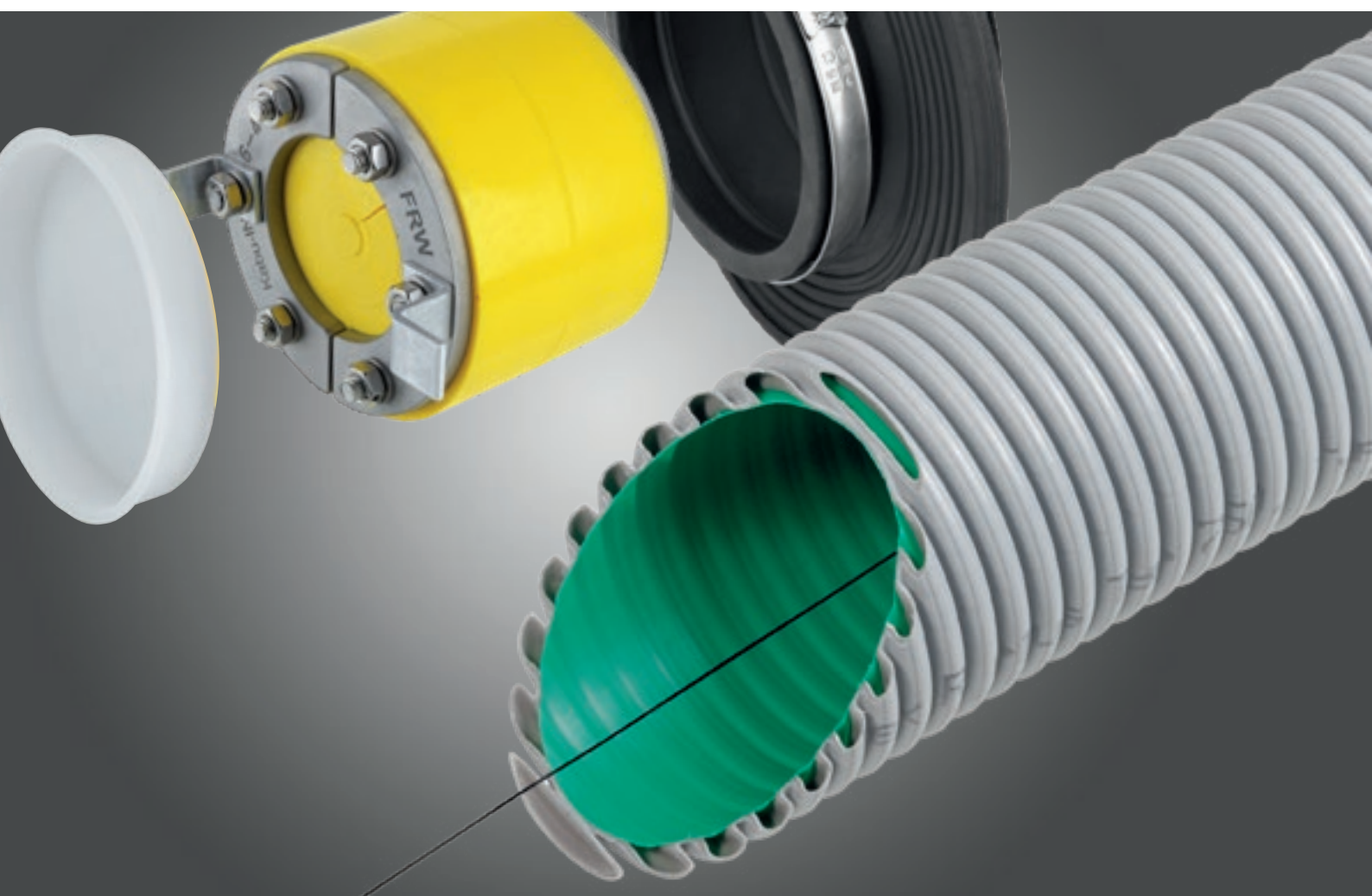


System brochure

Kabuflex®



Conduit systems buried underground and building lead-throughs

### Did you know that? All our products are REACH-compliant!

REACH is a regulation of the European Union adopted to improve the protection of human health and the environment against the risks that can be posed by chemicals, while enhancing the competitiveness of the EU chemicals industry. It also promotes alternative methods for the hazard assessment of substances in order to reduce the number of tests on animals.

Source: [www.echa.europa.eu/de/regulations/reach/understanding-reach](http://www.echa.europa.eu/de/regulations/reach/understanding-reach)



### Sustainability

Acting sustainably is essential to offer perspectives to future generations and leave them a sound environment. Our structures, processes & systems are thus continuously reviewed and improved within the framework of our certified energy & environmental management systems. In doing so, we reduce carbon emissions and the volume of waste we produce, cut our energy and water consumption, use natural resources sparingly, and develop pioneering products.



### First ecobalanced electrical conduits

Being the first provider of ecobalanced (i.e., featuring life cycle assessment) electrical conduits, FRÄNKISCHE pledges itself to ecological sustainability in construction. The FBY-EL-F co2ntrol, FFKuS-EM-F 105 co2ntrol, Kabuflex R plus 450 co2ntrol and Kabuflex R plus 750 co2ntrol corrugated plastic conduits feature an Environmental Product Declaration (EPD) certified by an independent verification body.

This EPD lists all ecologically relevant details of the conduits. By using regenerated materials, FRÄNKISCHE consumes up to 60 % fewer fossil resources and saves approx. 47 % CO<sub>2</sub>.





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## Underground installation with Kabuflex® R and R plus

### Application examples

Sound underground cable protection requires first and foremost safe and absolutely reliable products. In addition to the simple mechanical protection of media, the cable conduits also serve as unused conduits. This offers another handy advantage especially in electrical installations, because it allows subsequent feeding of cables and wires.

Installation underground or under roads and squares as well as building lead-throughs are the main applications for Kabuflex conduits. Additionally, the energy requirement for outdoor facilities has changed significantly over the past years so that the use of underground conduits is recommended.

#### Note

According to VDE 0100-520, cables must be installed at least 0.6 m underground, under roads at least 0.8 m. Lower depths are also possible when cable conduits are used.

Installation requirements are specified in VDE-AR-N 4222, e.g., cable conduits are to be installed at least 50 cm below the top edge of the traffic area, while the pipes (top edge) must be placed at least 10 cm below the planum (installation instructions from page 12).

#### Kabuflex R and R plus 450 co2ntrol

- Reliable protection of underground cables with normal pressure loads
- Under roads and squares
- As a building lead-out for annexes or in the garden



#### Kabuflex R plus 750 co2ntrol

- Reliable protection of underground cables with increased pressure loads
- For concrete installation acc. to VDE 0100-520
- Under roads and squares with minimum cover
- As a building lead-through for connection to the low-voltage network





## Properties and advantages

### Structured-wall design and PE – two invincible advantages

Kabuflex conduits are manufactured according to DIN EN 61386-24 and monitored consistently, thus guaranteeing a consistent quality standard.

Manufactured in structured-wall design: corrugated outside welded together with inner surface. State-of-the-art technology turns this strong, pliable conduit into a homogeneous unit.

- Kabuflex is produced in coils and straight lengths. The two designs are easily compatible using couplings.
- The impact strength and breaking resistance of PE makes loading, backfilling, etc. also possible in subzero temperatures.
- Kabuflex made of PE is resistant to acids and bases according to DIN 8075, supplementary sheet 1.



Kabuflex R  
Kabuflex R plus 450 co2ntrol  
Kabuflex R plus 750 co2ntrol

### Simple installation

Kabuflex can be cut and sawed easily and is also easy to install due to its pliability.

Therefore, it ensures effortless, quick and rational working in addition to easiest-possible loading, transport and storage properties.

Couplings allow combinations with common cable conduits.

The low-friction inner surface with optimized insertion characteristics facilitates inserting wires and cables.



Bend radius Kabuflex R plus, type 110



## Building lead-through for buildings with and without basements

### Application examples

Supply lines for power and communication cables are generally required for every building connection. Access to the building is provided via a building lead-through. However, cable network operators specify stringent standards regarding connections to the low voltage system and demand standard-compliant systems for building penetrations. In order to meet the requirements for proper sealing, FRÄNKISCHE ensures gas-tight and water pressure-tight building lead-throughs (for wall and foundation slab applications up to 1.5 bar) using the Kabuflex system. Power and communication cables can thus be connected quickly and according to TAB 2023. Be it wall or foundation slab lead-through, FRÄNKISCHE proves its electrical installation system competency with the perfect combination of cable conduit, sealings and feed-throughs.

#### Note

The building lead-throughs are suitable according to TAB 2023, and comply with VDE-AR-N 4100 (low voltage technical connection regulations) valid as of April 2019.

### Foundation slab lead-through for buildings without basement

For installation in concrete buildings yet to be built.

**Tightness tested according to DVGW VP 601.**

#### Approved products

- Kabu-FESH Set Elektro B building lead-through:
- Kabuflex R plus 750 co2ntrol
- Wall collar set
- Kabu-IN DD
- SD end cap or Kabuflex KDS SD (two-piece)



Application:  
Waterproof concrete wear class 1 and 2  
W1-E according to DIN 18533

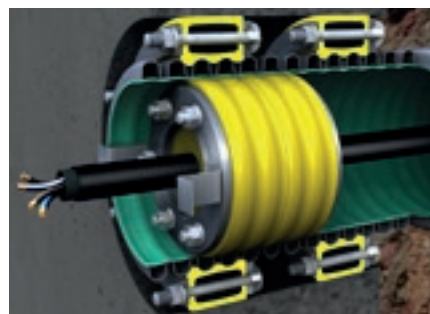
### Wall lead-through for buildings with basements

For installation in core drill holes or casings.

**Tightness tested according to DVGW VP 601.**

#### Approved products

- Kabuflex R plus 750 co2ntrol
- Kabu-Seal
- Kabu-IN DD
- SD end cap or Kabuflex KDS SD (two-piece)



Application:  
Waterproof concrete wear class 1 and 2



## Properties and advantages

### Kabu-FESH Set Elektro B one-use building lead-through

The Kabu-FESH Set Elektro one-use building lead-through for the floor is used for buildings without basements. Kabuflex R plus 750 control included in the set is manufactured/tested according to DIN EN 61386-24 and features N750 classification.

Therefore, the cable conduit for underground cable protection is suited for safe building lead-throughs and embedding in concrete.

When combined with the Kabu-IN DD system components, the wall collar set, or Kabu-Seal, the system features an approval mark confirmation of the DBI GTI Institute for Gas Technology (*DBI-Gastechnologisches Institut GmbH Freiberg*). The DVGW energy test laboratory has successfully tested the tightness according to the VP 601 test regulation.

#### Note

Network operators, e.g., Bayernwerk Netz GmbH, recommend Kabu-FESH Set Elektro B for standard-compliant building lead-throughs.



### Easy and quick installation without requiring special tools

The installation of the FRÄNKISCHE building lead-through guarantees the reliable sealing of the conduits through the ground up to the building and is also suited for feeding through the concrete foundation slab.

The continuous conduit connection up to the property line allows a flexible lead-through of the supply line irrespective of the construction progress. Power or communication cables can be exchanged at any time without requiring complicated excavation. The KDS SD cable feed-through plug (two-piece) ensures a sandtight seal in the conduit trench.

Additional advantages are the space-saving installation of the building and network connections and the associated connection equipment, and the easy and flexible height adjustment to the finished floor level.

