



FIRESTOP IN WOOD CONSTRUCTION

Solutions for
direct installation



INTRODUCTION TO WOOD CONSTRUCTION

WOOD construction on the rise

Wood has been used as a base material for construction for centuries. Due to improvements in technology and industrialization, wood constructions have gained high adaptation.

After centuries of use, wood is experiencing a renaissance as a building material. There are many advantages of wood over classic mineralic building materials, like sustainability as a renewable raw material, energy efficiency based on very good insulation values, high form stability at low net weight, construction time advantages, dry construction methodology. These advantages are becoming more and more convincing for building owners, planners, architects and engineers

Approximately 20 years ago, mass timber was born – the collective term for a set of industrially produced wood elements that offer static characteristics comparable to concrete and steel and also perform well under fire conditions.

Mass timber construction with Cross Laminated Timber (CLT), Glued Laminated Timber (Glulam) and others as a new set of in depth researched base materials enables significant regulatory changes across the globe that boost wood as a building material. This goes along with expanding the use of wood beyond today's main use in (single-family) residential housing projects with light duty framing structures into high-rise residential/commercial buildings.

Level of engineering



Traditional wood construction (sample)



Framing wood construction (sample)



Engineered wood construction (sample)

MEGATRENDS PROPEL CONSTRUCTION IN WOOD

Some global trends will significantly impact the traditional construction industry with new growth rates for wood as a construction material.



Climate change

- Cement industry is among the largest CO₂ emission producers¹
- Many states and countries have goals to reduce CO₂ emission.²



Demographic change

- Limited space in metropolitan areas leads to “vertical densification” (on-top construction)
- Cost efficient: modular constructions



Digitalization

- Digital planning and modelling allows for mass timber designs to take advantage of fully modularization

1: The Cement Sustainability Initiative 2002
 2: https://ec.europa.eu/clima/policies/strategies/2050_en

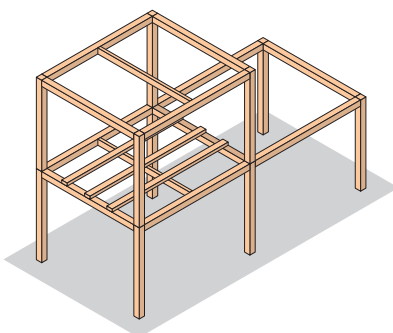
WOOD CONSTRUCTION METHODS

- Wood is an efficient and capable construction material. Its stability is comparable to concrete structures. And the production process is versatile. Wood has positive effects on indoor climate and is more sustainable than other materials.
- The main constructions in wood are driven by different setups and also influencing performances such as fire resistance.
- In general we distinguish in three major design and construction methods. a) Skeleton / lattice, b) Timber frame, c) Massive wood construction. No matter which methods are taken into consideration or even if so-called hybrid constructions with concrete: an intense and early planning is crucial. The big advantages in respect to productivity only count and become relevant, if special competencies of all involved stakeholders are considered in early phases of a project.

Wood light construction

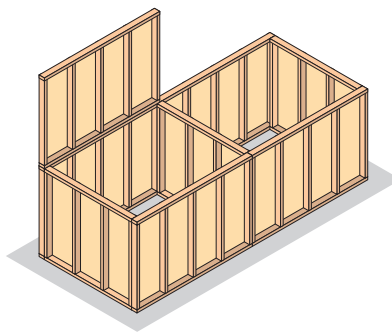
Skeleton / lattice

- Economical, low material usage
- Many design variations
- High voluminous buildings



Timber frame

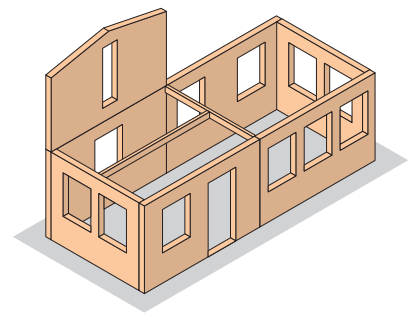
- Higher pre construction depth
- Space savings possible
- Modular construction



Massive timber construction

Massive

- High level of building stability
- Very good static properties / load bearing
- Modular construction
- Good for multilevel buildings



DIFFERENT TYPES OF ENGINEERED WOOD

Prevalence



CLT (Cross-laminated timber):

Cross-panelized (i.e. layers glued at 90° angle, e.g. 3, 5, 7, 9 layers) structural engineered wood with strong structural rigidity. Primarily used for walls, roofs and floors.



Glulam/GLT (Glue Laminated Timber):

Parallely panelized structural wood. Used in both columns and in roofing trusses and supports.



LVL (Laminated Veneer Lumber):

Thin layers of wood (<3mm) laminated using adhesives. Higher tensile and load carrying capacity than GLT. Commonly used as beams and trusses



NLT/DLT (Nail/Dowel Laminated Timber):

Nail reinforced panelized structural wood. Used in flooring, roofing and walls as well as elevators and stair shafts.

Cross Laminated Timber (CLT) is the most prevalent for fire rated floors and walls

WOOD CONSTRUCTION AND FIRE PROTECTION

- Wood construction methods have become more high-performing, capable and technically calculable. Therefore the usage of special wood construction methods like CLT have become highly relevant and used in multi level buildings.
- One topic though, fire, is a predominant concern and has led to many discussions and developments. Wood is a combustible material, but the charring layer that forms while burning leads to a calculable burn rate. The load-bearing behaviour of wood can therefore also be calculated mathematically under the influence of a fire. Compared to steel and reinforced concrete structures, wooden structures remain stable even at very high temperatures.
- Wood helps to protect itself in case of fire. It develops a charring layer which poorly conducts heat. This can be calculated based on the time and intensity of the fire. The inner layers and load bearing wooden core can be protected from collapse or burn-through for a defined time range. In average it can be assumed that this charring burn-up is approx. 0,7 mm per minute. In other words: in 30 minutes the cross section of naturally left wooden building elements is reduced by approx. 2cm, in 60 min by approx. 4 cm.
- To achieve the required fire resistance ratings of fire walls and floors, the burn-up is added to the static required cross-section. As a result the uncontrolled propagation of fire into the different compartments of a building is secured. The mass-burning rate is calculated in dependency of the wood construction type (CLT, etc.).
- With these measures it is possible to construct wall and floor elements with fire resistance ratings of 30, 60 and even 90 minutes (acc. to EN13501-1).
- Alternatively, in the case of multilevel wooden buildings, gypsum plaster boards are also installed and cover the wooden elements additionally. Advantageously, in case of of a fire, these boards are able to release encapsulated water. Therefore, engineers and architects prefer to construct wooden buildings without such elements to leverage on the wood as an optical design element.

BURNABILITY OF WOOD

- The burnability resp. the burning behavior can be classified according to the European classification system EN13501-1. Whereas non-burnable materials do not pose a fire load, burnable materials can have a part to the fire development.
- The building law framework for the use of wood in multi-storey building projects can be derived from the flammability of the building material, possible building materials depending on the fire resistance period and the required fire resistance period of the components depending on the building class.
- EN13501-1 and the related German norm DIN 4102-1 defines 6 building material classes from A (no contribution to fire) to F (no performance determined). In addition to fire behaviour, the European standard regulates the side effects: smoke development and flaming droplets or debris.

DIN 4102-1	Building inspectorate requirement	DIN EN 13501-1	Additional requirements	
			No smoke	Not a burning one Falling off / dripping off
A1	Non-flammable	A1	■	■
A2		A2-s1, d0	■	■
B1	Fire retardant	B-s1,d0; C-s1, d0	■	■
		A2-s2,d0; A2-s3,d0		■
		B-s2,d0; B-s3,d0		■
		C-s2,d0; C-s3,d0		■
		A2-s1,d1;A2-s1,d2	■	
		B-s1,d1; B-s1,d2	■	
		C-s1,d1; C-s1,d2	■	
		A2-s3,d2; B-s3,d2; C-s3,d2		
B2	Flammable	D-s1,d0; D-s2,d0		■
		D-s3,d0; E		■
		D-s1,d1; D-s2,d1		
		D-s3,d1; D-s1,d2		
		D-s2,d2; D-s3,d2		
		E-d2		
B3	Highly flammable	F		

*DIN EN 13501-1 „Classification of building products and types of construction in terms of their reaction to fire - Part 1: Classification with the results from the tests on the fire behavior of building products,„

The majority of wood building materials are classified as follows according to the European classification: D-s2, d0. Wood is normal flammable, has smoke development class 2 and does not drip while burning (charring layer).

FIRE RESISTANCE BEHAVIOUR OF WOOD

The European classification system is based on various fire resistance tests. The relevant test standard for the fire resistance of structures including firestop products is EN1366-3 „Fire resistance tests for installations-Part 3: Penetrations”.

The European system allows a classification according to different criteria with the respective specification of the fire resistance period in minutes. The following criteria are primarily relevant for the construction elements and penetration seals.



Criteria	Interpretation	Abbreviations
Load capacity	Measurement of the structural stability of an element in the event of fire	R – Resistance (Load bearing capacity)
Fire protection	Measurement of the ability of an element to prevent the passage of gases and flames in the event of fire	E- Integrity
Thermal Insulation	Measurement of the insulation capacity of an element, i.e., the period in which the side of the element facing away from the fire does not exceed a temperature increase of 180 K relative to the ambient temperature	I – Insulation

Extract of the classification criteria according to EN13501-1

The classifications of firestop penetration systems can be done from EI 15 to EI 240 minutes.

The tests and reports of a manufacturer of penetration systems then enable clear statements of the functionality of firestop systems in relation to integrity and temperature ratings in a wooden building. The ratings of wooden walls and floors in respect to additional load bearing capacities have to be considered separately.

WOOD AND FIRE

Conclusion

Fire protection and wood – these are not two areas which contradict each other.

Wood in fact is a construction material with many advantages and, if constructed correctly, helps to improve safety in the case of a fire. The natural properties as well as the correct planning of fire resistance topics based on test evidence ensure a proper fire protection.

Construction which exhibit an adequate fire resistance, will avoid fire, heat and smoke propagation into neighbouring compartments and therefore secure a high level of live safety and asset protection even in highrise constructions as well as in critical building segments like hospitals, hotels, schools or residential dormitories.

HILTI SUPPORTS FIRESTOP SOLUTIONS FOR DIFFERENT WOOD CONSTRUCTION METHODS

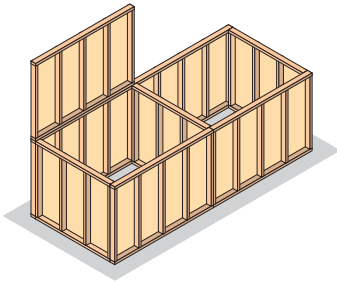
Different requirements

Depending on the purpose of the building, different wood construction methods could be used (framed, massive wood construction). In this case the advantages of the different methods come into play. The construction requirements as well as the firestopping methods depend on the type of the construction and the desired fire rating.

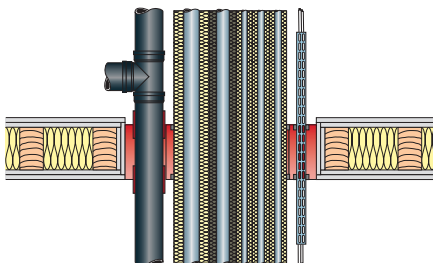
Different firestopping methods

Hilti supports different methods of timber construction with fire protection solutions that have been established in the traditional concrete construction for years. Through global approvals and assessments, evidence from independent testing institutes and our technical consultants, Hilti helps make the planning process in timber construction easier and with tested firestop systems or engineering judgements.

