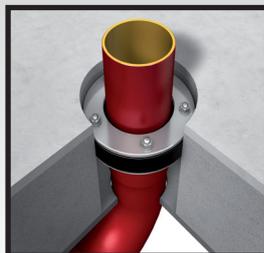
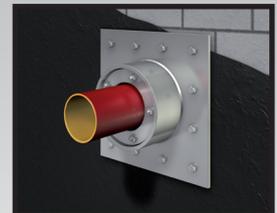


Planning guide

ENTRIES FOR CABLES AND PIPES



simple
gastight
watertight



Reliable sealing of entries for cables and pipes!



Wet basements or water inside of buildings are every house owner's nightmare.

Leakages are very often results of nonprofessionally installed sealing systems of line bushings.

Decisive for the sealing is not only the level of ground water (assumed ground water level).

Not like that, please!



In addition further impacts of humidity could appear later.

- Extreme weather conditions with large amounts of rainfall
- Rising of ground water level caused by redevelopment of sewers
- Sealing of surfaces
- Seepage of surface water near properties
- Ground subsidence (e. g. in mining regions) or
- Influences of water management (shut down of pumps)

Image: Kessel AG D-85101 Lenting

The position of supply- and disposal lines should be determined before the beginning of construction works

Line entries for the supply of power, water and telecommunication and at least one sewer line are necessary in every house.

In addition to this further lines and wires are entering buildings through the basement walls or floor slabs, for instance:

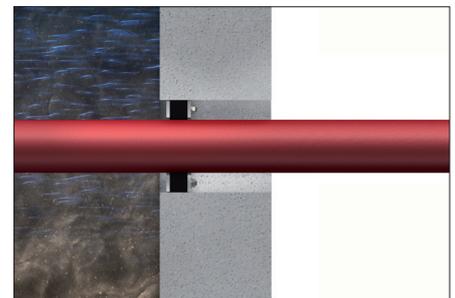
- Gas supply
- district heating
- Geothermal energy
- Rainwater harvesting
- Air ventilation systems
- Exterior lighting
- Power supply for garage/carport/ garden area

The professional sealing of all gaps is one of the necessities for a dry home.

Improvised building site solutions are neither reliable nor according to recognized technical standards. Results could be leakages and significant damages inside of buildings.

To avoid technical defects and related liability issues, a timely planning (before construction of houses) is obligatory.

Planners should always include a practice-oriented standard solution with industrial manufactured sealing systems in their tenders.



Please observe the regulations!!

Standards and regulations determine that a gas- and watertight installation of cables and pipes is obligatory. Industrial manufactured sealing systems fulfil the requirements.

Today such systems are state-of-the-art and should be included during the planning of each building.



Standards and regulations

In Germany and several German speaking countries the following technical codes for gas- and watertight sealing systems have to be considered during the planning phase (amongst others):

- DIN 18195, Waterproofing of buildings
- DIN 18322, VOB part C, ATV for underground line laying
- DIN 18336, VOB Teil C, ATV for waterproofing works
- DIN 1986-100
drainage plants for buildings and properties
- DAfStb-directive, waterproof buildings made of concrete (WU-directive)

System advantages

Industrial produced sealing systems provide the following advantages:

- tested gas- and watertightness
- quick, protected and time saving installation
- requirements of valid standards and regulations are fulfilled
- according to directives AGFW, DVGW, VDE-FNN, FHRK

Liability

- The question about responsibility will always arise in case of damages. For example: If water or gas penetrates into a building caused by sealing systems which are not installed properly.
- The responsibility for a gas- and watertight sealing of pipes and cables is usually carried by planners and executing companies. By using tested and approved sealing systems the following items are much easier to proof in case of judicial disputes:
- The sealing system is according to the valid standards and regulations
- You have exercised your duty of diligence

Load cases

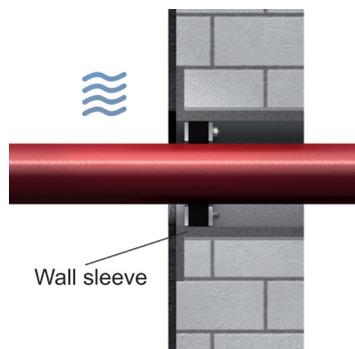
The choice of the right sealing system is depending on the load case of water which impacts on the building.

The load case has to be specified by the planner and is the result of determination of the assumed ground water level. Usually a time period of 20-30 years has to be taken into consideration. Further the factors influenced by water management should be taken into account.

Types of walls

For buildings made of waterproof concrete according to the German WU-Richtlinie directive it is preferable to encase wall sleeve pipes.

Apart from this the sealing system can be installed directly inside a core drill hole. The exposed reinforced steel has to be protected against corrosion (e.g. by applying a coating).