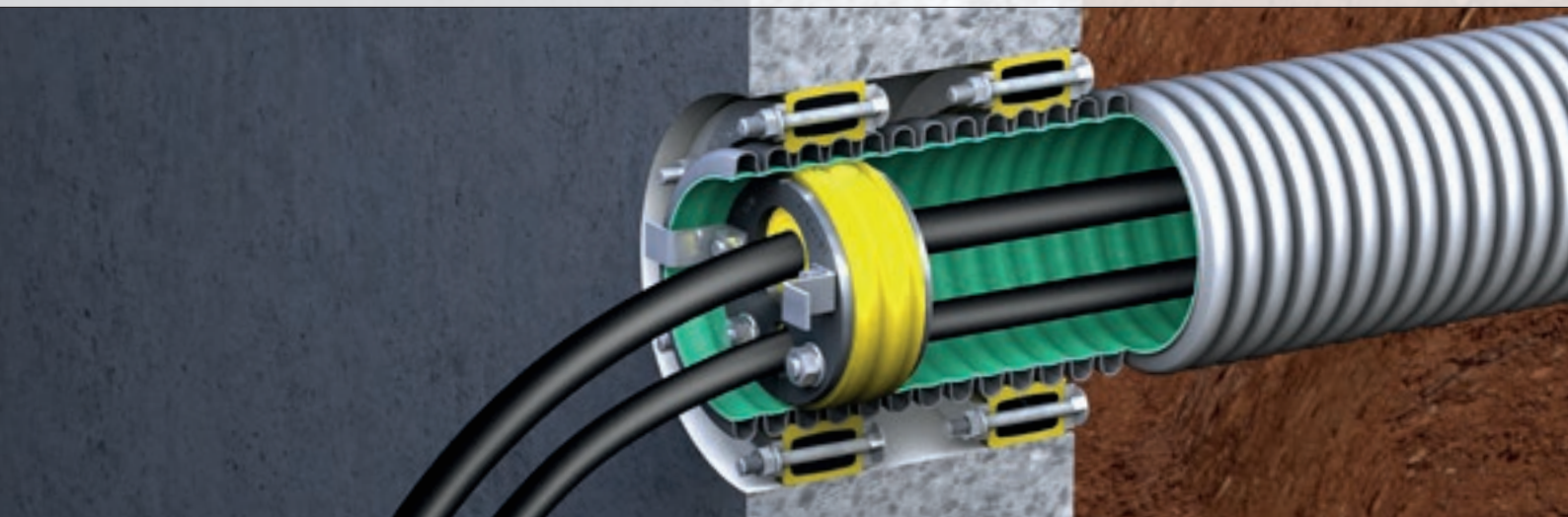


Kabuflex KDS SD

#### Note

Video of the building lead-through





## Conduit and cable sealings

### Application examples

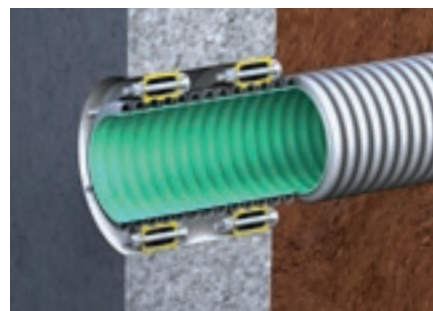
DIN 18012 with its general planning criteria for service connections for buildings and VDE-AR-N 4223, dealing with building penetrations and their sealing for buried cables, must be observed when sealing conduit and cable feed-throughs:

**Thus, building lead-throughs must be gas-tight and water pressure-tight.**

In this regard, FRÄNKISCHE offers different designs to meet these requirements on feed-through options.

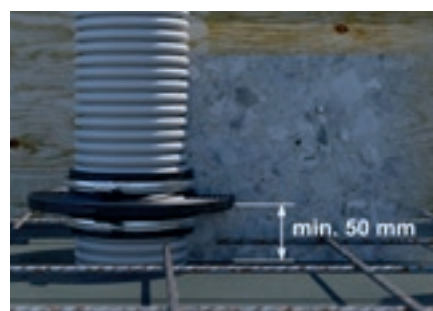
#### Kabu-Seal conduit sealings and wall collar set

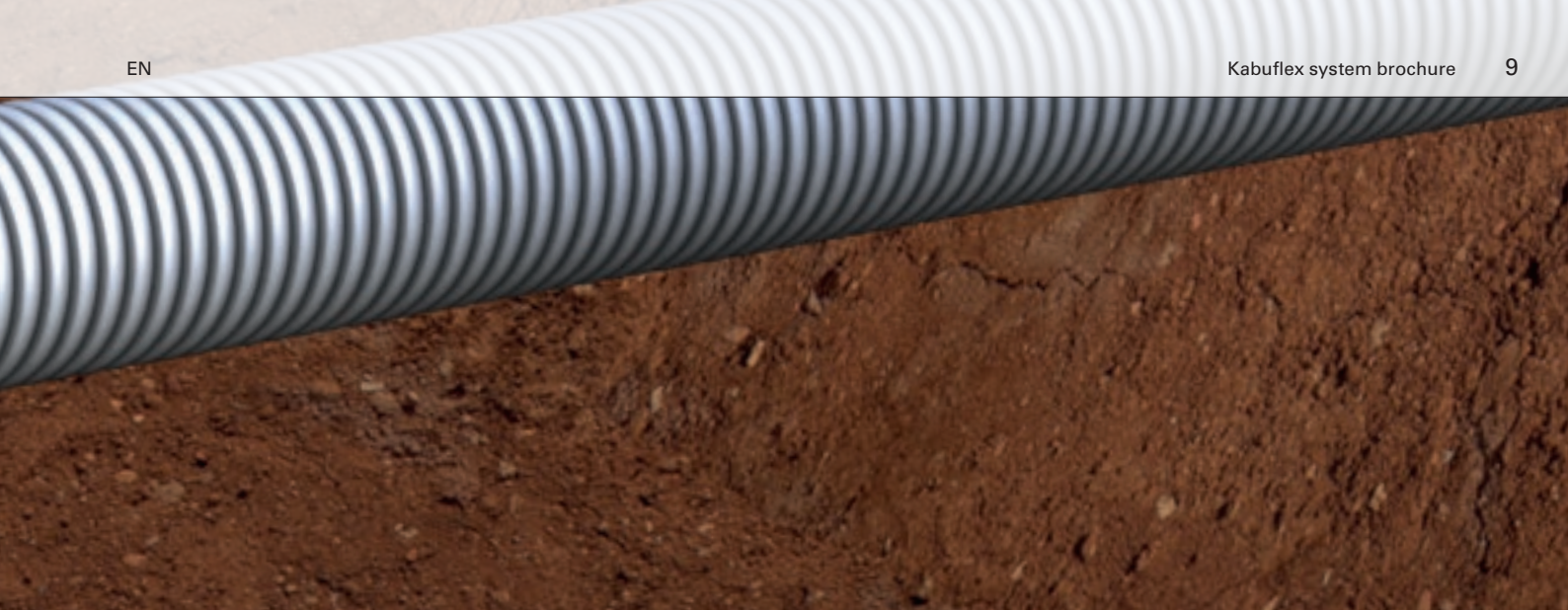
- Installation in core drill holes or casings
- Application in concrete foundation slabs
- Conduit connection between buildings



#### Kabu-IN and Kabu-IN DD cable sealings

- Connection of garages, annexes or for landscaping
- Supply of industrial and commercial buildings
- Sealing of unused Kabuflex conduits





## Properties and advantages

### Kabu-Seal conduit sealing and wall collar set

Kabu-Seal is an annular space sealing which can be used for all Kabuflex conduits. Its soft surface offers sealing of the cable conduit and core drill hole of 1.5 bar water pressure. Installation is possible via visual indication without special tools.

The wall collar set contains an EPDM wall collar including tightening straps and tightening locks. This wall lead-through is used for the absolutely tight lead-through of Kabuflex conduits into buildings through the foundation slab. When installed properly, the wall collar can withstand water pressures of 3.0 bar.

### Kabu-IN and Kabu-IN DD cable sealings

Kabu-IN and Kabu-IN DD are rubber pressure sealing rings for the feed-through of power and communication cables. Their two-piece design makes subsequent installation possible. Kabu-IN seals Kabuflex conduits gas-tight and water pressure-tight up to 0.5 bar, and Kabu-IN DD, since it has twice the sealing width, seals up to a pressure of 1.5 bar.

Due to the soft outside material (PUR), the Kabu-IN and Kabu-IN DD internal sealings ideally adapt to the conduit.

No torque spanner is required for the installation of the rubber pressure sealing rings, since tightening the nuts will lead to the formation of a bead for visual inspection.



### Kabu-BV end plug

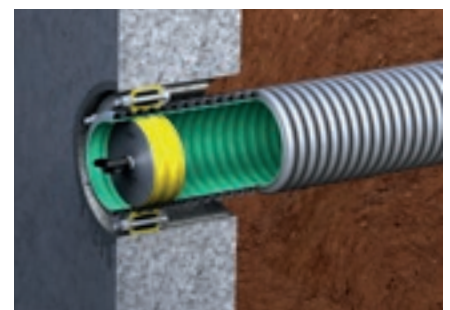
When the precise use of a conduit is not specified yet, the Kabu-BV end plug will provide a gas-tight and water pressure-tight sealing up to 0.5 bar until cable installation.

Installation can be effected without tools, since tightening the wing screw results in an optical visual indication.

### Internal conduit sealings require counterpressure!

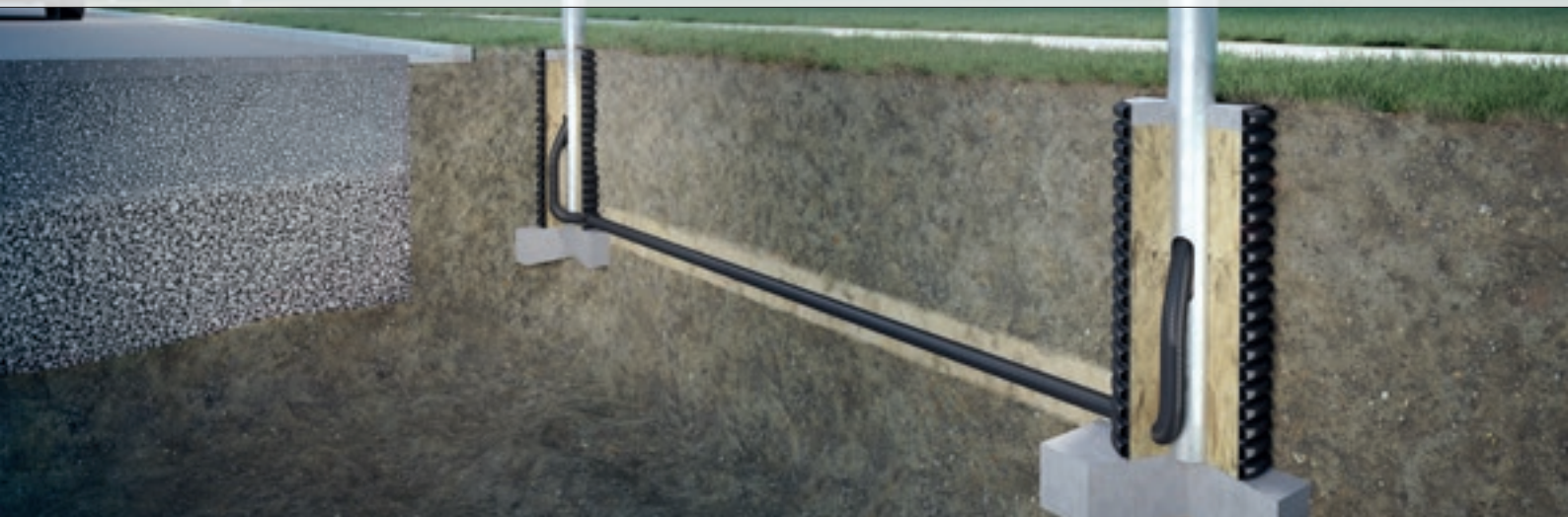
The Kabu-IN, Kabu-IN DD and Kabu-BV internal conduit sealings require counterpressure on the outside of the Kabuflex conduit during installation to ensure tightness.

