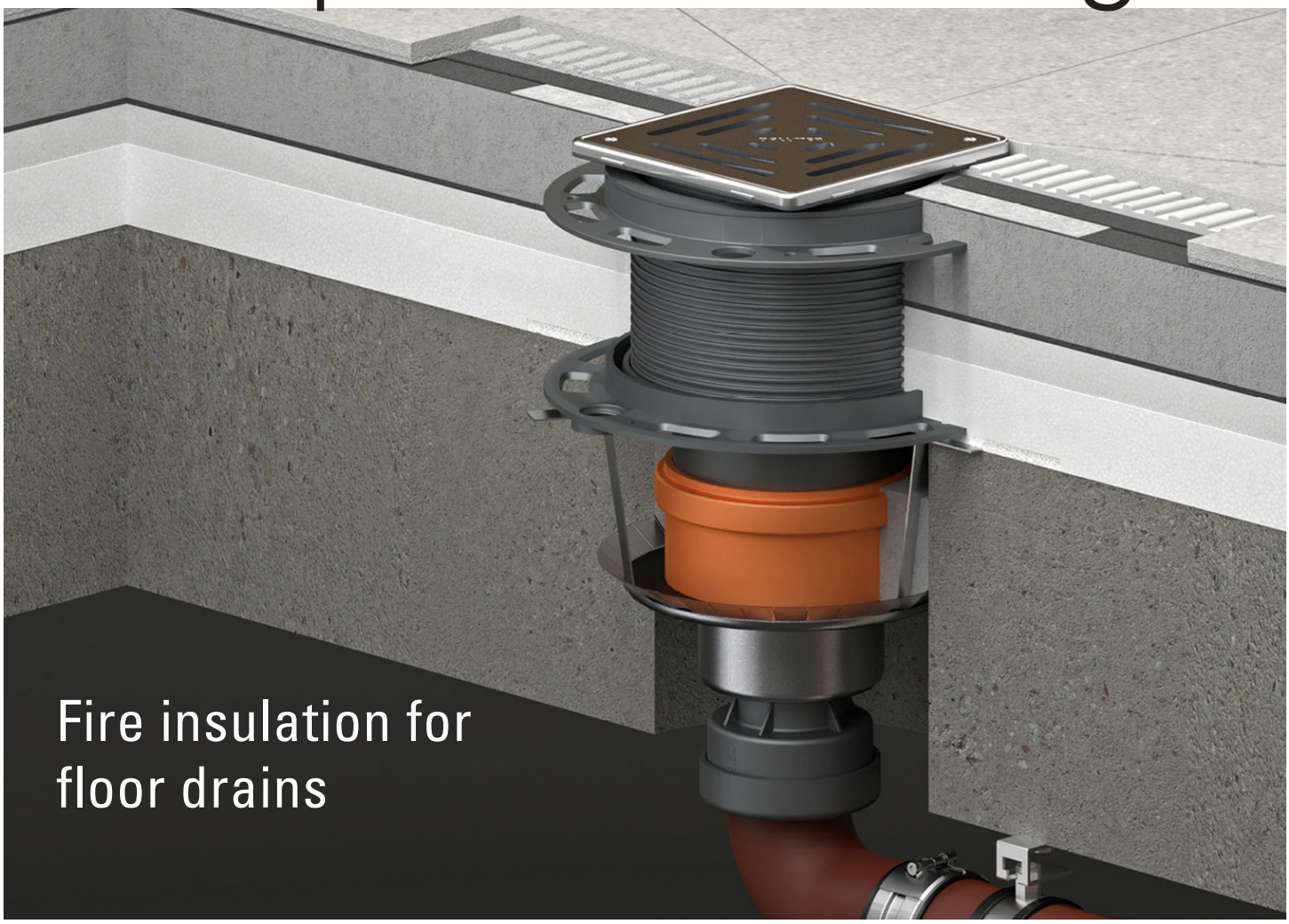
Compact knowledge



Fire insulation for floor drains

At a glance

✓ **Preventive fire insulation**
The term for all organisational, constructional and technical measures designed to prevent the outbreak and spread of fires. This includes the compliant safeguarding of pipes and ceiling feedthroughs.

✓ **Fire insulating structural elements**
Fire insulation elements fitted with a swelling agent (material which foams in case of fire) ensure that plastic pipes, drainage pipes and floor drains are safely sealed in the event of fire.

✓ **Fire resistance class / duration**
The fire resistance class of a component provides information on how long it can withstand a fire. The classification is defined in the standards DIN 4102-2 and DIN EN 13501-2.

✓ **Installation of fire insulating structural elements**
The low build height of the Dallmer fire insulation system provides the prerequisites that allow the drain pipe to be laid underneath the ceiling almost without clearance.

In general the installation conditions required for approval, the type of drain, of pipeline and of the ceiling must be observed during installation.

DALLMER

Fire insulation in drainage technology

Fire insulation for floor drains and shower channels in concrete surfaces

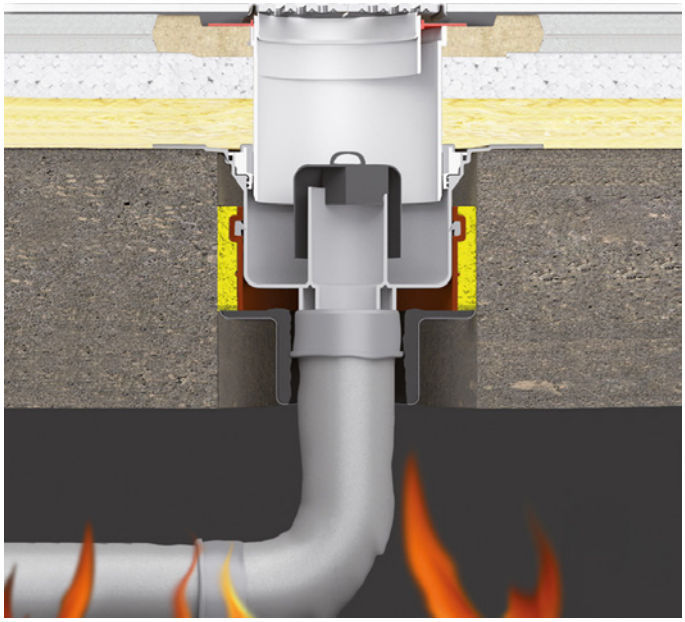
Within the context of preventive fire insulation, plastic floor drains with a vertical outlet are regarded as pipe / ceiling feedthroughs that require sealing off. This is because if a fire breaks out, flames, smoke and heat can spread very quickly via the wastewater pipe and set fire to further floors of a building. In order to prevent this, it must be possible to professionally seal all feedthroughs of this type in compliance with the pertinent standards.

The same applies to flat roofs. In this case, the fire can jump to the roof via the roof drains.

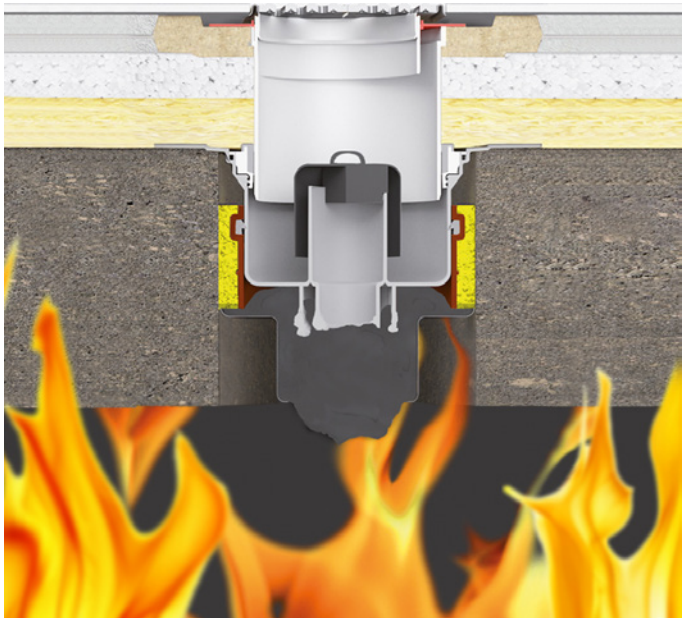
How the fire insulating structural element works

Dallmer offers fire insulating structural elements for sealing off floor feedthroughs that can be installed without the need for tools. The core piece of this element is a fire insulating insert made of an intumescent material (material that foams in the event of a fire) which begins to foam at a heat of approx. 150 °C. The volume of the material increases approx. 15 / 20-fold.

