75	75
140	80	80	80	75
160	-	80	80	80
180	-	80	80	80
200	-	-	80	80
220	-	-	80	80
240	-	-	80	80
260	-	-	-	80
280	-	-	-	80
300	-	-	-	80
320	-	-	-	80
340	-	-	-	80
360	-	-	-	-
363	-	-	-	-

***KNAUF***



**FIRE**  **TWINT**