FOR MEDIUM-TO-LARGE
FIRESTOP PENETRATIONS

ArmaProtect CM
Firestop mortar

Firestop mortar for mixed fire seals
in walls and floors

// Blank openings
// Mixed and multiple services
// Cables, cable bundles and cable trays
// Conduit and conduit bundles
// Non-combusitble and combustible pipes
// Speed pipes

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ArmaProtect™

ENHANCING SAFETY LEVELS TO PROTECT PROPERTY AND SAVE LIVES.

PASSIVE FIRE PROTECTION (PFP) products and systems are designed to provide fire-safe circumstances in the event of a fire emergency. Often built as part of the building component, PFP measures are not visible to building users and hence often overlooked as a fire protection measure.

PFP systems include:

// Building construction
- Fire protection to the load bearing structure
- The building envelope, e.g. fire rated external walls, curtain walls etc.

// Building services
- Firefighting shafts and stairwells
- Fire rated service ducts and shafts
- Fire rated cable coatings
- Fire rated elevators for emergency use only

// Ventilation systems
- Fire rated ductwork including fire dampers
- Fire rated air transfer grilles (mechanical or intumescent)

// Compartmentation
- Partitions and floors
- Fire rated doors
- Service shafts
- Suspended ceilings
- Fire rated glazing
- Fire shutters
- Industrial fire shutters and curtains
- Cavity barriers
- Linear gap seals
- Penetration seals for pipes, cables and other services, also known as firestop systems

COMPARTMENTATION

Regulated by building codes in many countries, buildings are sub-divided into "fire compartments" and in some cases also smoke compartments. In the event of a fire emergency in a building, the strategy is to keep the fire and smoke contained within a limited area of the building (the fire compartment) for a given amount of time (referred to as the fire rating). Fire ratings are country-dependent and typically ranges between 30 and 120 minutes (partly even up to 240 minutes).

Compartmentation contributes to a holistic fire safety strategy, and firestop systems is an integral measure to be considered.

Properly designed and installed, PFP systems complement fire compartments to provide multiple levels of fire safety, such as
- Providing building users sufficient time to safely make their way to a means of egress and escape from the building
- Keeping escape routes free from smoke and other toxic gasses, and
- Allowing emergency responders to safely rescue building users from the fire scene and attempt to extinguish the fire

Fire and flames cause severe harm but a key concern for humans is the inhalation of smoke and other toxic gasses. For example, if there is a hole as small as 10 mm (0.4") in diameter penetrating a fire rated floor or ceiling between the two rooms and a fire is to occur in a room, it would take less than 3 minutes for the adjacent room to be filled with smoke. In this situation, you would not be able to see your own hand even if placed just 45 cm (18") in front of you. Incapacitation and physical impairment due to smoke inhalation occurs even faster.

Apart from being a safety issue for humans, smoke can also cause severe damage to assets and equipment, for example in hospitals and data centres.

STANDARDS

BUILDINGS ARE EQUIPPED WITH MECHANICAL AND ELECTRICAL SYSTEMS TO PROVIDE COMFORT, SAFETY AND SECURITY. SERVICES CONNECTED TO THESE APPLIANCES RUN ACROSS BUILDINGS AND PENETRATE FIRE RATED WALLS, FLOORS AND SERVICE SHAFTS, COMPROMISING THE FIRE COMPARTMENTATION STRATEGY.

Firestop systems are designed to seal penetrations of such services, including:

Insulated and non-insulated combustible pipes
Insulated and non-insulated non-combustible pipes
Single cables and cable bundles
Cable trays

These systems should be tested according to local governing fire standards and installed in line with the details shown in the fire test report.

At Armacell, safety comes first and maximum reliability is essential. As a systems solutions provider, we know firestop system requirements and standards and offer global support. This table provides an indicative overview of fire test standards for firestop systems globally.

WITH ARMACELL YOU'RE ALWAYS ON THE SAFE SIDE.