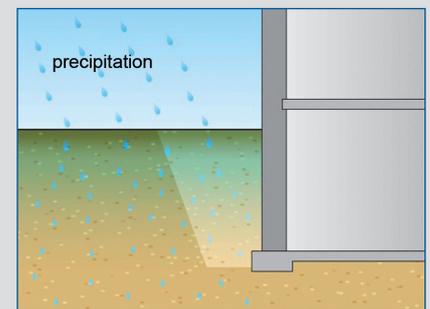
If the wall is made of brickwork a wall sleeve has to be encased imperatively.

Non-waterproof buildings have to be protected by a so called waterproofing sealing sheet according to the DIN 18195. This sealing sheet has to be included at the spot of entries of line(s).

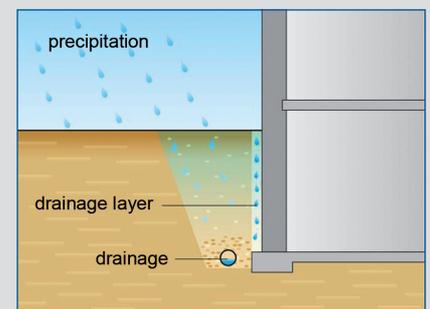
Examples of sealing sheets:

- Bitumen sealing membrane- and polymer bitumen membranes
- Plastic- and elastomer sealing sheets
- Plastic-modified bitumen compound (KMB)
- Plastic-modified bitumen sheets (KSK)

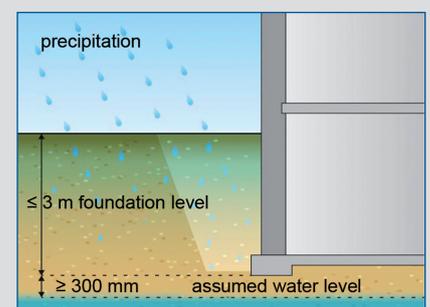
Definition of load cases



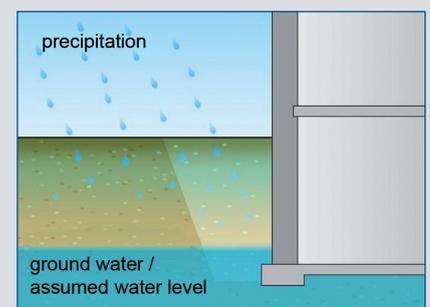
Ground moisture; extremely permeable ground (sand, gravel) with a water permeability coefficient of $k > 10^{-4}$ m/s



Non-accumulating seepage water; durable functional drainage according to DIN 4095



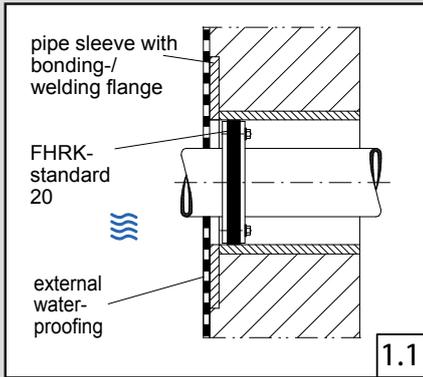
Temporarily accumulating seepage water



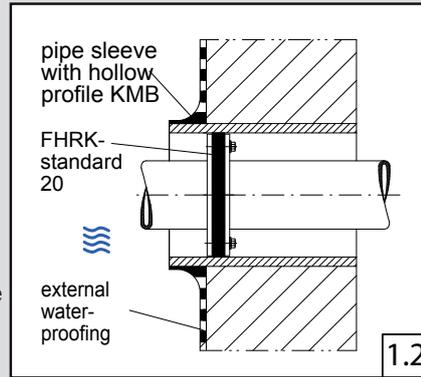
External water pressure

Criteria for the selection of sealing system

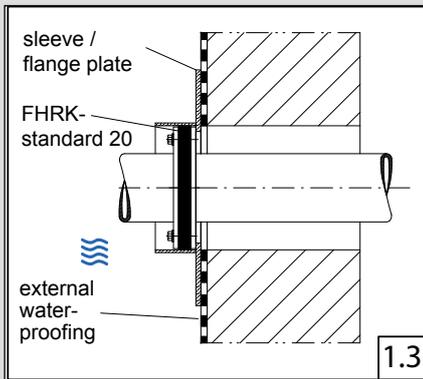
1 Wall/base plate made of concrete or masonry with outer sealing sheet according to DIN 18195 - part 4 Load case ground moisture + non-accumulating seepage water



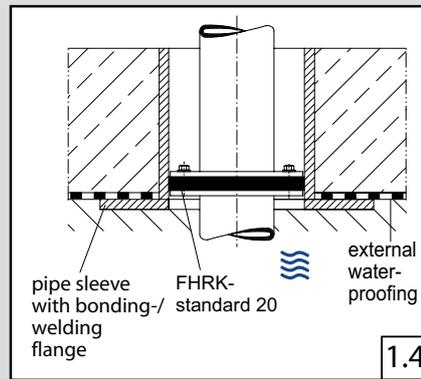
Wall penetration masonry-/ concrete wall with bonding-/ welding flange