This seals off the ceiling feedthrough quickly, reliably and safely and prevents the spread of any heat, flames or smoke via this feedthrough.



1. The fire heats the material which foams in the event of a fire (former of an insulating layer)



2. Ceiling feedthrough is sealed off

Construction of fire insulating structural element

1. Insert with grating
2. Raising piece for bonded waterproofing according to DIN 18534
3. Vertical drain body with outlet
4. Sound insulation collar
5. Mounting bracket and installation aid for tool-free assembly
6. Fire and sound-insulating structural element

Fire resistance classes DIN 4102-2 and DIN EN 13501-2

Fire insulating structural elements are divided into different fire resistance classes. This classification is regulated by the German standard DIN 4102-2 and the European standard DIN EN 13501-2.

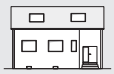
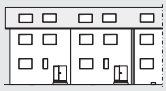
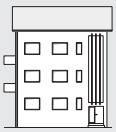
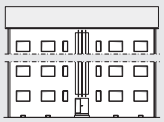
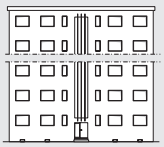
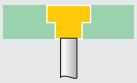
In both cases, the classification is determined by the length of time a component can withstand the fire.

	DIN 4102-2	DIN EN 13501-2
These standards describe the fire resistance of a component or product using the following criteria	F = Fire resistance duration	R = Load capacity (Caution! Depending on the context, R may also stand for "pipe bushing") E = Integrity I = Thermal insulation
Unit of measurement	Minutes – the value is always rounded down to the next multiple of 30	Minutes
These are divided into the following classes	F 30 / 60 / 90	REI 30 / 60 / 90 / 120 EI 30 / 60 / 90 / 120

Planners and architects must ensure that the fire resistance class of the selected fire insulating structural elements is appropriate for the roof where they are to be installed. Selecting a fire insulating element whose fire resistance class is too low will reduce the effectiveness of the ceiling fire resistance. Or in other words: a fire-resistant ceiling is of little use if the fire can spread via the piping.

The following table shows which requirements the Model Building Code and the Regional Building Code have in relation to the fire resistance of floor drains in accordance with the building class:

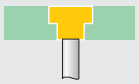
Requirements relating to the fire resistance of floor drains according to the Model Building Code / Regional Building Code

Building classes	GK 1 (a + b)	GK 2	GK 3	GK 4	GK 5	Special structures
OKF = Upper edge of common room flooring from upper edge of foundation	 Detached buildings ≤ 7 m OKF (≤ 2 building units and total ≤ 400 m²) 1)	 Buildings ≤ 7 m OKF (≤ 2 building units and total ≤ 400 m²) 1)	 Other buildings ≤ 7 m OKF 1)	 Buildings ≤ 13 m OKF (building units each with no more than 400 m²) 1)	 Other buildings ≤ 22 m OKF 1)	Hotels, Places of public assembly, Sports facilities, Schools, Hospitals, regardless of height and high-rise buildings ≤ 22 m OKF 2)
Components in basements (ceilings), MBO § 31 (2)	 F 30	 F 30	 F 90	 F 90	 F 90	 F 90 / F 120, 2)
Components in upper floors (ceilings), MBO § 31 (1)	 F 30	 F 30	 F 30	 F 60 / F 90, 3)	 F 90	 F 90
Requirements for components on upper floors (ceilings) of "non-F 30 German federal states" prior to the introduction of the building regulation MBO 2002	 F 30	 F 30	 F 30	 F 60 / F 90, 3)	 F 90	 F 90, 2)

1. According to § 40 there are no provisions requiring the sealing-off of floor drains in apartments and building units smaller than 400 m² and with fewer than 2 floors (GK 1 (a+b)).

2. Special structures are subject to different requirements. Details can be found in the special building regulations and special fire insulation concept, which form part of the building permit.

3. As there are currently no bushings on the market for highly fire-retardant components, bushings for fire-resistant components must be installed.


Floor drains in F 30 components with sound and fire insulating requirements


Floor drains with sound insulation requairements


Floor drains in F 60 / F 90 / F 120 components with sound and fire insulating requirements

Note:
Adherence to the table will cover all previous and all new requirements. Verification of the respective fire resistance duration must be provided in the form of a certification of suitability for use, e.g. a General Building Supervisory Authority Test Certificate (abP), a General Building Approval (abZ) or a General Design Certificate (aBG).

The required fire resistance durations for floor drains in the overview table must be taken into account during planning and implementation. Verification of the respective fire resistance duration must be provided in the form of a certification of suitability for use, e.g. a General Building Supervisory Authority Test Certificate (abP), a General Building Approval (abZ) or a General Design Certificate (aBG). This also applies to floor drains which are regulated in accordance with European standards and are documented in the Building Rules List.

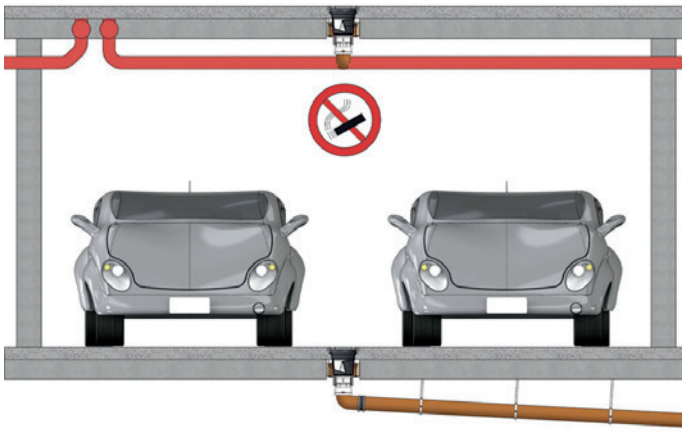
"Floor drains are construction products which are regulated by European standards and therefore require no further approval for the function as a floor drain. As soon as floor drains contain mechanisms for preventive fire insulation, they require a General Building Approval (abZ) or a General Design Certificate (aBG). To adhere to the fire insulation objectives it is recommended that floor drains in R 30 / 60 / 90 / 120 quality be tendered. The client must submit a declaration of compliance for each floor drain type.

For feedthroughs with an abZ / aBG, a type plate must be installed next to the floor drain on the underside of the ceiling." (Translation of quote from MLAR / LAR, 5th updated issue from authors Lippe, Czepuck, Möller, Reintsema)

Building areas with increased fire load

Underground car parks according to Model Building Code

Underground car parks within buildings according to Model Building Code and the Regional Building Code

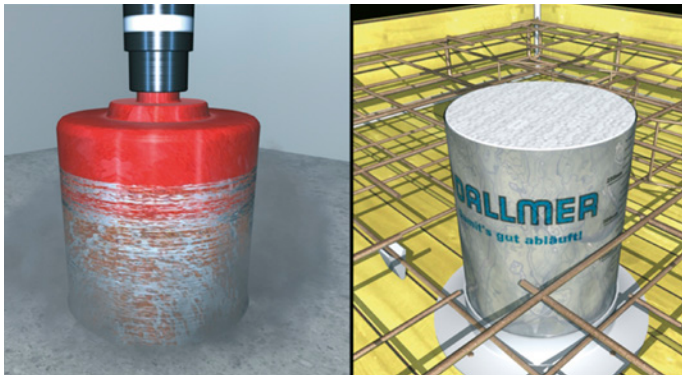


Note:
When laying pipelines in underground car parks, combustible or non-combustible pipes are permitted. When line feedthroughs are sealed off with components with requirements for fire resistance duration, this must be implemented according to MLAR / LAR, section 4.

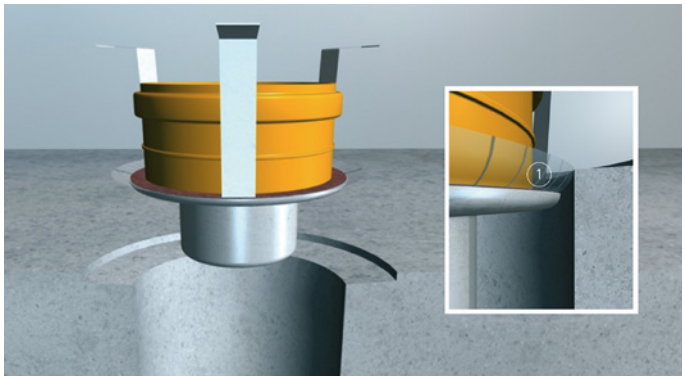
Yard and parking area drain 616 with fire insulation element 4

Note:
Suitable for use indoors and outdoors in combination with mastic asphalt according to abZ no. Z-19.17-1547.