Standard	Description	Geographic coverage
EN 1366-3	Penetration seals	Europe
EN 1366-4	Linear joints	Europe
EN 13501-2	Fire classification of construction products and building elements	Europe
ISO 834	Fire resistance tests	Europe
UL 263	Fire tests of building construction and materials	Asia, Middle East, USA
UL 1479	Fire test of through-penetration firestops	Asia, Middle East, USA
UL 2079	Tests for fire resistance of building joint systems	Asia, Middle East, USA
ASTM E814-13	Standard test method for fire tests of penetration firestop systems	Asia, Middle East, USA

EUROPEAN STANDARDS

The European Standards applicable to firestop systems are EN1366-3, EN1366-4 and EN13501-2. Fire rating is measured as EI (integrity and insulation) for a specific time duration, and written as EI 60, EI 90, EI 120, EI 180 or EI 240.

- E rating (integrity, "E" from French "Étanchéité"): This is the ability of a test component to stop fire from spreading to an unexposed side as a result of penetration of flames or smoke.
- I rating (insulation, "I" from French "Isolation"): This is the ability of a test component to restrict the temperature rise of the non-heated side to below specified levels during the fire, which is not more than +140 °C and up to +180 °C.

UL 1479 FOR THROUGH-PENETRATION FIRESTOPS

This method exposes test samples of penetration firestops to a fire for a standard period of time and temperature and to an application of a hose stream. Ratings are then established based on the length of time the firestop is able to resist before the first development of through-openings or flaming on the unexposed surface, the acceptable limitation of thermal transmission and acceptable performance under the application of the hose stream test.

Two ratings are established for each penetration firestop system:

- F rating (F = fire): based upon flame occurrence on the unexposed side of the test sample and acceptable hose stream performance
- T rating (T = temperature) based on temperature rise and flame occurrence on the unexposed side of the test sample and acceptable hose stream performance.

UL 2079 FOR FIRE RESISTANCE OF BUILDING JOINT SYSTEMS

These tests are applicable to joint systems of various materials and construction intended for use in linear openings between adjacent fire resistive structures. The fire endurance ratings for joint systems are intended to register performance during the period of fire exposure and are not intended to be interpreted as having determined the acceptability of the joint systems for use before or after fire exposure.

The intent of these methods is to develop data to assist others in determining the suitability of the joint systems where fire resistance is required.These requirements are intended to evaluate the length of time that the types of joint systems specified will contain a fire during a predetermined test exposure. The test evaluates the joint system's resistance to heat and, in some instances, to a hose stream, while carrying an applied load if the assembly is load bearing.

ARMAPROTECT FIRESTOP SOLUTIONS

ArmaProtect firestop systems:

- are easy to install and highly reliable.
- have been globally tested.
- are certified in numerous combinations and configurations, making the range a "one-stop-shop" solution
- are easy to inspect and to maintain.

Large, global approved range

Excellent fire performance

ArmaProtect CM
Firestop mortar

Firestop mortar for mixed fire seals in walls and floors

- Blank openings
- Mixed and multiple services
- Cables, cable bundles and cable trays
- Conduit and conduit bundles
- Non-combustible and combustible pipes

ArmaProtect CB
Coated fireboard system with ArmaProtect ABLC Firestop coating and ArmaProtect ABLF Firestop filler mastic

Ablative coated board system for mixed fire seals in walls and floors

- Blank openings
- Mixed and multiple services
- Cables, cable bundles and cable trays
- Conduit and conduit bundles
- Non-combustible and combustible pipes

ArmaProtect CU
Firestop cushion

Firestop cushions for wall and floor openings

- Temporary or permanent sealing
- Cables and cable trays

ArmaProtect CT
Firestop cable tube

Cable tube for fire seals in walls and floors

- Blank openings
- Cables and cable bundles
- Conduit and conduit bundles
- Combustible pipes
- HVAC split-line combinations
- Ideally for retrofitting applications

ArmaProtect EXPS
Firestop sealant

Intumescent firestop sealant for mixed fire seals in walls and floors

- Blank openings
- Cables and cable bundles
- Conduit and conduit bundles
- Non-combustible and combustible pipes