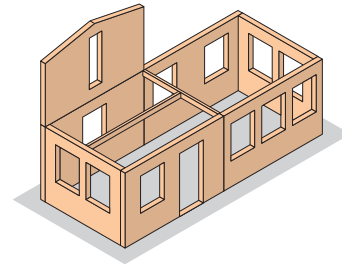
Framed wood



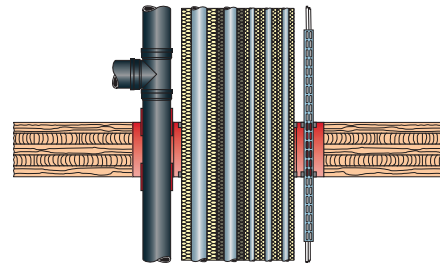
- Creation of formwork with gypsum board around the opening
- Apply Hilti pre-formed products



Massive wood (CLT)



- No formwork required
- Direct installation of firestop products on CLT
- Apply Hilti pre-formed products

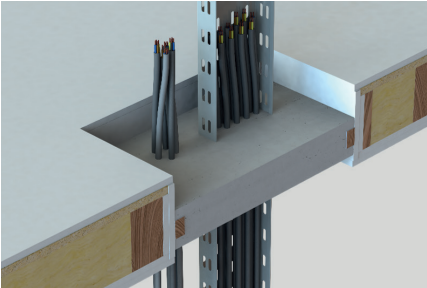
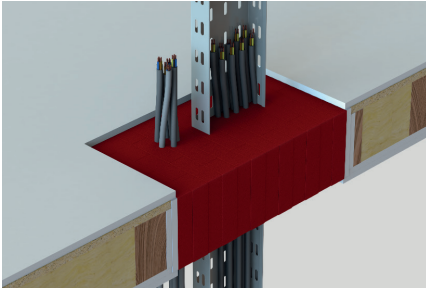



HILTI CAN OFFER FIRESTOP SOLUTIONS FOR MANY CASES

Correctly sealed pipe and cable penetrations hinder fire and smoke propagation in a building. Therefore tested firestop systems should be installed in fire rated walls and floors.

Different methods can be applied, like traditional mortar based penetrations, traditional framed penetrations with traditional or innovative Hilti dry solutions like firestop blocks or collars or, and this is new, completely unframed designs specifically tested by Hilti.

The firestop solutions from Hilti now offer also tested systems for many different wood construction elements with 30, 60 or even 90 minute fire resistance ratings.

Traditional		New tested solutions
		
<ul style="list-style-type: none"> • Framing required • Wet firestop solutions („concrete in wood construction“) • Generally valid assessments 	<ul style="list-style-type: none"> • Framing required • Dry, productive firestop solutions • Generally valid assessments 	<ul style="list-style-type: none"> • No framing required • Testing of floor and wall systems

Hilti Differentiation

TRADITIONAL FIRESTOP APPLICATIONS WITH MORTAR

Step 1:

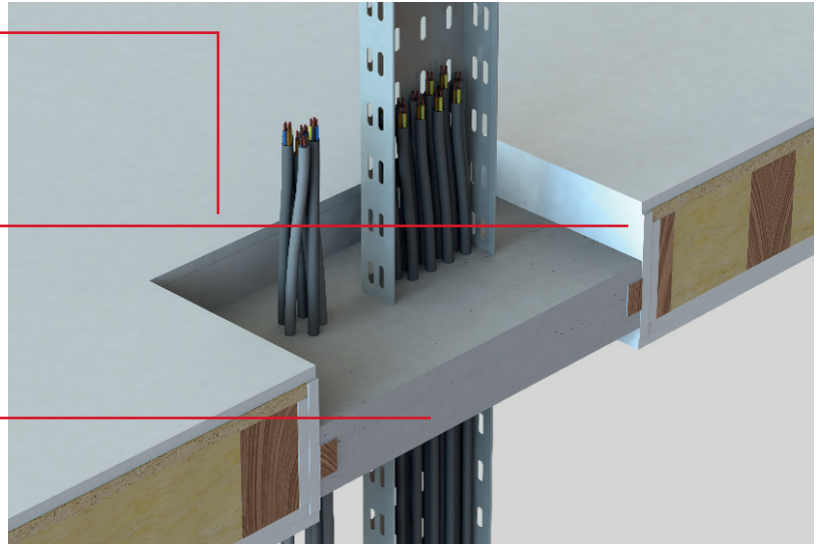
Creation of a rectangular opening around the penetrations

Step 2:

Installation of 2 layers of gypsum board at each side of the opening

Step 3:

Use of mortar to seal the opening



- ✓ No special approvals needed as the FS products are installed on the gypsum boards – standard approvals for drywalls
- ✓ Applicable for all wood types
- ✗ Limits productivity as installation and curing takes time
- ✗ Mortar is not a dry solution and it can bring water into the construction

Mortar application



TRADITIONAL FIRESTOP APPLICATIONS WITH “DRY” SOLUTIONS

Step 1:

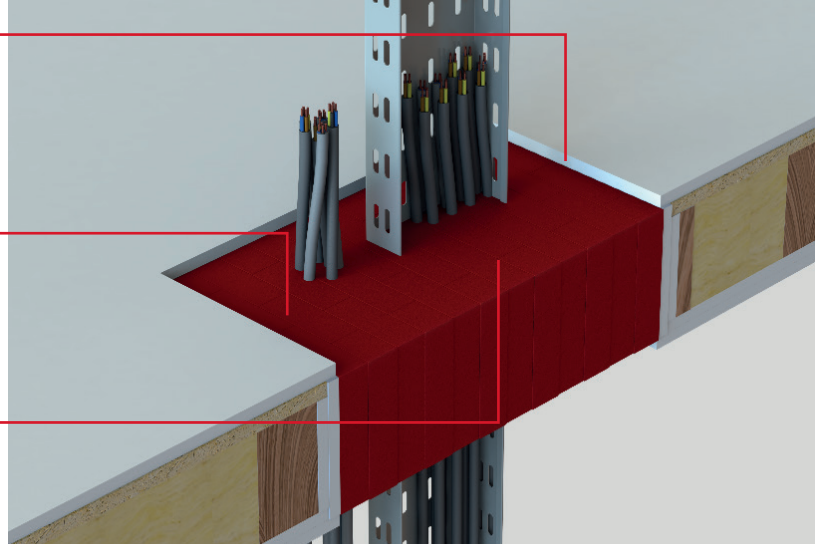
Creation of a rectangular opening around the penetrations

Step 2:

Installation of 2 layers of gypsum board at each side of the opening

Step 3:

Use of preformed products instead of mortar

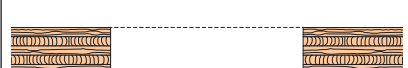

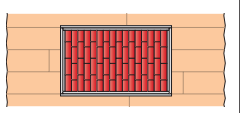

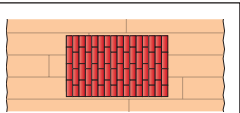


- ✓ No special approvals needed as the FS products are installed on the gypsum boards- standard approvals for drywalls
- ✓ Applicable for all wood types
- ✓ Preformed products easy to be installed
- ✗ Productivity issues as installation of gypsum board requires extra effort

Dry solutions application



OUR INNOVATIVE SOLUTIONS FOR CLT HELP YOU SAVE SPACE AND TIME

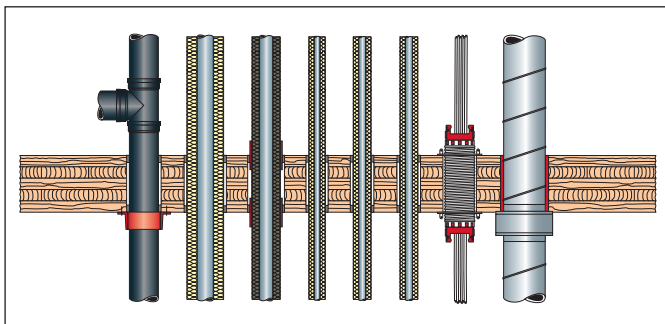
	Installation Steps	Space required
Systems with casing	 <p>Step 1: Create a blank opening</p>  <p>Step 2: Install 2 layers of gypsum board beneath and inside the opening</p>	 <p>Note: Framing occupies more space and reduces the usable space</p>
Tested solutions without casing	 <p>Step 1: Create a blank opening</p>	 <p>Note: More usable space available as framing with gypsum board is not required</p>

With Hilti tested solutions you save space and reduce the installation steps

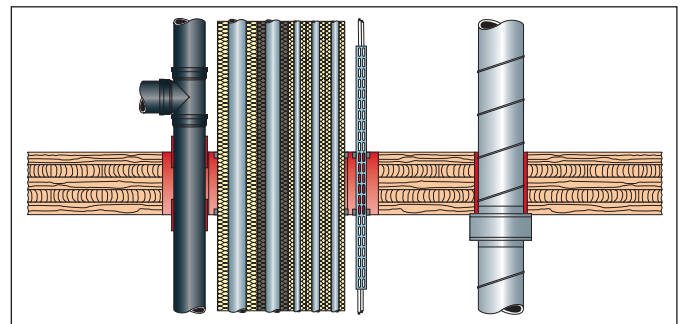
... AND MEET THE REQUIREMENTS OF THE DIFFERENT PLANNING METHODS

Large or single openings: different options available

Designing building services installations can be very complex and may require high precision.



Single openings: Hilti firestop solutions for cables, metal and plastic pipes and ventilation ducts



Large openings: Hilti firestop solutions for shafts with mixed applications

WOOD CONSTRUCTION COMES WITH EFFICIENCY BUT ALSO GREAT CHALLENGES

Early planning

Whether it is a wooden frame, massive timber or hybrid construction with concrete, an early and precise planning is necessary to increase efficiency and eliminate jobsite mistakes. The productivity gain in timber construction through prefabrication only comes into play if all building aspects and requirements are taken into account from an early phase.

Firestop planning is crucial

Fire protection in timber construction requires timely planning with the involvement of all relevant planners. The early selection of suitable fire protection solutions can not only help with productivity, but also eliminate unexpected costs. Passive fire protection in wood has been a grey area with limited or no approved solutions in the market so far.

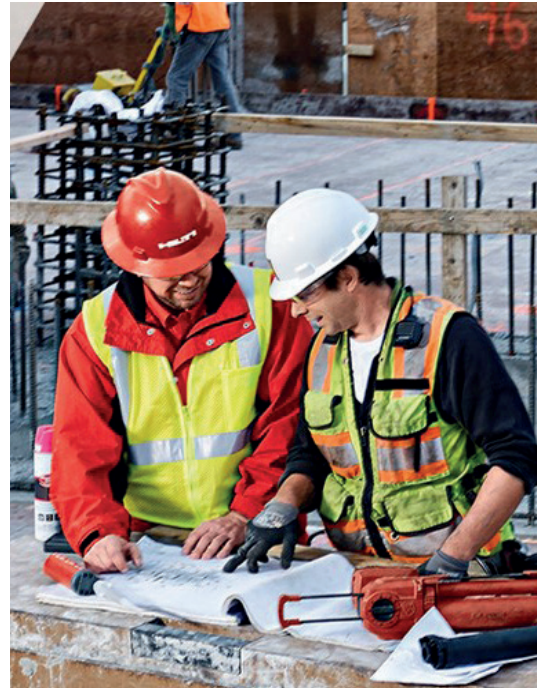


HILTI IS YOUR PARTNER FROM DESIGN TO MAINTENANCE

Plan your fire protection with Hilti

- Our specialists are there for you, to support you from the pre-planning and detailed design to project execution and commissioning.
- A rich library of technical 2D drawings contains all the key details that usually get buried in the approval texts. The technical drawings combined with supplementary documents such as product assessments, specification texts and support a quick design process.
- For your CAD design, you can find our fire protection solutions as 2D and 3D BIM objects in the extensive Hilti BIM / CAD library.
- For complex design requirements which are not approved by international guidelines, our experts help to provide additional information to support customers to do engineering judgements for project-based solutions.
- During the construction phase, our experienced engineers provide on-site support and consultation on the installation process to help minimize jobsite mistakes.
- For an easier inspection process and maintenance of the firestop applications, the Hilti Documentation Manager software available online, helps you keep your installation records up-to-date.

