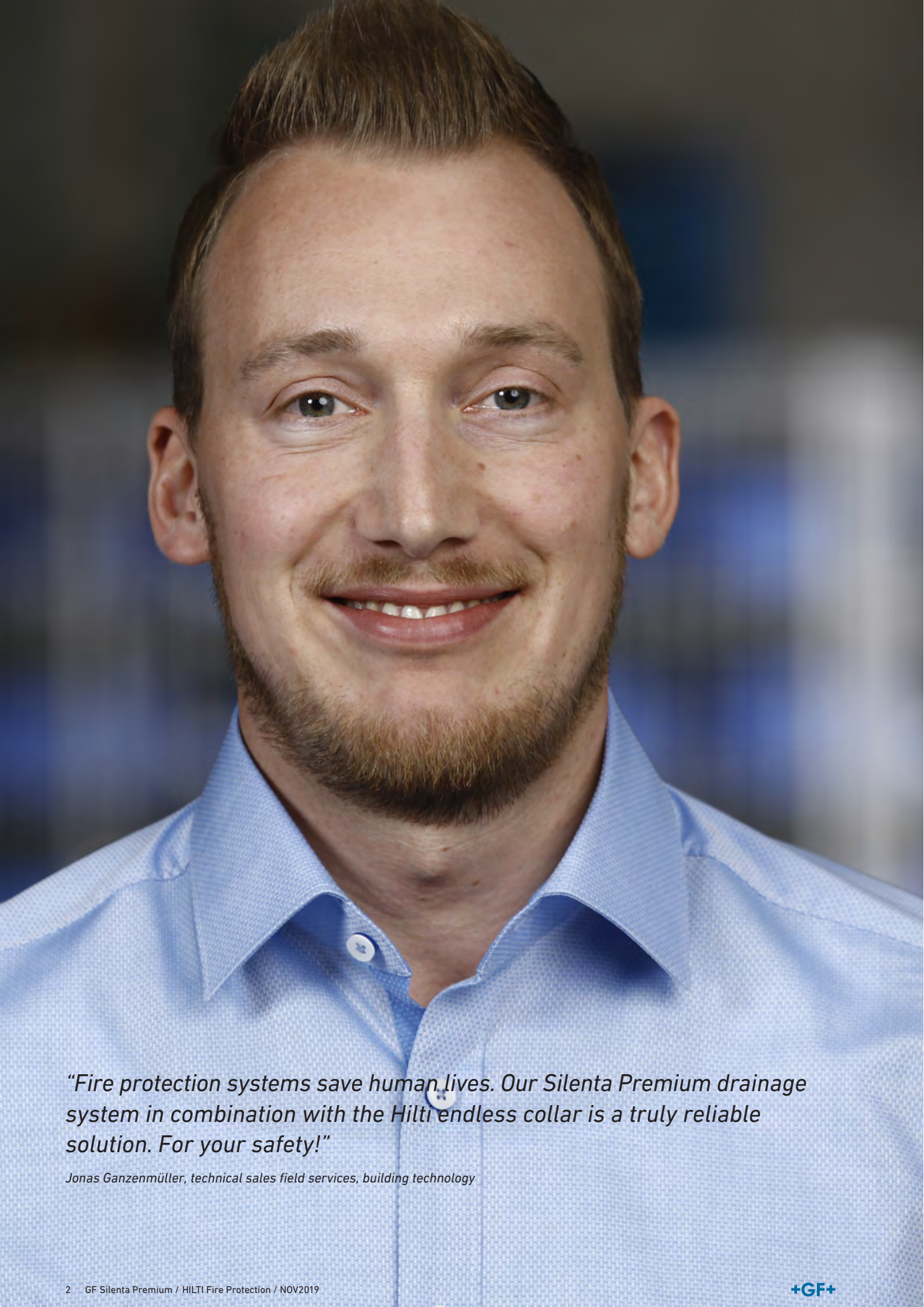
GF Piping Systems

Hilti Fire Protection Solutions

for
Silenta Premium Sewage System
JRG Sanipex MT Drinking Water System



“Fire protection systems save human lives. Our Silenta Premium drainage system in combination with the Hilti endless collar is a truly reliable solution. For your safety!”

Jonas Ganzenmüller, technical sales field services, building technology

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Fire Protection Planning Fundamentals

Planning Fundamentals Fire protection

1. For the sound insulation SILENTA PREMIUM building drainage system

Silenta Premium is a high-quality triple layer drainage system with sound insulation, which is made of mineral-reinforced polypropylene.

- It provides excellent acoustic insulation, creates ideal conditions for buildings, increases the
- Value of a system and the quality of life.
- It reduces vibration and unusual sounds, originating from the installation technology.
- According to DIN 4102 normal flammability

2. Compliance with building law safety objectives

Compliance with the building safety objectives “Fire, acoustic, and thermal protection” are firmly anchored in the Model Building Regulation (MBO) via the requirements for

- Fire protection
- Agitation protection = acoustic protection.

Note: All subsequent building law requirements are presented in purple.

2.1 Building law safety objectives

Systems must be arranged, constructed, altered and maintained in such a way that they do not endanger public safety and order, especially regarding life, health, and natural resources required for subsistence.

2.2 Building law fire protection safety objectives

Buildings and structures must be arranged, constructed, altered, and maintained in a way that prevents the development of a fire and the diffusion of fire and smoke (spread of fire), and that allows in case of fire the saving of humans and animals and effective extinguishing.

2.3 Building law acoustic protection safety objectives

Buildings must be equipped with acoustic insulation in line with their use. Sounds that are emitted by fixed elements of buildings and structure or on building plots must be insulated in such a way that prevents dangers or unacceptable disturbances.
Agitations or vibrations that are emitted by fixed elements of buildings and structure or on building plots must be insulated in such a way that prevents dangers or unacceptable disturbances.

2.4 Building law thermal protection safety objectives

In drainage system, thermal protection only applies to the physical construction size to prevent the formation of condensation with internal drainage lines.
During the planning and implementation, compliance with these legal building and physical construction aims are compulsory for the professional groups and individual persons and evidence of this compliance must be provided to the building owner.

3. Requirements of preventive fire protection

3.1 Requirements of the Model Building Regulation

Constructional fire protection in Germany is based on the MBO (Model Building Regulation) on a national level. The legal construction implementation is carried out by the respective LBO (State Building Regulations).

The primary aim of the constructional fire protection is the protection of life. Therefore, fire protection should not only be observed for new buildings, but also when managing a buildings, during restructuring as well as renovation/sanitation. The former generous interpretation of the concept of "protection of existing structures" is no longer valid today due to the current legislation. When it comes to renovations in particular, it should be checked whether the aims of the fire protection of old buildings needs to be amended by appropriate measures. This can be accomplished, among other means by strengthening ceilings and walls, as well as the use of pipe insulation.

Building products and construction methods may only be used if during their use the building structures meet the requirements of this law or based on this law and are functional with proper maintenance for a duration that is suitable for their purpose.

The suitability and durability of the applied fire protection solutions can be ensured through the use of products manufactured or approved according to the applicable standards.

The MBO classifies the different building types according to size and use to allow for the different requirements for fire protection.
In the MBO, buildings are divided into classes with different hazard potential based on the requirements for system lines, installation ducts, and installation channels. This requirement describes that the installed lines may not affect the fire protection of the concerned building.

Line systems, installation ducts

Lines may only be run through room-enclosing elements with a specified fire resistance if the spread of fire is not to be feared for a sufficient period of time or precautions have been made against the spread; this does not apply to ceilings

- in buildings of building class 1 and 2,
- inside apartments,
- within the same unit of no more than 400 m² overall.

In general, during the combined installation of several lines, precautions must be made against the spread of fire by using, e.g. Firestop collars, special insulation, etc. The prerequisites for not expecting the spread of fire without specific precautions are explained in the MLAR (model line system regulations) in sections 4.1. to 4.3.4.

Complementary to the specifications of the MBO, we would also like to mention at this point sections 5 and 6 of the FeuVO (Feuerungsverordnung - fire installation regulation) as well as the GarVO (Garagenverordnung – garage regulation), which permit the laying of flammable pipes in these areas (garages including underground garages) if properly attached and with the use of appropriate pipe penetration. In both regulations, only requirements for room-enclosing components such as ceiling and walls are stated, but not for the lines themselves.

3.2 Requirements of the Model line systems regulation (MLAR)

The MLAR (model line systems regulation) or the applicable LAR (line systems regulations) on the individual state level further define the requirements of the MBO regarding the fire protection requirements for line system.

MLAR, section 1 "Area of application"
(Excerpt for the area of application of flammable wastewater installations/lines DN 50 to DN 150)

This regulation applies to
a) Line systems in mandatory stairway areas, in areas between mandatory stairway areas and exits leading outdoors, except for mandatory hallways in open hallways in front of external walls,
b) the running of lines through room-enclosing components (walls and ceilings)

MLAR, section 2 "Definition of terms"
(Excerpt for the area of application of flammable water installations/lines DN 50 to DN 150)

2.1 Line systems are systems made of lines, in particular ...pipes including the associated fittings, building connec tion fittings, ... and insulation materials for the lines. The lines include their mountings and coatings.
2.3 Media
according to this guideline include liquids, vapors, gases and dusts.

MLAR, Section 3 "Line systems in escape routes"
(Excerpt for the area of application of flammable water installations/lines DN 50 to DN 150)

3.1 Basic requirements
3.1.1 According to the section "line systems" of the MBO line systems in
1. mandatory stairway areas
2. Areas between mandatory stairway areas and exits to the outdoors and
3. mandatory hallways
only permitted if the use as an escape route is possible long enough in case of fire. This prerequisite is complied with if the piping-systems in these areas are in line with the specifications of the MLAR sections 3.1.2 to 3.5.6.

3.1.2 Line systems may only affect bearing, supporting, or room-enclosing components as well as components of installation ducts and channels to such a degree that the required fire resistance capacity remains intact.
3.1.3 In safety staircase areas acc. to section 33 (2) sentence 3 MBO and in spaces between safety staircase areas as well as exits to outdoors only line systems that exclusively serve the immediate supply of these areas or fire fighting are permissible.