Wall penetration masonry-/ concrete wall with pipe sleeve

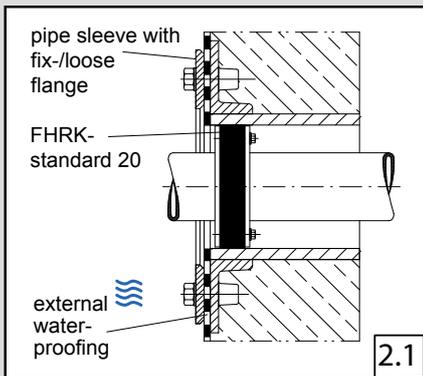


Wall penetration masonry-/ concrete wall with flange plate

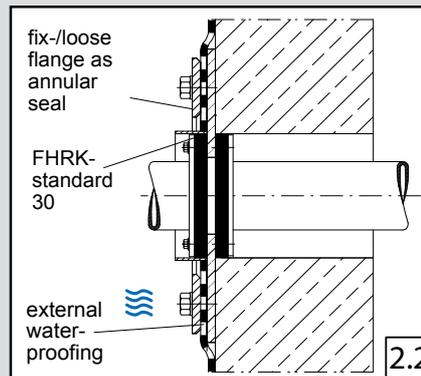


Floor penetration, pipe sleeve with bonding-/welding flange

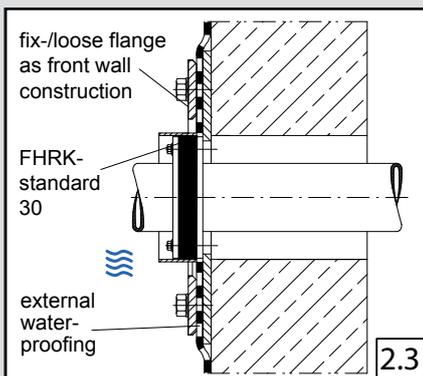
2 Wall/base plate made of concrete with outer sealing sheet according to DIN 18195 - part 6 Load case accumulating seepage water + external water pressure



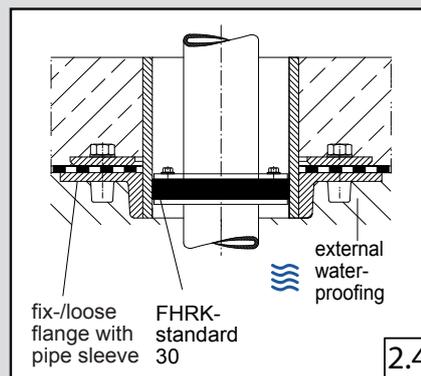
Wall penetration concrete wall, pipe sleeve with fix-/ loose flange



Wall penetration in concrete wall with core drill hole and fix-/loose flange as annular sealing gasket