Hilti Fire Protection experts will be happy to provide you with personal support. Simply speak to your Hilti team about it.



Project references

Walden 48 in Berlin, Germany: Fire protection solution for combination seals in cross laminated timber walls in an apartment building of building class 5.

Fire-resistant seals in solid wood walls were required for the distribution of the building services on each floor. The tested Hilti Firestop Block CFS-BL P was used as a combined solution for a design in exposed wood and the common cable routing within an opening. This dry fire protection solution fulfilled additional noise protection requirements.



WOOD MANUFACTURERS

CLT constructions are characterized by the setup with different layers, and are therefore massive and solid. Through the conglutination of the longitudinal and transverse layers the «workability» of wood is reduced to a minimum, basically a monolithic building material, with positive effects on fire protection and acoustic values. Hilti conducted various fire tests in connection with different wood CLT constructions. Floors and walls from different manufacturers are basically divided by number of layers, thickness of layers, and structure of layers. Most manufacturers offer CLT elements from 3 up to 11 layers. The thickness of layers are in most cases between 20 and 60mm. Overall relevant thicknesses therefore can go from 80 (EI30) to more than 180mm for an EI90 rating of the wall.

For the fire resistance classifications and the relevant technical information contact the wood manufacturer.

The following cross-laminated timber products can be used in combination with Hilti fire protection products. Additional tests for manufacturers with special constructions of wall and floor complete slabs have been conducted as well. The list and the overview of wood manufacturers gives some examples and is not exhaustive.

Producer	Product name	ETA	DIBt	Further evidence
Best Wood Schneider	best wood CLT	ETA-21/0568	Z-9.1-874	
Binderholz	Brettsperrholz BBS	ETA-06/0009	Z-9.1-534	CSTB Avis Technique 3.3/14-784 ICC-ES Certificate binderholz CLT BBS ESR-4081 ANSI/ APA PRG-320-2019
Derix	X-LAM	ETA-11/0189		
Eugen Decker	ED-BSP Elemente	ETA-12/0327		
HASSLACHER	HASSLACHER Cross Laminated Timber	ETA-12/0281		
KLH Massivholz	KLH® - CLT	ETA-06/0138		CSTB DTA 3.3/20-1016_V1:2020
Mayr-Melnhof Holz	MM-crosslam	ETA-09/0036		
Pfeifer Timber GmbH	Pfeifer CLT	ETA-20/0023		
Schilliger Holz	Schilliger Grossformatplatte®/CLT	ETA-19/0675		CSTB Avis Technique 3.3/17-920
Stora Enso	CLT – Cross Laminated Timber	ETA-14/0349		CSTB Avis Technique 3.3/15-798_V4 ICC-ES Listing Report ESL-1170
ZÜBLIN Timber	LENO®-Brettsperrholz	ETA-10/0241		
Xlam Dolomiti	XLAM	ETA-12/0347		
HOISKO	CLT	ETA-18/0621		



© binderholz Brettsperrholz BBS

Hilti offers firestop solutions for applications in exposed timber (without additional planking) for fire resistance of 30, 60 and 90 minutes. The results are based on fire tests performed at the Testing Laboratory for Fire Resistance and Reaction to Fire Testing "IBS Linz". The results are shown in the following classification reports.

Firestop Bandage CFS-B: 319091602-B / B
Acrylic Sealant CFS-S ACR: 319091602-C / ACR
Firestop Cable Collar CFS-CC: 319091602-E / CC
Firestop Endless Collar CFS-C EL: 319091602-J / CEL
Flexible Firestop Foam CFS-F FX: 319091602-F / FX
Firestop Speed Sleeve CFS-SL GA: 4789669807- SL GA
Firestop Module Box: 319091602-D / MB
Firestop Block: 319091602-H / BLP200, 319091602-I / BLP130

The results shown are applicable to different types of CLT or Glulam elements.

With reference to the "Expert Opinion No. 319111301-1, Rev.3 on supporting constructions made of wood", issued by IBS Linz, in combination with Hilti firestop products.

APPLICATIONS INTRO

The following supporting documents and assessments are based on intense fire tests according to EN1366-3 for cable penetrations, pipe penetrations and mixed penetrations. They were conducted in close cooperation with accredited and established test institutes. As firetesting of penetration seals in different wood constructions is a new journey for all stakeholders, Hilti will assist you with more technical details and services as well as engineering judgements wherever possible.

Fire resistance ratings are available for up to EI90 for many construction elements and manufacturers. The following documents can be used as further guidance and information:

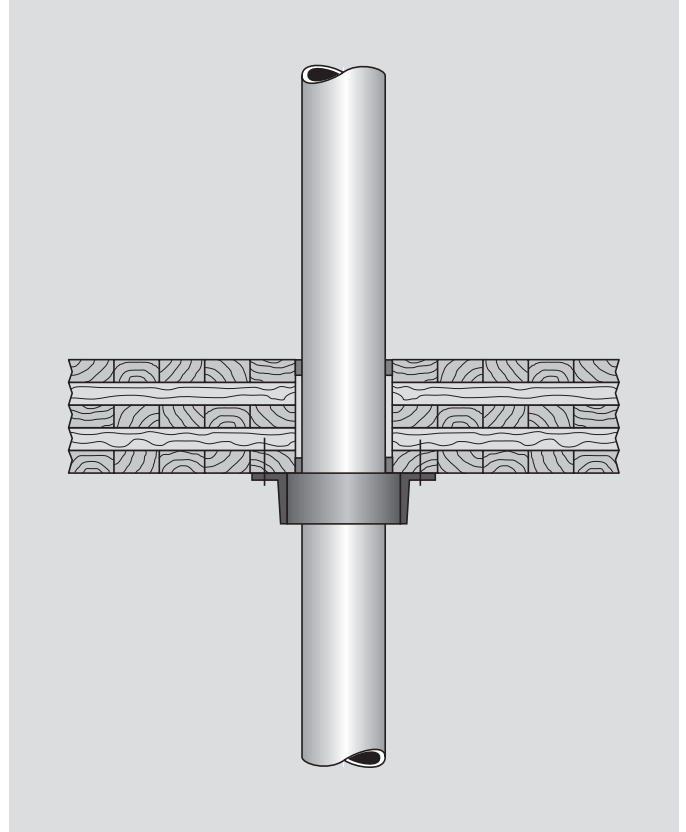
TECHNICAL DETAILS FOR FLOOR APPLICATIONS ACC. TO EN 1366-3

The following overview of applications just gives a generic overview and represents examples for EI60 fire resistance ratings. All details of tested and approved wood constructions, installations and specific fire resistance ratings please review the respective reports and approval documents as well as the respective instructions for use.



WASTE WATER AND ROOF DRAINAGE APPLICATIONS

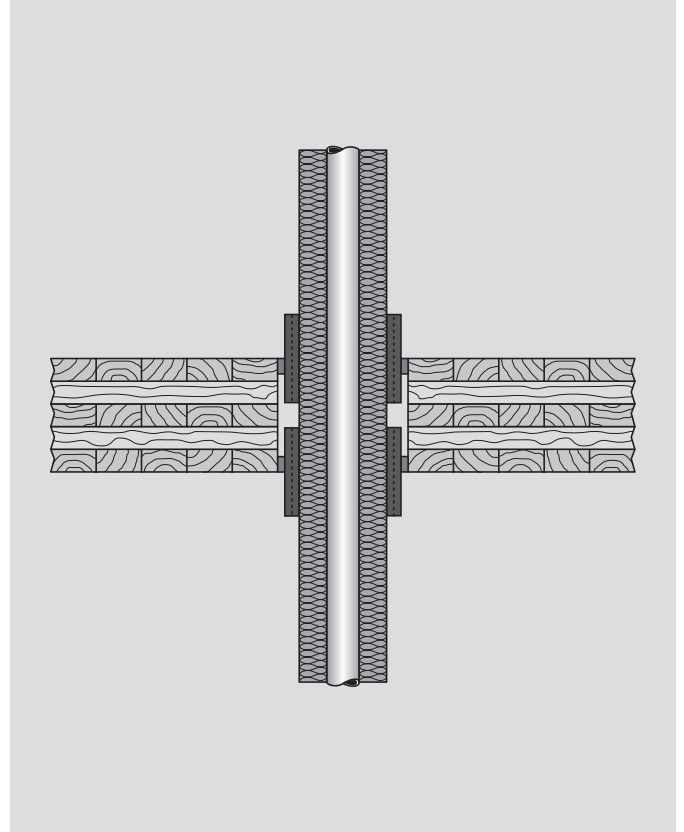
Burnable plastic pipes \varnothing 50–110 mm



- E160 U/U, application also available for E130 and 90 fire resistance ratings
- Burnable plastic pipes \varnothing 50-110mm , different PP pipes (e.g. Geberit Silent dB20), PP-H pipes, PE-HD, ABS, PVC-C, PVC-U and other types with specific diameters and pipe wall thicknesses
- Wood construction elements CLT and Gluelam ceiling with defined manufacturer and minimum thickness and number of layers
- Hilti firestop endless collar CFS-C EL with Hilti Acrylic Sealant CFS-S ACR as annular gap filler
- Tested and approved fastener, for example Hilti HUS-H/P 6