MLAR, section 3.3
"Pipe systems for non-flammable media"
(Excerpt for the area of application of flammable water installations/lines DN 50 to DN 150)

Note: Domestic wastewater is considered a non-flammable medium

3.3.1 The pipe systems including the insulation materials made of non-flammable building materials – also including flammable sealing and fasteners and with flammable pipe coatings up to a thickness of 0.5 mm – may be laid exposed.
3.3.2 The pipe systems made of flammable building materals or with flammable insulation materials must be laid
a) in slots of solid walls that are closed with at´ least 15 mm thick mineral plastering on non-flammable plaster base or with at least 15 mm thick sheets of mineral materials,
b) in installation ducts and channels according to section 3.5,
c) on top of false ceilings according to section 3.5,
d) in underground channels acc. to section 3.5 or
e) in double floors.

MLAR, section 3.5 "Installation ducts and channels, false ceiling and double floor channels"
(Excerpt for the area of application of flammable wastewater installations/lines DN 50 to DN 150)

3.5.1 Installation ducts and channels – including the closures of openings – must consist of non-flammable materials and have a fire resistance capacity, that complies with the highest required fire resistance of the room closing components that they penetrate. The closings must be sealed tight with an all-round gasket. The mount ing of the installation ducts and channels must be carried out with non-flammable mounting equipment.

3.5.2 In deviation to section 3.5.1 in mandatory hallways it is sufficient to install installation ducts that do not bridge ceilings and installation channels (including the closures of openings), that are at least fire retardant and are made of non-flammable materials.

3.5.3 False ceilings – including the closures of openings – must consist of non-flammable building materials and must be at least fire retardant from both the top and the bottom in mandatory hallways, and at least comply with the required fire resistance capacity of the ceilings in mandatory stairway areas and in areas between mandatory stairway areas and exits to the outdoors. The special requirements regarding the fire-proof mounting of the lines installed in the area between the - ceilings and false ceilings must be observed.

3.5.4 In mandatory hallways of buildings of building class 1 to 3 whose units do not exceed an area of 200 m^2 each, and that are not special buildings, installation ducts that do not bridge ceilings, installation channels and false ceilings (including the closures of openings), only need to be made of non-flammable materials with cohesive surfaces. Fittings, such as lamps and speakers are not included.

3.5.6 Underground channels for the laying of lines that are lush with the screed flooring or covered by t in mandatory stairway areas, in areas between mandatory stairway areas and exits to the outdoors as well as in mandatory hallways must have a top cover of non-flammable building materials. They may not have openings, except revision or subsequently installed openings inmanda toryhallways with tight-fitting locks made of non-flammable building materials.

MLAR, section 4 "Running of lines through room-enclosing components (walls and ceilings)"
(Excerpt for the area of application of flammable wastewater installations/lines DN 50 to DN 150)

4.1 Basic requirements

4.1.1 According to section on line systems in the MBO Lines may only be laid through room-enclosing elements with a specified fire resistance if the spread of fire is not to be feared for a sufficient period of time or precautions have been made against the spread, this does not apply to ceilings
a) in buildings of building class 1 and 2,
b) inside apartments,
c) within the same unit of no more than 400 m^2 overall across no more than two floors.

These prerequisites are complied with when the line penetration complies with the requirements of sections 4.1 to 4.3 of the MLAR.

4.1.2 The lines must
a) are guided through sealing that exhibits at least the same fire resistance as the room-enclosing components or
b) are guided within installation ducts or channels, which – including the closures of openings – have at least the same fire resistance characteristics as the penetrated room – enclosing components and are made of non – flammable building materials.

4.1.3 The minimum distance among the sealing, installation ducts or channels as well as the required distance to other penetration ducts (for example ventilation lines) or other opening enclosures (for example fire doors) are derived from the provisions of the respective proofs of usage or application; if there are no such specifications, a distance of at least 50 mm is required.

4.3.4 Individual pipes with or without insulation in wall trenches or with sheathing

In deviation of section 4.1 individual pipes with an external diameter of up to 110 mm

a) made of non-flammable building materials – except aluminum and glass – (also with flammable coattings) or

b) made of flammable building materials, aluminum or glass for non-flammable liquids, vapors, or dusts may be guided through ceilings. This applies only if on each floor they are consistently

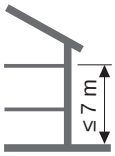
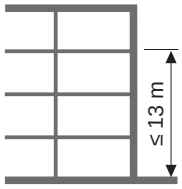
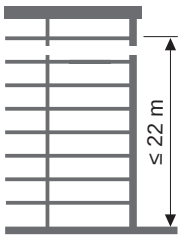
a) laid in own trenches of solid walls, which are closed by at least 25 mm-thick mineral plastering on non-flammable plaster base or with at 25 mm-thick sheets of non-flammable mineral building materials; the remaining wall cross-sections must retain the required fire resistance duration, or

b) laid individually in the corners of solid walls in such a way that they are enclosed at least from two sides by the walls and fully enclosed on the other sides by components made of at least 25 mm -thick mineral lastering on non-flammable plaster base or of at least 25 mm. thick sheets of non-flammable mineral building materials.

The lines branching off these pipes may be laid exposed as long as they are guided within a single floor level.

Note for section 4.3.4 of the MLAR:
The planned modifications of MLAR 2015 were already taken into account.

Requirements for ceiling/wall penetration according to building types

Building classes according to MBO	Description	Load-bearing components in basement floors (walls and ceilings)	Load-bearing components in upper floors (walls and ceilings)
GK 1 (a + b) 	– Detached buildings ≤ 7 m FFL [≤ 2 units and overall ≤ 400 m²] 1) – Detached buildings for agricultural or forestry use	fire retardant	none Requirements
GK 2 	– Building ≤ 7 m FFL [≤ 2 units and overall ≤ 400 m²] 1)	fire retardant	fire retardant 3)
GK 3 	– other buildings ≤ 7 m FFL 1)	fire resistant	fire retardant 3)
GK 4 	– Building ≤ 13 m FFL [units with each no more than 400 m²] 1)	highly fire retardant	highly fire retardant 3)
GK 5 	– other buildings ≤ 22 m FFL 1)	fire resistant	fire resistant 3)
Special buildings: – Hotels – Sports halls – Schools – Hospitals – Kindergartens – Penitentiaries	– Public assembly venues of any height and high rises ≥ 22 m FFL – Shelf warehouses top edge of the stored goods > 7.50 m – Sales venues > 800 m² – Structures whose use is associated with handling or storage of materials that are potentially explosive or flammable 2	fire resistant 2)	fire resistant 2)

1) According to the MBO, there are no requirements for the sealing of line systems, installation ducts and channels, as well as ventilation systems within apartments and units of no more than 400 m² across no more than 2 floors.
2) The various requirements for special buildings can be found in detail in the special building regulations as well as the special fire protection concepts as part of the building license.
3) Ceilings under attics and flat roofs are not subject to any requirements according to the MBO if there are no habitable areas in the attic space. The specific requirements of the respective LBO of the federal states must be observed.

Requirement profile for ceiling and wall penetration according to building types

Model Building Regulation (MBO): Version of 2002, last amended by a decision of the construction ministers' conference of May 13, 2016

The MBO contains nationwide basic building authority requirements for built structures. the compliance with which involves building products.

Section 3 MBO

Systems must be arranged, constructed, altered and maintained in such a way that they do not endanger public safety and order, especially regarding life, health, and natural resources required for subsistence.
The basic prerequisites for buildings according to Appendix I of the regulation (EU) no. 305/2011 must be considered. This also applies to the removal of systems and the change in use.

Section 14 MBO

"Buildings and structures must be arranged, constructed, altered, and maintained in a way that prevents the development of a fire and the diffusion of fire and smoke (spread of fire), and that allows in case of fire the saving of humans and animals and effective extinguishing."

This paragraph defines the four major protection aims of fire protection. Other safety aims may apply to specific buildings, e.g. production safety, workplace, data, environmental protection, listed buildings, and works of art. These may require measures that go beyond the minimum requirements of the building regulation. We recommend the creation of a fire protection concept that incorporates these protection aims.

Section 21 MBO

"Construction methods that considerably deviate from technical building regulations or for which there are no generally recognized technical rules (unregulated building types) may only be used for the construction, alteration and maintenance of structural works if they are granted

1. a general building authority approval (section 18) or
2. an approval for individual cases (section 20)

Instead of a general building authority approval a general building authority test certificate is enough if the construction method does not serve the fulfillment of considerable requirements for the safety of structured works or is evaluated according to generally recognized test methods."

According to DIN 4102, the fire behavior of building products must be tested prior to their use (building material and building component test). These tests are carried out by officially recognized material testing institutions. Based on these tests, the Deutsches Institut für Bautechnik (DIBt, Berlin) issues a general building authority approval(ABZ)for a maximum period of 5 years. In some cases, e.g. the sealing on non-flammable pipes, a general building authority test certificate (ABP) issued by the material testing institution is sufficient proof. Which proof is required can be found in the Building Rules List. All fire protection products are subject to constant third-party monitoring by the material testing institutions.

Section 40 MBO

"Lines may only be run through room-enclosing elements with a specified fire resistance if the spread of fire is not to be feared for a sufficient period of time or precautions have been made against the spread."
According to the sealing principle, line penetration ducts must be built with the same fire resistance duration as the penetrated wall or ceiling.

Section 16a (2) MBO

Construction methods that considerably deviate from technical building regulations according to section 85a (2) no. 2 or no.3 a),or for which there are no generally recognized technical rules may only be used for the construction, alteration and maintenance of structural works if they are granted

1. A general construction method approval by the DIBt
2. a project-related construction method approval by the highest construction authority.

Model administration regulation for technical building specifications (draft MVVTB status as of 31.05.2017) Appendix 4, section 6 Cable and pipe sealing as proof of the fire resistance capacity of structured works that contain pipe and cable sealing and for whose construction construction methods with proof of adaptability according to section 16a MBO are applied, the allocation can be either according to DIN 4102, or according to harmonized technical specifications in line with regulation (EU) no. 305/2011 ... 6.3.2 ... The use of a building product or construction set with ETA according to ETAG026-1/-2 for sealing in fire-resistant components requires a construction method approval according to section 16a MBO 14.3 Linear joint sealing for use of fire protection products for sealing and closing of joints... linear joint sealing according to ETAG 026-3 is subject to the following building authority application and implementation provisions. Joints are not considered separately in terms of construction law. The declaration of the performance characteristic "fire resistance" for the joint sealing does not replace the necessary proof of fire resistance of the entire component, including the joints.

State Building Regulations (LBO):

The state building regulations based on the MBO and complementary penetration regulations specify the protection aims of fire protection in individual requirements:

- Location of the building on the plot of land and in relation to neighboring buildings.
- Firefighting, room for ambulances and fire trucks, water supply for fire fighting.
- Escape routes, location and design (stairs, hallways).
- Fire behavior of building materials and components, e.g. exclusive use of non-flammable building materials for walls and suspended ceiling sections.
- Fire compartments: size, location, protection.
- Tightness of the locks of openings in room-enclosing components.