This is achieved by installing the internal sealings at the level of the concrete or screed when introducing the conduit via the foundation slab. In the case of a wall lead-through, this is achieved by installation in the area of the Kabu-Seal annular space sealing.



#### Note

Seal core drill holes with coating



## Outdoor facilities using Furowell

### Application examples

---

Furowell gives masts and posts a firm hold in the ground and also serves as preparation for charging poles and stands.

If you want to build foundations for playground equipment such as swings, climbing frames, or a flagpole for your favourite sports club, you will be on the safe side with FRÄNKSCHE's Furowell pole foundation conduit. Additional installation situations include the installation of traffic signs, lighting poles and posts of all kinds. Furowell is also used for landscaping and as a distribution point for the conduit infrastructure.

### Furowell with end cap

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- As a distribution point for the conduit infrastructure
- For the installation of all types of poles, masts and rods
- For fixing stands and charging poles



### Characteristics

---

Furowell is a structured-wall pole foundation conduit made of PE-HD. The conduit has a corrugated outside, a smooth inside, and is halogen-free.

Advantages are its light weight and easy installation and handling as compared to concrete pipes and concrete foundations.

Due to its structured-wall design, Furowell is very robust and can be installed in no time by experts: Pole foundation conduits are installed and secured from the outside, e.g., by backfilling with tamped concrete up to the height of the lateral cable connection. After the mast or pole has been inserted, the annular space and gaps are backfilled and compacted.

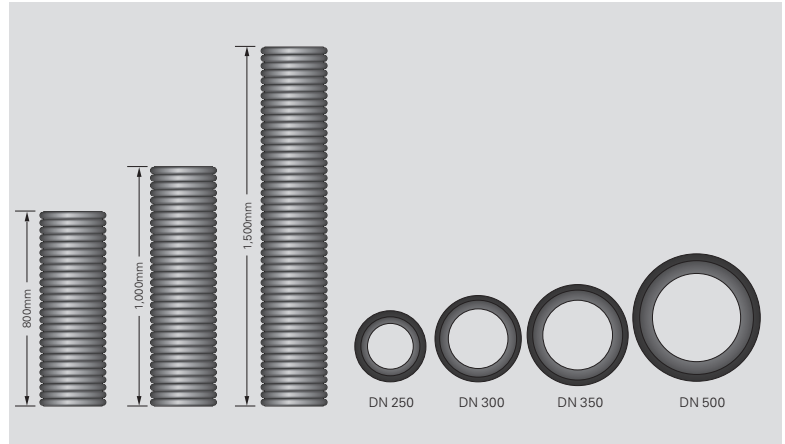
To connect electrical lines, installers can laterally drill a hole into the pole foundation conduit using a commercially available hole saw and thus receive a connection for Kabuflex conduits. A 68 mm core bit provides, e.g., a fitting connection for Kabuflex conduit types 63.

Protective covers are used for temporary sealing and covering during the construction phase.

Furowell is available in different practice-oriented heights (can be cut easily, if required).

## Advantages

- Quick and easy installation thanks to low weight
- Ideal embedding thanks to outside corrugation
- Different heights available to meet specific needs  
Can be cut to length, if necessary
- High stability thanks to structured-wall design
- Protective cover for temporary sealing and covering during the construction phase (DN 250 to 350)
- Easy lateral drilling for connections



## Application (lamp post)

Secure the Furowell pole foundation conduit from the outside with tamped concrete up to the height of the lateral cable connection. Afterwards, insert the lamp post.

**Foundation depth according to the pole manufacturer's specifications**

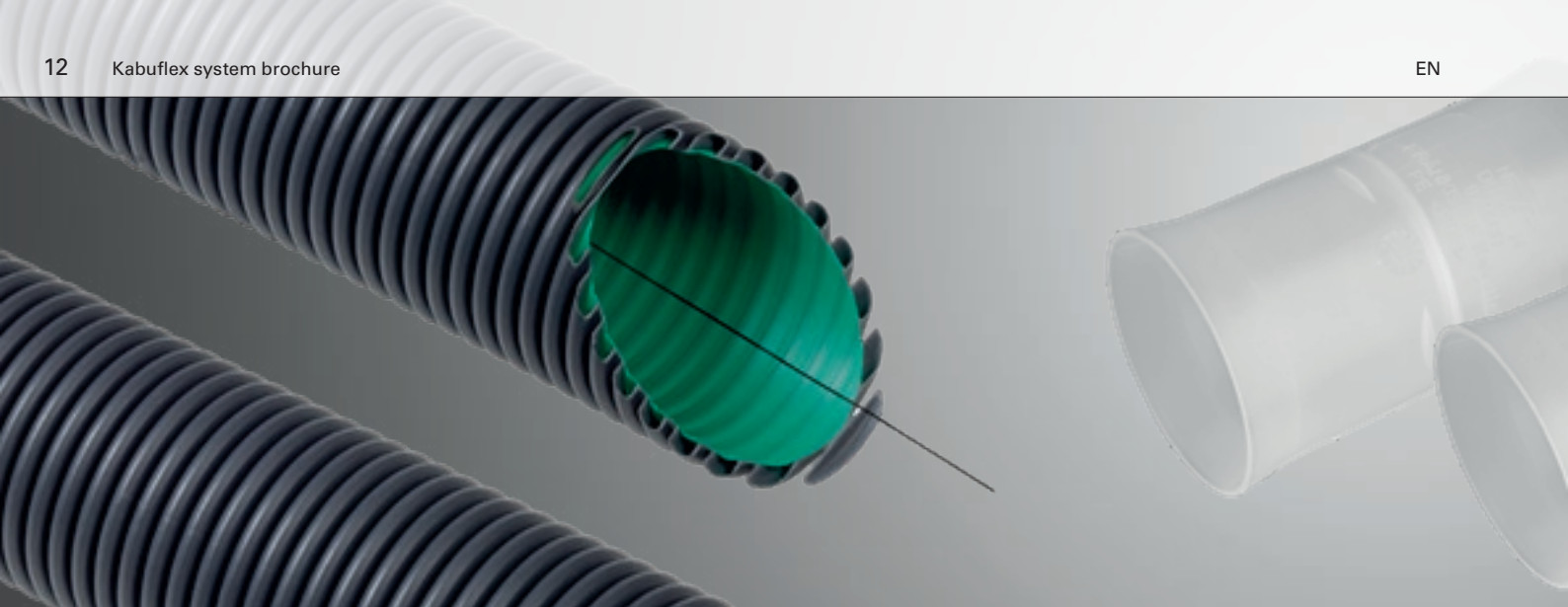


Then, fill the annular space in the pole foundation conduit with sand. Backfill the upper area of the annular space with tamped concrete for lateral adjustment and to prevent water ingress.



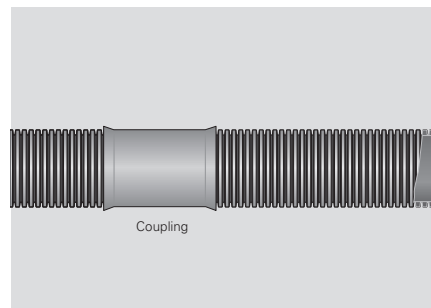
Then, backfill and compact the remaining gap around Furowell with native non-cohesive soil and provide a cover layer.





## Installation instructions for Kabuflex® conduits

The applicable standards and regulations such as DIN EN 1610, ZTV A-StB 12, DWA-A 139, A 515 and A 535a/b by the Plastic Pipe Association KRV, and the additional provisions of utility companies must be observed.



### 1. Transport and storage of the conduit components

Avoid dropping, dumping as well as hitting the pallets, conduits and accessories hard against each other!

DIN EN 1610 applies apart from that. Check the conduit components for defects before installation.

Store on even ground! Do not stack loose conduits higher than 1.5 m. You may stack packeted conduit pallets on top of each other (do not stack more than 2 pallets). Coils must be stored horizontally.

If the conduits are stored outdoors, do not exceed a storage period of 12 months.



### 2. Conduit swale and bearing

The provisions of DIN 18300 "Earthworks", DIN 18303 "Timbering to trenchwork", DIN 4124 "Excavations and trenches", and DIN EN 1610 apply.

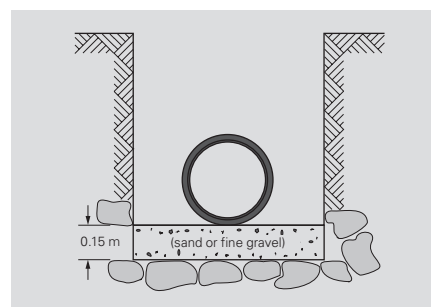
In case of rocky, consolidated or stony ground: 0.15 m of stoneless cover (sand, fine gravel) required as lower bedding (see DIN EN 1610 and KRV A 535a/b)

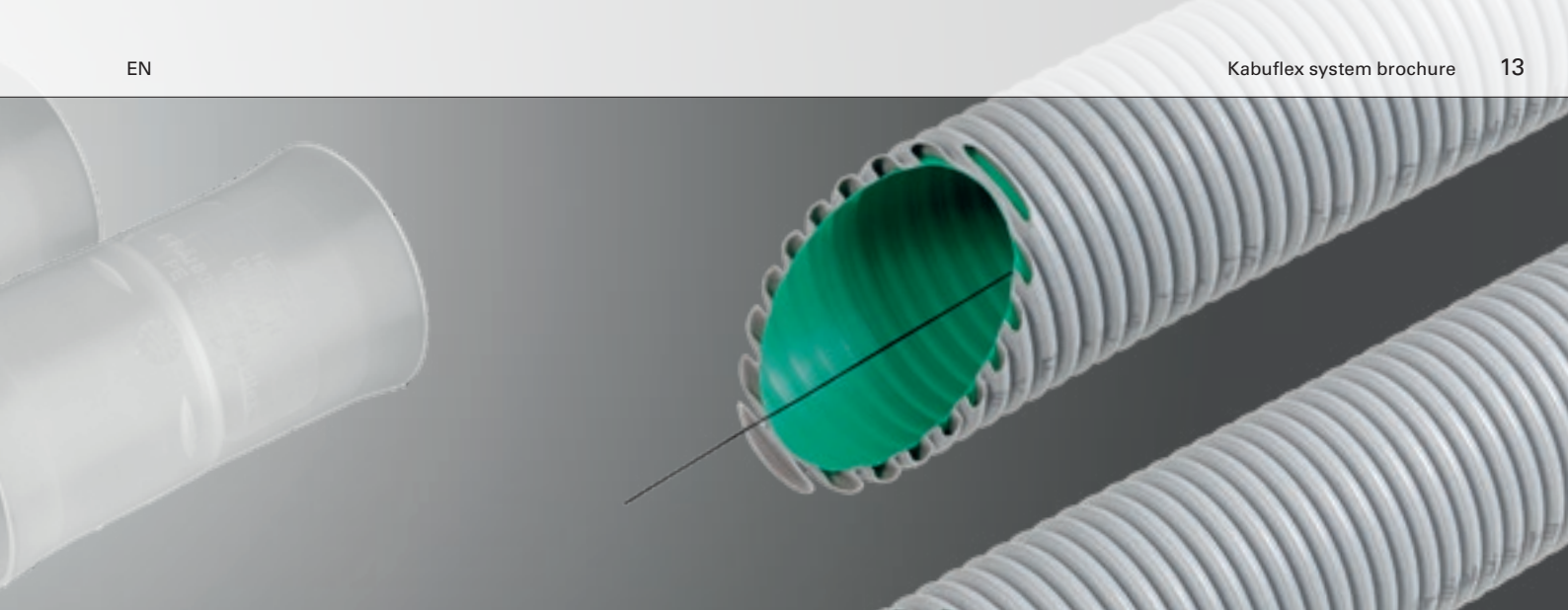
#### Note

Support and embedding of the conduits (stone-free, compactable soil!) are of decisive importance for any conduit deformation! Execute carefully according to DIN EN 1610, DWA-A 139 and KRV A 535a/b!