SANITARY: HEATING AND DRINKING WATER APPLICATIONS

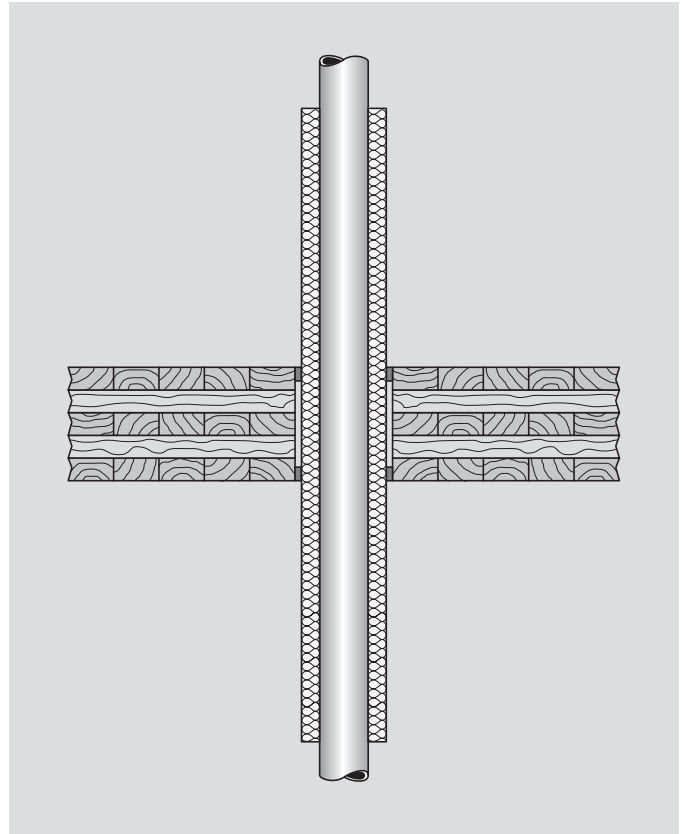
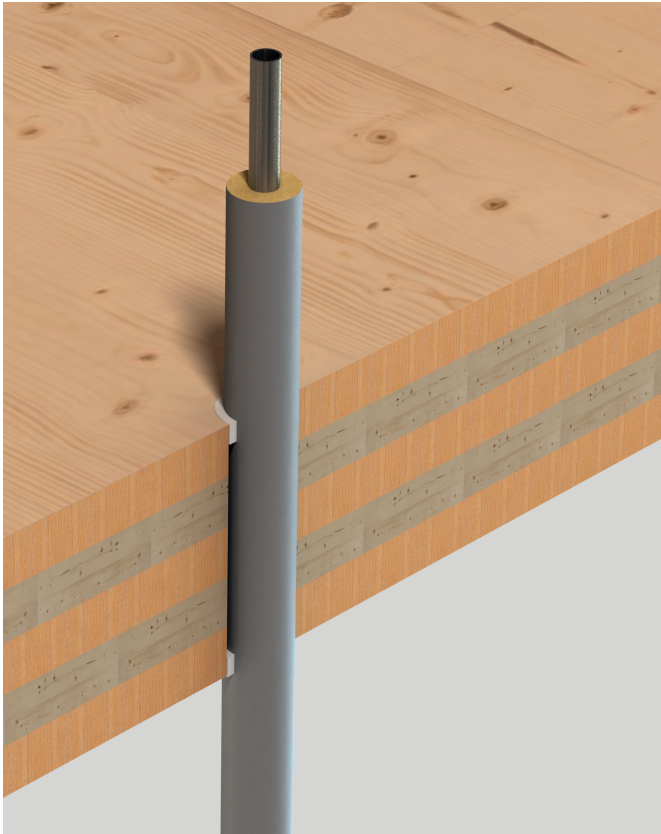
Non burnable insulated pipes



- EI60 C/U, application also available for EI30 and 90 fire resistance ratings
- non-burnable pipes (copper, steel) diameter 10-42mm, with burnable elastomeric flexible rubber insulation, other specific pipes and aluminum composite pipes
- Wood construction elements CLT and Gluelam ceiling with defined manufacturer and minimum thickness and number of layers
- Hilti firestop bandage CFS-B (two layers) and Hilti firestop acrylic sealant CFS-S ACR as annular gap filler

SANITARY: HEATING AND DRINKING WATER APPLICATIONS

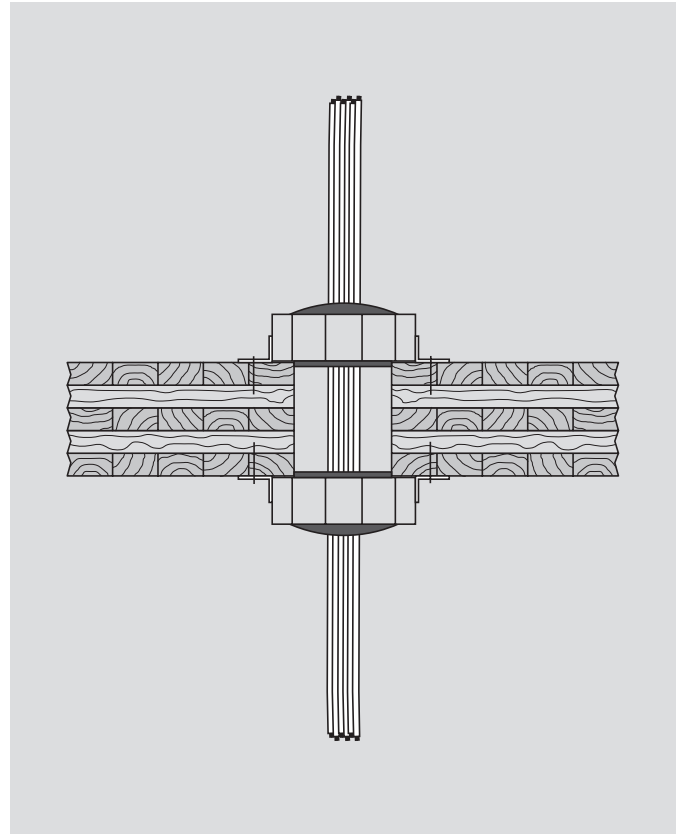
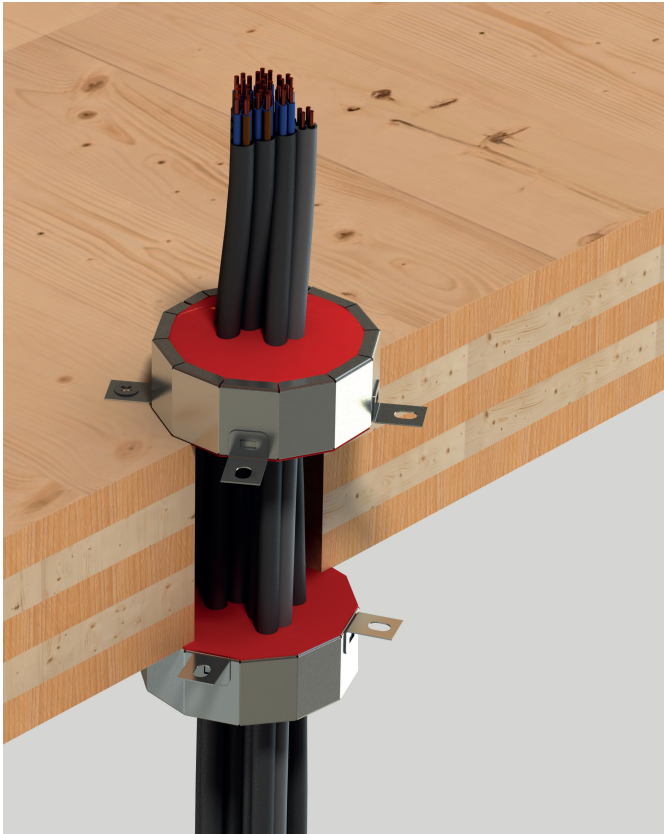
Non-combustable pipes steel and copper, aluminum composite pipes, with mineral wool insulation



- EI60 C/U, application also available for EI30 and 90 fire resistance ratings
- Non-combustable pipes diameter 10-88,9mm with non-burnable mineral wool insulation, other specific pipes and aluminum composite pipes
- Wood construction elements CLT and Gluelam ceiling with defined manufacturer and minimum thickness and number of layers
- Hilti Firestop Acrylic Sealant CFS-S ACR, annular gap $\leq 15\text{mm}$

CABLING APPLICATIONS

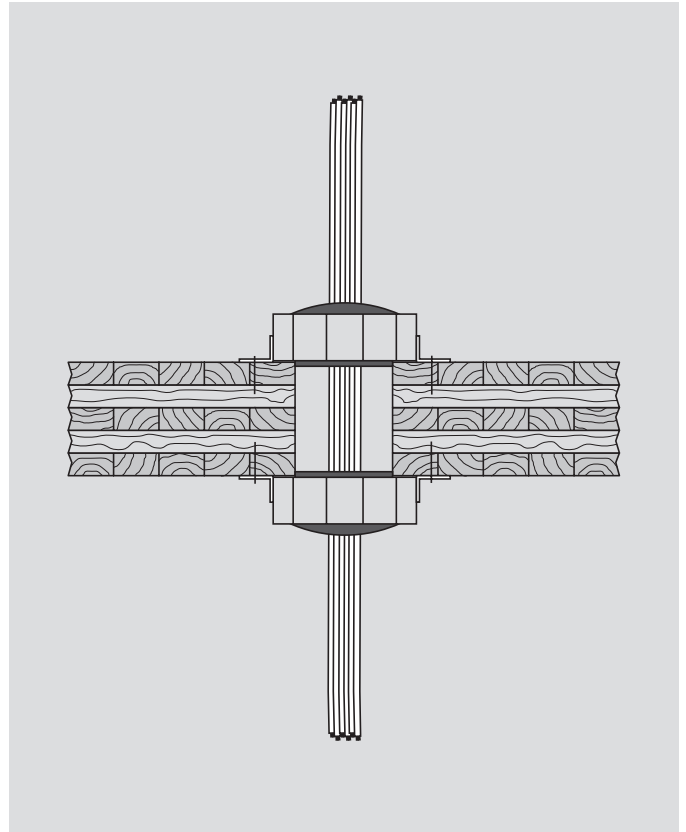
Cables and cable bundles for on-the-floor installation



- EI60, application also available for EI30 and 90 fire resistance ratings
- Cables with diameter up to 21mm, cable bundles diameter $\leq 100\text{mm}$, plastic conduits and tubes diameter $\leq 32\text{mm}$
- Wood construction elements CLT and Gluelam ceiling with defined manufacturer and minimum thickness and number of layers
- Hilti firestop cable collar CFS-CC and CFS-FIL as gap filler
- Tested and approved fastener e.g. Hilti HUS-H/P 6

CABLING APPLICATIONS

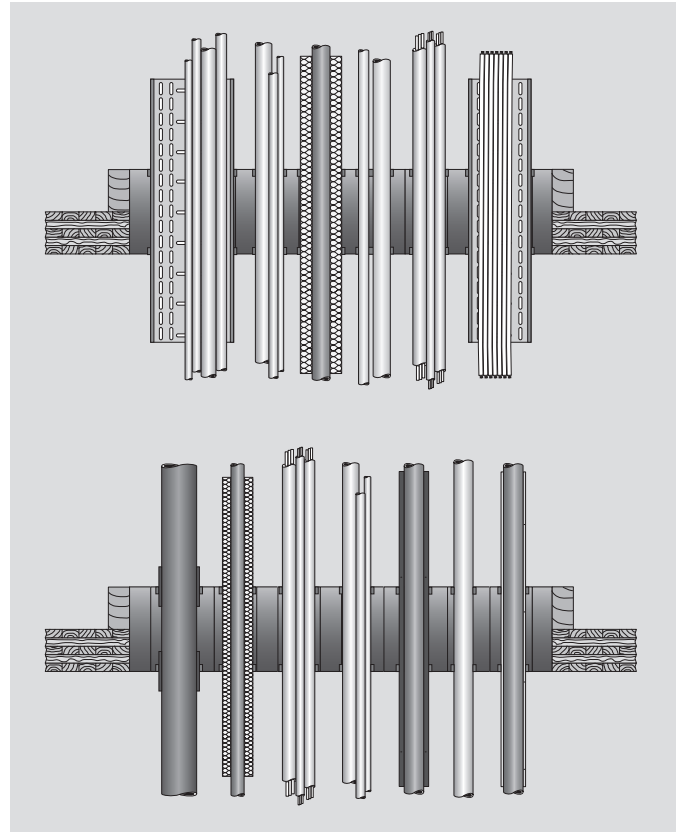
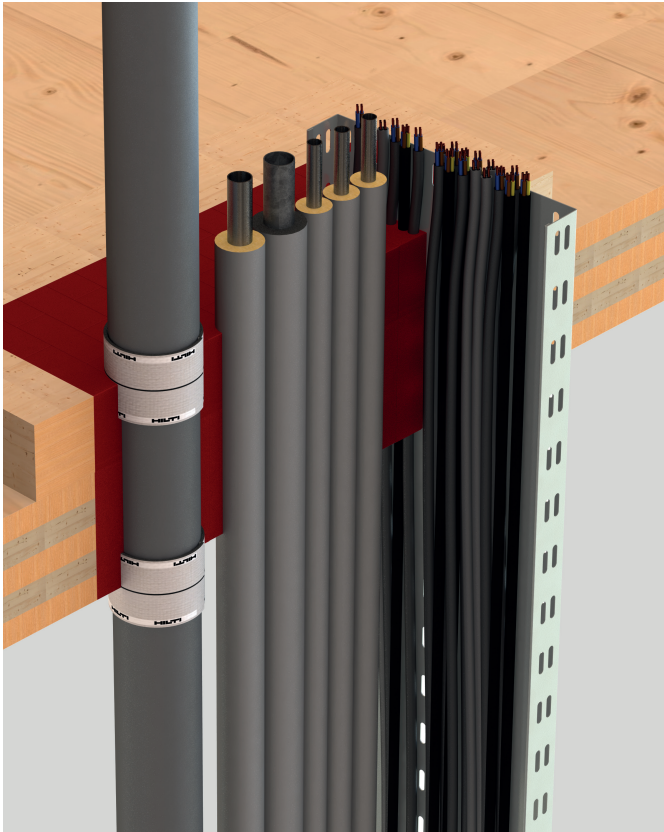
Electric cables and cable bundles for easy re-penetration