While these individual requirements apply to residential buildings and office buildings up to the high rise limit, buildings that are of a special type or special use are subject to additional regulations according to section 51 MBO, for example:

- High rise regulation.
- Hospital regulation.
- Restaurant construction regulation.
- Garage regulation.
- Public gathering places regulation.

Relevant building authority directives apply to schools, as well as for buildings with increased explosion and fire hazard, e.g. systems for the storage and filling of combustible liquids.

While the MBO determines specific requirements, the individual federal states are authorized to practice administrative discretion within these guidelines and to issue their own regulations. For example, section 40 of the MBO is limited to fire-resistant (F90) components. As based on the protection aims it seems also expedient to include F30 components, many federal states have added the term fire retardant (F30) to this paragraph in their LBOs.

Approval for individual cases

Based on the approval of the highest building authority, in individual cases also building products may be used that do not have a proof of usability (approval, test certificate) according to section 17 (2) sentence 1 of the MBO. However, this option is only practical in exceptional cases and is limited to the use within a single building project. Transfer to other building projects is not possible.

State Building Regulations (LBO):

The Model line systems regulation (MLAR) in its version of 04/2016 has now been adopted by almost all federal states in their building laws as LAR. Its application area includes all building types that are regulated according to the MBO and LBOs. With observance of specific prerequisites, it defines contingency measures (simplifications) with which a transfer of fire and smoke is ruled out. Additional proof by a building authority approval is not required in these cases.

One example would be lines penetrating fire walls and ceilings (building element thickness at least 80 mm). The application area is limited to the following line types:

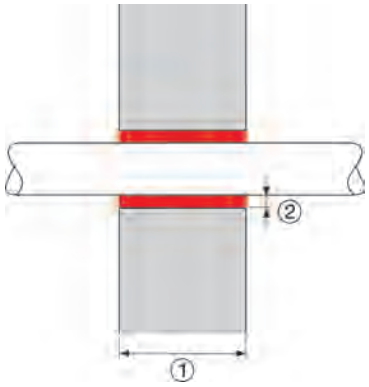
1. **Single electrical lines.**
2. **Single non-flammable pipes (except for glass and aluminum) Ø ≤ 160 mm, also with coating made of flammable building materials up to 2 mm thickness.**
3. **Individual pipes for non-flammable liquids, vapors, gases, dusts and Installation pipes for electrical lines Ø ≤ 32 mm made of flammable building materials, glass, or aluminum.**

In addition, the minimum distances of the lines to each other and the required sealing measures must be observed.

	Wall/ceiling [mm]	
Fire resistance duration:	**90 minutes**	**30 minutes**
① **Minimum thickness of the component:**	80	60
Diameter:		
Electrical lines	Single cable Ø = ∞	Single cable and cable bundle up to 50 mm
Cable trays	no	no
Flammable pipes	Ø ≤ 32	-
Non-flammable pipes	Ø ≤ 160	Ø = ∞
② **Max. annular gap:**		
Firestop mortar CP 633 M10 + CP 636	unlimited	unlimited
Elastic Firestop silicone sealant CFS-S SIL	≤ 50	≤ 50
Acrylic Firestop sealant CFS-S ACR	≤ 50	≤ 50
Intumescent Firestop sealant CP 611A	≤ 15	≤ 15
Firestop foam CP 660	≤ 15	≤ 50
Minimum distances:		
Non-flammable pipe to non-flammable pipe	1 x Ø larger pipe	≤ 20
Flammable pipe to flammable pipe	5 x Ø larger pipe	≤ 20
Non-flammable pipe to flammable pipe	5 x Ø flammable pipe or 1 x Ø non-flammable pipe the larger value applies in each case	≤ 20
Cable to cable	1 x Ø larger cable	≤ 20

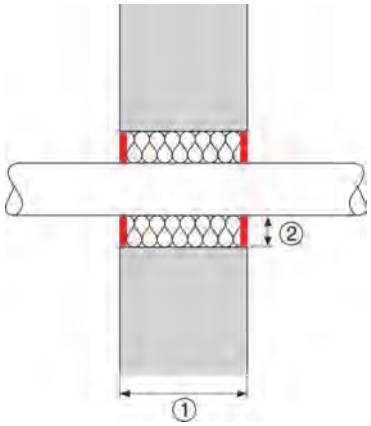
Sealing with Firestop mortar CP 633/CP 636:

- Seal the opening fully with mortar (e.g. Firestop mortar CP 633 M10 or CP 636) or concrete.
- The annular gap (2) or the total opening size for the penetration of several pipes is not limited.



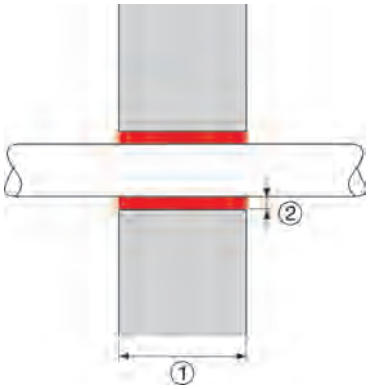
Sealing with mineral wool and Firestop sealant CFS-S SIL/CFS-S ACR:

- An annular gap (2) ≤ 50 mm can be filled with non-flammable mineral wool (melting point > 1000° C).
- Hilti recommends 10 mm-thick, double-sided, smoke-tight sealing of the mineral wool with elastic Firestop silicone sealant CFS-S SIL or acrylic Firestop sealant CFS-S ACR.



Sealing with flameproof coating building materials and Firestop sealant CP 611A, Firestop foam CP 660:

- Annular gaps (2) ≤ 15 mm can be fully sealed with a building material that creates a flameproof coating in case of fire, the Firestop sealant CP 611A or the Firestop foam CP 660.
- Important: additional insulation of the pipes is not necessary.
- During the penetration of walls by insulated pipes it should be generally observed that only non-flammable insulation material may be used in the penetration area. In addition, the distances of the pipes to each other must be observed, which will not be discussed further at this point.



4. Implementation of preventive fire protection for SILENTA PREMIUM

The fire protection sealing of the Silenta Premium drainage system is possible as a standard and a number of special configurations with Hilti CFS-C EL Firestop endless collar. Standard configurations consist of classical wall and ceiling penetration with different mounting options.

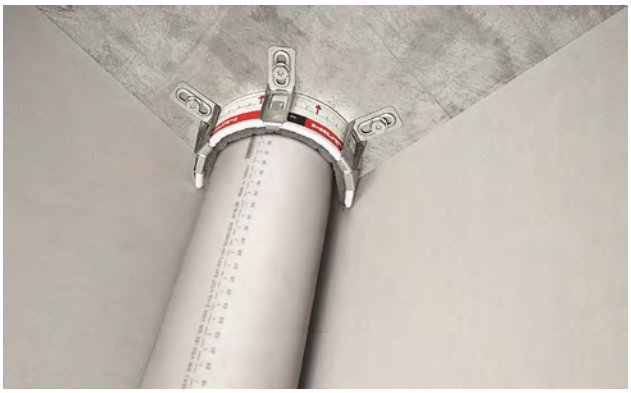
Wall and ceiling application with straight pipe penetration

Installation with mortared-in mounting hooks

Special configurations include chamfered pipe penetration and elbow pipes as well as corner applications. A variety of installation situations with zero distance can also be implemented.

Slanted pipes (45°) in light partition walls, solid walls and ceilings

Pipe elbows in the ceiling area (2 x 45° or 87°)



Corner applications with pipes in contact to solid walls or ceilings

Zero distance with multiple applications of the Hilti endless collar CFS-C EL

Zero distance to metal pipe systems with non-flammable insulation (Rockwool Conlit 150 U, Rockwool 800) for heating and drinking water applications

Zero distance to pipe systems such as GF Sanipex MT with flammable Synthetic rubber insulation (Armaflex, Insul-Tube, Kaiflex...) and Hilti Firestop bandage CFS-B for heating or drinking water applications

The sealing of the Silenta Premium drainage system with acoustic insulation has been tested positively in combination with the Hilti CFS-C EL Firestop endless collar for the following applications:

- Solid ceilings, thickness ≥ 150 mm
- Solid walls, thickness ≥ 100 mm
- Light partition walls (LTW), thickness ≥ 100 mm

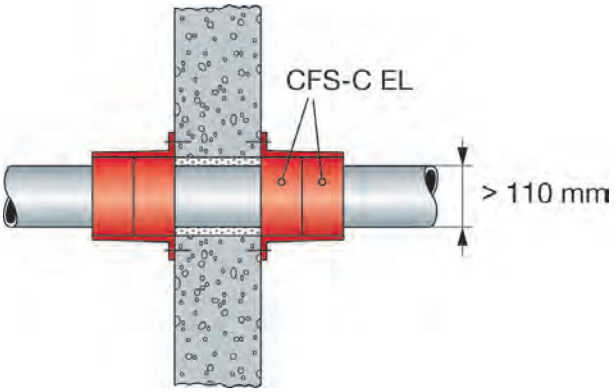
The Silenta Premium drainage system according to abZ Z-42.1-537 falls into the pipe category F and can therefore be installed in the following standard and special configurations. Until the general building authority approval (abZ) Z-19.53-2192 is transformed into a construction method permit the constructor of the construction type can provide proof of the conformity attestation as well as the unsubstantial deviation to the proof of usability.

4.1 Standard configurations with Hilti Firestop endless collar CFS-C EL

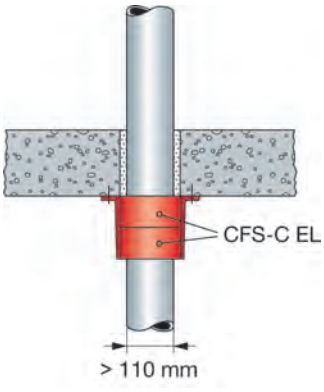
Silenta Premium pipes up to and including an outside diameter (d) of 110mm, can be sealed in light partition walls, solid walls and solid ceilings by a Hilti Firestop endless collar CFS-C EL. Pipes with a larger external diameter than 110 mm that penetrate solid walls and solid ceiling, must be sealed by two Hilti Firestop endless collars CFS-C EL.