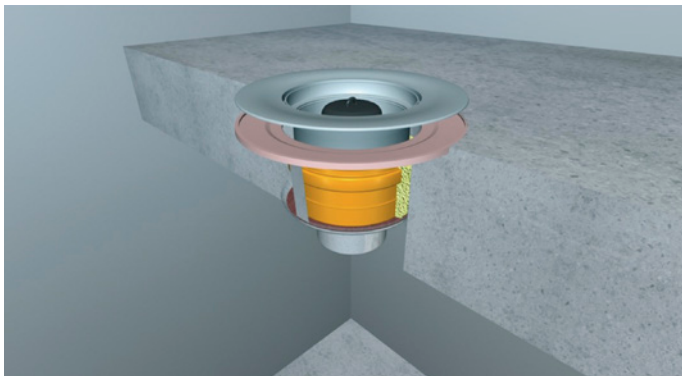
Installation of a floor drain with fire insulation element



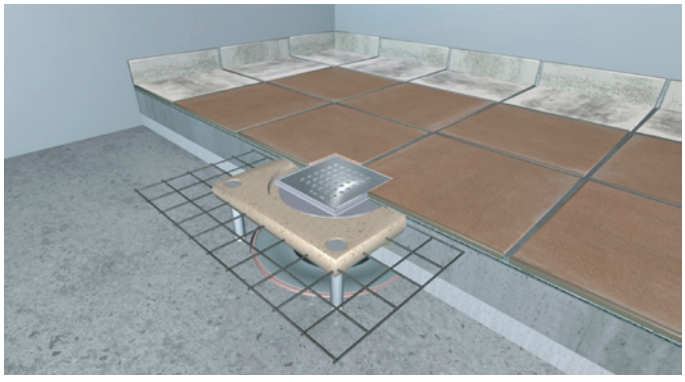
Core drilling
Alternative: The appropriate polystyrene ceiling feedthrough



– Inserting fire insulation element
– The integrated installation aid (1) automatically seals the gap between the fire insulation element and the wall in the downwards direction
– Grouting spaces with MG II or MG III mortar



Installing floor drain with sound insulation collar ...



... and completing it

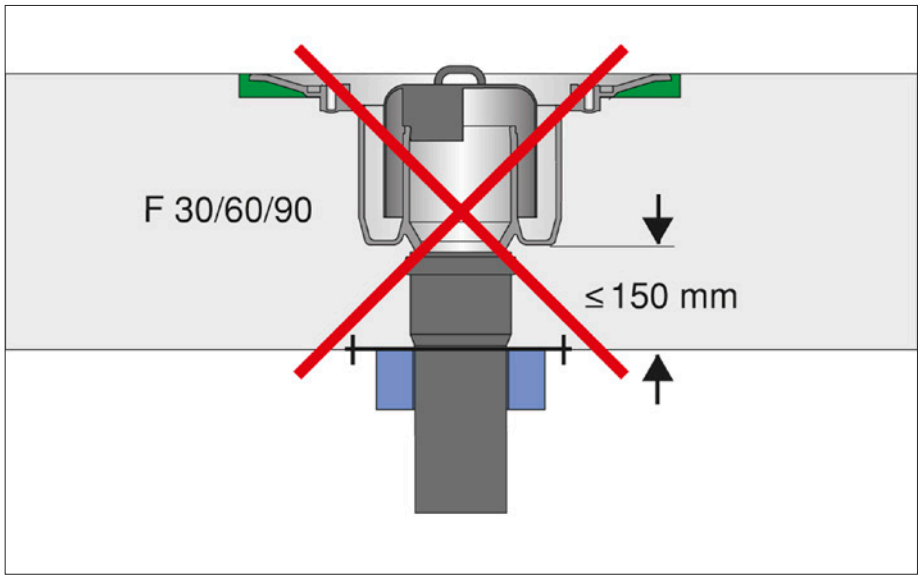
Note:
A major benefit of the Dallmer fire insulation system is the low build height which means that the requirements for laying the drain lines underneath the ceiling almost without clearance are met.

Required for approved systems

Installation of floor drains with fire insulation pipe collars on the floor drain

Fire insulation collar installation instructions for floor drains on ceiling slab: installation instructions for sealing off combustible floor drains with R 30 to R 90 fire insulation collars underneath solid ceilings with requirements for the fire resistance duration. All variants for sealing off and examples (in relation to the pipe collars) must be implemented according to the specifications of the General Building Approval (abZ) or the General Design Certificate (aBG) for the respective R 30 to R 90 fire insulation collars. If necessary, "non-substantial deviations" (see diagram) from the abZ / aBG must be documented and confirmed by the owner of the approval. For substantial deviations from the abZ / aBG, applications must be made for approvals for individual circumstances or project-related design certificates (vBG).

Not approved!

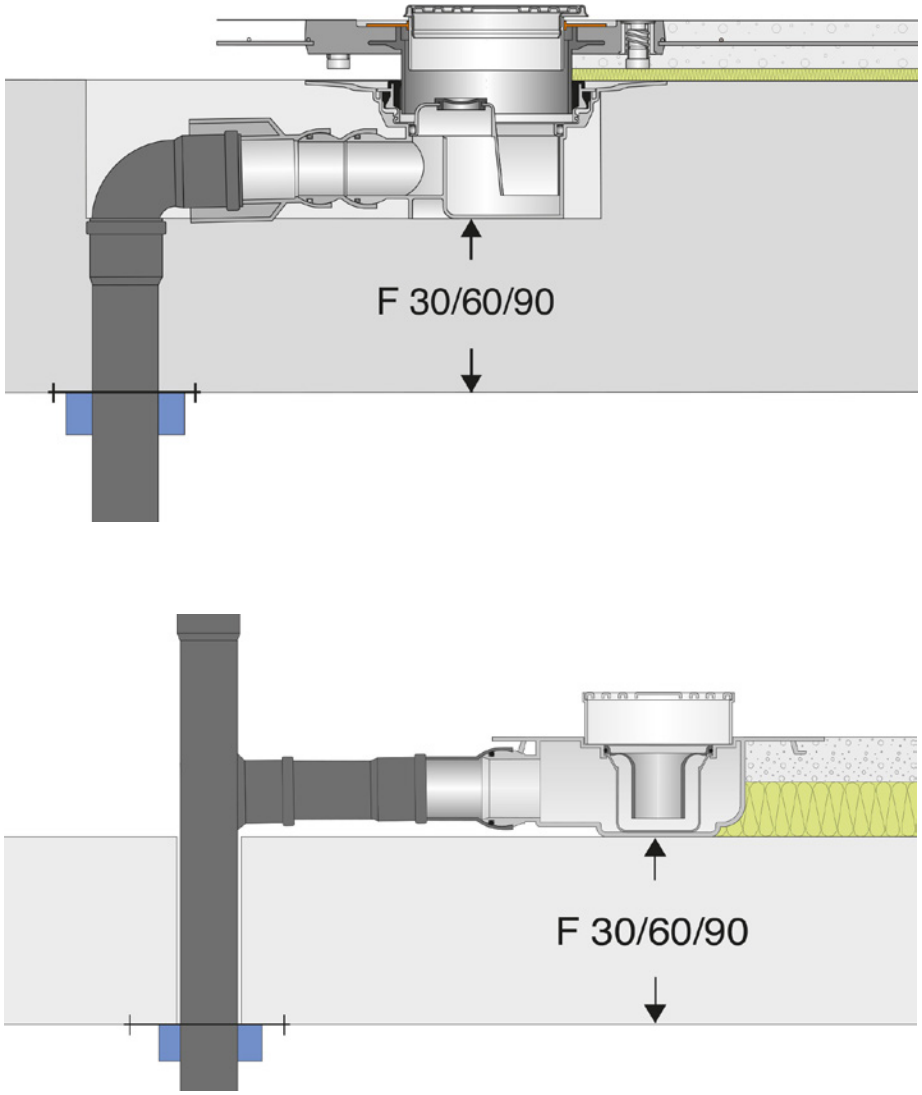


Vertical pipe connection with fire insulation collar

The sealing-off of combustible floor drains with R 30 / 60 / 90 fire insulation collars is only permitted if the pipe connection is within the compliant minimum coverage below of ≥ 150 mm. In case of component thicknesses < 150 mm between the bottom edge of the floor drain and the upper edge of the fire insulation collar, sealing-off with fire insulation collar is not permitted.