- EI60, application also available for EI30 and 90 fire resistance ratings
- Electric cables diameter ≤ 21 mm, cable bundle
- Wood construction elements CLT and Gluelam ceiling with defined manufacturer and minimum thickness and number of layers
- Hilti firestop sleeve CFS-SL GA

MIXED OPENINGS

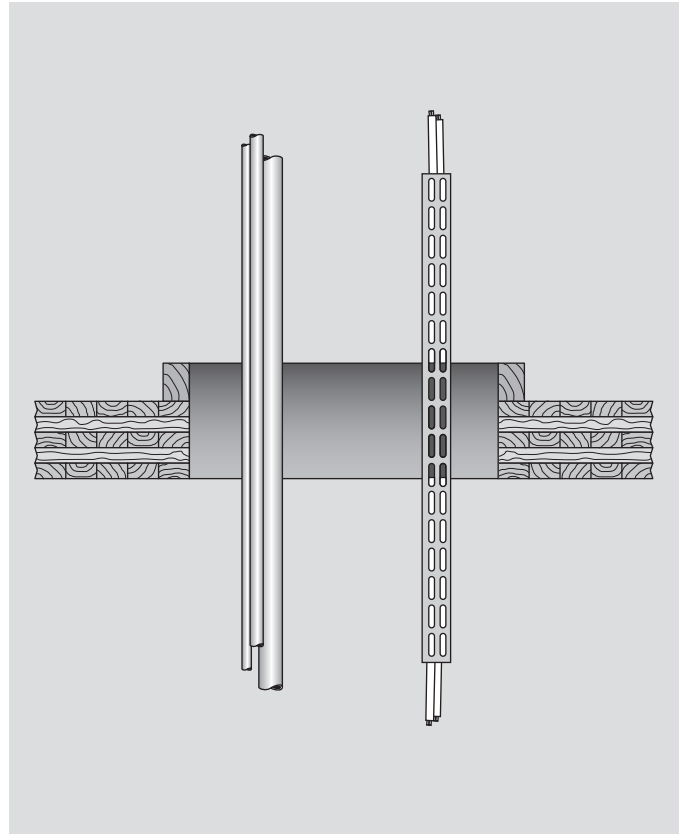
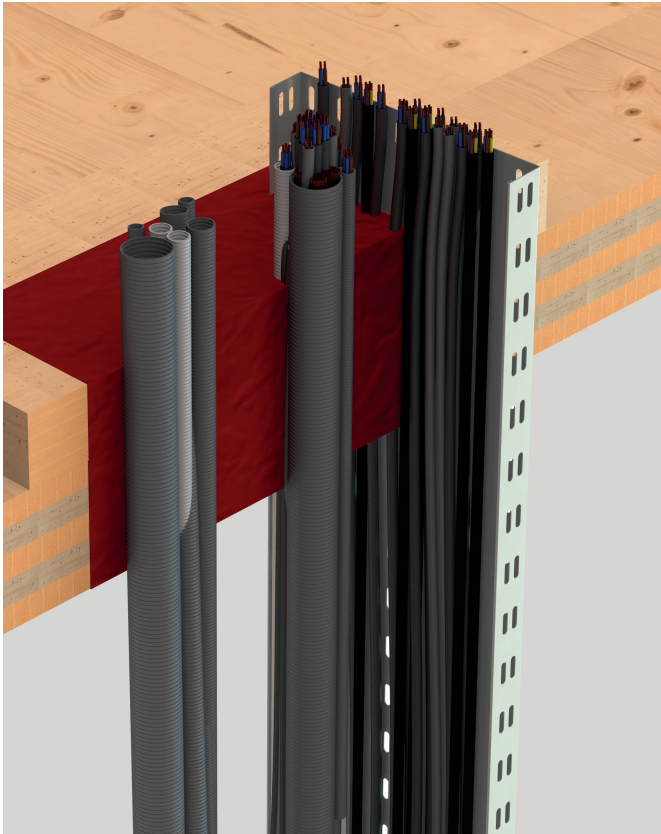
Single cables, cable bundles, cable tray, combustable and non-combustable pipes, opening size up to 400x1000mm



- EI60, application also available for EI30 and 90 fire resistance ratings
- Communication cables diameter $\leq 21\text{mm}$,
- Flexible and rigid plastic conduits and tubes
- Cable tray
- Aluminum composite pipes of specific type and manufacturer
- Non combustable pipes copper and steel mineral wool insulated
- Non combustable pipes copper and steel with burnable flexible elastomeric insulation
- Burnable plastic pipes (e.g. PE, PVC) and other specific types and materials
- Wood construction elements CLT and Gluelam ceiling with defined manufacturer and minimum thickness and number of layers
- Hilti firestop block CFS-BL P and ancillary products as gap filler or for specific pipe applications

„OPENINGS WITH MULTIPLE CABLE CONFIGURATIONS“

Different electric cables, cable bundles or cable trays, opening size up to 400x400mm



- EI60, application also available for EI30 and 90 fire resistance ratings
- Communication cables diameter $\leq 21\text{mm}$, flexible and rigid plastic conduits and tubes, cable bundle, cable tray
- Wood construction elements CLT and Gluelam ceiling with defined manufacturer and minimum thickness and number of layers
- Hilti firestop flexible foam CFS-F FX

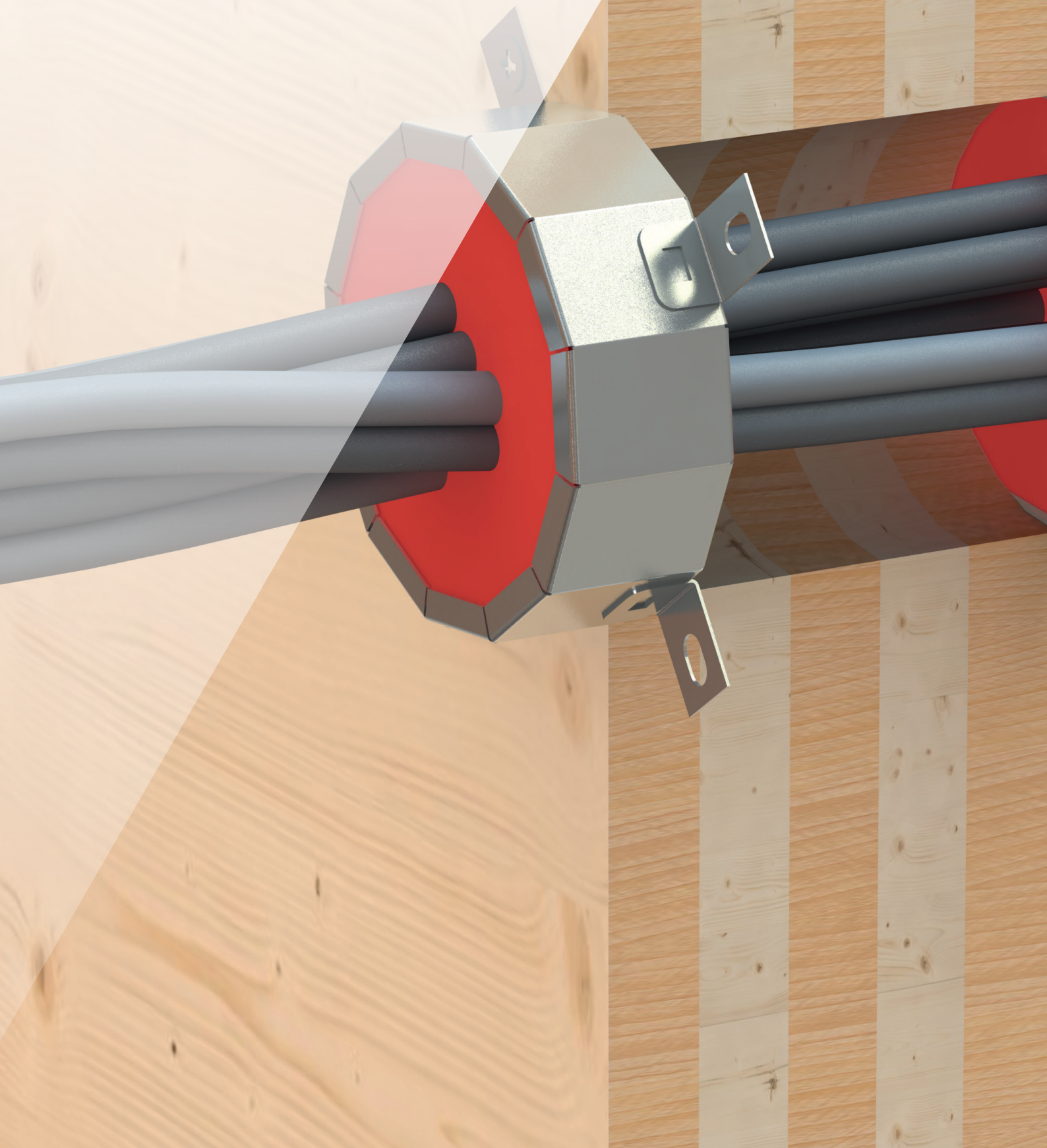


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WALL APPLICATIONS

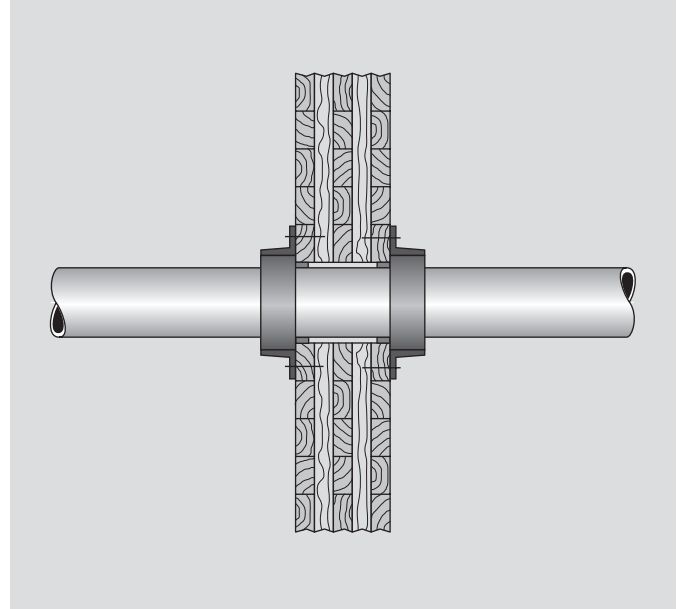
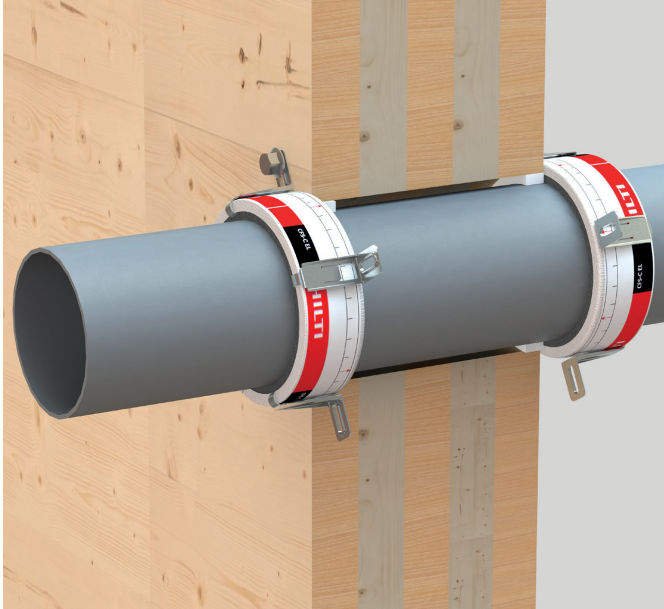
EN 1366-3

The following overview of applications just gives a generic overview and represents examples for E160 fire resistance ratings. All details of tested and approved wood constructions, installations and specific fire resistance ratings please review the respective reports and approval documents as well as the respective instructions for use.