ArmaProtect FW1
Firestop wrap

Firestop wrap for fire seals in walls and floors

- Cable bundles up to Ø150mm
- Combustible pipes up to Ø160mm

ArmaProtect FW2
Firestop wrap

Firestop wrap for fire seals in walls and floors

- Non-combustible pipes up to Ø323.9mm with combustible insulation
- Composite pipes
- Conduits and conduit bundles

ArmaProtect FW3
Firestop wrap

Firestop wrap for fire seals in walls and floors

- Combustible pipes Ø≤160mm (without combustible insulation)
- Combustible pipes Ø≤110mm (with combustible insulation)
- Multi-layer composite pipes Ø≤110mm

ArmaProtect FC1 and FC2
Firestop collar

Firestop collar for fire seals in walls and floors

For sealing of combustible pipes without insulation up to Ø160 mm (FC1) and Ø400 mm (FC2), respectively

ArmaProtect EFC1 and EFC2
Endless firestop collar

Endless firestop collar for fire seals in walls and floors

- Combustible pipes Ø≤ 160 mm (with and without sound insulation)
- Non-combustible pipes Ø≤ 108 mm (with combustible insulation)
- Multi-layer composite pipes Ø≤ 110 mm[1]

SOLUTIONS WITH EN TESTING (ETA)

// For small to large openings

See relevant ETA for further installation details.

	SMALL	MEDIUM	LARGE
EXCEPTIONAL SOLUTION ★★★	ArmaProtect CT ▪ Pre-installed device ▪ Clean installation ▪ Easy re-penetration ▪ Openings up to Ø116mm ▪ Up to EI 120 	ArmaProtect CB ▪ Easy re-penetration and maintenance ▪ Cable, pipe, mixed and multiple penetrations ▪ Up to EI 240 ▪ Openings up to 1.4m x 2.0m or 1.2m x 2.4m, respectively 	
SUPERIOR SOLUTION ★★	ArmaProtect EXPS ▪ Up to EI 120 ▪ Openings up to Ø150mm ArmaProtect ABLF ▪ Up to EI 90 ▪ Openings up to Ø160mm		
STANDARD SOLUTION ★	ArmaProtect CM ▪ Cable, pipe, mixed and multiple penetrations ▪ Up to EI 240 ▪ Openings up to 1.2m x 2.0m 		

// For pipe penetrations

See relevant ETA for further installation details.

	SMALL TO MEDIUM PIPE DIAMETER	LARGE PIPE DIAMETER
EXCEPTIONAL SOLUTION ★★★	ArmaProtect EFC1 and EFC2 ■ Flexible and clean installation ■ Problem solver for special applications on job site ■ Combustible pipes Ø≤ 160 mm (with and without sound insulation) ■ Non-combustible pipes Ø≤ 108 mm (with combustible insulation) ■ Multi-layer composite pipes Ø≤ 110 mm ■ Up to EI 240 	ArmaProtect FC2 ■ Pre-formed product ■ Clean installation ■ Combustible pipes Ø≤ 400mm (without insulation) ■ Up to EI 120 
SUPERIOR SOLUTION ★★	ArmaProtect FC1 ■ Pre-formed product ■ Clean installation ■ Combustible pipes Ø≤160mm (without insulation) ■ Up to EI 240  ArmaProtect FW3 ■ Flexible and clean installation ■ Combustible pipes Ø≤160mm (without combustible insulation) ■ Combustible pipes Ø≤110mm (with combustible insulation) ■ Multi-layer composite pipes Ø≤110mm ■ Up to EI 120 	ArmaProtect FW2 ■ Flexible and clean installation ■ Non-combustible pipes up to Ø323.9mm (with combustible insulation) ■ Up to EI 120 

SOLUTIONS WITH UL TESTING (ACC. TO UL 1479 / ASTM E814)

// For small to large openings

See relevant UL systems for further installation details.