Note:
Only permitted if the floor drain is covered below or the fire insulation collar is covered above by ≥ 150 mm.

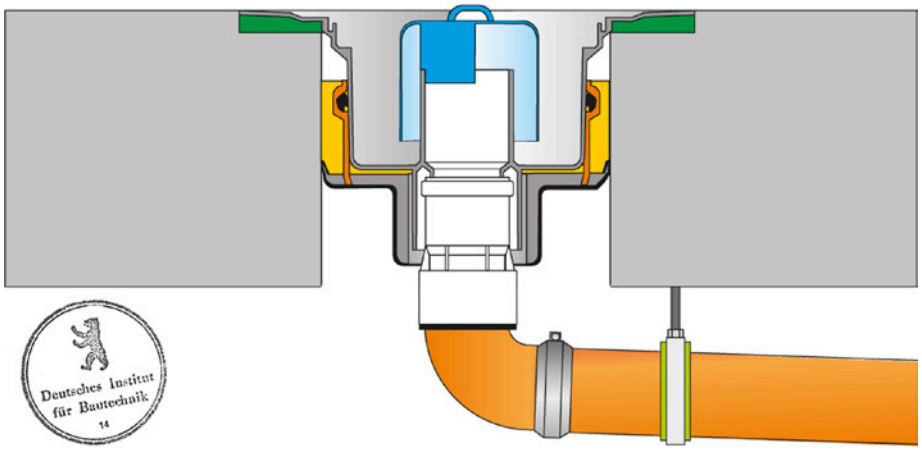
Approved with restrictions!



Horizontal pipe connection with R 30 / 60 / 90 fire insulation collar

The installation of combustible floor drains is only permitted if the minimum coverage below is observed. The component beneath the floor drain must meet the minimum requirements for the fire resistance duration and must have abZ / aBG certification.

Approved by the Deutsche Institut für Bautechnik (German Institute for Construction Engineering)!



Vertical installation with R 30 / 60 / 90 / 120 Dallmer fire insulation element

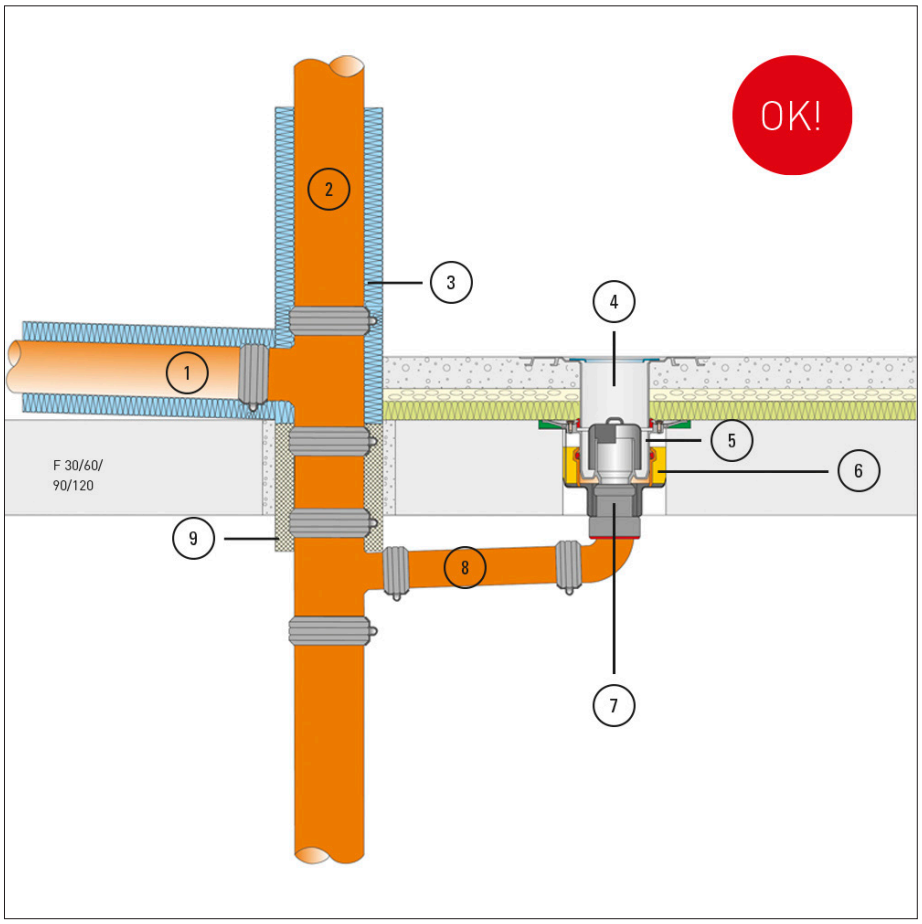
Installation has been confirmed by the DIBt (German Institute for Construction Engineering), Berlin as a General Building Approval (abZ) and General Design Certificate (aBG) when the installation conditions required for approval are observed.

Note on plastic drains with connection to combustible and non-combustible pipelines

Connecting pipes underneath the ceiling must be made up completely of a non-combustible pipe with non-combustible fastening as the loss of the room integrity cannot otherwise be avoided on the connecting pipe.

This also applies to connections with ceiling feedthroughs. Transition pieces made of combustible building materials are permitted if the floor drains are engineered in R 30 / 60 / 90 quality.

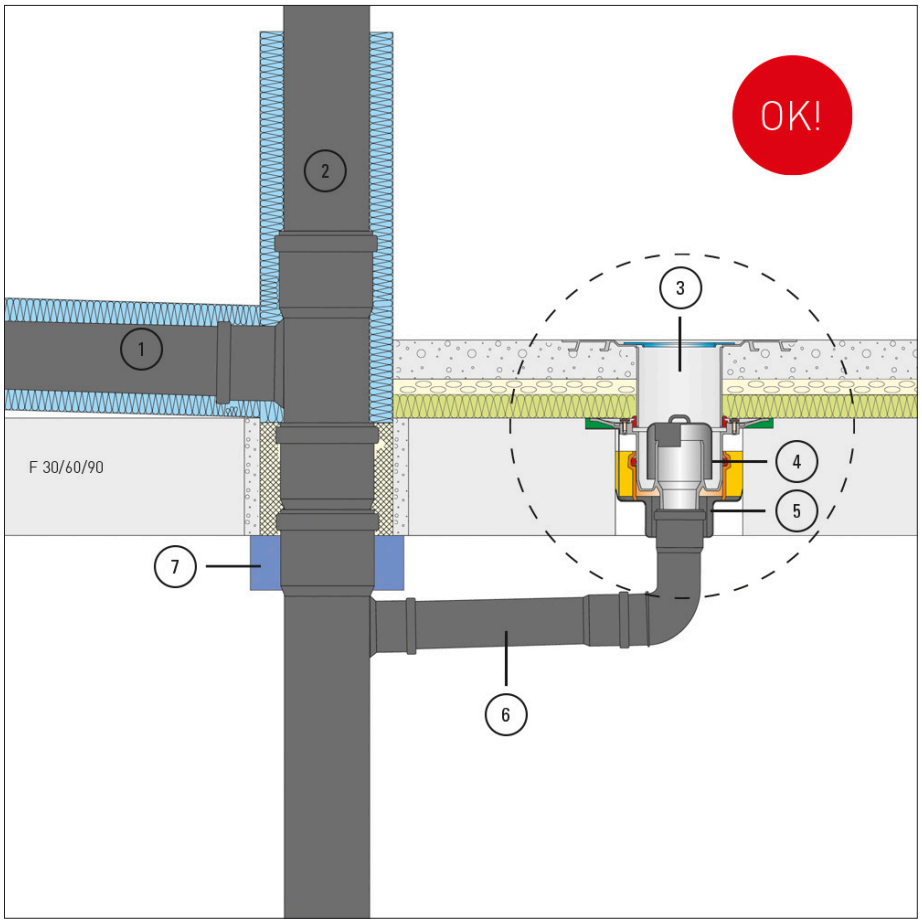
Installation variant 1: Plastic drain with connection to NON-COMBUSTIBLE pipelines



1. Cast iron pipe DN 80
2. Cast iron pipe DN 100
3. Klimarock mat / 30 mm
4. TistoDrain S 10 raising piece
5. Drain body 40 S, DN 50
6. Dallmer fire insulating structural element
7. Dallmer HT / SML pipe coupling
8. Cast iron pipe DN 50
9. R 30 / 60 / 90 / 120 pipe bushings from various manufacturers with abP / abZ / aBG

Installation example of an R 30 / 60 / 90 / 120 Dallmer floor drain in conjunction with non-combustible drainage pipes, e.g. SML wastewater pipe. The non-combustible drainage pipe must be sealed off in R 30 / 60 / 90 / 120 quality or in accordance with the relaxations of MLAR / LAR, section 4.3.