#### Note

According to VDE 0100-520 and VDE-AR-N 4222, cable conduits must be provided with a warning device (such as cable protector or warning tape) above the conduit to avoid damage.





### 3. Straight or consistently bent installation

- Place the conduits in a straight line on the conduit bedding and secure them at the sides.
- Meandering installations significantly reduce possible insertion lengths later on.

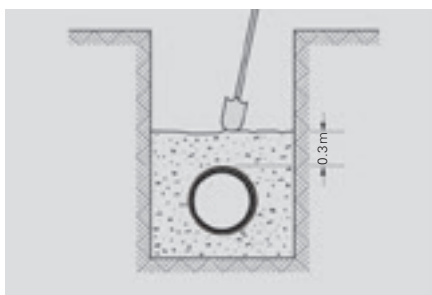
### 4. Backfilling and compacting

Fill up to 30 cm of the stoneless, compactable soil (20 mm maximum grain size; 0 mm to 8 mm grain size acc. to VDE-AR-N 4222) in layers on both sides of the conduit. Mechanically compact the main backfilling right above the conduit only after adding a layer with a minimum thickness of 30 cm above the conduit crown.

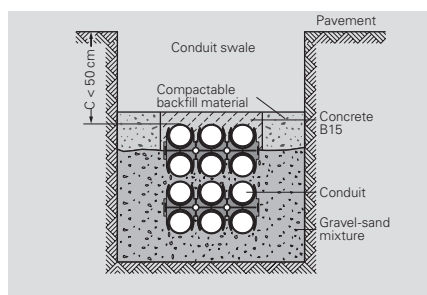
- The total thickness of the layer right above the conduit required before mechanical compacting depends on the type of compaction equipment.
- Do not shift conduits sideways during embedding.
- If required, secure the conduit heights during embedding.
- In case of multiple-layer installations in the conduit swale, embed every conduit layer individually (backfilling and compacting); only then can you place the next layer! Afterwards, backfill and compact as described above.
- Arrange for measures of load separation in areas with less than the minimum cover of 50 cm (e.g., backfilling the conduit swale with a mixture of sand and cement).
- When embedding in concrete, make sure that the conduit connections are watertight and secure the conduits against buoyancy!
- According to DIN EN 12613, you must use signal tape to mark buried cable conduits.  
A distance of 30-40 cm above the conduit ensures the best possible warning in the event of excavator intervention.

#### Please note

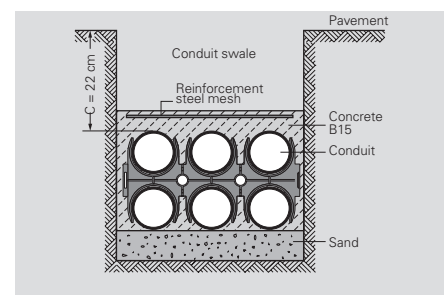
**Kabuflex is not suited for installations in tunnel vaults!**



Backfill and compact conduit up to 30 cm above the conduit crown by hand with stoneless, compactable soil.



Conduit layer installed in concrete with minimum cover (example see also KRV A 515/A 535a/b)



Protection of the conduit layer against deflection and mechanical damage when going below the minimum cover



5. Spacer

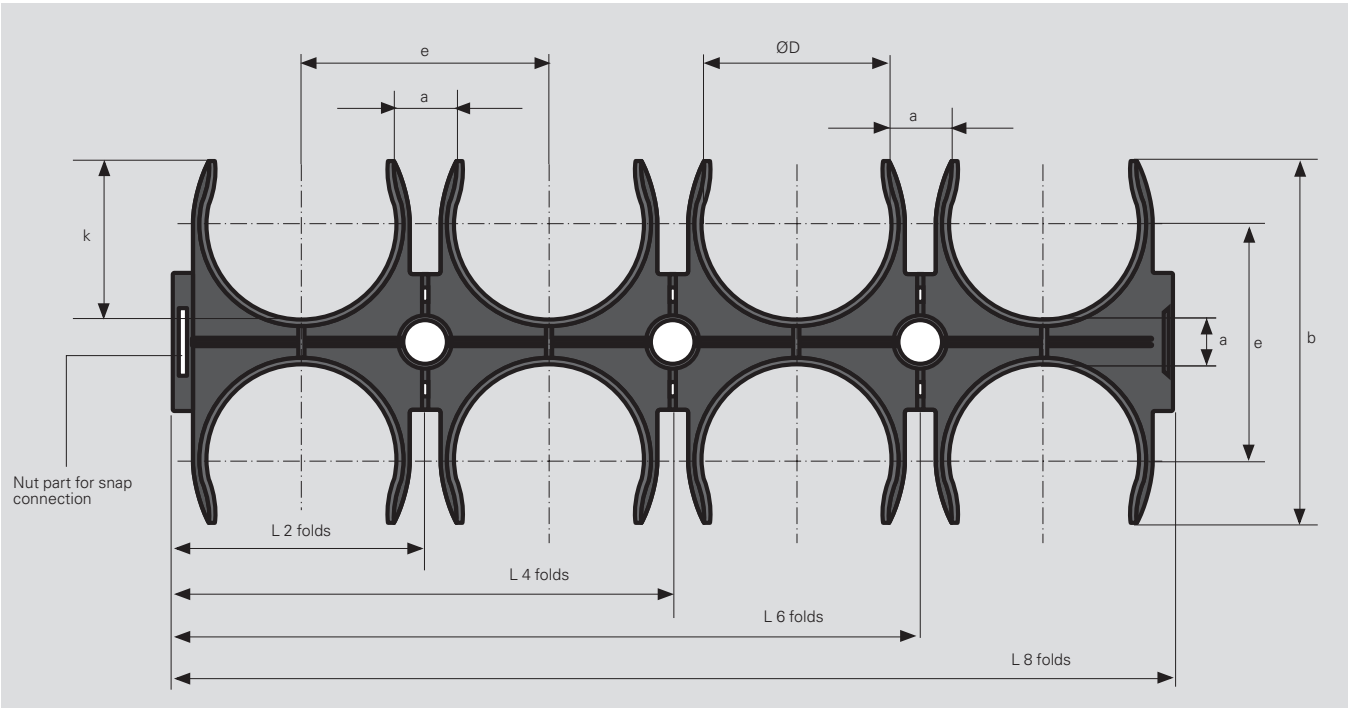
Install spacers to secure conduits in multiple-layer installations in the conduit swale.  
Allow for spacing according to the local installation conditions.

**Recommendation**

Maximum distance of 1.5 m for Kabuflex S and 1.0 m for Kabuflex R!

| Type                 |      | 50  | 75  | 90  | 110 | 120 / 125 | 160 | 200  |
|----------------------|------|-----|-----|-----|-----|-----------|-----|------|
| D                    | [mm] | 50  | 75  | 90  | 110 | 120       | 160 | 200  |
| L <sub>2</sub> folds | [mm] | –   | 105 | 125 | 142 | 175       | 225 | 287  |
| L <sub>4</sub> folds | [mm] | –   | 208 | 247 | 284 | 336       | 445 | 577  |
| L <sub>6</sub> folds | [mm] | 239 | 305 | 360 | 426 | 497       | 665 | 846  |
| L <sub>8</sub> folds | [mm] | 324 | 408 | 482 | 568 | 658       | 885 | 1135 |
| a                    | [mm] | 28  | 25  | 28  | 30  | 38        | 60  | 80   |
| b                    | [mm] | 100 | 125 | 148 | 190 | 210       | 313 | 347  |
| Thickness            | [mm] | 14  | 12  | 14  | 15  | 20        | 33  | 25   |
| e                    | [mm] | 78  | 100 | 118 | 140 | 158       | 220 | 280  |
| k                    | [mm] | 35  | 50  | 59  | 80  | 88        | 126 | 135  |

Due to the production process, the spacers can only be joined together to a limited extent

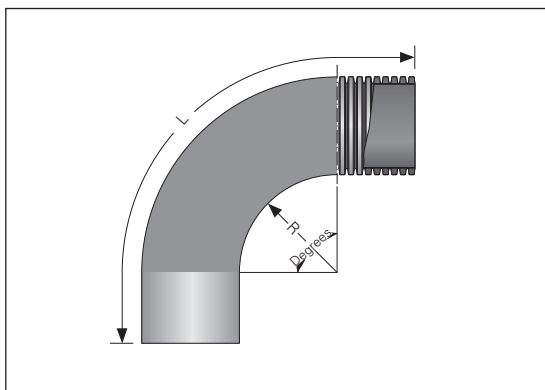


Drawing type 110

## 6. Change of direction in the conduit route

Avoid small bend radii theoretically possible with Kabuflex R and R plus coiled lengths as to not impede or prevent inserting wires and cables.

The finished 45°/90° bends for Kabuflex S straight lengths serve as an orientation for the smallest possible installation radii (see table).