	SMALL	MEDIUM	LARGE
EXCEPTIONAL SOLUTION ★★★	ArmaProtect CT ▪ Pre-installed device ▪ Clean installation ▪ Easy re-penetration ▪ Openings up to Ø116mm ▪ Up to 3 h F rating 	ArmaProtect CU ▪ Pre-formed product ▪ Clean installation ▪ Easy re-penetration ▪ For temporary and temporary use ▪ Openings up to 400mm x 200mm ▪ Up to 3 h F rating	
SUPERIOR SOLUTION ★★	ArmaProtect FW1 ▪ Flexible and clean installation ▪ Combustible pipes up to Ø160mm ▪ Cable bundles up to Ø150mm ▪ Up to 3 h fire rating  ArmaProtect FW2 ▪ Flexible and clean installation ▪ Non-combustible pipes up to Ø159mm ▪ Composite pipes ▪ Conduits and conduit bundles ▪ Up to 3 h fire rating 	ArmaProtect CB ▪ Easy re-penetration and maintenance ▪ Also tested for bus bars and ducts ▪ Up to 3 h F rating ▪ Openings up to 0.6m x 0.4m 	
STANDARD SOLUTION ★	ArmaProtect CM ▪ Up to 3 h F rating ▪ Openings up to 0.6m x 0.4m 		

// For pipe penetrations

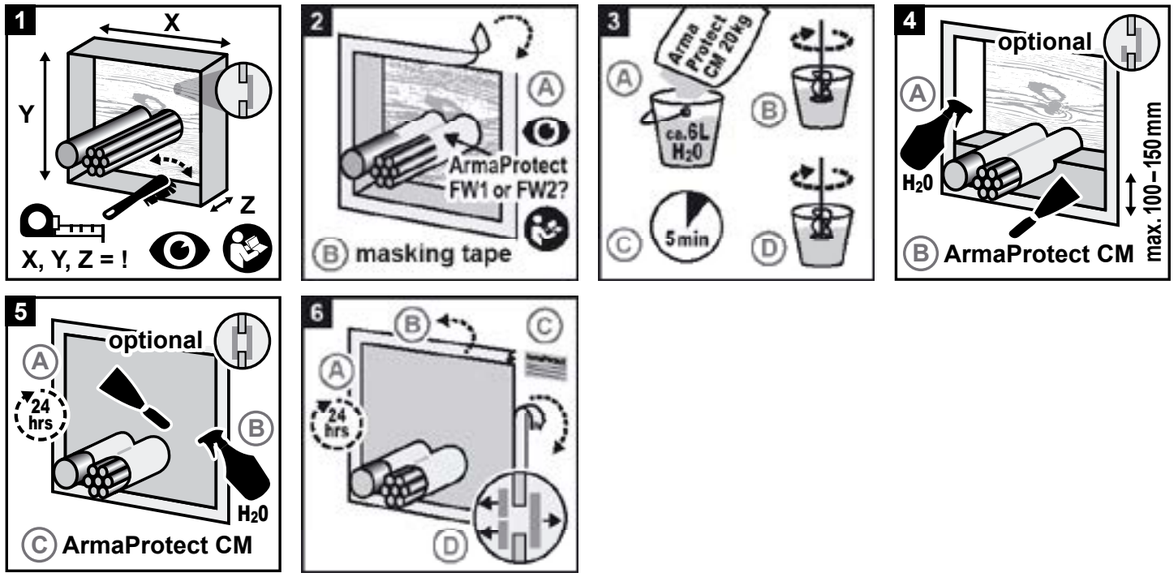
See relevant UL systems for further installation details.

	COMBUSTIBLE PIPES	NON-COMBUSTIBLE PIPES
SUPERIOR SOLUTION ★★	ArmaProtect FW1 ■ Flexible and clean installation ■ Combustible pipes up to Ø160mm ■ Also tested for cable bundles up to Ø150mm ■ Up to 3 h fire rating 	ArmaProtect FW2 ■ Flexible and clean installation ■ Non-combustible pipes up to Ø159mm ■ PE/AL/PE composite pipe up to Ø63mm ■ Also tested for PE-HD conduits up to Ø100mm (conduits Ø≤ 32mm), PE-HD conduits up to Ø50mm with speed pipe bundles and clima split bundles ■ Up to 3 h fire rating 