		Walls		Ceiling
DN	d (mm)	≥ 100 mm Light partition wall	≥ 100 mm Solid	≥ 150 mm Solid
56	58	■	■	■
70	78	■	■	■
90	90	■	■	■
100	110	■	■	■

Installation options with Hilti CFS-C EL Firestop endless collar



Installation in solid wall with two collar hinges for Pipe diameters larger than 110mm



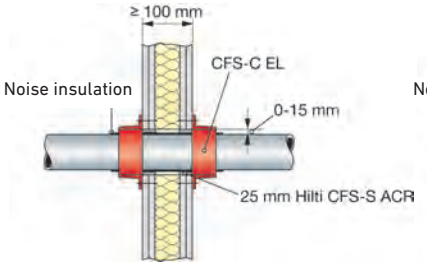
Installation in solid ceilings with two collar hinges for pipe diameters larger than 110mm

		Cut length			Mounting	
DN	d (mm)	0 mm acoustic pipe insulation	4 mm acoustic pipe insulation	9 mm acoustic pipe insulation	Number of hinges	Number of hooks
56	58	230	250	290	1	3
70	78	290	310	340	1	3
90	90	340	360	390	1	3
100	110	400	420	450	1	3
125	135	480	500	530	2	2 short, 4 long
150	160	560	580	610	2	2 short, 4 long

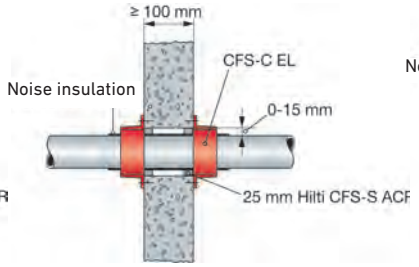
Installation details with Hilti CFS-C EL Firestop collar

Depending on the annular gap width there are several options for smoke-tight gap sealing for standard configurations.

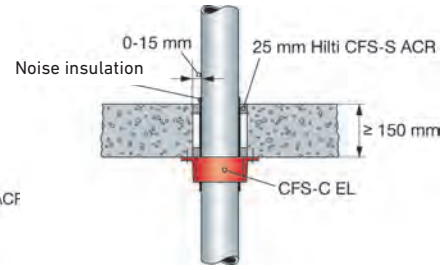
4.1.1 Gap sealing with Hilti Firestop sealant CFS-S ACR up to 15mm ring annular gap width



Light partition wall

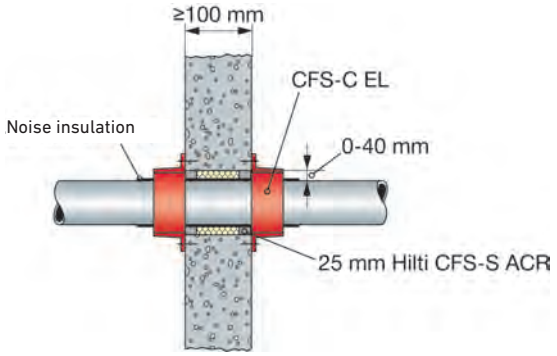


Solid wall

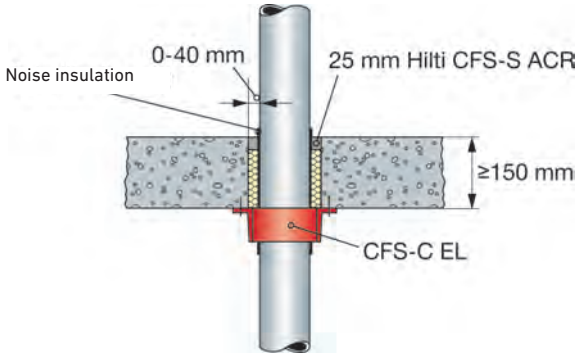


Solid ceiling

4.1.2 Gap sealing with Hilti Firestop sealant CFS-S ACR and mineral wool infill up to 40 mm annular gap width

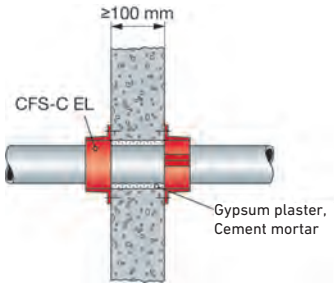


Solid wall

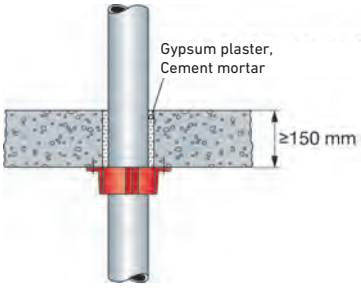


Solid ceiling

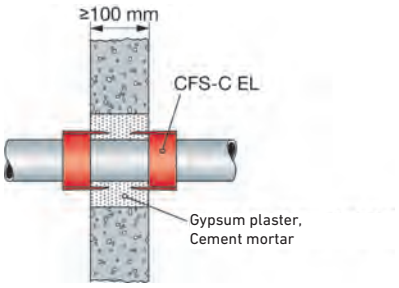
4.1.3 Gap sealing with non-combustible construction materials:



Solid wall



Solid ceiling



Installation in solid walls or ceilings with mortared-in mounting hooks

4.2 Special configurations with Hilti Firestop endless collar CFS-C EL

4.2.1 Slanted pipe penetration

Silenta Premium penetrating with a slant can be used in dry walls, solid walls, and solid ceilings. The slant must be between 45 and 90 degrees.

For this application you must measure the length of the Hilti Firestop endless collar CFS-C EL directly on the pipe.

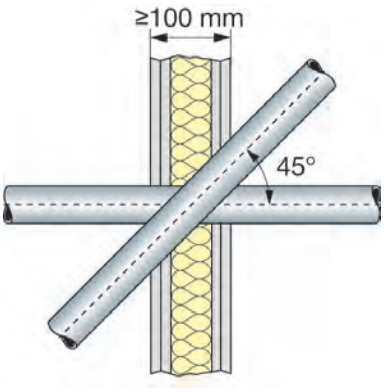
It is crucially important that there is no gap between the collar and the pipe.

		Walls		Ceiling
DN	d (mm)	≥ 100 mm Light partition wall	≥ 100 mm Solid	≥ 150 mm Solid
56	58	■	■	■
70	78	■	■	■
90	90	■	■	■
100	110	■	■	■

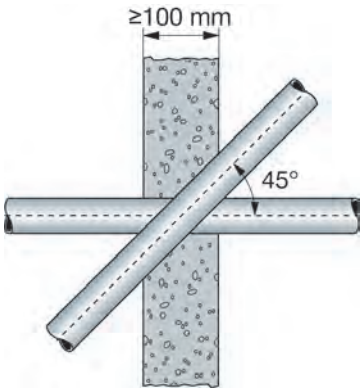
Installation options with Hilti CFS-C EL Firestop endless collar with slanted pipe penetration

		Mounting			
DN	d (mm)	Number of hinges	Number of hooks		
			0 mm acoustic pipe insulation	4 mm acoustic pipe insulation	9 mm acoustic pipe insulation
56	58	1	3	3	3
70	78	1	3	4	4
90	90	1	4	4	5
100	110	1	5	5	5

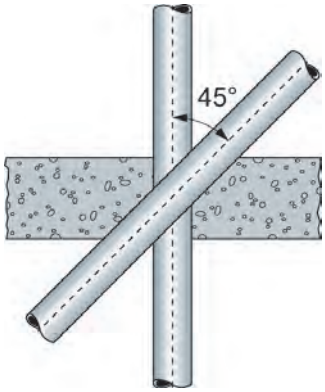
Installation details with Hilti CFS-C EL Firestop endless collar with slanted pipe penetration



Light partition wall



Solid wall



Solid ceiling

4.2.2 Pipe elbows (2x45° or 87°) in the ceiling area

It is possible to install a pipe elbow on the support directly behind the penetration. This pipe elbow with 87 degrees and 2 x 45 degrees also serves as a connection element that enlarges the overall diameter of the pipe. If the pipe elbow is too close to the building material and only very limited free space is available, the Hilti Firestop endless collar CFS-C EL can be installed in a U shape around the pipe elbow. For this purpose, a slightly longer collar length in combination with the end cover sheets and the small hooks are used.

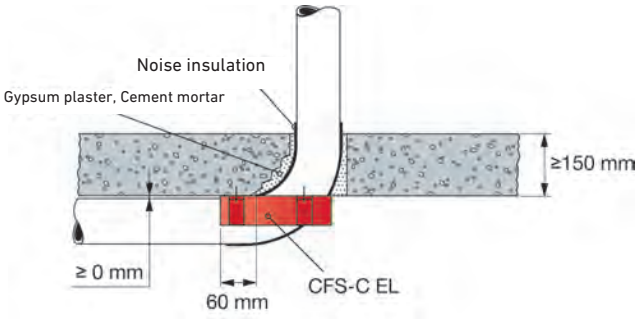
		Walls		Ceiling
DN	d (mm)	≥ 100 mm Light partition wall	≥ 100 mm Solid	≥ 150 mm Solid
56	58			■
70	78			■
90	90			■
100	110			■

Installation options with Hilti CFS-C EL Firestop endless collar with slanted pipe penetration

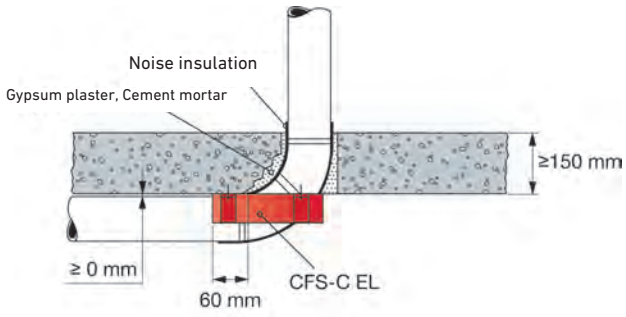
		Cut length			Mounting	
DN	d (mm)	0 mm acoustic pipe insulation	4 mm acoustic pipe insulation	9 mm acoustic pipe insulation	Number of hinges	Number of hooks
56	58	350	370	410	1	3
70	78	410	430	460	1	3
90	90	460	480	510	1	3
100	110	520	540	570	1	4

Installation details with Hilti CFS-C EL Firestop endless collar for pipe elbows

You must add 120 mm to the recommended diameter length. The reason for this is the fact that the hooks of the cover plates (that are mandatory for this application) must be installed at a safe distance from the closure of of the opening in the ground material. In this application, the collar must not be fitted tightly, it is installed in a U shape.