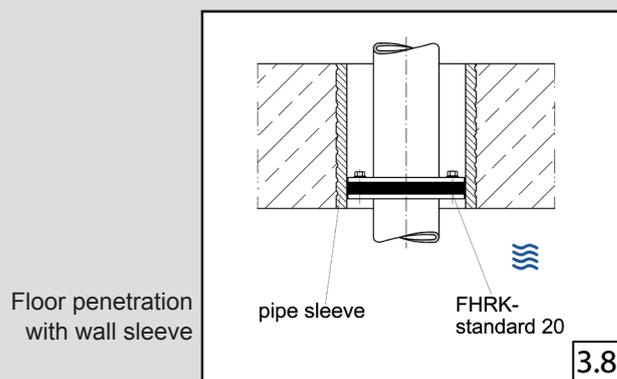
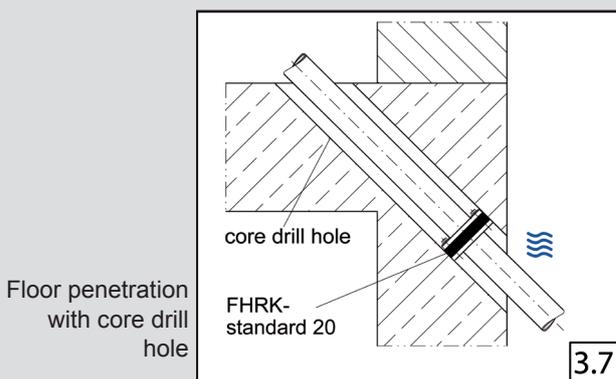
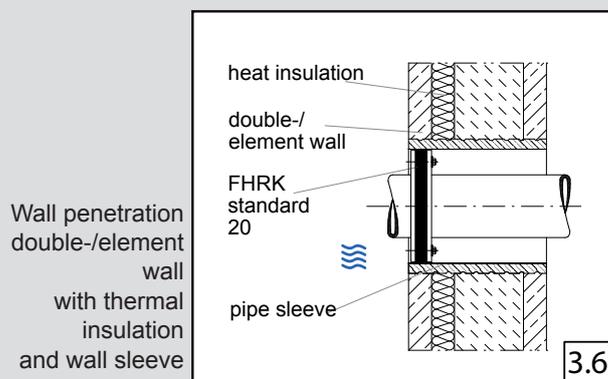
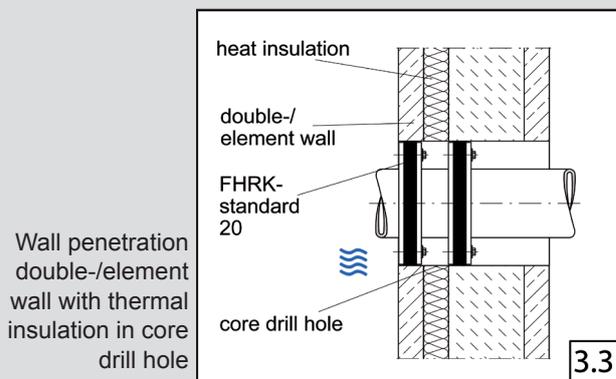
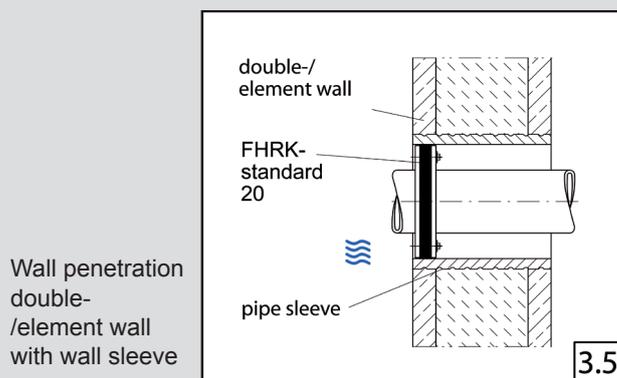
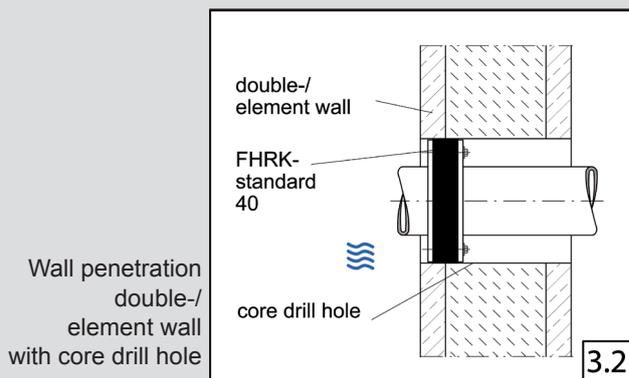
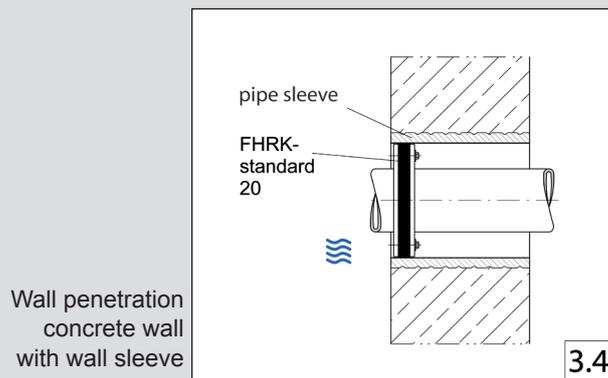
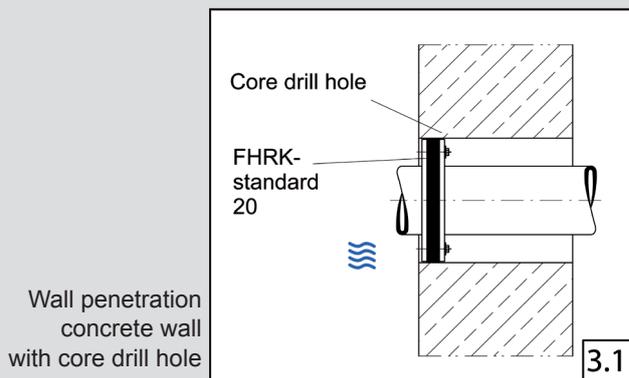


Wall penetration concrete wall, core drill hole with fix-/loose flange as front wall construction



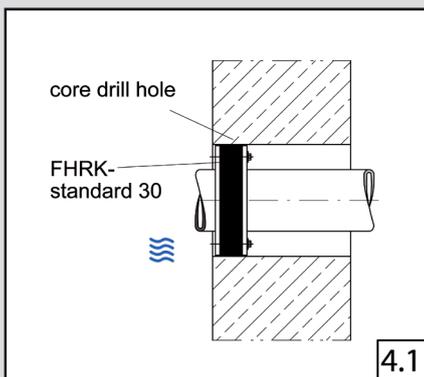
Floor penetration, fix-/loose flange with pipe sleeve