45° and 90° conduit bends, nominal diameter, and radius R of the conduit bend (inside of bend)

| DN     |     | R [m] |
|--------|-----|-------|
| DN 75  | 45° | 0.75  |
|        | 90° | 0.75  |
| DN 90  | 45° | 0.75  |
|        | 90° | 0.75  |
| DN 110 | 45° | 0.90  |
|        | 90° | 0.90  |
| DN 120 | 45° | 0.90  |
|        | 90° | 0.90  |
| DN 125 | 45° | 1.00  |
|        | 90° | 1.00  |
| DN 145 | 45° | 1.00  |
|        | 90° | 1.00  |
| DN 160 | 45° | 1.00  |
|        | 90° | 1.00  |
| DN 175 | 45° | 1.00  |
|        | 90° | 1.00  |

### Kabuflex dimensions and bend radii

| Kabuflex S – rigid cable conduit |        | D <sub>o</sub> [mm] <sup>1)</sup> | D <sub>i</sub> [mm] <sup>1)</sup> | R <sub>min</sub> [m] <sup>2)</sup> |
|----------------------------------|--------|-----------------------------------|-----------------------------------|------------------------------------|
| Kabuflex S                       | DN 75  | 75                                | 63                                | 2.0                                |
|                                  | DN 110 | 110                               | 94                                | 2.8                                |
|                                  | DN 120 | 117                               | 99                                | 3.0                                |
|                                  | DN 125 | 125                               | 108                               | 3.2                                |
|                                  | DN 145 | 145                               | 125                               | 3.6                                |
|                                  | DN 160 | 160                               | 137                               | 4.0                                |
|                                  | DN 175 | 173                               | 149                               | 4.5                                |

Irrespective of that: include the installation of a cable chute after small curves!

| Kabuflex R – pliable cable conduit                                                       |        | D <sub>o</sub> [mm] <sup>1)</sup> | D <sub>i</sub> [mm] <sup>1)</sup> | R <sub>min</sub> [m] <sup>2)</sup> |
|------------------------------------------------------------------------------------------|--------|-----------------------------------|-----------------------------------|------------------------------------|
| Kabuflex R<br>Kabuflex R plus 450 co2ntrol<br>Kabuflex R plus 750 co2ntrol <sup>3)</sup> | DN 40  | 40                                | 31                                | 0.35                               |
|                                                                                          | DN 50  | 50                                | 40                                | 0.35                               |
|                                                                                          | DN 63  | 64                                | 52                                | 0.35                               |
|                                                                                          | DN 75  | 75                                | 62                                | 0.35                               |
|                                                                                          | DN 90  | 90                                | 75                                | 0.35                               |
|                                                                                          | DN 110 | 110                               | 93                                | 0.50                               |
|                                                                                          | DN 125 | 125                               | 106                               | 0.60                               |
|                                                                                          | DN 160 | 160                               | 137 / 136                         | 0.75                               |
|                                                                                          | DN 200 | 200                               | 173                               | 0.75                               |

<sup>1)</sup> Production-related dimensional tolerances

<sup>2)</sup> Minimum bend radius applies to an ambient temperature of 20 °C. In lower temperatures, we recommend that the minimum bend radii be increased as follows: by a factor of  $\geq 1.5 \times$  at approx. 10 °C, by a factor of  $\geq 2 \times$  at approx. 0 °C.

<sup>3)</sup> Kabuflex R plus 750 co2ntrol is available in DN 75, 90, 110, 125 and 160

## 7. Feed cord and insertion of wires and cables, insertion lengths

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### Feed cord – Kabuflex R and R plus

The feed cord delivered with Kabuflex R and R plus is used to insert the cable feed wire and/or cord, not for inserting cables! The feed cord has a tensile strength of approx. 30 kg.

Always release the cord ends attached to the conduit before installing conduits.

Do not install conduit ends and couplings while the cord ends are still attached.  
If you do not need the feed cord, remove it from the conduit before installation!

Before uncoiling the conduit, remove the cord fastening and open the ball at the conduit end with the long excess cord (ball) only and tie the cord end to the conduit outside profile. Then, uncoil the conduit.

### Inserting cables – Kabuflex conduits

The following factors determine possible insertion lengths:

- Cable (type/weight/flexibility)
- Course of the conduit (height profile, number/position/curve radii/inaccuracies)
- Friction coefficient and admissible tensile forces (cable/conduit wall)
- Lubricant (type/amount)
- Insertion method and speed (also surface temperature)
- Ratio of inside conduit diameter to cable diameter

For Kabuflex coiled conduits, smaller distances between the spacers and the Kabuflex S conduits must be observed.

Due to a number of factors which cannot be determined exactly, the manufacturer cannot make a definite statement regarding maximum insertion lengths.

## 8. Cutting the Kabuflex® conduit

---

If necessary, cut to length with a fine-toothed saw or an appropriate knife; cuts must be made in corrugation troughs and at right angles!

Cutting the corrugation trough at right angles is required to ensure that the pull-out protection in the coupling snaps in exactly!

Remove burrs and unevenness from the separating surfaces.

## 9. Establishing connections with conduits and fittings

### Sandtight:

- Clean dirt off spigot and coupling
- Insert the spigot all the way into the coupling

### Watertight:

- Clean dirt off spigot, coupling inside and sealing ring
- Mount the profile sealing ring onto the spigot (into the second corrugation trough, for type 200 into the third corrugation trough)
- Apply lubricant to the profile sealing ring and the coupling
- Insert spigot all the way into the coupling

## 10. Building connections

House and building lead-throughs must be implemented according to the rules and provisions of (E) VDE-AR-N 4223. This VDE application rule pools the accepted technical practices in terms of building penetrations. Generally, penetrations must be gas-tight and water pressure-tight and the functionality of the building sealing must not be compromised.

### Approved products

- Kabuflex R plus 750 co2ntrol
- Kabuflex R and R plus 450 co2ntrol
- Wall collar set or Kabu-Seal
- Kabu-IN or Kabu-IN DD

## 11. Conduit fill and conduit dimensioning for cable occupation

Select conduit fill and/or minimum diameter of the cable conduit depending on the installation conditions, cable type and diameter (see in particular Chapters 6 and 7).

| Conduit type          | Conduit fill | Ratio of inside conduit diameter to cable diameter for occupation with 1 cable |
|-----------------------|--------------|--------------------------------------------------------------------------------|
| Kabuflex S            | ≤ 35 %       | ≥ 1.70                                                                         |
| Kabuflex R and R plus | ≤ 25 %       | ≥ 2.00                                                                         |

| Kabuflex R and R plus | Kabuflex S | Conduit fill | Constant a |
|-----------------------|------------|--------------|------------|
| R and R plus          | S          | 20 %         | 2.24       |
| R and R plus          | S          | 25 %         | 2.00       |
| –                     | S          | 30 %         | 1.83       |
| –                     | S          | 35 %         | 1.70       |

This information on possible applications and installations is provided to the best of our knowledge. Our application department must be consulted when installation situations and installation techniques deviate from our recommended uses.

FRÄNKISCHE, however, is not responsible to check the suitability of the product for the intended purpose. Before product use, customers must check the product for suitability. Also observe our general terms of delivery.

### Note

Observe the following formula for dimensioning when occupying the conduit with several cable strands:

$$d_{Ri} = a \cdot \sqrt{d_{12}^2 + d_{22}^2 \dots + d_{n2}^2}$$

**d<sub>Ri</sub>** Inside diameter of Kabuflex conduit

**d<sub>n</sub>** Outside diameter of cable

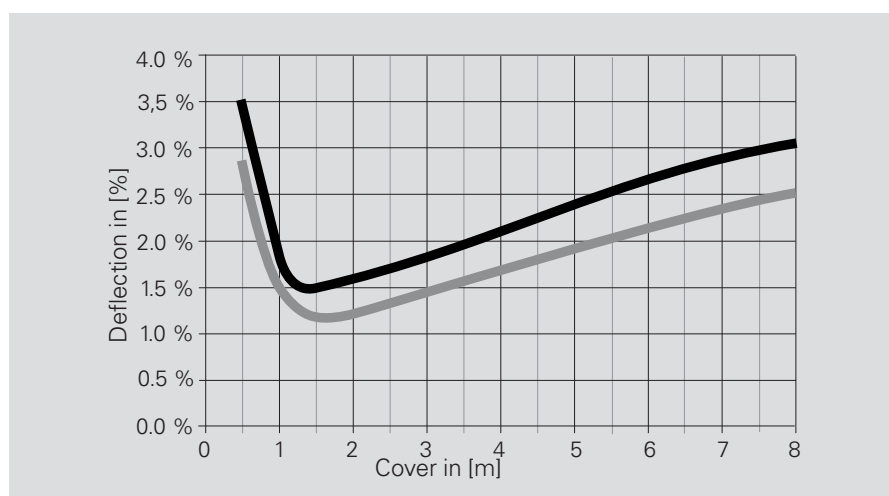
**a** Constant depending on conduit fill

## High static load capacity

The diagram shows the deflection of Kabuflex R plus 450 co2ntrol and 750 co2ntrol, DN 110 (individual conduit installation) with an increasing depth of cover and takes into consideration the installation conditions next to the chart. For this purpose, professional installation according to relevant provisions is assumed.

### Note

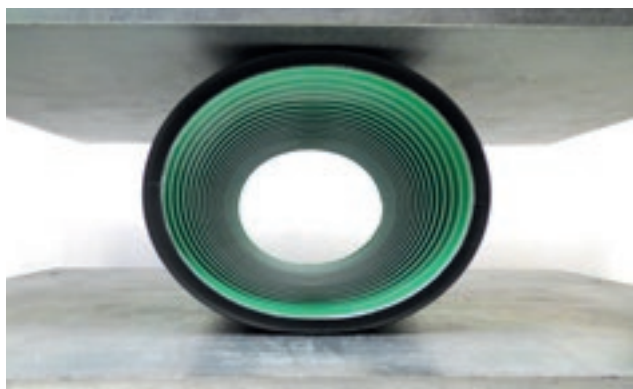
The conduit stress analysis procedure according to ATV-DVWK-A 127 generally applies to single cable ducts only!



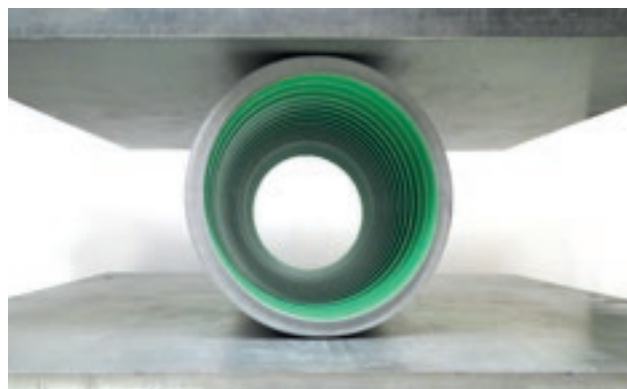
### The following installation conditions apply:

- Kabuflex R plus 450 co2ntrol, DN 110
- Kabuflex R plus 750 co2ntrol, DN 110
- Permissible deflection 6 %
- Single conduit installation
- Embanking
- Soil cover 0.5 – 8.0 m
- HGV 60 traffic loads
- Conduit zone: soil group G1/non-cohesive soils, 180° bedding angle, loose bedding
- Native soil and backfill G3 with 95 %  $D_{Pr}$

## Compression test according to DIN EN 61386-24



Kabuflex R plus 450 co2ntrol = 45 kg



Kabuflex R plus 750 co2ntrol = 75 kg

### Please note

**Kabuflex is not suited for installations in tunnel vaults!**

## Kabuflex® sandtight (SD) – IP code 54

Marking according to EN 60529

### Reference number:

5 = dust proof

4 = splash proof

The SD coupling guarantees absolutely reliable connections of Kabuflex. It is used wherever it is sufficient to protect against soil particle ingress.

It is sandtight and can be installed easily and quickly.

## Kabuflex® watertight (WD) – IP code 68

Marking according to EN 60529

### Reference number:

6 = dust tight

8 = watertight in case of continuous immersion in water

Check the tightness with pressing water of 0.5 bar internal pressure to ensure the tightness in compliance with IP 68.

The SD coupling in connection with the profile sealing ring ensures watertight connections (WD).

The profile sealing ring must be inserted into the second corrugation trough, for **type 200 into the third corrugation trough** (visual position check at the transparent coupling)!

Use lubricant to mount the sealing ring. The profile sealing ring is used when the conduit system must be sealed against water pressure (0.5 bar) according to DIN EN 1610.