87° pipe elbow



2 x 45° pipe elbows

4.2.3 Corner applications

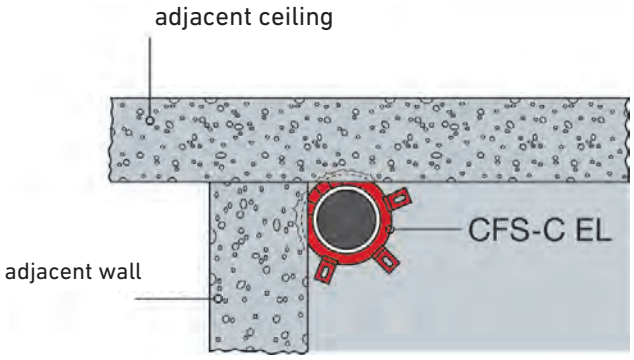
Silenta Premium installed directly in the corner with zero distance to two rigid support elements. Determine the length required for the pipe diameter by directly measuring the circumference. It must cover more than ¾ of the total circumference of the pipe.

		Walls		Ceiling
DN	d (mm)	≥ 100 mm Light partition wall	≥ 100 mm Solid	≥ 150 mm Solid
56	58		■	■
70	78		■	■
90	90		■	■
100	110		■	■

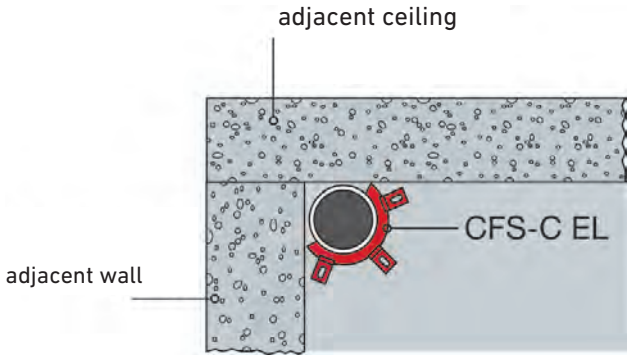
Installation options with Hilti CFS-C EL Firestop endless collar for corner applications

		Mounting			
DN	d (mm)	Number of hinges	Number of hooks		
			0 mm acoustic pipe insulation	4 mm acoustic pipe insulation	9 mm acoustic pipe insulation
56	58	1	3	3	3
70	78	1	3	3	3
90	90	1	3	3	3
100	110	1	3	3	3

Installation details with Hilti CFS-C EL Firestop collar for corner applications



Wall fitting with ceiling contact – carving work is required for the wall and the ceiling. The collar must fully cover the circumference.



Ceiling installation

4.2.5 Pipe connections within the sealing

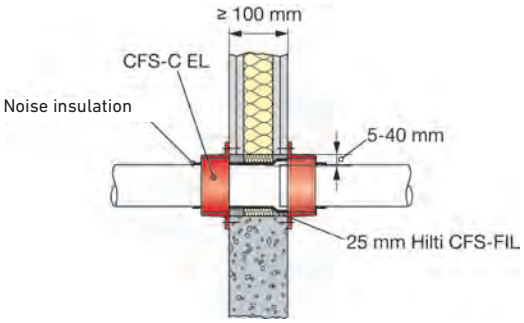
The Hilti Firestop endless collar CFS-C EL can be used inside the wall for pipe connections (bushing) that are placed half inside and half outside the wall. The length must be determined by directly measuring the circumference of the pipe connection.

		Walls		Ceiling
DN	d (mm)	≥ 100 mm Light partition wall	≥ 100 mm Solid	≥ 150 mm Solid
56	**58**	■	■	■
70	**78**	■	■	■
90	**90**	■	■	■
100	**110**	■	■	■

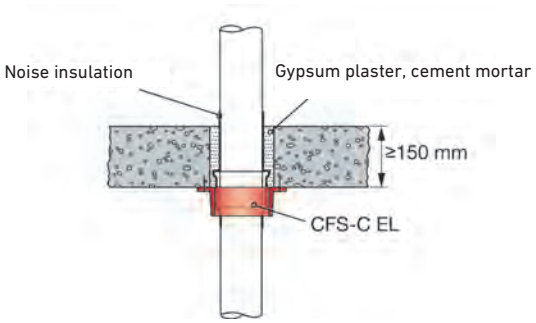
Installation options with Hilti CFS-C EL endless Firestop collar for pipe connections within the sealing

DN	d (mm)	Mounting			
		Number of hinges	Number of hooks		
			0 mm acoustic pipe insulation	4 mm acoustic pipe insulation	9 mm acoustic pipe insulation
56	58	1	3	3	3
70	78	1	3	3	3
90	90	1	3	3	3
100	110	1	4	4	4

Installation details with Hilti CFS-C EL endless Firestop collar for pipe connections within the sealing



Installation in light partition walls or solid walls with Hilti Firestop sealant CFS-FIL and infill with mineral wool



Installation in solid walls with non-flammable such as cement mortar or gypsum plaster

4.2.6 Distance regulations

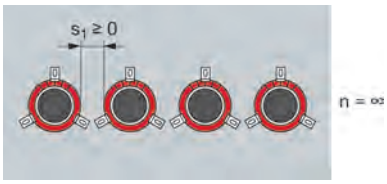
The distance of the component openings to be closed to other openings or installed elements must comply with the data provided in the following table.

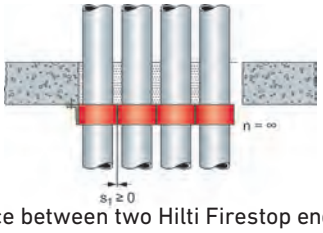
Distance of the pipe sealing to	Size of the adjacent openings	Distance between the openings
Other cable or pipe sealing	One/both openings > 40cm x 40cm	≥ 20cm
	Both openings ≤ 40cm	≥ 10cm
Other openings or installed elements	One/both openings > 20cm x 20cm	≥ 20cm

In deviation from the above table the zero distances described in the general building authority approval apply to the following installation situations.

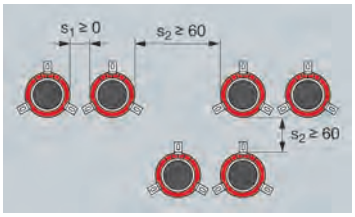
4.2.7 Zero distance to other Hilti Firestop endless collars CFS-C EL

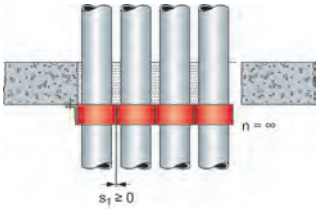
For Silenta Premium pipes up to an including and external diameter (d) of 110mm, the distance between two Hilti Firestop endless collars CFS-C EL can be zero (s1 ≥ 0 mm) while the maximum number of pipes installed in a row is unlimited. This applies to dry walls and solid walls with a width ≥ 100 mm and for ceilings ≥ 150 mm.





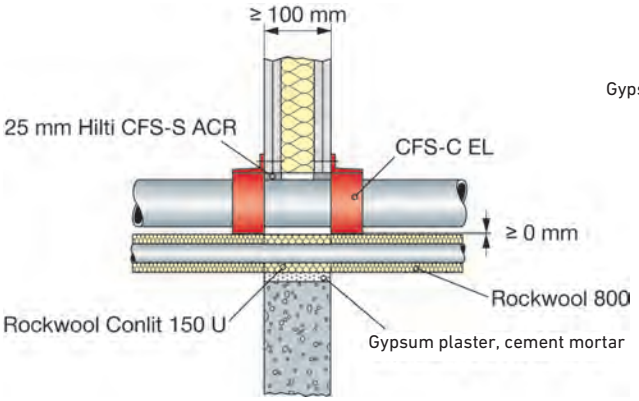
For pipes with an external diameter larger than 110mm, the distance between two Hilti Firestop endless collars CFS-C EL can also be zero (s1 ≥ 0 mm), however, the maximum number of pipes installed in a solid wall (thickness ≥ 150 mm) is 2 and the distance between two pipe runs must be $s_2 \geq 60$ mm. For solid walls (thickness ≥ 150 mm) the maximum number of pipes is unlimited.



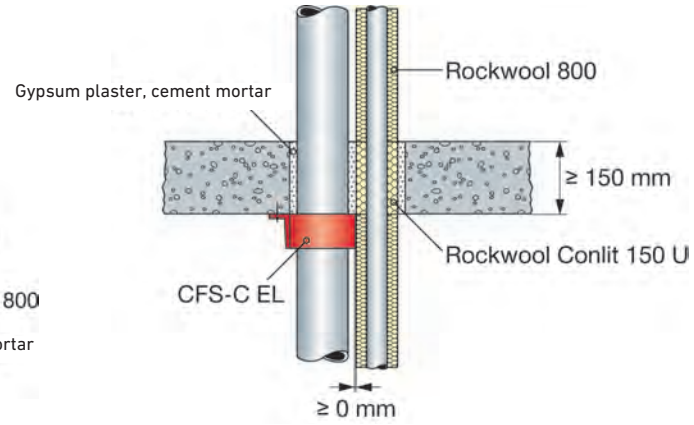


4.2.8 Zero distance to metal pipe systems with non-flammable insulation

The Hilti CFS-C EL endless Firestop collar on Silenta Premium up to an external diameter of 110mm can be installed with direct contact to metal pipes up to an external diameter of 42mm with insulation made of non-flammable insulation material (Rockwool Conlit 150U and Rockwool 800) (distance ≥ 0 mm).



Installation in light partition walls or solid walls



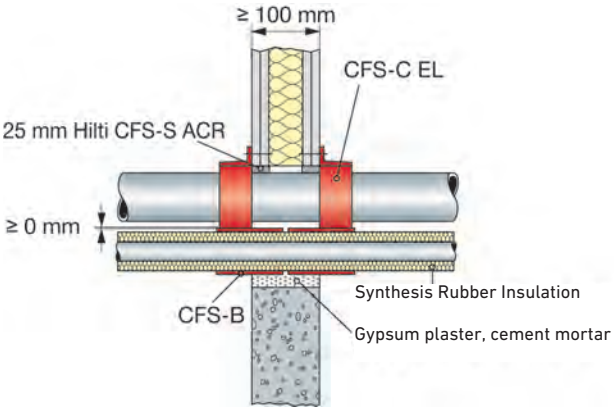
Fitting in solid ceiling

4.2.9 Zero distance to pipe systems such as Georg Fischer Sanipex MT with flexible synthetic rubber insulation

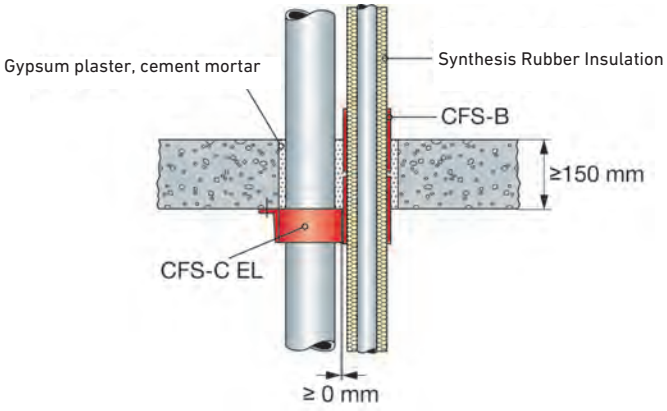
The Hilti CFS-C EL endless Firestop collar on Silenta Premium up to an external diameter of 110mm can be installed with direct contact to metal pipes with insulation made of flexible synthetic rubber insulation and sealing with the Hilti Firestop bandage CF-S B (distance ≥ 0 mm). For wall installation, the external diameter of the aluminum compound pipes is limited to 32 mm and for ceiling installation to 63 mm.