3 Wall/base plate made of waterproof concrete – load class 2 (WU concrete)
Load case ground moisture + non-accumulating seepage water

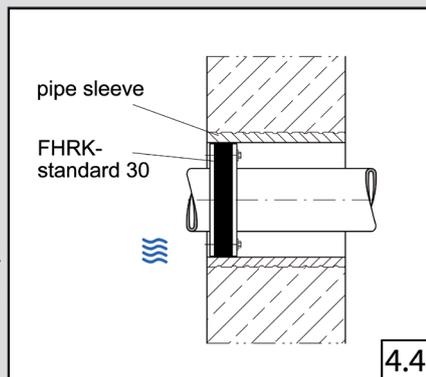


4 Wall/base plate made of waterproof concrete – load class 1 (WU concrete) Load case accumulating seepage water + external water pressure

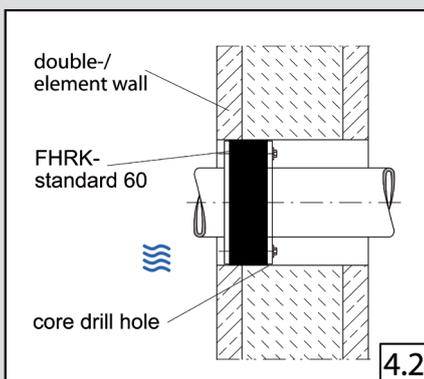
Wall penetration waterproof concrete wall (WU-concrete) with core drill hole



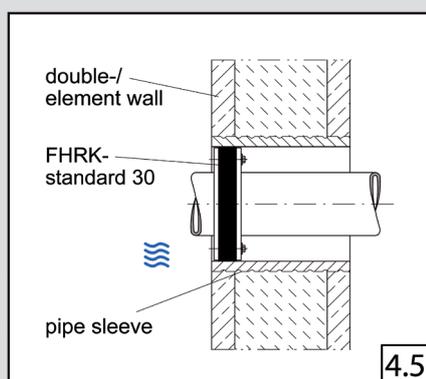
Wall penetration waterproof concrete wall (WU-concrete) with pipe sleeve



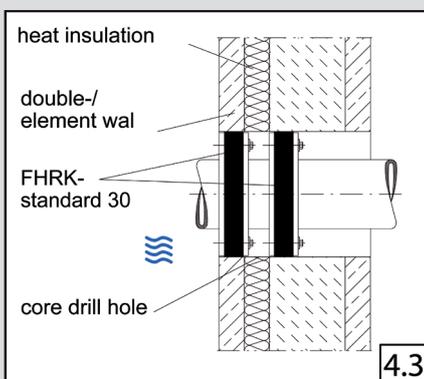
Wall penetration waterproof double-/element wall with core drill hole



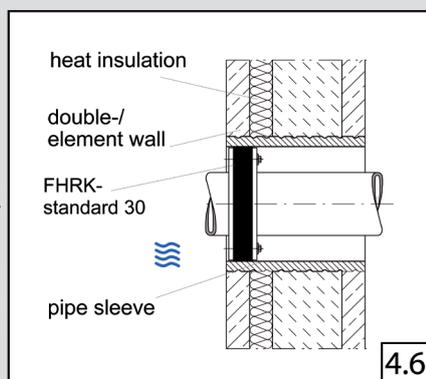
Wall penetration waterproof double-/element wall with pipe sleeve



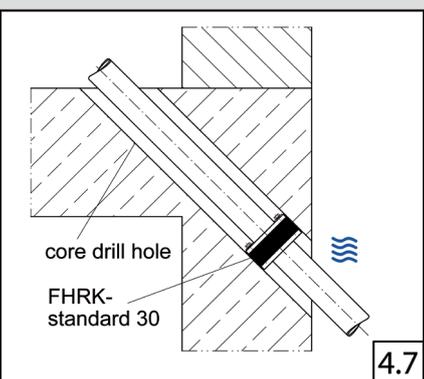
Wall penetration waterproof concrete double-/element wall with thermal insulation and core drill hole



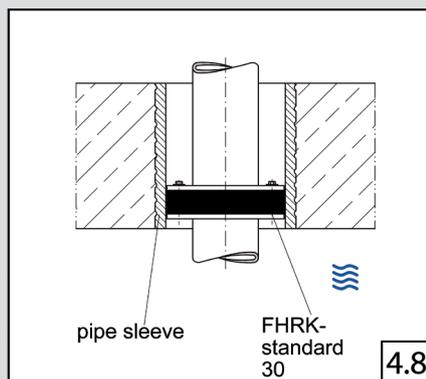
Wall penetration waterproof concrete double-/element wall with thermal insulation and pipe sleeve



Floor penetration waterproof concrete with core drill hole

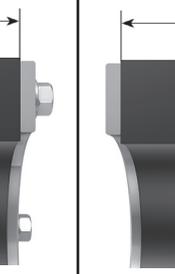


Floor penetration waterproof concrete with pipe sleeve



Minimum thickness of the seal

In accordance to the load case (stress of humidity) it requires a sufficient thickness of the seal. In the following table you can find the minimum thickness of annular seals according to the FHRK standard.