### Note

**The tightness of the installed Kabuflex system cannot be checked according to DIN 1610.**

### Protective and nominal distances

Take appropriate protective measures (e.g. target distances according to A 515, A 535a/b by the KRV) for intersections with external equipment.

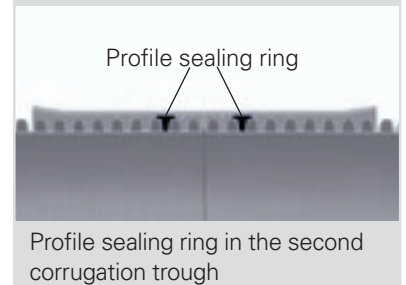
| External installation                    | Protective distance of the remote signalling equipment in the intersection/proximity area [m] |
|------------------------------------------|-----------------------------------------------------------------------------------------------|
| High-voltage cables/high voltage systems | 0.3                                                                                           |
| Other remote signalling equipment        | 0.3                                                                                           |
| Gas/water pipes                          | 1.0                                                                                           |
| Other service pipes                      | 0.3                                                                                           |
| District heating plants                  | 1.0                                                                                           |

Table: Protective distances at intersections and/or in the proximity area of external installations (according to A 515 by the KRV)

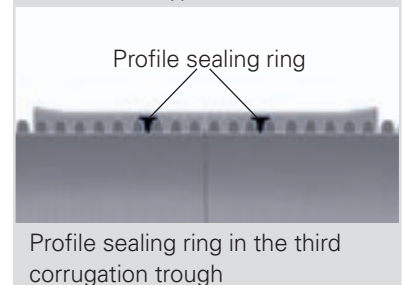
### SD: sandtight



### WD: watertight (type 40 to type 175)



### WD: watertight (type 200)



### Note

**The transparent coupling type 200 (19250200) with profile sealing ring is only suitable for Kabuflex R plus conduits.**

# Products system overview

## Kabu®-FESH Set Elektro B

Classification code

**N750**

- Building lead-through for embedding in the foundation slab
- For power and telecommunication cables
- Variable height adjustment
- Set includes: Kabuflex R plus 750 co2ntrol, Kabu-IN DD, wall collar set and two end caps SD
- Tightness tested according to DVGW VP601
- Waterproof concrete wear class 1 + 2, W1-E according to DIN 18533
- Complies with TAB 2023
- Radon-tight

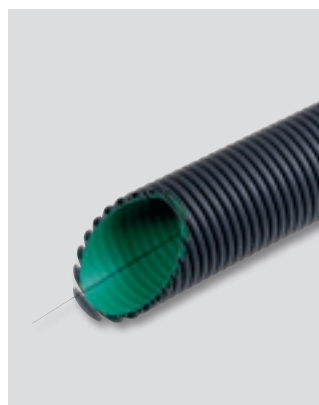


EN 61386-24  
VDE-AR-N-4100

| Cat. no. | Type | Coil length [m] | Cable Ø [mm] | Tightness [bar] | Length [mm] | Width [mm] | Height [mm] | Packing unit [pcs.] | Packing unit weight [kg] | Pallet content [pcs] |
|----------|------|-----------------|--------------|-----------------|-------------|------------|-------------|---------------------|--------------------------|----------------------|
| 19241075 | 75   | 6               | 1x 7-24      | 1.5             | 780         | 190        | 780         | 1                   | 5.0                      | 6                    |
| 19242075 | 75   | 10              | 1x 7-24      | 1.5             | 780         | 300        | 780         | 1                   | 7.8                      | 4                    |
| 19241110 | 110  | 6               | 1x 7-48      | 1               | 780         | 300        | 780         | 1                   | 8.7                      | 4                    |
| 19242110 | 110  | 10              | 1x 7-48      | 1               | 1170        | 780        | 385         | 1                   | 13.0                     | 2                    |

## Kabuflex R plus 450 co2ntrol®

Classification code

**N450**

- Underground cable protection
- Green inner surface for quicker cable insertion
- With feed cord and transparent coupling (sandtight)
- Material: PE
- Compressive stress type 450 and normal impact strength
- Temperature range -5 °C to +90 °C



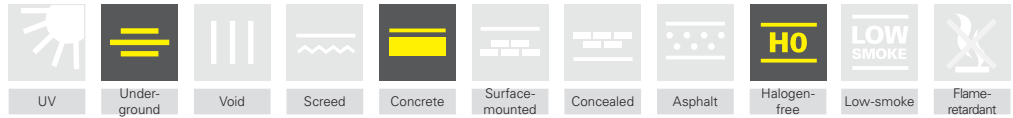
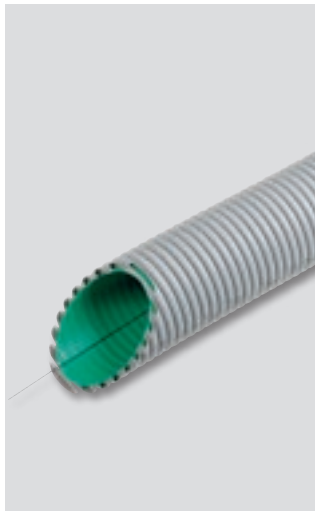
DIN EN 61386-24

| Cat. no. | Type | Outside Ø [mm] | Inside Ø [mm] | Coil length [m] | Coil weight [kg] | Bending radius* ≥ [mm] | Colour |
|----------|------|----------------|---------------|-----------------|------------------|------------------------|--------|
| 19210040 | 40   | 40.0           | 31.0          | 50              | 7.3              | 350                    | black  |
| 19210050 | 50   | 50.0           | 40.0          | 50              | 9.6              | 350                    |        |
| 19210063 | 63   | 63.0           | 52.0          | 50              | 13.6             | 350                    |        |
| 19210075 | 75   | 75.0           | 62.0          | 50              | 16.6             | 350                    |        |
| 19210090 | 90   | 90.0           | 75.0          | 50              | 21.7             | 350                    |        |
| 19210110 | 110  | 110.0          | 93.0          | 50              | 27.2             | 500                    |        |
| 19210125 | 125  | 125.0          | 106.0         | 25              | 18.0             | 600                    |        |
| 19210160 | 160  | 160.0          | 137.0         | 25              | 28.9             | 750                    |        |
| 19210200 | 200  | 200.0          | 173.0         | 25              | 39.4             | 750                    |        |

Production-related dimensional tolerances outside Ø according to EN 61386-24

\* Valid for an ambient temperature of 20 °C. At lower temperatures, we recommend that the minimum bending radii be increased (by a factor of ≥ 1.5 x at approx. 10 °C by a factor of ≥ 2 x at approx. 0 °C).

## Kabuflex R plus 750 co2ntrol®

Classification  
code**N750**

- Cable protection in concrete and underground
- For building lead-throughs according to VDE-AR-N 4100 (TAR low voltage)
- Green inner surface for quicker cable insertion
- With feed cord and transparent coupling (sandtight)
- Material: PE
- Compressive stress type 750 and normal impact strength
- Temperature range -5 °C to +90 °C



DIN EN 61386-24

| Cat. no.        | Type | Outside Ø [mm] | Inside Ø [mm] | Coil length [m] | Coil weight [kg] | Bending radius* ≥ [mm] | Colour |
|-----------------|------|----------------|---------------|-----------------|------------------|------------------------|--------|
| <b>19230075</b> | 75   | 75.0           | 62.0          | 50              | 26.5             | 350                    | grey   |
| <b>19230090</b> | 90   | 90.0           | 75.0          | 50              | 36.0             | 350                    |        |
| <b>19230110</b> | 110  | 110.0          | 93.0          | 50              | 47.5             | 500                    |        |
| <b>19230125</b> | 125  | 125.0          | 106.0         | 25              | 27.7             | 600                    |        |
| <b>19230160</b> | 160  | 160.0          | 136.0         | 25              | 41.2             | 750                    |        |

Production-related dimensional tolerances outside Ø according to EN 61386-24

\* Valid for an ambient temperature of 20 °C. At lower temperatures, we recommend that the minimum bending radii be increased (by a factor of ≥ 1.5 x at approx. 10 °C by a factor of ≥ 2 x at approx. 0 °C).

## Kabuflex® R

Classification code

**N450**

UV



Under-ground



Void



Screed



Concrete



Surface-mounted



Concealed



Asphalt



Halogen-free



Low-smoke



Flame-retardant

- Underground cable protection
- Inner surface for easy cable insertion
- With feed cord and Kabuflex coupling (sandtight)

- Material: PE
- Compressive stress type 450 and normal impact resistance
- Temperature range -5 °C to +90 °C



EN 61386-24

| Cat. no. | Type | Outside Ø* [mm] | Inside Ø [mm] | Coil length [m] | Coil weight [kg] | Bending radius* ≥ [mm] | Colour |
|----------|------|-----------------|---------------|-----------------|------------------|------------------------|--------|
| 19130040 | 40   | 40.0            | 32.0          | 50              | 7.0              | 350                    | black  |
| 19130050 | 50   | 50.0            | 40.0          | 50              | 9.0              | 350                    |        |
| 19130063 | 63   | 63.0            | 52.0          | 50              | 12.8             | 350                    |        |
| 19130075 | 75   | 75.0            | 62.0          | 50              | 17.0             | 350                    |        |
| 19130090 | 90   | 90.0            | 75.0          | 50              | 22.5             | 350                    |        |
| 19130110 | 110  | 110.0           | 93.0          | 50              | 31.0             | 500                    |        |
| 19130120 | 120  | 120.0           | 99.0          | 25              | 18.0             | 500                    |        |
| 19130125 | 125  | 125.0           | 107.0         | 25              | 19.3             | 600                    |        |
| 19130160 | 160  | 160.0           | 138.0         | 25              | 26.3             | 750                    |        |
| 19130200 | 200  | 200.0           | 172.0         | 25              | 38.8             | 750                    |        |
| 19132040 | 40   | 40.0            | 32.0          | 50              | 7.0              | 350                    | red    |
| 19132050 | 50   | 50.0            | 40.0          | 50              | 9.0              | 350                    |        |
| 19132063 | 63   | 63.0            | 52.0          | 50              | 12.8             | 350                    |        |
| 19132075 | 75   | 75.0            | 62.0          | 50              | 17.0             | 350                    |        |
| 19132090 | 90   | 90.0            | 75.0          | 50              | 22.5             | 350                    |        |
| 19132110 | 110  | 110.0           | 93.0          | 50              | 31.0             | 500                    |        |
| 19132125 | 125  | 125.0           | 107.0         | 25              | 19.3             | 600                    |        |
| 19132160 | 160  | 160.0           | 138.0         | 25              | 26.3             | 750                    |        |

Production-related dimensional tolerances for outside Ø according to EN 61386-24

\* Valid for an ambient temperature of 20 °C. At lower temperatures, we recommend that the minimum bending radii be increased (by a factor of ≥ 1.5 x at approx. 10 °C, by a factor of ≥ 2 x at approx. 0 °C).