	Walls		Ceiling
Sanipex MT	**≥ 100 mm light partition wall**	**≥ 100 mm solid**	**≥ 150 mm solid**
16 mm	■	■	■
20 mm	■	■	■
26 mm	■	■	■
32 mm	■	■	■
40 mm			■
50 mm			■
63 mm			■
iFIT	**≥ 100 mm light partition wall**	**≥ 100 mm solid**	**≥ 150 mm solid**
16 mm	■	■	■
20 mm	■	■	■
25 mm	■	■	■
32 mm	■	■	■
iLITE	**≥ 100 mm light partition wall**	**≥ 100 mm solid**	**≥ 150 mm solid**
16 mm	■	■	■
20 mm	■	■	■
26 mm	■	■	■
32 mm	■	■	■

Possible combinations with Hilti CFS-C EL endless Firestop collar at zero distance to pipes with flexible synthetic rubber insulation

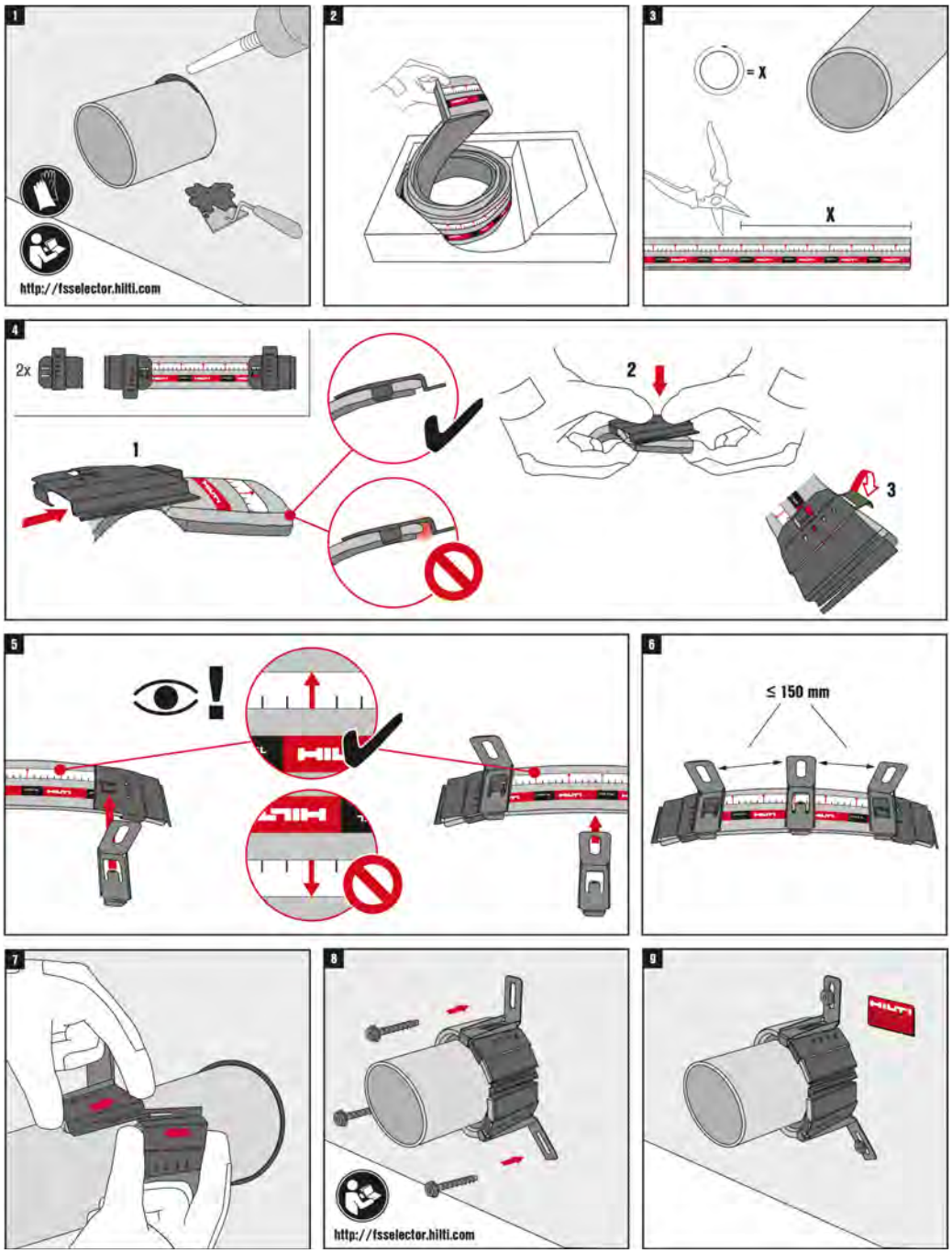


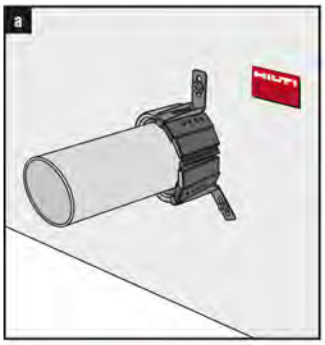
Installation in light partition walls or solid walls

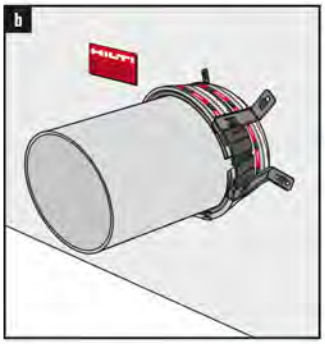


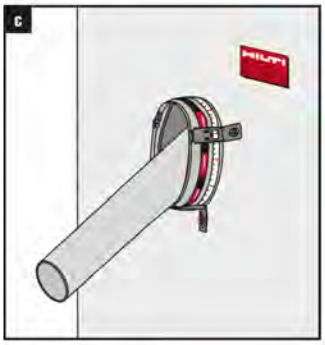
Fitting in solid ceiling

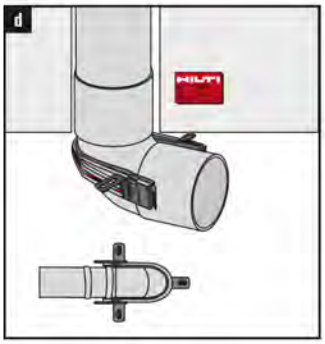
4.3 Installation instructions Hilti Firestop endless collar CFS-C EL

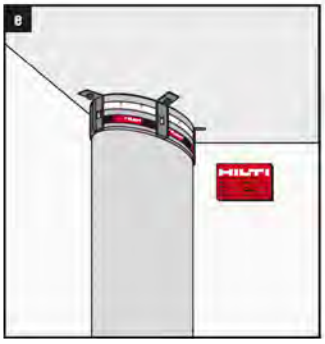


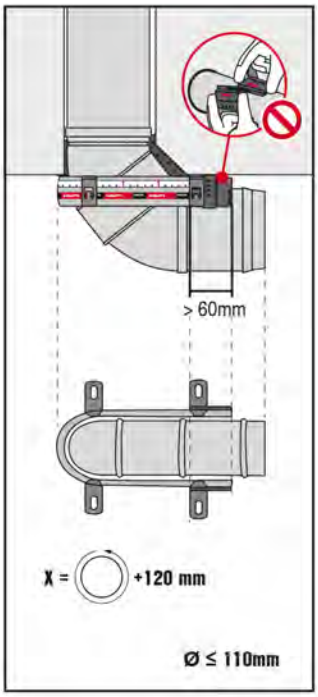


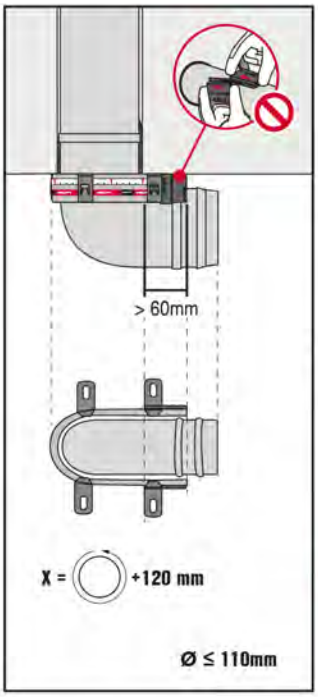


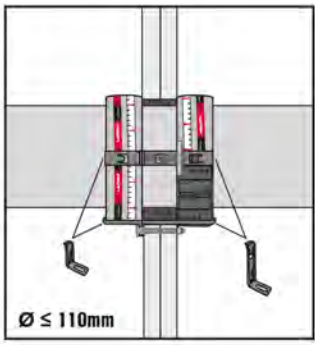


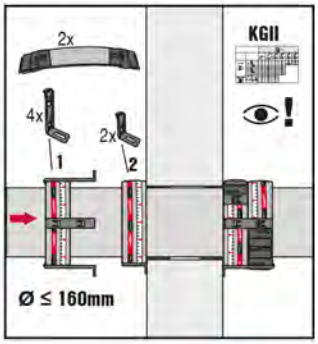


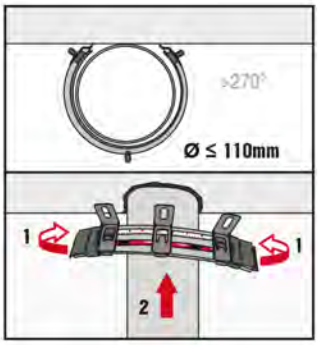


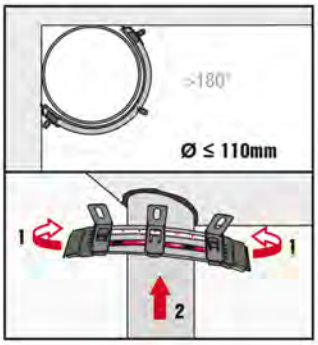


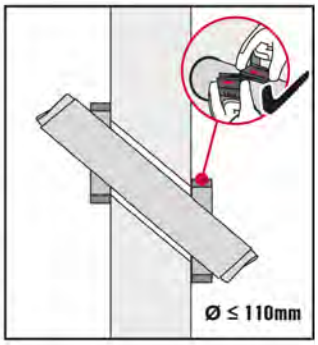












= X		mm Ø	- CFS C-EL mm	4 mm CFS C-EL mm	9 mm CFS C-EL mm	13 mm CFS C-EL mm	25 mm CFS C-EL mm
Ø ≤ 125mm	2x	16	130	130	160	180	260
		32	150	180	210	230	310
		40	180	200	230	260	340
		50	210	230	270		
	3x	56	230	250	290		
		63	250	280	310		
		75	290	310	340		
		90	340	360	390		
		110	400	420	450		
125 ≤ Ø ≤ 160mm	KGII= 2x 4x	125	450	470	500		
		135	480	500	530		
		140	490	520	550		
		160	560	580	610		