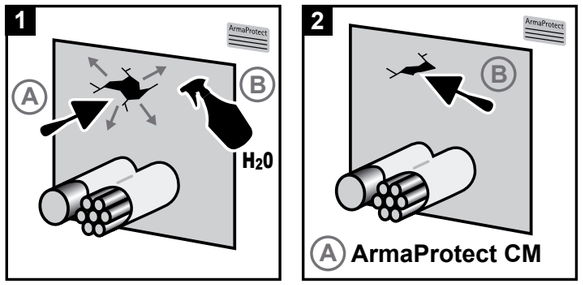
INSTRUCTIONS FOR USE

Before you begin, ensure surfaces are solid and free of any adhesion-reducing substances such as dust. Absorbent surfaces should be pre-wet with water. The mortar consistency needs to be adapted so that all components are filled without cavities.

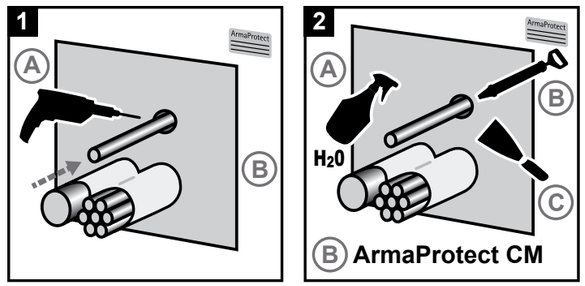
// Wall installation



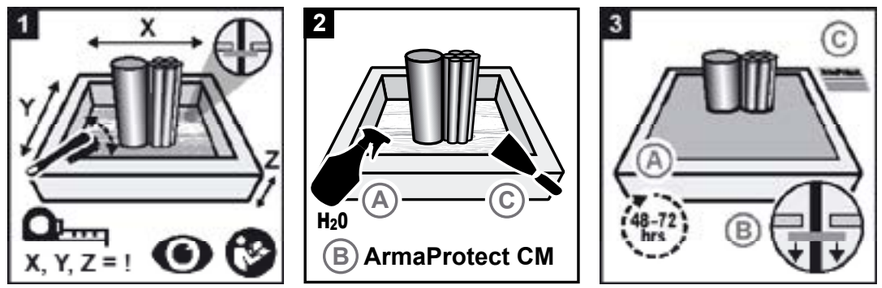
// Repairing cracks



// Repenetration



// Floor installation



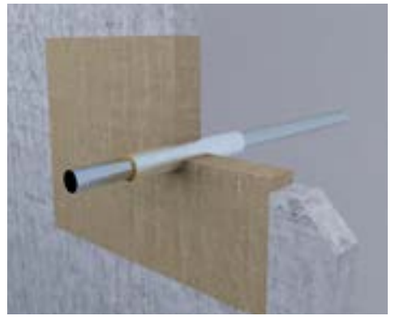
// Consumption guide

Approximate consumption [kg]			
Maximum sealing size [m³]	**0% services**	**30% servces**	**60% services**
0.01	1.50	1.05	0.60
0.02	3.00	1.10	1.20
0.03	4.50	3.15	1.80
0.05	7.50	5.25	3.00
0.10	15.00	10.50	6.00
0.20	30.00	21.00	12.00
0.30	45.00	31.50	18.00
0.50	75.00	52.50	30.00
1.00	150.00	105.00	60.00

Take note of potential material loss during application at the job site.

MAIN APPLICATIONS ACC. ETA-22/0064





In drywalls[1]

Base material	Drywall
Base material thickness	⩾ 100 mm
Seal thickness	⩾ 100 mm
Maximum seal size (wall)	550 mm x 600 mm
Penetrants • Cables ⩽ Ø 80 mm[2] • Cable bundles ⩽ Ø 150 mm (with cables ⩽ Ø 21 mm)[2] • Cable trays[2] • Plastic conduits ⩽ Ø 32 mm (with cables ⩽ Ø 21 mm)[3] • Plastic conduit bundles ⩽ Ø 100 mm (conduits ⩽ Ø 32 mm, with cables ⩽ Ø 21 mm)[3] • Plastic conduits ⩽ Ø 32 mm (with cables ⩽ Ø 21 mm)[3] • PE lines "speed pipes" (24 x ⩽ Ø 7.0 mm, 7 x ⩽ Ø 10.0 mm, 5 x ⩽ Ø 12.0 mm)[1]	up to EI 120[1]