## Kabuflex® R - UV

Classification  
code**N450**

UV

Under-  
ground

Void



Screed



Concrete

Surface-  
mounted

Concealed



Asphalt

Halogen-  
free

Low-smoke

Flame-  
retardant

- Cable protection above ground
- UV-resistant for up to 10 years
- Inner surface for easy cable insertion
- With feed cord and Kabuflex coupling (sandtight)
- Material: PE
- Compressive stress type 450 and normal impact strength
- Temperature range -5 °C to +90 °C



DIN EN 61386-24

| Cat. no.        | Type | Outside Ø<br>[mm] | Inside Ø<br>[mm] | Coil length<br>[m] | Coil weight<br>[kg] | Bending radius*<br>≥ [mm] | Colour |
|-----------------|------|-------------------|------------------|--------------------|---------------------|---------------------------|--------|
| <b>19140110</b> | 110  | 110.0             | 93.0             | 50                 | 27.2                | 500                       | black  |

Production-related dimensional tolerances outside Ø according to EN 61386-24

\* Valid for an ambient temperature of 20 °C. At lower temperatures, we recommend that the minimum bending radii be increased (by a factor of ≥ 1.5 x at approx. 10 °C, by a factor of ≥ 2 x at approx. 0 °C).

## Kabuflex® S

Classification  
code**N450**

- Underground cable protection
- Straight installation in case of long distances in the cable route
- Pliable
- Smooth inner surface for easy cable insertion
- Material: PE
- Compressive stress type 450 and normal impact strength
- Temperature range -5 °C to +90 °C



EN 61386-24

| Cat. no.                                       | Type | Outside Ø [mm] | Inside Ø [mm] | Length [mm] | Weight per straight length [kg] | Pallet content [m] | Bend radius* ≥ [mm] | Colour |
|------------------------------------------------|------|----------------|---------------|-------------|---------------------------------|--------------------|---------------------|--------|
| <b>3 m straight lengths with coupling (SD)</b> |      |                |               |             |                                 |                    |                     |        |
| <b>19021075</b>                                | 75   | 75.0           | 63.0          | 3           | 1.14                            | 630                | 2000                | black  |
| <b>19021110</b>                                | 110  | 110.0          | 94.0          | 3           | 1.80                            | 300                | 2800                |        |
| <b>19021120</b>                                | 120  | 120.0          | 99.0          | 3           | 2.20                            | 270                | 3000                |        |
| <b>19021125<sup>a</sup></b>                    | 125  | 125.0          | 107.0         | 3           | 2.32                            | 231                | 3200                |        |
| <b>19021145</b>                                | 145  | 145.0          | 125.0         | 3           | 2.74                            | 180                | 3600                |        |
| <b>19021160</b>                                | 160  | 160.0          | 137.0         | 3           | 3.46                            | 138                | 4000                |        |
| <b>19021175</b>                                | 175  | 175.0          | 149.0         | 3           | 3.96                            | 126                | 4500                |        |

|                                              |     |       |       |   |      |      |      |       |
|----------------------------------------------|-----|-------|-------|---|------|------|------|-------|
| <b>6 m straight lengths without coupling</b> |     |       |       |   |      |      |      |       |
| <b>19040075</b>                              | 75  | 75.0  | 63.0  | 6 | 2.26 | 1260 | 2000 | black |
| <b>19040110</b>                              | 110 | 110.0 | 94.0  | 6 | 3.58 | 600  | 2800 |       |
| <b>19040120</b>                              | 120 | 120.0 | 99.0  | 6 | 4.38 | 540  | 3000 |       |
| <b>19040125</b>                              | 125 | 125.0 | 107.0 | 6 | 4.62 | 462  | 3200 |       |
| <b>19040145</b>                              | 145 | 145.0 | 125.0 | 6 | 5.46 | 360  | 3600 |       |
| <b>19040160</b>                              | 160 | 160.0 | 137.0 | 6 | 6.90 | 276  | 4000 |       |
| <b>19040175</b>                              | 175 | 175.0 | 149.0 | 6 | 7.90 | 252  | 4500 |       |

Production-related dimensional tolerances for outside Ø according to EN 61386-24

a = on request, minimum order quantity 231 m

\* Valid for an ambient temperature of 20 °C. At lower temperatures, we recommend that the minimum bending radii be increased (by a factor of ≥ 1.5 x at approx. 10 °C, by a factor of ≥ 2 x at approx. 0 °C).

## Kabuflex® bend



- Bend for small bend radii in the cable route
- Material: PE
- For Kabuflex S

| Cat. no.        | Type | Outside Ø [mm] | Inside Ø [mm] | Length [mm] | Radius* [mm] | Packing unit [pcs.] | Packing unit weight [kg] | Colour |
|-----------------|------|----------------|---------------|-------------|--------------|---------------------|--------------------------|--------|
| <b>45° bend</b> |      |                |               |             |              |                     |                          |        |
| <b>19085075</b> | 75   | 75.0           | 63.0          | 0.9         | 750          | 5                   | 1.70                     | black  |
| <b>19085110</b> | 110  | 110.0          | 94.0          | 1.0         | 900          | 5                   | 2.98                     |        |
| <b>19085120</b> | 120  | 120.0          | 99.0          | 1.0         | 900          | 5                   | 3.88                     |        |
| <b>19085125</b> | 125  | 125.0          | 107.0         | 1.1         | 1100         | 5                   | 4.45                     |        |
| <b>19085145</b> | 145  | 145.0          | 125.0         | 1.2         | 1100         | 5                   | 5.25                     |        |
| <b>19085160</b> | 160  | 160.0          | 137.0         | 1.2         | 1100         | 5                   | 6.05                     |        |
| <b>19085175</b> | 175  | 175.0          | 149.0         | 1.2         | 1100         | 5                   | 7.55                     |        |

|                 |     |       |       |     |      |   |       |       |
|-----------------|-----|-------|-------|-----|------|---|-------|-------|
| <b>90° bend</b> |     |       |       |     |      |   |       |       |
| <b>19080075</b> | 75  | 75.0  | 63.0  | 1.5 | 750  | 5 | 2.83  | black |
| <b>19080110</b> | 110 | 110.0 | 94.0  | 1.8 | 900  | 5 | 5.35  |       |
| <b>19080120</b> | 120 | 120.0 | 99.0  | 1.9 | 900  | 5 | 6.85  |       |
| <b>19080125</b> | 125 | 125.0 | 107.0 | 2.0 | 1100 | 5 | 7.93  |       |
| <b>19080145</b> | 145 | 145.0 | 125.0 | 2.1 | 1100 | 5 | 9.55  |       |
| <b>19080160</b> | 160 | 160.0 | 137.0 | 2.1 | 1100 | 5 | 11.03 |       |
| <b>19080175</b> | 175 | 175.0 | 149.0 | 2.1 | 1100 | 5 | 13.80 |       |

Production-related dimensional tolerances for outside according to EN 61386-24

\* Radius in relation to the conduit axis

## Transparent Kabuflex® coupling



- Connection for all Kabuflex conduits
- Material: PP/PE
- Visual inspection of the insertion depth and the profile sealing ring
- Sandtight
- UV-resistant for up to 10 years
- Watertight up to 0.5 bar with profile sealing ring

| Cat. no.         | Type | Outside Ø [mm] | Inside Ø [mm] | Length [mm] | Packing unit [pcs.] | Packing unit weight [kg] | Colour           |
|------------------|------|----------------|---------------|-------------|---------------------|--------------------------|------------------|
| <b>19250040</b>  | 40   | 47.1           | 40.0          | 83          | 1                   | 0.02                     | trans-<br>parent |
| <b>19250050</b>  | 50   | 57.9           | 50.0          | 100         | 1                   | 0.03                     |                  |
| <b>19250063</b>  | 63   | 73.0           | 63.0          | 110         | 1                   | 0.04                     |                  |
| <b>19250075</b>  | 75   | 84.2           | 75.0          | 130         | 1                   | 0.05                     |                  |
| <b>19250090</b>  | 90   | 100.5          | 90.0          | 148         | 1                   | 0.10                     |                  |
| <b>19250110</b>  | 110  | 122.8          | 110.0         | 162         | 1                   | 0.11                     |                  |
| <b>19250125</b>  | 125  | 142.2          | 125.0         | 200         | 1                   | 0.20                     |                  |
| <b>19250160</b>  | 160  | 173.9          | 160.0         | 221         | 1                   | 0.34                     |                  |
| <b>19250200*</b> | 200  | 211.7          | 202.6         | 190         | 1                   | 0.43                     |                  |

\* With profile sealing ring only suited for Kabuflex R plus conduits.

## Kabuflex® coupling



- Connection for all Kabuflex conduits
- Sandtight
- Material: PE
- Watertight up to 0.5 bar with profile sealing ring

| Cat. no.   | Type | Outside Ø* [mm] | Inside Ø [mm] | Length [mm] | Packing unit [pcs.] | Packing unit weight [kg] | Colour |
|------------|------|-----------------|---------------|-------------|---------------------|--------------------------|--------|
| 19910040   | 40   | 47.1            | 40.0          | 83          | 1                   | 0.02                     | black  |
| 19910050   | 50   | 57.9            | 50.0          | 100         | 1                   | 0.02                     |        |
| 19910063   | 63   | 73.0            | 63.0          | 110         | 1                   | 0.04                     |        |
| 19910075   | 75   | 84.2            | 75.0          | 130         | 1                   | 0.06                     |        |
| 19910090   | 90   | 100.5           | 90.0          | 148         | 1                   | 0.14                     |        |
| 19910110   | 110  | 122.8           | 110.0         | 162         | 1                   | 0.18                     |        |
| 19910120   | 120  | 130.9           | 120.0         | 196         | 1                   | 0.19                     |        |
| 19910125   | 125  | 142.2           | 125.0         | 200         | 1                   | 0.20                     |        |
| 19910145   | 145  | 157.2           | 145.0         | 219         | 1                   | 0.27                     |        |
| 19910160   | 160  | 177.2           | 162.9         | 224         | 1                   | 0.32                     |        |
| 19910175   | 175  | 193.0           | 175.0         | 222         | 1                   | 0.30                     |        |
| 19911200*  | 200  | 211.7           | 202.6         | 190         | 1                   | 0.43                     |        |
| 19911201** | 200  | 216.0           | 203.0         | 190.0       | 1                   | 0.42                     |        |

\* Sandtight

\*\* Watertight WD for Kabuflex R, profile sealing rings required (to be ordered separately)

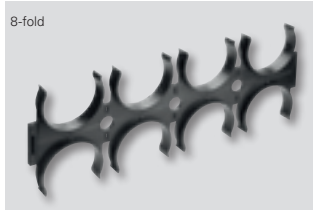
## Kabuflex® profile sealing ring



- Watertight connection of Kabuflex conduits
- In connection with Kabuflex couplings
- Material: EPDM
- Watertight up to 0.5 bar

| Cat. no. | Type | Outside Ø* [mm] | Inside Ø [mm] | Length [mm] | Packing unit [pcs.] | Packing unit weight [kg] | Colour |
|----------|------|-----------------|---------------|-------------|---------------------|--------------------------|--------|
| 19980040 | 40   | 43.0            | 30.3          | 4.2         | 1                   | 0.01                     | black  |
| 19980050 | 50   | 53.0            | 39.0          | 5.0         | 1                   | 0.01                     |        |
| 19980063 | 63   | 65.5            | 49.7          | 5.1         | 1                   | 0.01                     |        |
| 19980075 | 75   | 65.0            | 58.5          | 4.0         | 1                   | 0.01                     |        |
| 19980090 | 90   | 80.0            | 67.6          | 5.0         | 1                   | 0.01                     |        |
| 19980110 | 110  | 95.0            | 82.7          | 8.0         | 1                   | 0.02                     |        |
| 19980120 | 120  | 105.0           | 87.5          | 8.0         | 1                   | 0.02                     |        |
| 19980125 | 125  | 122.0           | 87.5          | 8.8         | 1                   | 0.02                     |        |
| 19980145 | 145  | 145.0           | 110.3         | 10.0        | 1                   | 0.04                     |        |
| 19980160 | 160  | 145.0           | 125.0         | 10.0        | 1                   | 0.05                     |        |
| 19980175 | 175  | 155.0           | 142.0         | 10.0        | 1                   | 0.04                     |        |
| 19980200 | 200  | 199.5           | 167.5         | 16.0        | 1                   | 0.06                     |        |