5. Implementation of preventive fire protection for JRG Sanipex MT

The fire protection sealing of the Sanipex MT system by a flexible synthetic rubber insulation is covered by the Hilti Firestop bandage CFS-B.

Shortening the Hilti CFS-B Firestop bandage

Wall and ceiling application with straight pipe penetration

Sealing the JRG Sanipex MT Systems in combination with the Hilti Firestop bandage CFS-B is approved via the general building authority approval (abZ) Z-19.53 2218 legally permissible for the following applications:

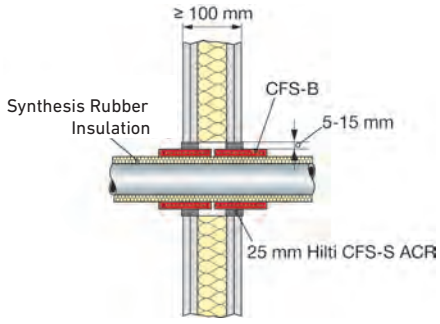
- Solid ceilings, thickness ≥ 150 mm
- Solid walls, thickness ≥ 100 mm
- Light partition walls (LTW), thickness ≥ 100 mm

The JRG Sanipex MT system falls into the pipe categories D and C and can therefore be installed in the following configurations.

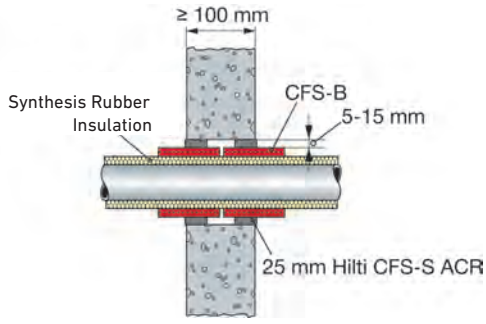
5.1 Configurations with Hilti Firestop bandage CFS-B

	Walls		Details	
JRG Sanipex MT	≥ 100 mm light partition wall	≥ 100 mm solid	Pipe group	Insulation thickness
16 mm	■	■	D	8-32 mm
20 mm	■	■	D	8-32 mm
26 mm	■	■	D	8-32 mm
32 mm	■	■	C	8-32 mm
40 mm	■	■	C	36.5 mm*
50 mm	■	■	C	37.5 mm*
63 mm	■	■	C	39.5 mm**

Installation options and details with the Hilti CFS-B Firestop bandage, *150 mm light partition wall/solid wall: min. insulation thickness 9 mm for pipe group C
**200 mm solid wall: min. insulation thickness 9 mm for pipe group C



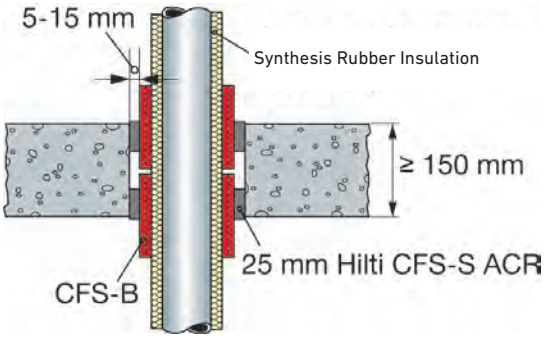
Light partition wall



Solid wall

	Ceiling	Details	
JRG Sanipex MT	≥ 150 mm solid	Pipe group	Insulation thickness
16 mm	■	D	8-32 mm
20 mm	■	D	8-32 mm
26 mm	■	D	8-32 mm
32 mm	■	C	8-32 mm
40 mm	■	C	9-32 mm
50 mm	■	C	9-37.5 mm
63 mm	■	C	9.5-39.5 mm

Installation options and details with the Hilti CFS-B Firestop bandage

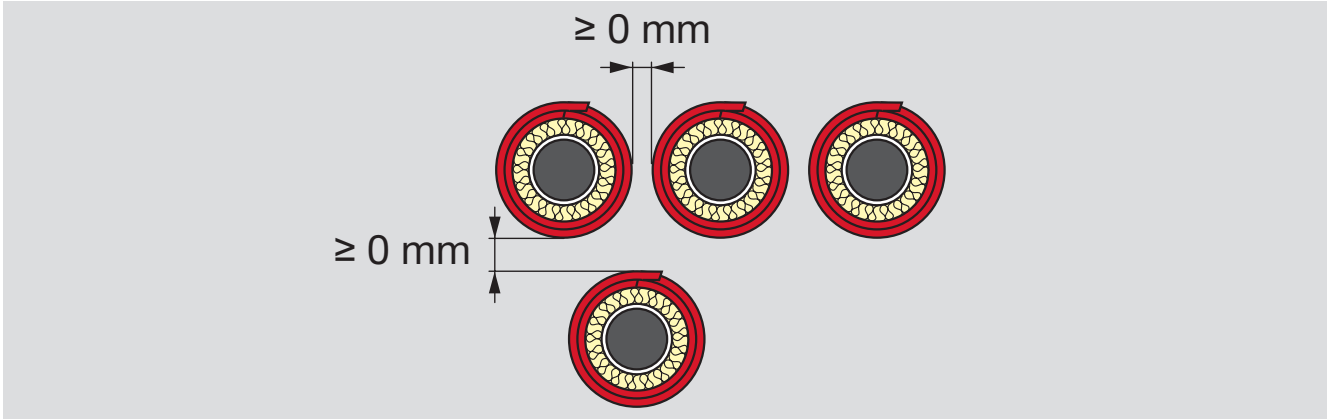


Solid ceiling

The remaining opening between the wall or the ceiling and the insulated JRG Sanipex MT pipe must be completely filled to the thickness of the building component with dimensionally stable, non-flammable building materials such as concrete, cement (Hilti Firestop mortar CP636), or gypsum mortar. Alternatively an annular gap with a maximum width of 15 mm must be filled on both sides of the building component at least 25 mm deep with gypsum or Hilti Firestop sealant CFS-S ACR.

5.2 Zero distance with Hilti Firestop bandage CFS-B

JRG Sanipex MT pipes insulated with Hilti Firestop bandage CFS-B may be installed with zero distance to each other if they are installed in 150 mm-thick solid components (wall, ceiling), or in 100 mm-thick solid components if their outer pipe diameter is no more than 40 mm.

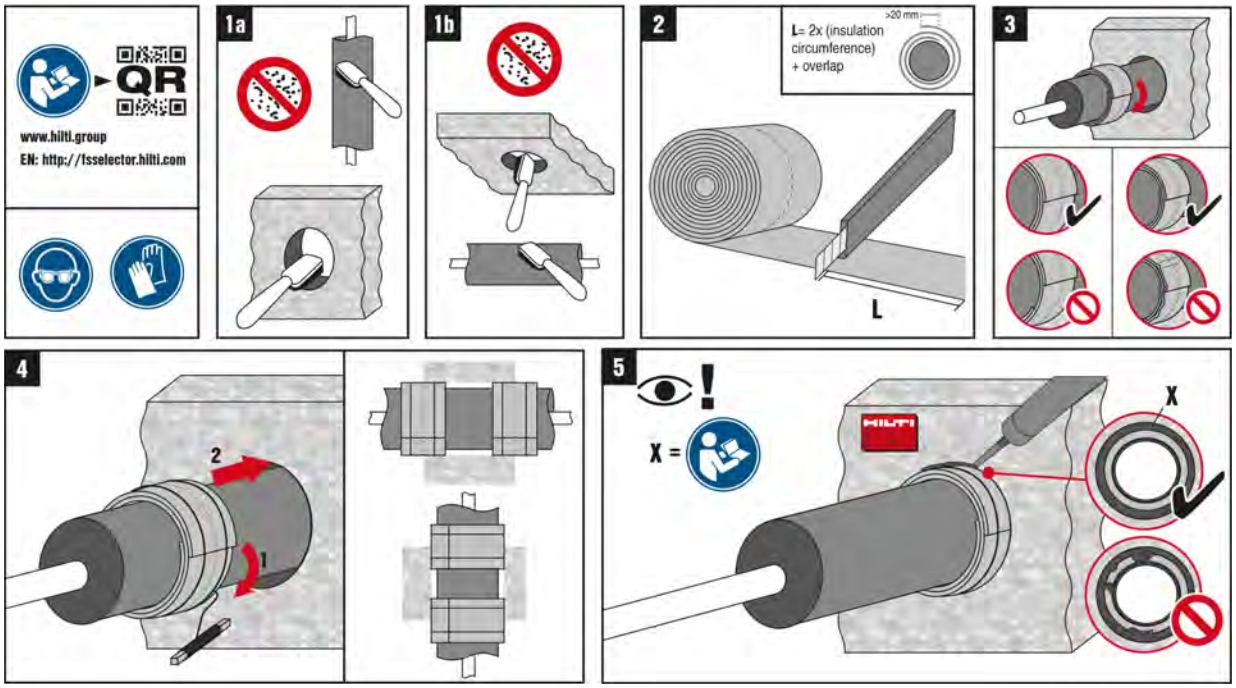


5.3 Insulation materials with Hilti Firestop bandage CFS-B

The following insulation materials are approved by construction law.