Installation variant 2: Plastic drain with connection to COMBUSTIBLE pipelines



1. B1 / B2 pipe
2. B1 / B2 pipe DN 100
3. TistoDrain S 10 raising piece
4. Drain body 40 S, DN 50
5. Dallmer fire insulating structural element
6. B1 / B2 pipe DN 50
7. R 30 / 60 / 90 / 120 fire insulation collar with subsequent fastening or individual grouting with abZ / aBG

Installation example of an R 30 / 60 / 90 / 120 Dallmer floor drain in conjunction with combustible drainage pipes. Combustible drainage pipes must be sealed off in R 30 / 60 / 90 quality with fire insulation collars on the basis of a General Building Approval (abZ) or a General Design Certificate (aBG).

Application examples

Fire insulation for floor drains in F 30 / 60 / 90 / 120 components

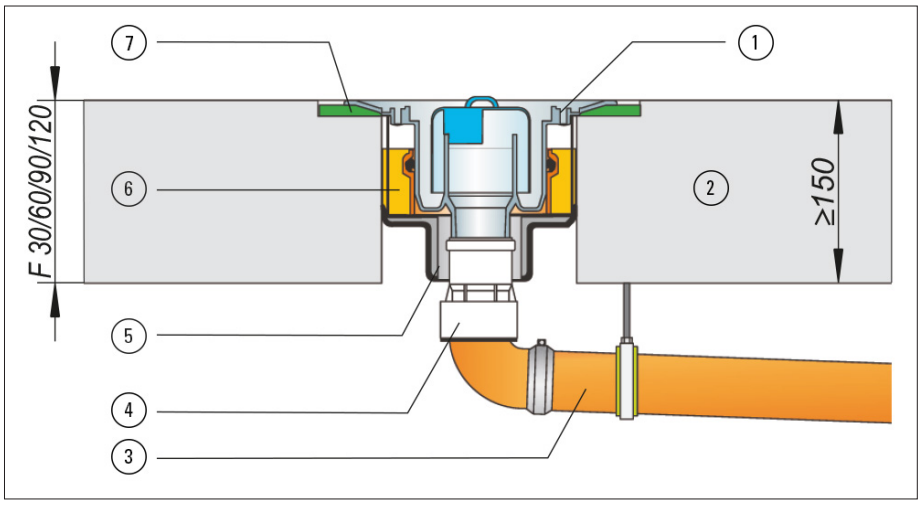
The requirements for the fire insulation function of the sealing-off of floor drains are regulated in the Model Conduit Systems Directive (MLAR) and the Conduit Systems Directives (LAR) introduced as construction legislation in the federal states on its basis.

"Floor drains are a component of the wastewater system according to DIN EN 12056. For this reason, identical requirements for the sealing-off apply as for pipe sleeves, as described in the Conduit Systems Directives introduced as construction legislation in section 4 of the MLAR / LAR. Special mention in the MLAR / LAR is thus not required." (Translation of quote from the documentation from Dipl.-Ing. Manfred Lippe on the sealing-off of floor drains).

It is therefore imperative that the fire insulation requirements of the Conduit Systems Directives in relation to fire resistance duration also be adhered to for floor drains.

Thanks to the special construction of the floor drains with fire insulation, Dallmer supplies a wide range of connection options for common drainage systems.

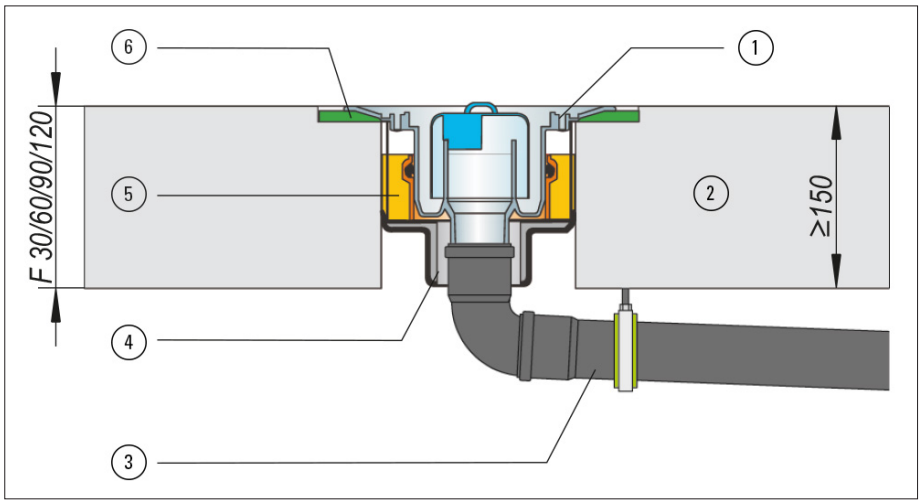
With non-combustible pipelines



with abZ Z-19.17-1543

1. Drain
2. Concrete surface
3. Non-combustible pipe, e.g. SML pipe
4. HT / SML coupling
5. Fire insulating structural element
6. Mortar MG II / III
7. Sound insulation collar

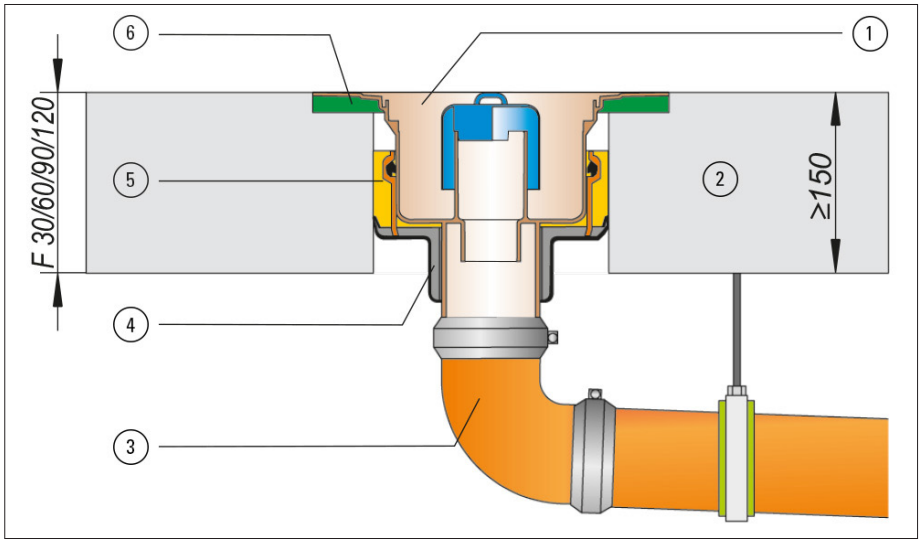
With combustible pipelines



1. Drain
2. Concrete surface
3. Combustible pipe, e.g. HT pipe
4. Fire insulating structural element
5. Mortar MG II / III
6. Sound insulation collar

with abZ Z-19.17-1543

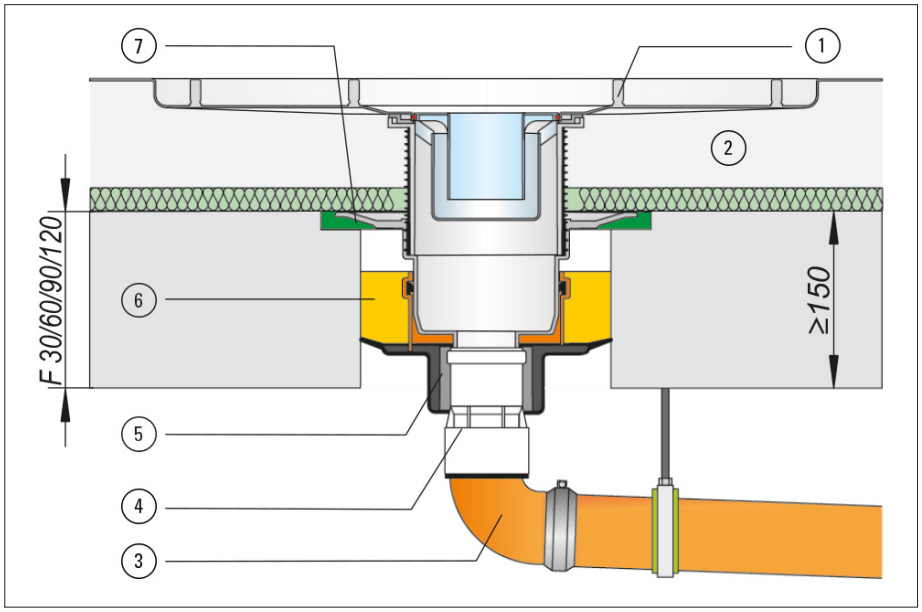
With non-combustible pipelines (direct connection)