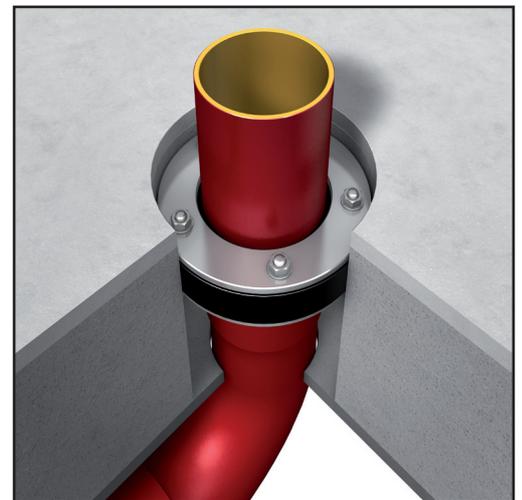
Annular seal				
	Minimum thickness*	≥ 20 mm	≥ 30 mm	≥ 40 mm
FHRK-standard	20	30	40	60

* For special sorts of wires/lines or special situations on site larger thicknesses of the seal could be necessary.

Versions for buildings without basement

For entering through base plates lines or conduits for lines have to be laid in the ground before the base plate is established.

For this purpose suitable floor sleeves have to be installed; where appropriate it is necessary to link the conduits for lines by a gas- and watertight connection to the pipe sleeve.



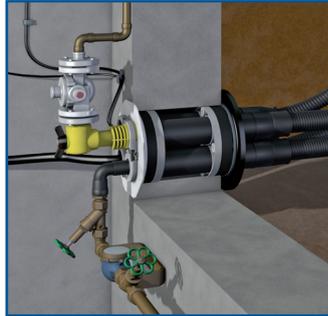
Special fibre cement pipe sleeve
for the installation in the wall / ceiling



Building with a basement – Service entry through basement wall

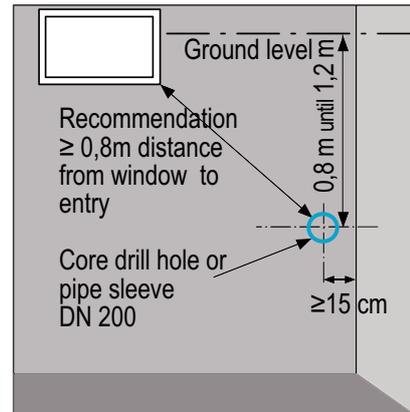
Multiple service entry for

Gas
Water
Power supply
Telecommunications



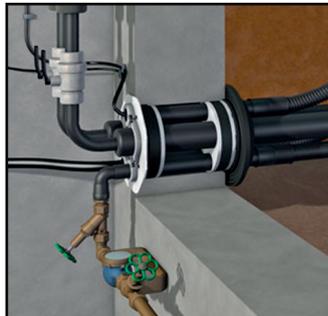
Recommended –minimum-distances* of wall entry to bordering components.

Dimension of core drill hole or pipe sleeve: **DN 200**



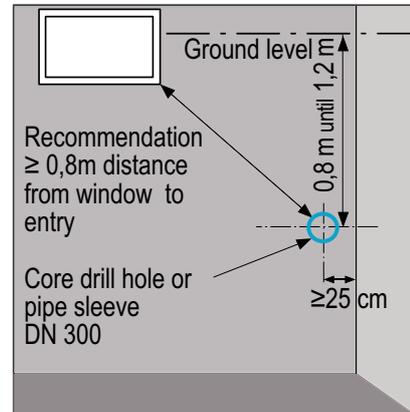
Multiple service entry for

District heating or heat pump
Water
Power
Telecommunications



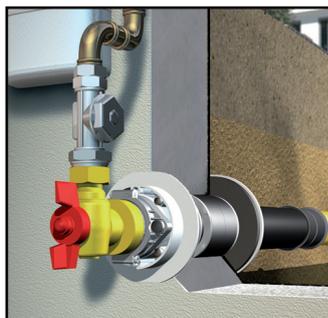
Recommended –minimum-distances* of wall entry to bordering components.

Dimension of core drill hole or pipe sleeve: **DN 300**



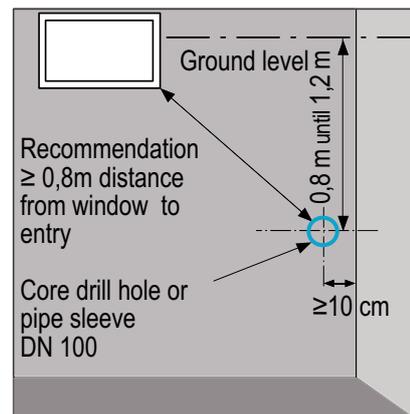
Single service entry for

Gas or
Water or
Power supply or
Telecommunications



Recommended –minimum-distances* of wall entry to bordering components.