[1] See ETA-22/0064 for further installation details.
[2] For cables > 21 mm and cable bundles use 2 x 2-layer ArmaProtect FW2, 125 mm outside seal.
[3] Use 2 x 2-layer ArmaProtect FW2, 50 mm inside seal / 75 mm outside seal.

In solid walls and concrete floors[1]

Base material	Concrete wall, aerated concrete wall, masonry wall, concrete floor
Base material thickness	⩾ 150 mm (wall) ⩾ 150 mm (floor)
Seal thickness	⩾ 150 mm (wall) ⩾ 150 mm (floor)
Maximum seal size (wall)	1200 mm x 1200 mm
Maximum seal size (floor)	1200 mm x 2000 mm
Penetrants • Cables ⩽ Ø 80 mm[2] • Cable bundles ⩽ Ø 100 mm (with cables ⩽ Ø 21 mm)[3] • Cable trays[1] • Plastic conduits ⩽ Ø 63 mm (with cables ⩽ Ø 21 mm)[4] • Plastic conduit bundles ⩽ Ø 100 mm (conduits ⩽ Ø 32 mm, with cables ⩽ Ø 21 mm)[5] • PE lines "speed pipes" (24 x ⩽ Ø 7.0 mm, 7 x ⩽ Ø 10.0 mm, 5 x ⩽ Ø 12.0 mm)1 • Non-combustible pipe with mineral wool insulation (steel pipes ⩽ Ø 323.9 mm, copper pipes ⩽ Ø 88.9 mm)[1] • Non-combustible pipe with FEF insulation (steel pipes ⩽ Ø 168.3 mm, copper pipes ⩽ Ø 108 mm)[1] • Multilayer composite pipes ⩽ Ø 63 mm[1] • Combustible pipes ⩽ Ø 160 mm[1] • HVAC split-line-combinations[1]	up to EI 120[1]

[1] See ETA-22/0064 for further installation details.
[2] For cables ⩽ 50 mm use 2 x 2-layer ArmaProtect FW2, 125 mm outside seal, for cables > 50 mm use 2 x 2-layer ArmaProtect FW2, 125 mm (EI 90) or 150 mm (EI 120) outside seal.
[3] Use 2 x 1-layer ArmaProtect FW2, 125 mm outside seal.
[4] Use 2 x 2-layer ArmaProtect FW2.

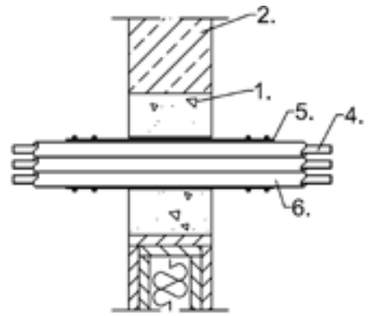
In solid walls and concrete floors[1]

Base material	Concrete wall, aerated concrete wall, masonry wall, concrete floor
Base material thickness	⩾ 240 mm (wall) ⩾ 200 mm (floor)
Seal thickness	⩾ 240 mm (wall) ⩾ 240 mm (floor)
Maximum seal size (wall)	600 mm x 600 mm
Maximum seal size (floor)	600 mm x 600 mm
Penetrants • Cables ⩽ Ø 80 mm[1] • Cable bundles ⩽ Ø 100 mm (with cables ⩽ Ø 21 mm)[1] • Cable trays[1]	up to EI 240[1]

[1] See ETA-22/0064 for further installation details.