Manufacturer	Product name
Armacell GmbH	Armaflex AF, Armaflex SH, Armaflex Ultima, Armaflex HT
NMC Group	Insul-Tube (NMC), Insul-Tube H-Plus (NMC)
Kaimann GmbH	Kaiflex KK, Kaiflex KK plus
L'Isolante K-Flex	l'Isolante K-Flex HT, l'Isolante K-Flex ECO, l'Isolante K-Flex ST, l'Isolante K-Flex H, l'Isolante K-Flex ST Plus, Mondoflex H IKS-W1
Conel	Conel Flex EL

5.4 Installation instructions Hilti CFS-B Firestop bandage



6. Implementation of preventive fire protection for iFIT and iLITE

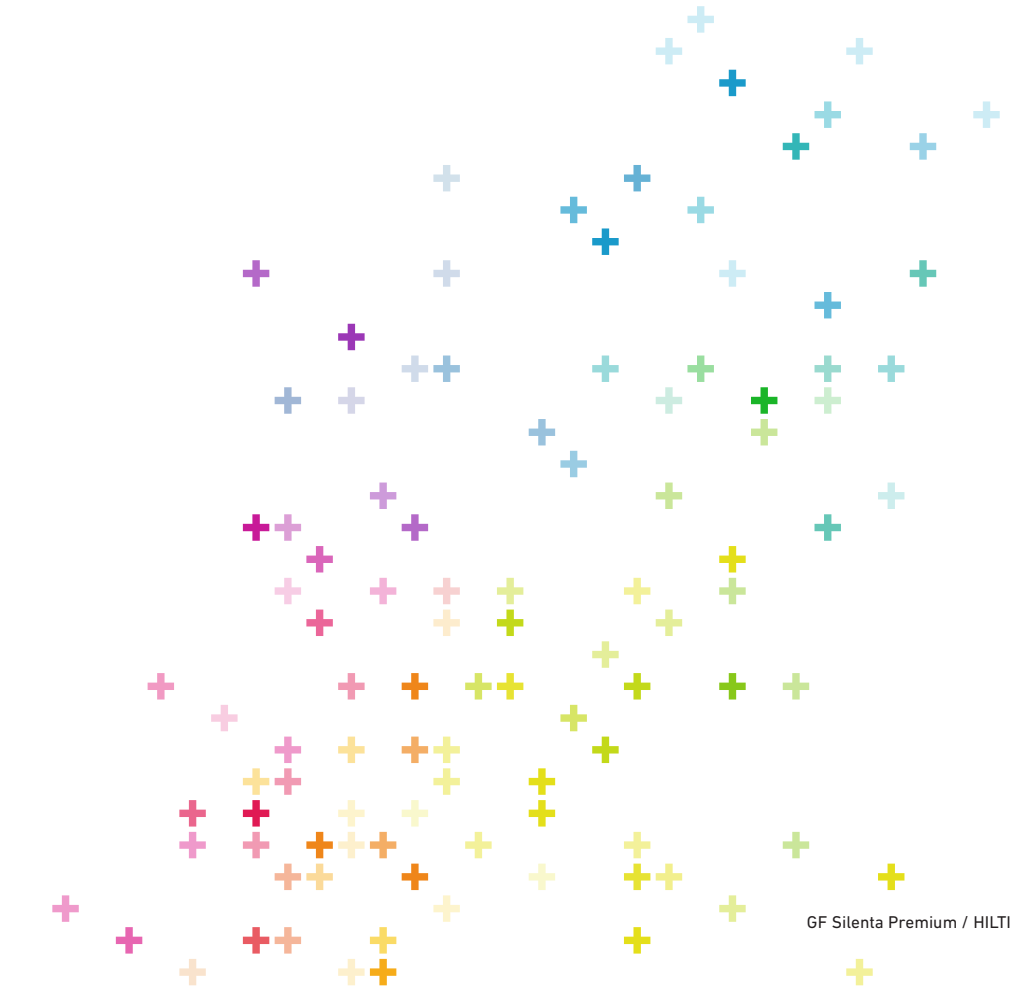
The fire protection sealing of the iFIT and iLITE systems by a flexible synthetic rubber insulation is covered by the Hilti Firestop bandage CFS-B.
Sealing the IFIT and iLITE systems in combination with the Hilti Firestop bandage CFS-B is approved via the general building authority approval (abZ) Z-19.53 2218 legally permissible for the following applications:

- Solid ceilings, thickness ≥ 150 mm
- Solid walls, thickness ≥ 100 mm
- Light partition walls (LTW), thickness ≥ 100 mm

The iFIT and iLITE systems fall into the pipe category D can therefore be installed in the following configurations. The same installation details as for Sanipex MT apply.

	Walls		Ceiling	Details	
iFIT	**≥ 100 mm light partition wall**	**≥ 100 mm solid**	**≥ 150 mm solid**	**Pipe group**	**Insulation thickness**
16 mm	■	■	■	D	8-32 mm
20 mm	■	■	■	D	8-32 mm
25 mm	■	■	■	D	8-32 mm
32 mm	Solutions with Hilti CFS-BL P Firestop block or Hilti CFS-F FX Firestop foam				
iLITE	**≥ 100 mm light partition wall**	**≥ 100 mm solid**	**≥ 150 mm solid**	**Pipe group**	**Insulation thickness**
16 mm	■	■	■	D	8-32 mm
20 mm	■	■	■	D	8-32 mm
26 mm	■	■	■		

Installation options and details with the Hilti CFS-B Firestop bandage



7. Firestop bandage, technical data

CFS-B Firestop bandage

APPLICATIONS

- Fire protection around (heat/cold) insulated non-flammable pipes
- Raw materials: Copper, steel, and other metals with a thermal conductivity that is lower than that of copper (e.g. cast iron, stainless steel, etc.)
- Various insulation materials
- Suitable for application in openings in concrete, bricks, or dry walls
- Aluminum composite pipes

ADVANTAGES

- Variable use – a single product for a large number of insulation materials, raw materials, and pipe diameters
- Quick and easy to install – no drilling or additional tools required
- No need to punctuate the pipe insulation material within the wall/floor penetration
- Minimal thickness for easy mounting in narrow gaps
- Good elasticity for optimal flexibility

Technical Data	
General-purpose applications	Pipes
Application temperature range	-5 - 50 °C
Temperature resistance range	-20 - 100 °C
Storage and transport temperature range	-5 - 50 °C
Shelf life[1)]	At 25 °C and 50 % relative humidity from the manufacturing date
Additional products	CP 636, CP 633, CFS-S ACR
Reaction temperature (approximate)	210°C
Die swell ratio (unlimited)	1:14
Building material class (EN 13501-1)	E
Approvals	Z-19.53-2210, Z-19.53-2218

Order designation	Packaged for	Article number
CFS-B Firestop bandage	1 unit.	**429557**

Firestop sealant (acrylic) CFS-S ACR

Applications

- Between dry separating walls
- Vertical gaps between solid walls
- Horizontal gaps (wall-wall, wall-ceiling, wall-floor)
- Insulation of non-flammable pipes

Order designation	Color	Volume per unit	Packaged for	Article number
CFS-S ACR CG	Grey	310 ml	1 unit	**435862**
CFS-S ACR CW	White	310 ml	1 unit	**435859**

8. Firestop collar, technical data

Firestop endless collar CFS-C EL

APPLICATIONS

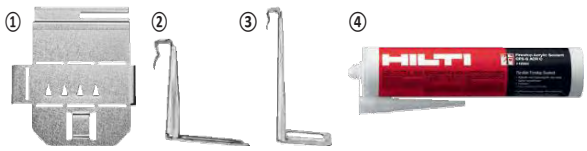
- Suitable for use on shaft walls, soft firestop, dry walls, porous concrete, masonry, and concrete
- Approved for versions made of PVC, PP, PE and a wide range of sound proof pipes
- Sound proof pipes tested with insulation and acoustic decoupling
- Tested configurations: pipe elbows, chamfered pipes, pipes with little distance to the wall
- No minimum distance required for the Firestop bandage CFS-B, endless collar CFS-C EL, and Conlit

ADVANTAGES

- Flexible solution for wastewater pipes, roof drainage and pneumatic tube lines
- Endless solution: One product for all applications
- Problem solution for non-standard applications
- Easy to assemble

Technical Data	
Pipe diameter (range)	16 – 160 mm
L x W x H	2580 x 52 x 17 mm
Reaction temperature (approximate)	210°C
Application temperature	-5 – 50 °C
Temperature resistance	-30 – 80 °C
Storage and transport temperature	-30 – 50 °C
Building material class (EN 13501-1)	E
Die swell ratio (unlimited until max.)	1:19
Additional products	CFS-S ACR, CFS-FIL
Approval	Z-19.53-2192

Order designation	Package content	Packaged for	Article number
CFS-C EL	1 Firestop endless collar CFS-C EL, 18 closing sheets, 22 short hooks	1 units	**2075120**



Accessories

Order designation		Packaged for	Article number
Closing plate CFS-C EL	①	18 units	**2075121**
Hooks CFS-C EL short	②	22 units	**2075122**
Hooks CFS-C EL long	③	20 units	**2075123**
CFS-S ACR CG	④	1 units	**435862**
CFS-S ACR CW	④	1 units	**435859**

Note: Order an implementation sign for each sealing.
Please observe the applicable approval/test report and the contained handling information for the assembly!

Your contact

Our sales companies and distribution partners near you offer you consulting, maintenance, and seminars.

Sales company Germany
GF Piping Systems GmbH
Daimlerstraße 6
73095 Albershausen
Telephone +49 7161 302-0
Fax +49 7161 302-259
info.de.ps@georgfischer.com
www.gfps.com

Sales office Hannover
GF Piping Systems GmbH
Heidering 37-39
30625 Hannover
Telephone +49 511 957 88-0
Fax +49 511 957 88-44

Sales office Leipzig
GF Piping Systems GmbH
Georg-Fischer-Straße 2
04249 Leipzig
Telephone +49 341 484 70-0
Fax +49 341 484 70-21

Sales office Neuburg
GF Piping Systems GmbH
Nördliche Grünauer Straße 65
86633 Neuburg
Telephone +49 8431 58 17-0
Fax +49 8431 58 17-20

Hilti Deutschland AG
Hiltistrasse 2
86916 Kaufering; Germany
Telephone +49 (0) 800 / 888 55 22
www.hilti.de

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