Dimension of core drill hole or pipe sleeve: **DN 100**

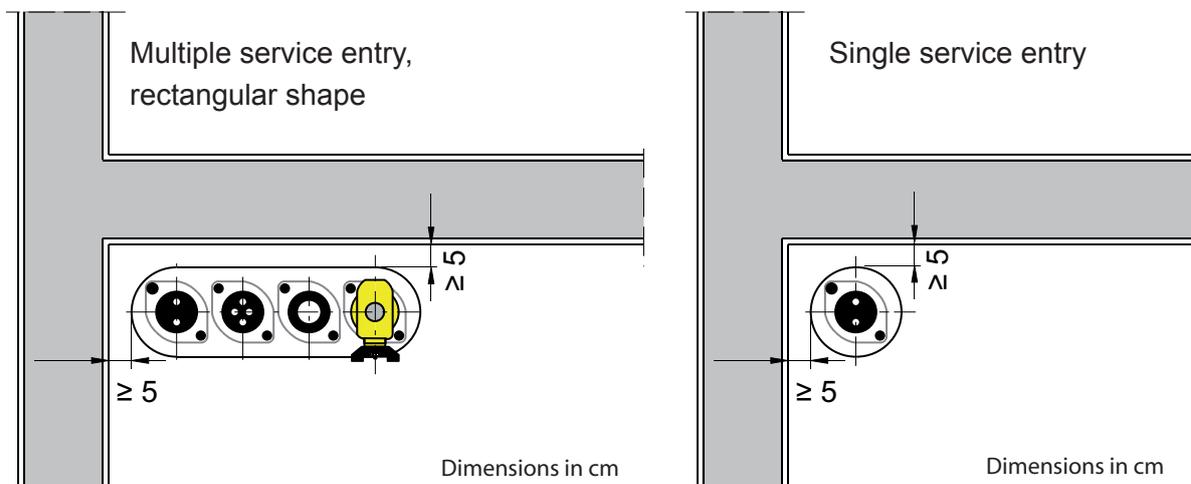


* To avoid problems:

- Please coordinate the dimensions (position, adjustment, wall distance, etc.) with your local utility company and the information of the manufacturer (please pay attention to the size of the armatures).
- Inspection shafts, drainage systems or other lines may not be placed in the range of the house connection route.
- The connection of service lines is in the responsibility of the network operators.
- During installation pay attention to the assembly instructions of the manufacturer.

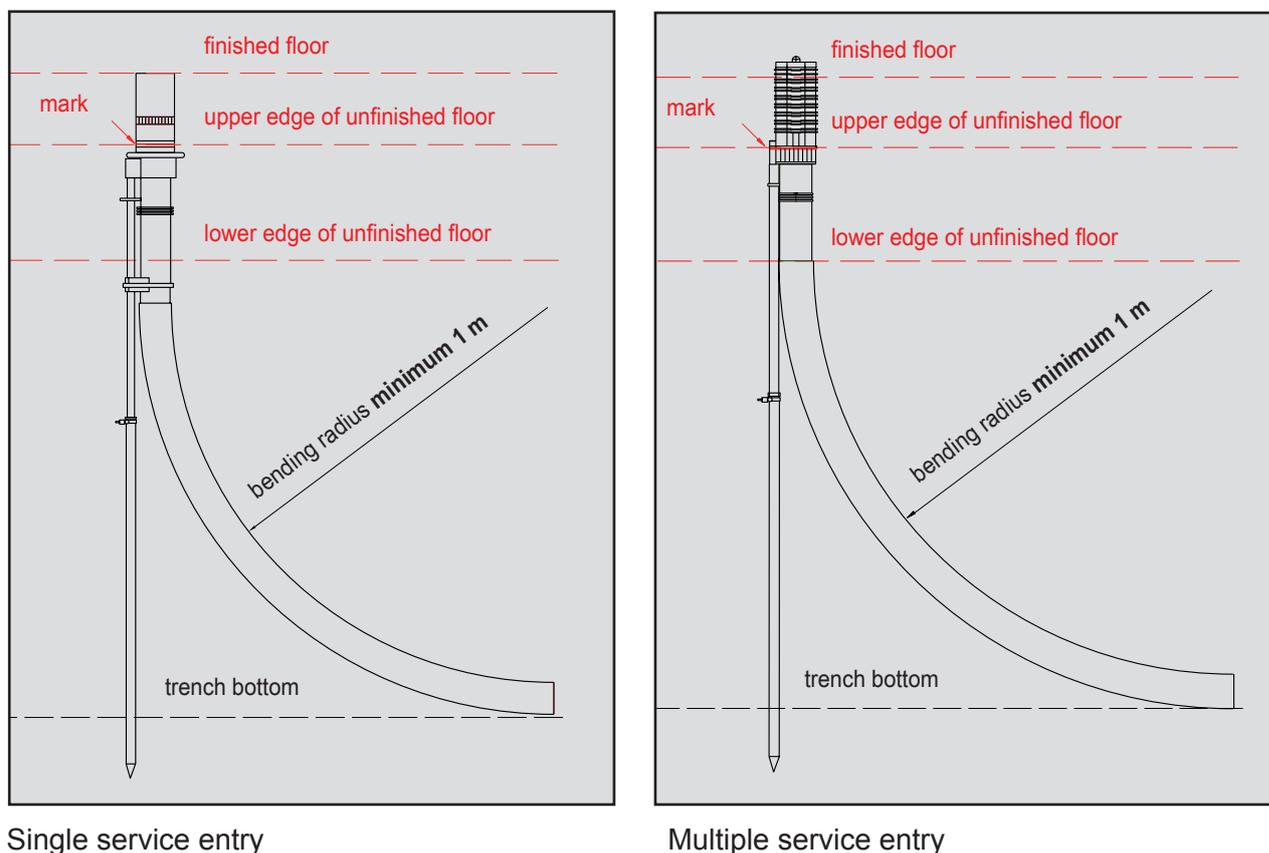
Building without basement – Service entry through the base plate