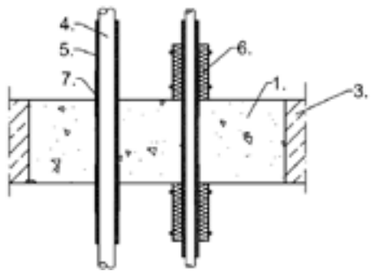
// Typical ETA approved systems[1]

Wall application



Legend
1. ArmaProtect CM
2. Rigid wall
4. Cable
5. ArmaProtect FW2
6. Plastic conduits

Floor application



Legend
1. ArmaProtect CM
3. Rigid floor
4. Non-combustible pipe
5. FEF insulation
6. Protection insulation made of mineral fibre mats / shells
7. ArmaProtect FW2

[1] See ETA 22/0064 for further installation details.

OTHER APPROVED APPLICATIONS ACC. ETA-22/0064

ArmaProtect CT firestop cable tube (150 mm length) in ArmaProtect CM penetration for retrofitting in walls[1]	
Penetrants	
• Cables ⩽ Ø 50 mm[1]	up to EI 90[1]
• Cable bundles ⩽ Ø 107 mm (with cables ⩽ Ø 21 mm)[1]	
• Plastic conduits ⩽ Ø 32 mm (with cables ⩽ Ø 14mm)[1]	
• HVAC split line combinations[1]	

[1] See ETA-22/0064 for further installation details.

UL APPROVED SYSTEMS

// Typical UL approved systems[1]

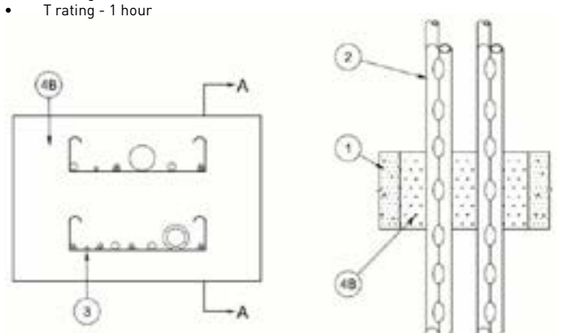
Penetrants	
• Cables trays	⩽ 300 mm width
• PE-HD conduit bundles	⩽ Ø 100 mm (conduits ⩽ 32mm)

[1] See relevant UL system for further installation details.

// Selected exemplary UL approved systems

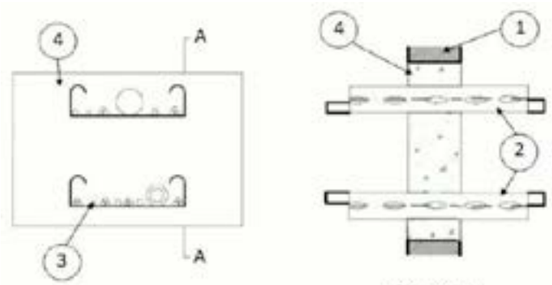
System No. F-A-4025 (cable tray in floor opening)

ANSI/UL 1479 (ASTM E814)
- F rating - 3 hours
- T rating - 1 hour



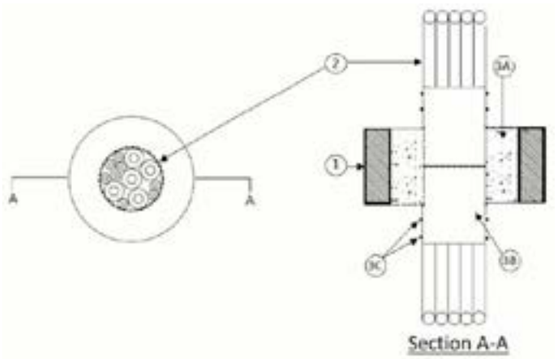
System No. W-J-4107 (cable tray in wall opening)

ANSI/UL 1479 (ASTM E814)
- F rating - 2 hours
- T rating - 2 hours



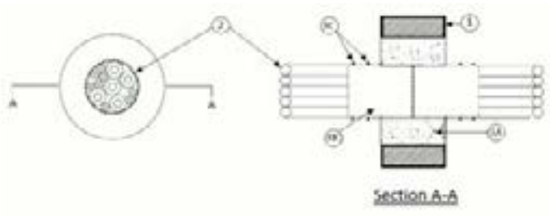
System No. F-A-8061 (PE-HD bundle in floor opening)