WASTE WATER AND ROOF DRAINAGE APPLICATIONS

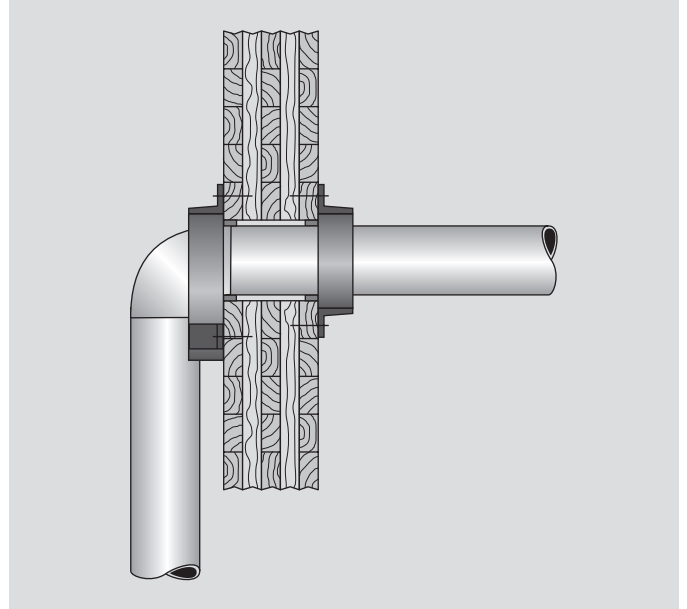
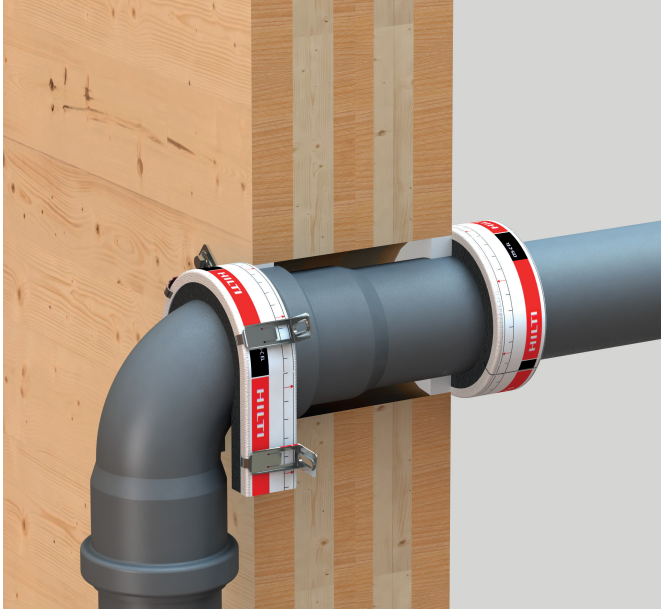
Burnable plastic pipes \varnothing 50-110mm



- EI60 U/U, application also available for EI30 and 90 fire resistance ratings
- Burnable plastic pipes 50-110mm, different PP pipes (e.g. Geberit Silent dB20), PP-H pipes, PE-HD, ABS, PVC-C, PVC-U and other types with specific diameters and pipe wall thicknesses
- Wood construction elements CLT and Gluelam wall with defined manufacturer and minimum thickness and number of layers
- Hilti firestop endless collar CFS-C EL with Hilti Acrylic Sealant CFS-S ACR as annular gap filler
- Tested and approved fastener, for example Hilti HUS-H/P 6

WASTE WATER AND ROOF DRAINAGE APPLICATIONS – ELBOW PIPE

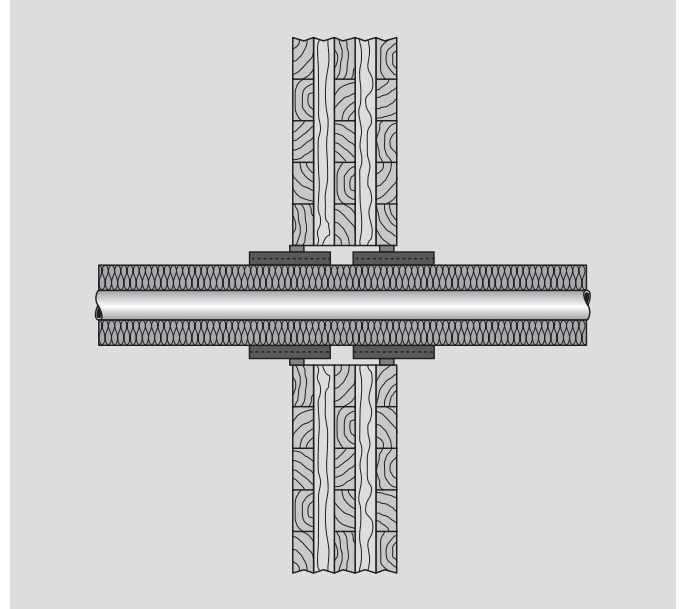
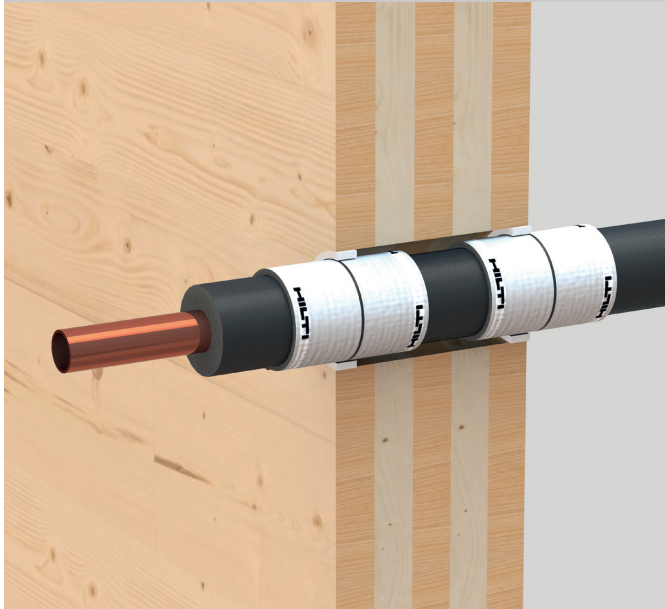
Burnable plastic pipe (specific types)



- EI60 U/U, application also available for EI30 and 90 fire resistance ratings
- Burnable plastic pipe (specific types)
- Wood construction elements CLT and Gluelam wall with defined manufacturer and minimum thickness and number of layers
- Hilti firestop endless collar CFS-C EL with Hilti Acrylic Sealant CFS-S ACR as annular gap filler
- Tested and approved fastener, for example Hilti HUS-H/P 6

SANITARY: HEATING AND DRINKING WATER APPLICATIONS

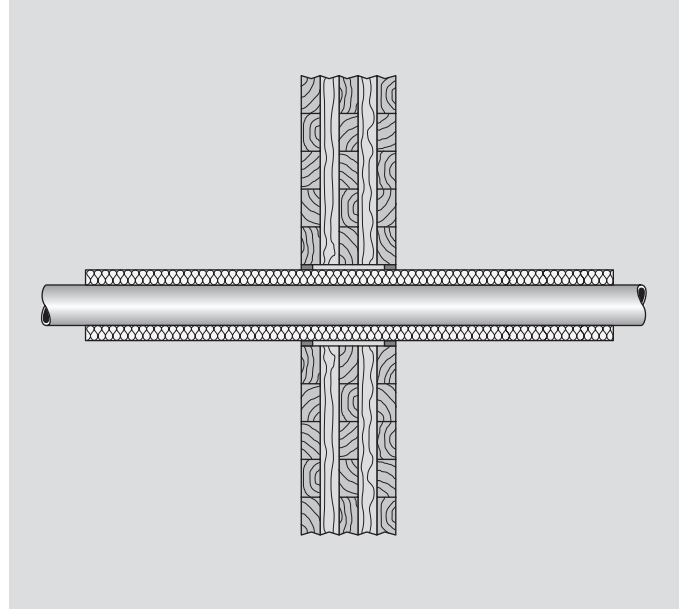
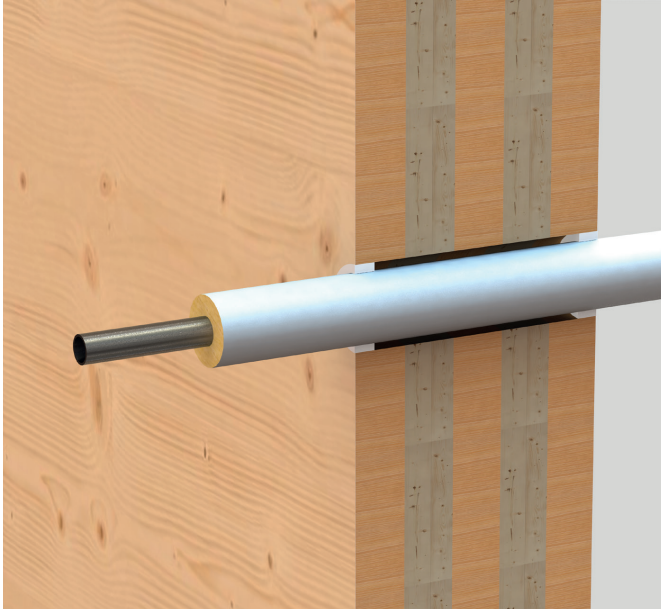
Non combustable steel and copper pipes, aluminum composite pipes,
with flexible elastomeric insulation



- EI60 C/U, application also available for EI30 and 90 fire resistance ratings
- Non-burnable pipes (copper, steel) diameter 10-42mm, with burnable elastomeric flexible rubber insulation, other specific pipes and aluminum composite pipes
- Wood construction elements CLT and Gluelam wall with defined manufacturer and minimum thickness and number of layers
- Hilti firestop bandage CFS-B (two layers) with Hilti Acrylic Sealant CFS-S ACR as annular gap filler