Recommended minimum distance* to adjoining walls including wall surface (plaster)

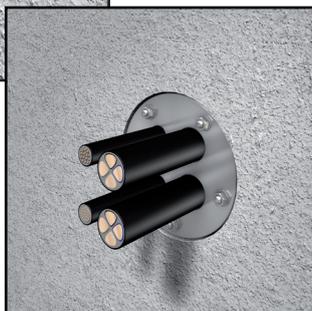
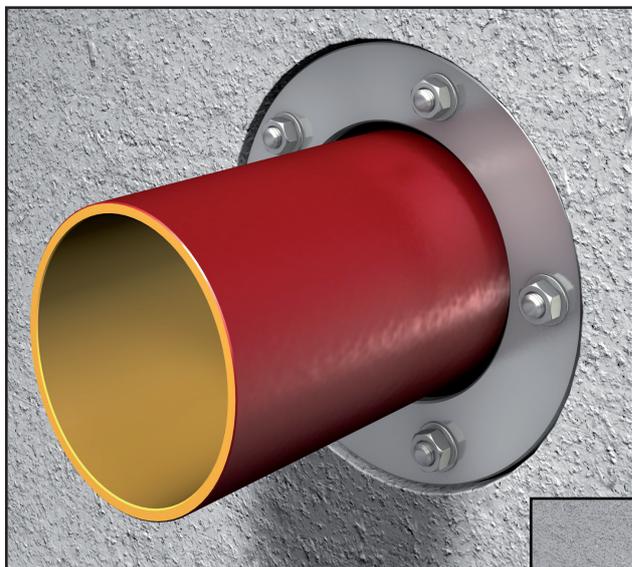


Installation in the base plate

Reference point for the installation of the service entries in the base plate is the upper edge of the unfinished floor.



Tested sealing systems...



... that the home remains dry

Planning guide online –
get your tender text easily

Further information
www.fhrk.eu



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Fon +49 (0) 7321 5306 810
Email: info@fhrk.eu
Internet: www.fhrk.eu



Every house needs supply- and disposal lines which are entering buildings from the outside through basement wall or base plate. Industrial produced and tested sealing systems guarantee a permanent gas- and watertight sealing of all cables and pipes (waste water, water, power, gas, telecommunication, rainwater, ventilation lines, etc.).

CHECKLIST

That your house building runs smoothly:

Planning and register	Date	done
Registration of power consumed on site		<input type="checkbox"/>
Registration of water for site		<input type="checkbox"/>
Determine spots of sealing systems in coordination with the utility company		<input type="checkbox"/>

Registration for connection:

Gas network		<input type="checkbox"/>
Power grid		<input type="checkbox"/>
Water network		<input type="checkbox"/>
District heating system		<input type="checkbox"/>

Applications for:

Phone		<input type="checkbox"/>
Cable television		<input type="checkbox"/>
Connection to canalization		<input type="checkbox"/>

Determine spots of sealing systems and include in architectural construction plan:

Waste water		<input type="checkbox"/>
Rainwater harvesting		<input type="checkbox"/>
Geothermal heat		<input type="checkbox"/>
Controlled ventilation (inlet and exhaust)		<input type="checkbox"/>
Power supply garage / carport		<input type="checkbox"/>
Exterior lighting / garden area		<input type="checkbox"/>

Determine selection criteria for annular seal:

Design basis water level		<input type="checkbox"/>
Sort of wall		<input type="checkbox"/>
Sealing system for the building		<input type="checkbox"/>
Version of sealing system		<input type="checkbox"/>

For technical support and planning advisory the FHRK member companies are at your service.