ANSI/UL 1479 (ASTM E814)
- F rating - 3 hours
- T rating - 2 hours



System No. W-J-8090 (PE-HD bundle in floor opening)

ANSI/UL 1479 (ASTM E814)
- F rating - 3 hours
- T rating - 1 hour



TECHNICAL DATA - ARMAPROTECT CM FIRESTOP MORTAR

Brief description	ArmaProtect CM is a cementitious-based firestop mortar used to maintain the fire resistance performance of fire penetrations in walls and floors.
Material type	Cementitious based firestop mortar.
Additional material information	6 - 7 l water + 20 kg dry mortar ≈ 20 l ready-to-use wet mortar ≈ 20 l volume after hardening
Product colour range	Grey
Product range	Available as a 20 kg bag of mortar. 25 bags on a pallet.
Applications	Firestop mortar for mixed fire seals in walls and floors for blank openings, mixed and multiple services, cables, cable bundles and cable trays and non-combustible and combustible pipes.
Installation	For professional use only. Refer to third party published listings, national approvals / assessments and Armacell's product literature for specific application details as well as before handling this product.
Declaration of Performance (DoP)	ArmaProtect CM

Approvals and compliance

Specification compliance	• ETA-22/0064 acc. EN 1366-3	• UL acc. UL 1479 (ASTM E814)

Property	Value/Assessment	Standard/Test method
Temperature range		
Operating temperature	5 °C to 200 °C (41 °F to 392 °F)	
Application temperature	5 °C to 25 °C (41 °F to 77 °F)	
Storage and transportation temperature	5 °C to 25 °C (41 °F to 77 °F)	
Mechanical properties		
Dry bulk density	ca. 900 kg/m^3	EN 998-2
Bulk density	1200 ± 100 kg/m^3 (fresh mortar)	EN 998-2
Pressure resistance	M 2.5	EN 998-2
Fire performance		
Reaction to fire	Class A1	EN 13501-1
Resistance to fire	See Annex	
Health and environment		
Emission of dangerous substances	No dangerous substances.	ETAG 026-02
Other technical features		
Durability and serviceability	Use category type Z_2	EOTA TR 024
Cure time	Fully cured after approximately 28 days.	
Safety information	Please refer to the safety data sheet available on our website.	
Shelf life	Can be kept for at least 12 months unopened if stored properly.	
Storage	Store in a cool and dry place with an ambient temperature of 5 °C to 25 °C and protect from frost.	

Firestop mortar

Item	Description	Content
PRO-CM-20kg	ArmaProtect CM Firestop mortar	20 kg

Firestop wrap

Item	Description	Content
PRO-FW1-10m	ArmaProtect FW1 Firestop wrap	10 m
PRO-FW2-10m	ArmaProtect FW1 Firestop wrap	10 m

Firestop cable tube

Item	Description	Content
PRO-CT-S060	ArmaProtect CT Firestop cable tube 150 mm / Ø 60 mm packed as 1 cable tube with 2 soft plugs	30 set(s)
PRO-CT-S090	ArmaProtect CT Firestop Cable tube 150 mm / Ø 90 mm packed as 1 cable tube with 2 soft plugs	24 set(s)

Firestop wrap.

Item	Description	Content
PRO-ID-SET	ArmaProtect ID identification plate set	5 pieces

00580 | ArmaProtect CM | ArmaProtect | PDS | 022022 | en-WW

ABOUT ARMACELL

As the inventors of flexible foam for equipment insulation and a leading provider of engineered foams, Armacell develops innovative and safe thermal, acoustic and mechanical solutions that create sustainable value for its customers. Armacell's products significantly contribute to global energy efficiency making a difference around the world every day. With more than 3,000 employees and 24 production plants in 16 countries, the company operates two main businesses, Advanced Insulation and Engineered Foams. Armacell focuses on insulation materials for technical equipment, high-performance foams for high-tech and lightweight applications and next generation aerogel blanket technology.

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For more information, please visit:
www.armacell.com