1. Drain 61 GA for direct connection to SML pipe
2. Concrete surface
3. Non-combustible pipe, e.g. SML pipe
4. Fire insulating structural element
5. Mortar MG II / II
6. Sound insulation collar

with abZ Z-19.17-1543

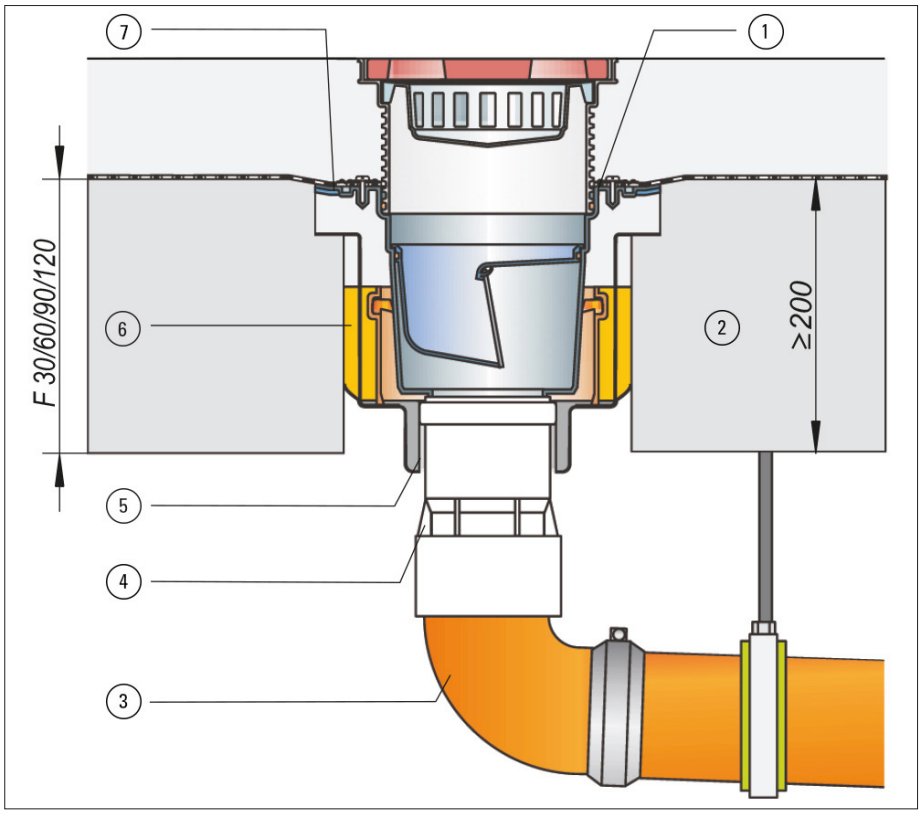
With shower channels



1. Shower channel
2. Concrete surface
3. Non-combustible pipe, e.g. SML pipe
4. HT / SML coupling
5. Fire insulating structural element
6. Mortar MG II / III
7. Sound insulation collar

with abZ Z-19.17-1547

With courtyard and car park drains



1. Drain
2. Concrete surface
3. Non-combustible pipe, e.g. SML pipe
4. HT / SML coupling
5. Fire insulating structural element
6. Mortar MG II / III
7. Sound insulation collar

with abZ Z-19.17-1543

Fire insulation with floor drains in existing buildings

Given that the construction trade now concentrates very much on "construction within an existing building" and "refurbishment of existing buildings", concepts have to be developed for the planning and implementation of pipe system for existing ceilings. The following illustrations are intended as recommendations for implementation in the field regulated by the building authority and in practice.

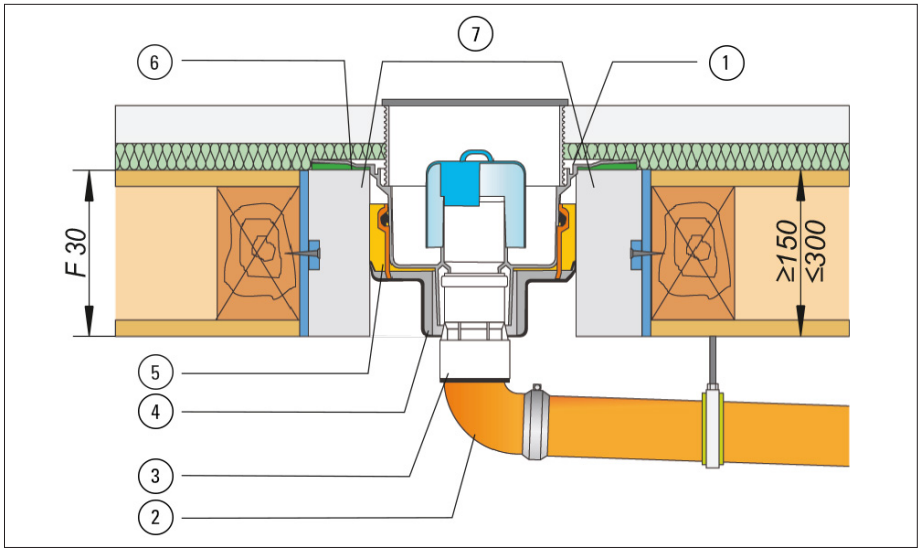
Conduits and bushings for special / existing ceilings

There are a number of floor ceilings – in particular in existing buildings – which are not sufficiently covered by the area of application of measures for sealing-off which are certified by the building authority (abZ / aBG) with regard to installation in special ceilings.

The following examples are named:
– Timber ceilings with F 30 / F 90 suspended ceilings
– Ribbed brick ceilings
– Hollow ceilings
– Vaulted ceilings
– and many others.

All Dallmer fire insulating structural elements can be installed within an "F 30 / 60 / 90 lining and mortaring". The lining and mortaring represents the breakthrough within the special ceiling.

In timber ceiling F 30* (with lining and mortar grouting)

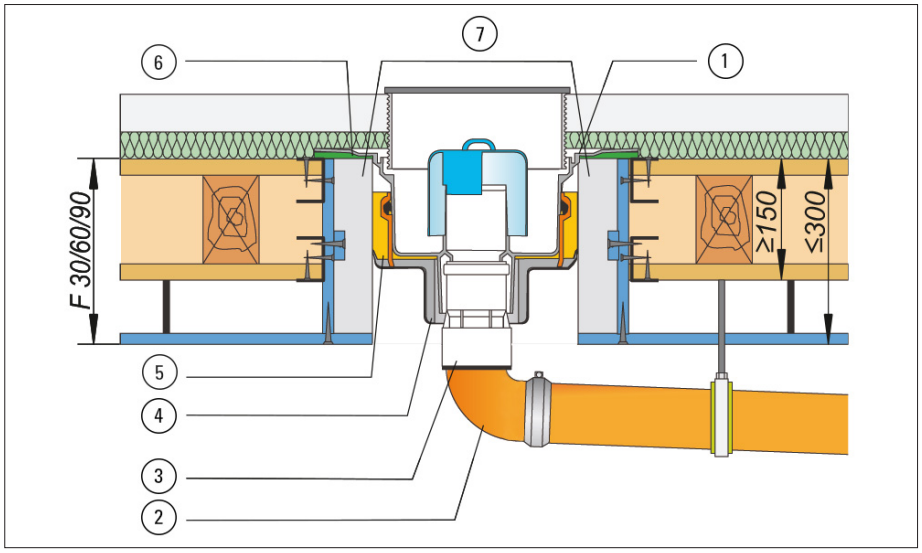


with abZ Z-19.17-1543

1. Drain
2. Non-combustible pipe, e.g. SML pipe
3. HT / SML coupling
4. Fire insulating structural element
5. Mortar MG II / III
6. Sound insulation collar
7. Lining

*Different installation of the floor drain in solid ceiling mortaring within special ceilings in accordance with the installation suggestions in the comment on the MLAR / LAR (5 th updated version by authors Lippe, Czepuck, Möller, Reintsema)