SANITARY: HEATING AND DRINKING WATER APPLICATIONS

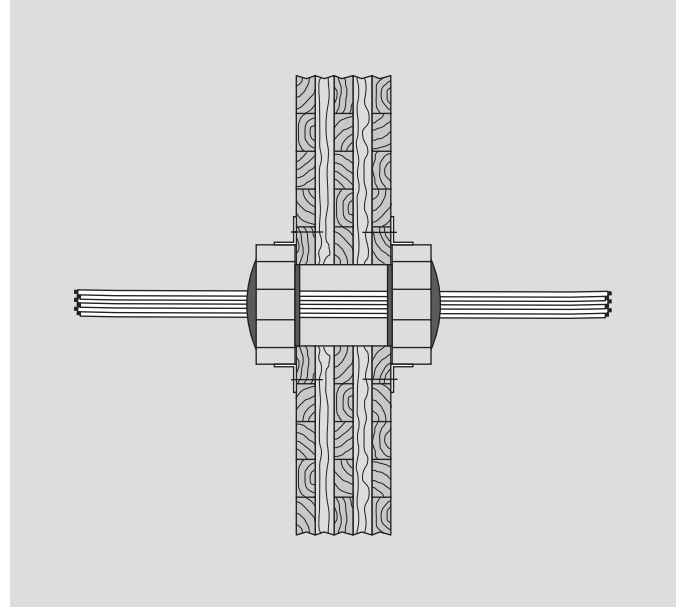
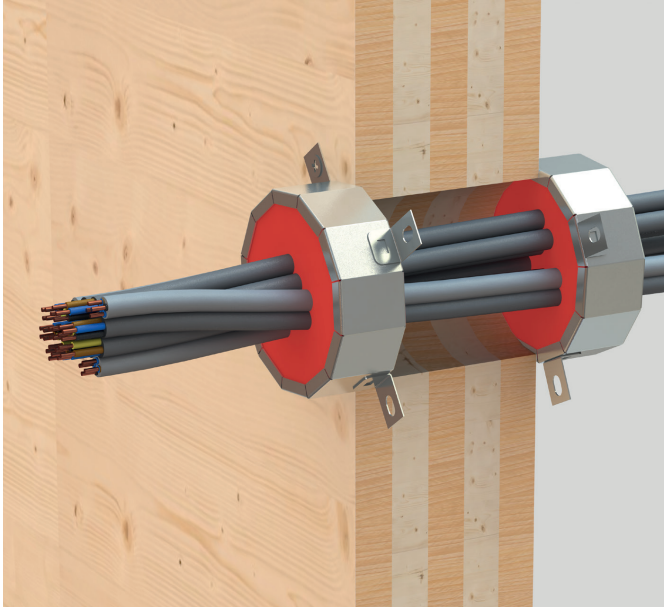
Non-combustable pipe steel and copper, aluminum composite pipe, with mineral wool insulation



- EI60 C/U, application also available for EI30 and 90 fire resistance ratings
- Non-combustable pipes diameter 10-88,9mm with non-burnable mineral wool insulation, other specific pipes and aluminum composite pipes
- Wood construction elements CLT and Gluelam wall with defined manufacturer and minimum thickness and number of layers
- Hilti Acrylic Sealant CFS-S ACR, annular gap $\leq 15\text{mm}$

CABLING APPLICATIONS

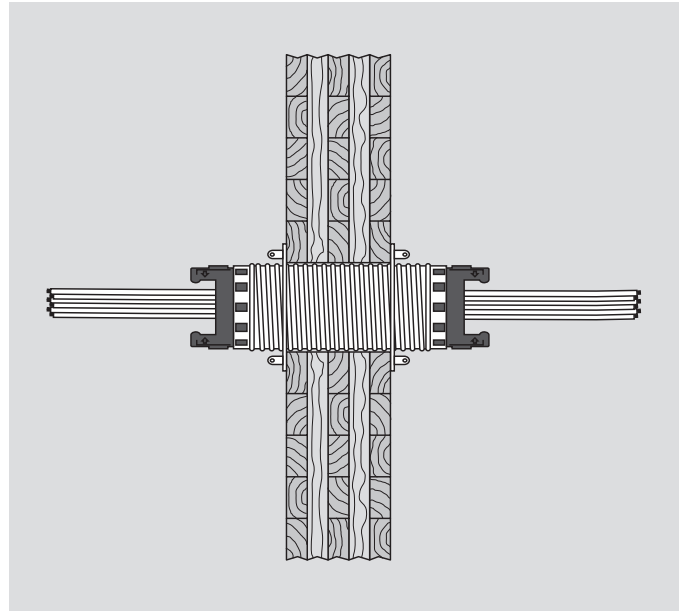
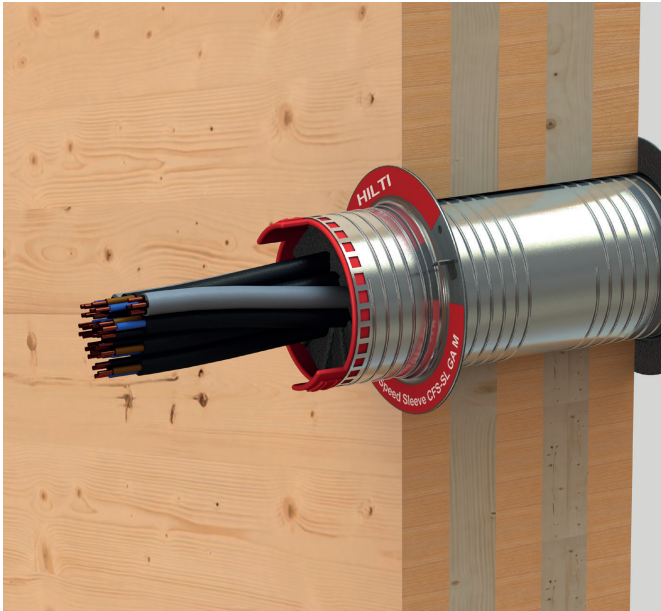
Cables and cable bundles for on-the-wall installation



- EI60, application also available for EI30 and 90 fire resistance ratings
- Electric cables diameter $\leq 21\text{mm}$ and cable bundles diameter $\leq 100\text{mm}$
- Wood construction elements CLT and Gluelam wall with defined manufacturer and minimum thickness and number of layers
- Hilti firestop cable collar CFS-CC, CFS-FIL as gap filler
- Tested and approved fastener e.g. Hilti HUS-H/P 6

CABLING APPLICATIONS

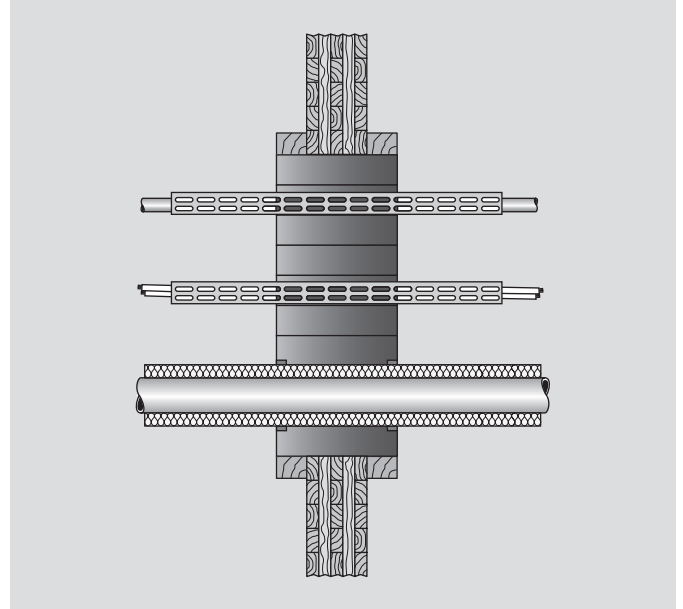
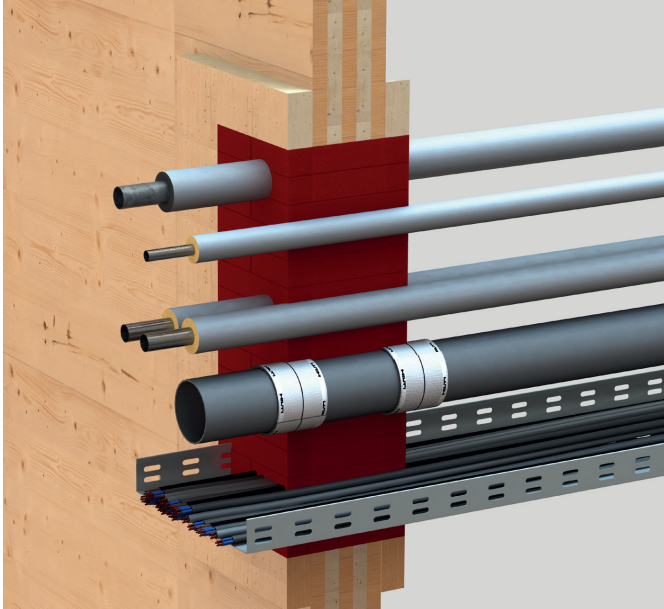
Electric cables and cable bundles for easy re-penetration



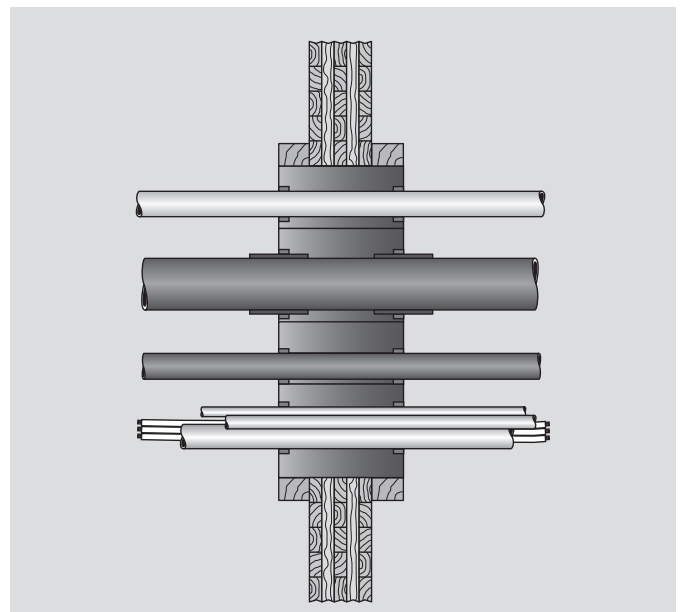
- EI60, application also available for EI30 and 90 fire resistance ratings
- Electric cables diameter $\leq 21\text{mm}$ and cable bundle
- Wood construction elements CLT and Gluelam wall with defined manufacturer and minimum thickness and number of layers
- Hilti firestop sleeve CFS-SL GA

MIXED OPENINGS

Single cables, cable bundles, cable tray, combustable and non-combustable pipes, opening size up to 400x1000mm