In timber ceiling F 30 / 60 / 90 suspended ceiling* (with lining and mortar grouting)

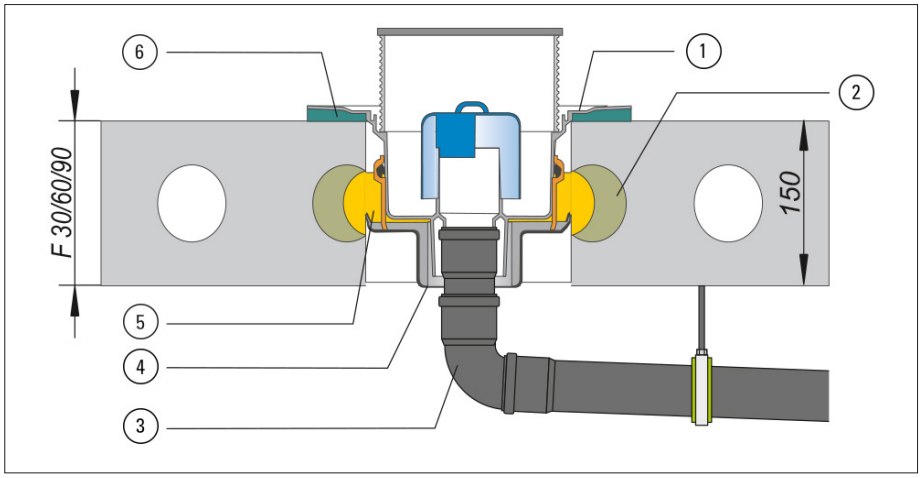


with abZ Z-19.17-1543

1. Drain
2. Non-combustible pipe, e.g. SML pipe
3. HT / SML coupling
4. Fire insulating structural element
5. Mortar MG II / III
6. Sound insulation collar
7. Lining

*Different installation of the floor drain in solid ceiling mortaring within special ceilings in accordance with the installation suggestions in the comment on the MLAR / LAR (5th updated version by authors Lippe, Czepuck, Möller, Reintsema)

In hollow ceilings F 30 / 60 / 90*

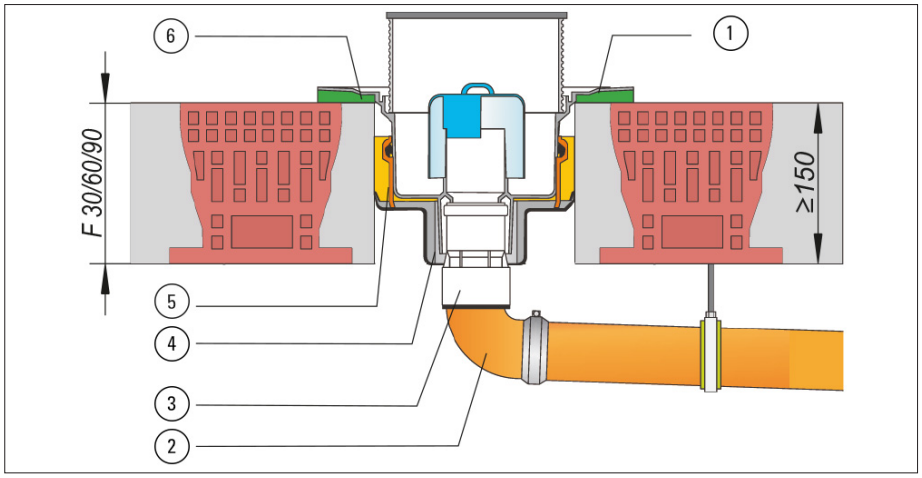


with abZ Z-19.17-1543

1. Drain
2. Mineral wool ≥ 1000 °C
3. Combustible pipe, e.g. HT pipe
4. Fire insulating structural element
5. Mortar MG II / III
6. Sound insulation collar

*Different installation of the floor drain in solid ceiling mortaring within special ceilings in accordance with the installation suggestions in the comment on the MLAR / LAR (5th updated version by authors Lippe, Czepuck, Möller, Reintsema)

In ribbed and brick ceilings F 30 / 60 / 90*



with abZ Z-19.17-1543

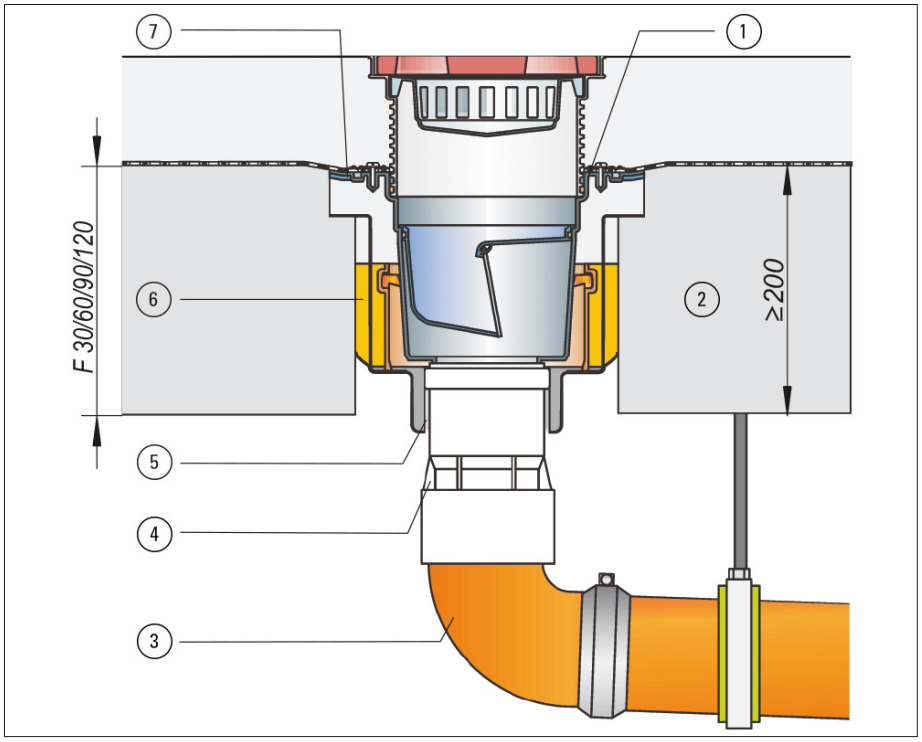
1. Drain
2. Non-combustible pipe, e.g. SML pipe
3. HT/ SML coupling
4. Fire insulating structural element
5. Mortar MG II / III
6. Sound insulation collar

*Different installation of the floor drain in solid ceiling mortaring within special ceilings in accordance with the installation suggestions in the comment on the MLAR / LAR (5th updated version by authors Lippe, Czepuck, Möller, Reintsema)

Fire insulation for level-access showers with bonded waterproofing according to ZDB data sheet 1.2010 in existing buildings

– The stipulations from the General Building Supervisory Authority Test Certificate (aBP) and the approvals (abZ / aBG) must be adhered to for creating the seal.
– An application for approval for individual circumstances (ZiE) or project-related design certificates (vBG) from the highest building authority or approval of a deviation from the LAR by the lower-level building authority is generally not required.
– Consulting with a structural engineer before creating the breakthrough is strongly recommended.
– The local fire insulation officer or specialist construction supervisor for fire insulation must be consulted.

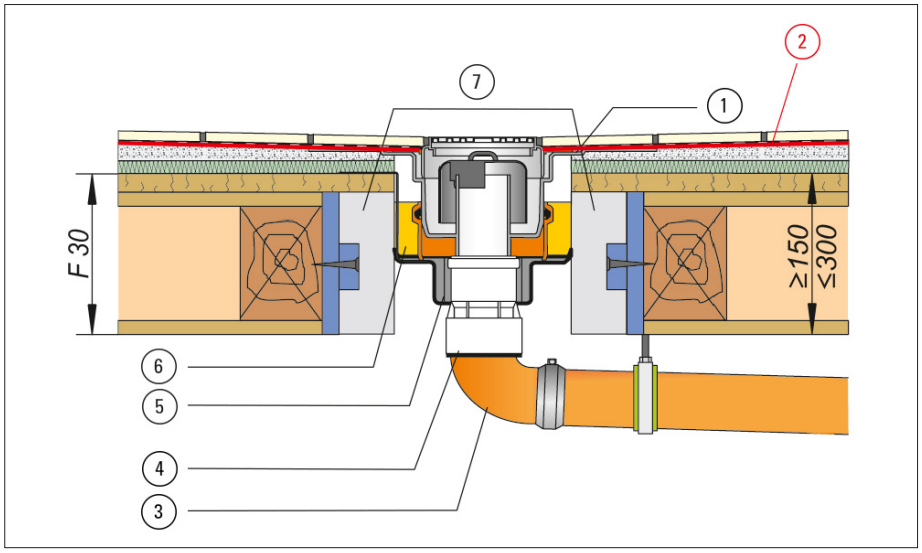
With courtyard and car park drains



1. Drain
2. Concrete surface
3. Non-combustible pipe, e.g. SML pipe
4. HT / SML coupling
5. Fire insulating structural element
6. Mortar MG II / III
7. Sound insulation collar

with abZ Z-19.17-1547

In timber ceiling F 30* (lining and mortar grouting)

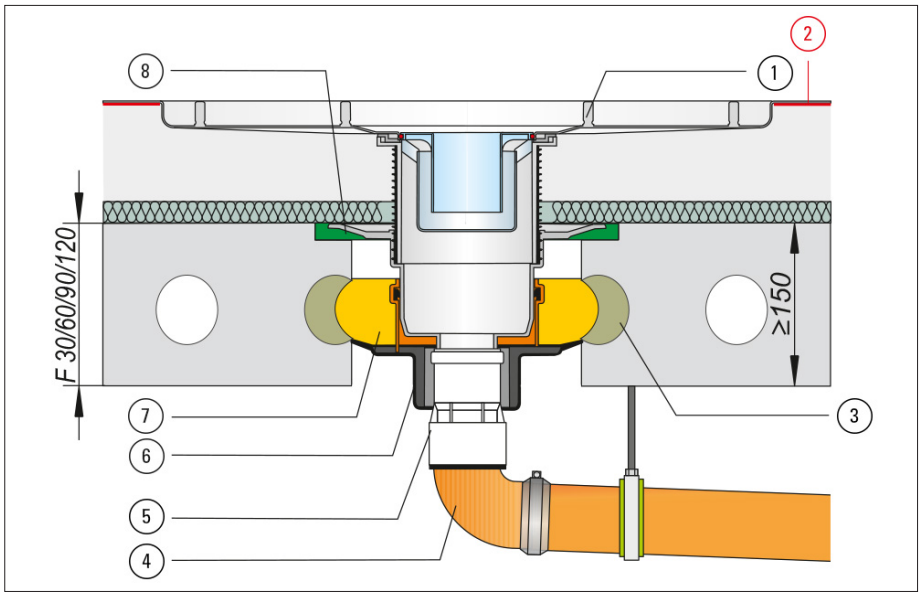


with abZ Z-19.17-1543

1. Drain
2. Bonded waterproofing
3. Non-combustible pipe, e.g. SML pipe
4. HT / SML coupling
5. Fire insulating structural element
6. Mortar MG II / III
7. Lining

*Different installation of the floor drain in solid ceiling mortaring within special ceilings in accordance with the installation suggestions in the comment on the MLAR / LAR (5th updated version by authors Lippe, Czepuck, Möller, Reintsema)

In hollow ceilings F 30*

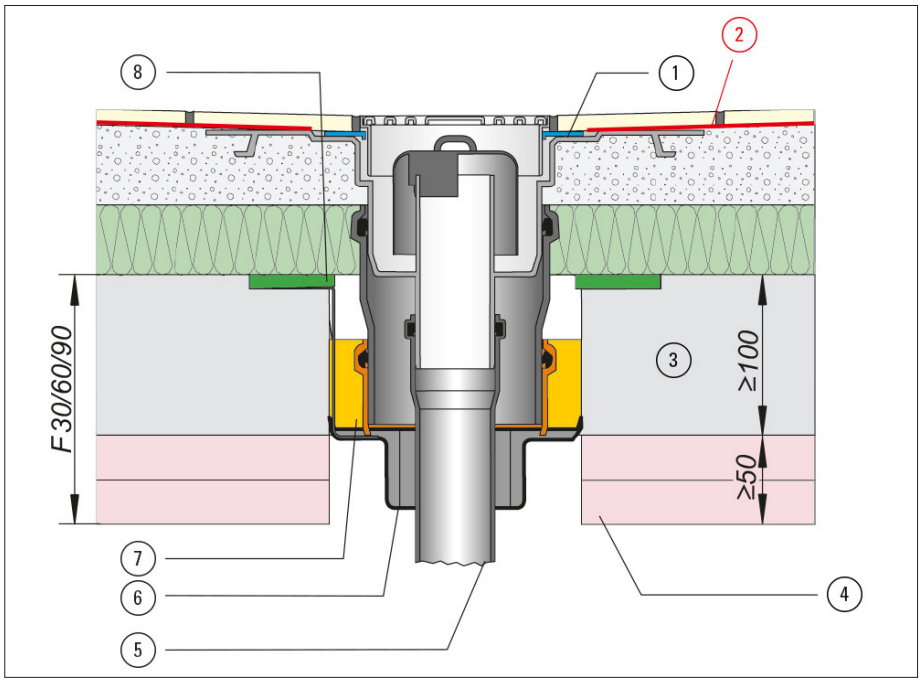


with abZ Z-19.17-1543

1. Shower channel
2. Bonded waterproofing
3. Mineral wool ≥ 1000 °C
4. Non-combustible pipe, e.g. SML pipe
5. HT / SML coupling
6. Fire insulating structural element
7. Mortar MG II / III
8. Sound insulation collar

*Different installation of the floor drain in solid ceiling mortaring within special ceilings in accordance with the installation suggestions in the comment on the MLAR / LAR (5th updated version by authors Lippe, Czepuck, Möller, Reintsema)

In concrete surface at least 100 mm



1. Drain
2. Bonded waterproofing
3. Concrete surface
4. Calcium silicate additional cladding
5. Non-combustible pipe, e.g. SML pipe
6. Fire insulating structural element
7. Mortar MG II / III
8. Sound insulation collar

with abZ Z-19.17-1543

Standards and directives

Model Building Code

Is published by the committee of ministers and senators of the 16 federal states responsible for urban development, construction housing (ARGEBAU).

MLAR / LAR

Model Conduit Systems Directive, issued by the ARGEBAU, published by the German Institute for Construction Engineering (DIBt)

The MLAR explains how to achieve the (fire) safety targets specified by the Model Building Code. It serves as a guideline for the planning and installation of conduits and drains in terms of preventative fire insulation. The LAR is the issue announced as construction legislation in the respective federal state. The LAR describes the requirements of conduits, including fastenings and insulating materials, in conjunction with installation in emergency escape routes. The LAR aims to improve preventative fire insulation in conduit systems and help all involved to erect buildings to an appropriate and compatible safety standard. The LAR defines the execution principles for the penetration of a vertical pipe or a floor / roof drain through a fire-resistant wall or ceiling. The wall and / or ceiling feedthroughs then have to be implemented in conjunction with national certification of suitability for use (abZ / abP / aBG) in R 30 / 60 / 90 / 120 quality.

DIN EN 12056

This standard refers to gravity drainage within buildings and specifications, including how drainage systems are to be planned and installed in order to ensure reliable protection against the spreading of fires. In buildings where pipes need to be fed through walls and ceilings that are subject to special requirements in terms of fire resistance, special measures are required according to national and international regulations.

DIN 4102

This standard refers to the fire behaviour of components and materials. It defines the fire resistance classes of materials to be used in house technology and how the components and materials are to be tested.

DIN EN 13501

European standard for the fire behaviour classification of building products and building elements. It serves a similar purpose at European level to DIN 4102 at German level.

Glossary

Fire insulation

Fire insulation includes all measures that contribute towards the prevention and control of fires. Because this is a broad and complex field, different types of fire insulation are divided into the following categories:

– Preventive fire insulation
  Concrete measures which contribute towards enabling a fire to be extinguished as quickly as possible and that help save people and animals.

– Technical fire insulation
  All technical systems which help fire prevention, fire detection and fire fighting. Typical examples are smoke detectors, automatic extinguishing systems and smoke and heat extraction systems.

– Structural fire insulation
  Refers to the materials and components which are approved for use and how emergency escape routes and extinguishing systems must be planned.

– Organisational fire insulation
  Fire officers and company training on the topic of fire insulation fall under the heading of organisational fire insulation.

– Defensive fire insulation
  All concrete measures aimed at preventing fires and stopping the spread of fires.

Fire resistance classes

According to DIN 4102 and DIN EN 13501, building products are divided into different classes, depending on how long they retain their functionality when exposed to heat.

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