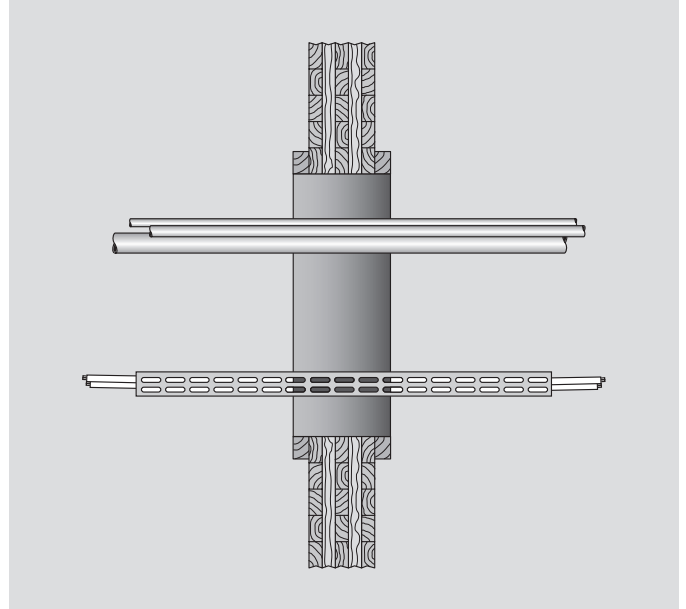
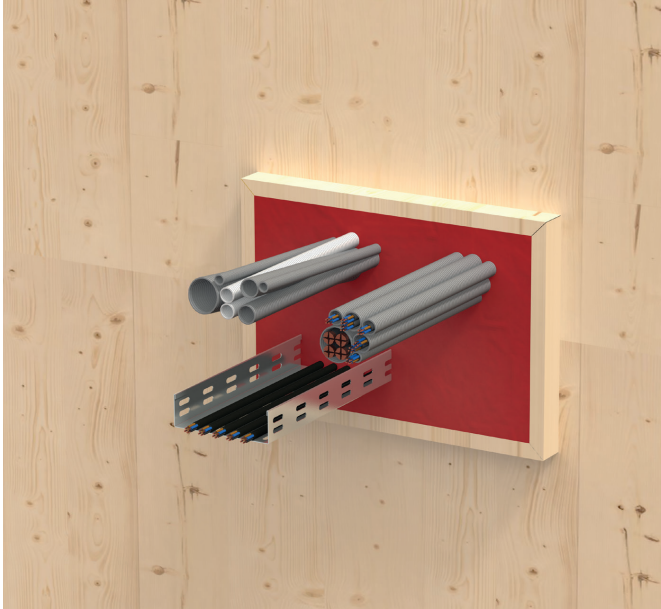


- EI60, application also available for EI30 and 90 fire resistance ratings
- Communication cables diameter $\leq 21\text{mm}$,
- Flexible and rigid plastic conduits and tubes
- Cable tray
- Aluminum composite pipes of specific type and manufacturer
- Non-combustable pipes copper and steel mineral wool insulated
- Non-combustable pipes copper and steel with burnable flexible elastomeric insulation
- Burnable plastic pipes (PP-H)
- Wood construction elements CLT and Gluelam wall with defined manufacturer and minimum thickness and number of layers
- Hilti firestop block CFS-BL P and ancillary products CFS-B and CFS-FIL



OPENINGS WITH MULTIPLE CABLE CONFIGURATIONS

Different electric cables, cable bundles or cable trays, opening size up to 400x400mm



- EI60, application also available for EI30 and 90 fire resistance ratings
- Communication cables diameter $\leq 21\text{mm}$, flexible and rigid plastic conduits and tubes, cable bundle, cable tray
- Wood construction elements CLT and Gluelam ceiling with defined manufacturer and minimum thickness and number of layers
- Hilti firestop flexible foam CFS-F FX

FIRESTOP COLLAR ENDLESS CFS-C EL



APPLICATIONS

- Approved for use with PVC, PP, PE and a wide array of standard acoustic pipes
 - Configurations tested include pipe elbows, inclined pipes, pipes with limited clearance to the wall
 - Acoustic pipes tested with insulation and sound decoupling
 - Zero distance required to CFS-B firestop bandage, CFS-C EL firestop endless collar and Conlit
- Suitable for use on shaft walls, coated board, drywall, aerated concrete, masonry and concrete

ADVANTAGES

- Endless solution: one product for all applications
- Problem solver for non-standard applications
- Easy installation
- Flexible solution for waste water, roof drainage and pneumatic pipes
- Well-suited to complex pipe configurations

Technical Data

Application temperatures range	-5 - 50° C
Temperature resistance range	-30 - 80° C
Reaction to fire class (EN 13501-1)	E
Dimensions (LxWxH)	2580 x 52 x 17 mm
Shelf life ¹⁾	Not relevant
LEED/VOC	11 g/l
Mold and mildew performance	Class = (EN ISO 846)
Reaction time (ca.)	210° C
Storage/transportation temperature range	-30 - 50° C

¹⁾ at 77° F/ 25° C and 50% relative humidity; from date of manufacture



FIRESTOP ACRYLIC SEALANT CFS-S ACR



APPLICATIONS

- Designed to help prevent the passage of fire, smoke and toxic fumes
- Paintable
- Strong adhesion to various base materials

ADVANTAGES

- Within or between flexible wall constructions
- Vertical joints in/between wall constructions
- Horizontal joints in a wall abutting a floor, ceiling or roof
- Penetration seats (steel and copper pipes)

Technical Data

Color	Grey, white
Cartridge, volume	310 ml
Application temperature range	5 – 40° C
Approx. Curing time (at 24° C and 50% humidity)	3mm/3 days
Storage/transportation temperature range	5 – 25° C
Temperature resistance range	-30 – 80° C
Can be painted	Yes
LEED/VOC	75 g/l
Reaction to fire class (EN 13501-1)	D-s1d0



FIRESTOP BANDAGE CFS-B



APPLICATIONS

- Firestopping around insulated (hot/cold) metal pipes
- Pipe materials: copper, steel and other metals with heat conductivity lower than that of copper (e.g. cast iron, stainless steel etc. and melting point of minimum 1050° C
- Various insulation materials
- Suitable for use in openings in concrete, masonry block or drywall

ADVANTAGES

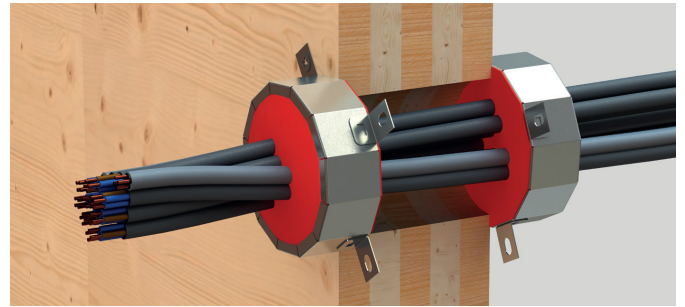
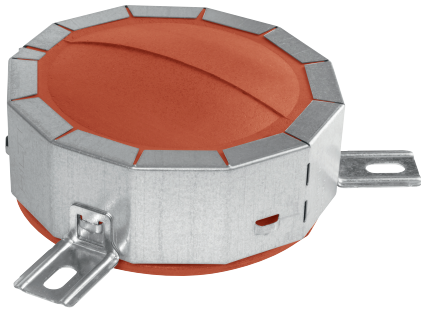
- Highly versatile – one product for a variety of insulation materials, pipe materials and pipe diameters
- Quick and easy to install – no drilling or additional tools needed
- No need to interrupt the pipe insulation material within the wall/floor penetration
- Minimal thickness for easy installation in narrow gaps
- Good elasticity for optimum flexibility
- Very good acoustic insulation properties

Technical Data

Color	Grey
Intumescent	Yes
Length	10 m
Width	125 mm
Thickness	2 mm
Application temperature range	-5 – 50° C
Temperature resistance/temperature range	-20 – 100° C
Expansion temperature	180° C



FIRESTOP CABLE COLLAR CFS-CC



APPLICATIONS

- Single and bundled cables in floors and walls
- New and existing cable installations
- Conduits, coaxial cables, conduit bundles

ADVANTAGES

- Fast and easy solution for dry walls
- Problem solver for 100% fill of openings up to 108 mm in diameter
- No chisel work in massive walls necessary
- Lip seal closes annular gaps
- Zero separation to next firestop cable collar
- Re-penetrable to allow increase in future cable capacity
- Pre-formed firestop material does not expire, eliminating shelf-life concerns
- Immediately functional after installation
- Low VOC content and no CFOs or HCFCs

Technical Data

Color	Red
Intumescent	Yes
Expansion temperature (Approx.)	200° C
Expansion ratio (unrestricted, up to)	1:3
Application temperature range	5 – 40° C
Storage and transportation temperature range	-5 – 40° C
Temperature resistance range	-15 – 60° C



FIRESTOP SLEEVE CFS-SL GA



APPLICATIONS

- Sealing penetrations for single cables and cable bundles
- For use on drywall, concrete, masonry and sandwich panel
- Ideal solution when cable configurations are regularly changed, such as in data centers, server rooms, hospitals, event halls or production plants
- Firestop sleeves can be used together with gangplate for optimal use of space with professional designs

ADVANTAGES

- Easy to install and to inspect
- Fully functional immediately after installation
- Cable fill up to 100%
- Easy subsequent installation of additional cables

Technical Data

Application temperatures range	-5 - 50° C
Application resistance range	-30 - 75° C
Reaction to fire class (EN 13501-1)	E
Max. annular space	7 mm
Shelf life ¹⁾	Not relevant
Mould and mildew resistance	Yes

¹⁾ at 77° F/ 25° C and 50% relative humidity; from date of manufacture



FIRESTOP BLOCK CFS-BL P



APPLICATIONS

- Temporary or permanent passive fire sealing around cables, cable bundles and cable trays in wall or floor openings
- Firestopping penetrations for conduits and conduit bundles
- Optimal for rooms with dust- and fibre-free requirements and areas with frequent retrofitting, such as server rooms, laboratories and hospitals
- Sealing mid sized and larger opening sizes
- For use in drywalls, concrete, masonry walls and rigid floors
- Conduit and tubes

ADVANTAGES

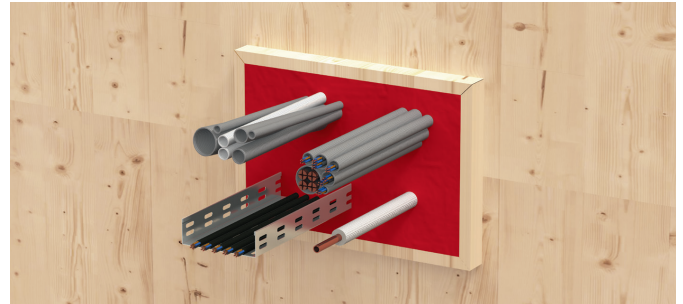
- Easy to install, no power tools required
- Easy maintenance and possible retrofitting of cables
- Economical installation – blocks arrive pre-cured and ready-to-use
- Fibre-, halogen- and solvent-free
- Virtually dust and fibre-free

Technical Data

Color	Red
Size (LxWxH)	200x13x50 mmw
Intumescent	Yes
VOC acc. to LEED	4.4 g/l
Storage and transportation temperature range	-5 – 40° C
Application temperature range	5 – 40° C
Temperature resistance range	-15 – 60° C
Expansion temperature range	170-200° C
Expansion rate (at 600° C)	1:3
Building class (EN13501-1)	E



FLEXIBLE FIRESTOP FOAM CFS-F FX



APPLICATIONS

- Electrical: cable conduits, cables, cable bundles, cable trays and cable trunking
- Mechanical: metal & plastic pipes, composite pipes, split AC unit piping
- Mixed penetration seal
- Repenetration with single cables
- Approvals in combination with Hilti CFS-BL firestop blocks, especially for large openings or applications in specialist industry applications (telecom, industrial)

ADVANTAGES

- Foam can be easily shaped during the curing process
- Neat and tidy application
- Very quick and easy to install and provides a reliable firestop seal with only one product
- Maintenance and retrofitting of cables is very easy
- Single-sided installation possible
- Smoke-tightness and firestopping with one system

Technical Data

Approx. tack-free time (at 23° C / 50% rel. humidity)	5 min
Approx. curing time	10 min
Application temperature range	10 – 35° C
Application resistance range	-30 – 60° C
Storage and transportation temperature range	5 – 25° C
Content per can / cartridge	325 ml
Color	Red
Foam yield	up to 2.1l
Storage time	9 months
Building material class (EN13501-1)	E
LEED / VOC	34.5 g/l