## Spacer



- For Kabuflex conduit packages
- Material: PP
- Exact spacing for professional sanding up prevents deformation
- Can be separated as required using standard tools

| Cat. no. | Type    | Length [mm] | Width [mm] | Height [mm] | Packing unit [pcs.] | Packing unit weight [kg] | Colour |
|----------|---------|-------------|------------|-------------|---------------------|--------------------------|--------|
| 2-fold   |         |             |            |             |                     |                          |        |
| 19942075 | 75      | 105         | 12         | 125         | 1                   | 0.02                     | black  |
| 19942090 | 90      | 125         | 14         | 148         | 1                   | 0.03                     |        |
| 19942110 | 110     | 146         | 30         | 208         | 1                   | 0.08                     |        |
| 19942120 | 120/125 | 154         | 33         | 220         | 1                   | 0.10                     |        |
| 19942160 | 160     | 225         | 33         | 313         | 1                   | 0.13                     |        |
| 19942200 | 200     | 290         | 30         | 350         | 1                   | 0.33                     |        |
| 4-fold   |         |             |            |             |                     |                          |        |
| 19944075 | 75      | 208         | 12         | 125         | 1                   | 0.04                     | black  |
| 19944090 | 90      | 247         | 14         | 148         | 1                   | 0.06                     |        |
| 19944110 | 110     | 286         | 30         | 208         | 1                   | 0.15                     |        |
| 19944120 | 120/125 | 313         | 33         | 220         | 1                   | 0.19                     |        |
| 19944160 | 160     | 445         | 33         | 313         | 1                   | 0.24                     |        |
| 19944200 | 200     | 560         | 30         | 350         | 1                   | 0.65                     |        |
| 6-fold   |         |             |            |             |                     |                          |        |
| 19946050 | 50      | 239         | 14         | 100         | 1                   | 0.05                     | black  |
| 19946075 | 75      | 305         | 12         | 125         | 1                   | 0.06                     |        |
| 19946090 | 90      | 360         | 14         | 148         | 1                   | 0.10                     |        |
| 19946110 | 110     | 426         | 30         | 208         | 1                   | 0.22                     |        |
| 19946120 | 120/125 | 468         | 33         | 220         | 1                   | 0.27                     |        |
| 19946160 | 160     | 665         | 33         | 313         | 1                   | 0.35                     |        |
| 19946200 | 200     | 850         | 30         | 350         | 1                   | 0.98                     |        |
| 8-fold   |         |             |            |             |                     |                          |        |
| 19948050 | 50      | 324         | 14         | 100         | 1                   | 0.06                     | black  |
| 19948075 | 75      | 408         | 12         | 125         | 1                   | 0.08                     |        |
| 19948090 | 90      | 482         | 14         | 148         | 1                   | 0.13                     |        |
| 19948110 | 110     | 572         | 30         | 208         | 1                   | 0.28                     |        |
| 19948120 | 120/125 | 622         | 33         | 220         | 1                   | 0.36                     |        |
| 19948160 | 160     | 885         | 33         | 313         | 1                   | 0.46                     |        |
| 19948200 | 200     | 1140        | 30         | 350         | 1                   | 1.30                     |        |

Spacer for Kabuflex S, every 1.5 m, for Kabuflex R and R plus at least every 1.0 m

Due to the production process, the spacers can only be joined together to a limited extent

## Kabuflex® SD end cap



■ Sandtight sealing

■ Material: PE

■ For all Kabuflex conduits

| Cat. no. | Type | Length [mm] | Width [mm] | Height [mm] | Packing unit [pcs.] | Packing unit weight [kg] | Colour                      |
|----------|------|-------------|------------|-------------|---------------------|--------------------------|-----------------------------|
| 19970040 | 40   | 38          | 38         | 16          | 1                   | 0.01                     | yellow;<br>trans-<br>parent |
| 19970050 | 50   | 46          | 46         | 16          | 1                   | 0.01                     |                             |
| 19970063 | 63   | 58          | 58         | 16          | 1                   | 0.01                     |                             |
| 19970075 | 75   | 68          | 68         | 14          | 1                   | 0.01                     |                             |
| 19970090 | 90   | 87          | 87         | 18          | 1                   | 0.02                     |                             |
| 19970110 | 110  | 106         | 106        | 19          | 1                   | 0.02                     |                             |
| 19970120 | 120  | 110         | 110        | 20          | 1                   | 0.02                     |                             |
| 19970125 | 125  | 125         | 125        | 20          | 1                   | 0.02                     |                             |
| 19970145 | 145  | 133         | 133        | 25          | 1                   | 0.04                     |                             |
| 19970160 | 160  | 145         | 145        | 25          | 1                   | 0.04                     |                             |
| 19970175 | 175  | 160         | 160        | 35          | 1                   | 0.04                     |                             |
| 19970200 | 200  | 200         | 200        | 56          | 1                   | 0.08                     |                             |

## Kabuflex® KDS SD



■ Sandtight cable feed-through plug

■ Material: PE

■ Can be opened for cables already installed

■ For Kabuflex plus conduits

■ Also suitable for feeding through of conduits

■ Foam insert provides additional protection against silting up

| Cat. no.  | Type | Length [mm] | Width [mm] | Height [mm] | Packing unit [pcs.] | Packing unit weight [kg] | Colour |
|-----------|------|-------------|------------|-------------|---------------------|--------------------------|--------|
| 19972063  | 63   | 125.5       | 82.3       | 57.0        | 10                  | 0.44                     | black  |
| 19972075  | 75   | 128.0       | 110.0      | 75.0        | 10                  | 0.68                     |        |
| 19972090  | 90   | 128.0       | 104.0      | 80.0        | 10                  | 1.08                     |        |
| 19972110  | 110  | 134.4       | 126.1      | 102.8       | 10                  | 1.50                     |        |
| 19972125* | 125  | 140.0       | 130.0      | 118.0       | 10                  | 1.62                     |        |
| 19972160  | 160  | 140.0       | 145.0      | 145.0       | 10                  | 2.78                     |        |

\* compatible with Langmatz plastic foundations

## Kabuflex® WD end cap



■ Watertight sealing incl. profile sealing ring

■ Material: ABS

■ Watertight up to 0.5 bar

■ For all Kabuflex conduits

| Cat. no.              | Type | Outside Ø [mm] | Inside Ø [mm] | Length [mm] | Packing unit [pcs.] | Packing unit weight [kg] | Colour |
|-----------------------|------|----------------|---------------|-------------|---------------------|--------------------------|--------|
| 19971090 <sup>a</sup> | 90   | 104.4          | 91.7          | 82.3        | 1                   | 0.09                     | black  |
| 19971110              | 110  | 127.2          | 112.0         | 102.0       | 1                   | 0.03                     |        |
| 19971120              | 120  | 132.2          | 120.0         | 108.0       | 1                   | 0.14                     |        |
| 19971125              | 125  | 140.2          | 127.9         | 109.0       | 1                   | 0.14                     |        |
| 19971160              | 160  | 175.4          | 162.9         | 122.0       | 1                   | 0.20                     |        |
| 19971175              | 175  | 203.0          | 175.9         | 93.0        | 1                   | 0.27                     |        |

a = available on request

## Reducer



- Kabuflex/KG conduit adapter
- Watertight up to 0.5 bar with profile sealing ring
- Material: PVC
- For all Kabuflex conduits

| Cat. no.          | Type | Outside Ø<br>KG-side [mm] | Inside Ø<br>Kabu-side [mm] | Length<br>[mm] | Packing unit<br>[pcs.] | Packing unit<br>weight [kg] | Colour |
|-------------------|------|---------------------------|----------------------------|----------------|------------------------|-----------------------------|--------|
| <b>19995110*</b>  | 110  | 110                       | 110                        | 300            | 1                      | 0.47                        | black  |
| <b>19995160**</b> | 160  | 160                       | 160                        | 350            | 1                      | 1.25                        |        |

\* For KG conduit 100 (push-fit KG coupling)

\*\* For KG conduit 150 (push-fit KG coupling)

## Kabu®-IN



- Cable sealings for Kabuflex R plus
- Internal conduit sealing
- Two-piece
- Gas-tight and water pressure-tight up to 0.5 bar with Kabuflex R plus, up to 0.3 bar with Kabuflex R
- Material: PUR/EPDM – V2A compressive flanges
- Visual inspection of the tightening torque
- Segmented cable sealing insert
- Radon-tight



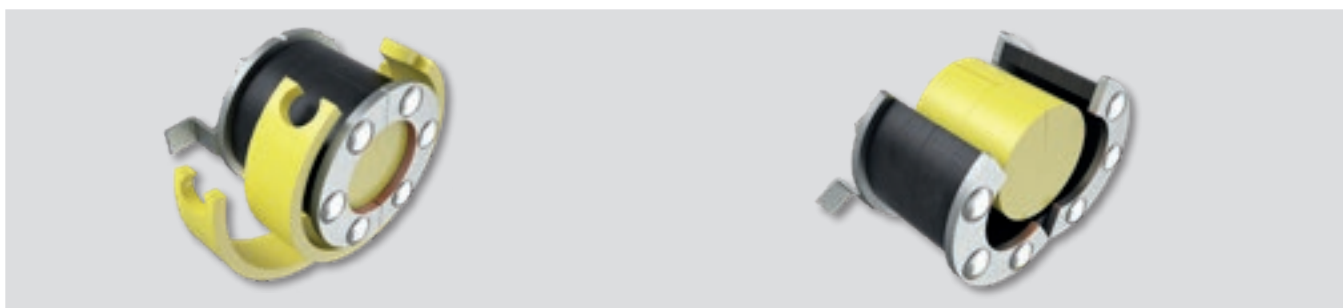
| Cat. no.        | Type | Outside Ø<br>[mm] | Cable Ø<br>[mm] | Height<br>[mm] | Sealing<br>width [mm] | Packing unit<br>[pcs.] | Packing unit<br>weight [kg] | Colour |
|-----------------|------|-------------------|-----------------|----------------|-----------------------|------------------------|-----------------------------|--------|
| <b>1 cable</b>  |      |                   |                 |                |                       |                        |                             |        |
| <b>19951063</b> | 63   | 50                | 7-18            | 64             | 30                    | 1                      | 0.21                        | yellow |
| <b>19951075</b> | 75   | 61                | 7-24            | 64             | 30                    | 1                      | 0.29                        |        |
| <b>19951090</b> | 90   | 74                | 7-36            | 64             | 30                    | 1                      | 0.40                        |        |
| <b>19951110</b> | 110  | 92                | 7-48            | 64             | 30                    | 1                      | 0.60                        |        |

|                 |     |    |              |    |    |   |      |        |
|-----------------|-----|----|--------------|----|----|---|------|--------|
| <b>2 cables</b> |     |    |              |    |    |   |      |        |
| <b>19952110</b> | 110 | 92 | 7-18<br>7-36 | 64 | 30 | 1 | 0.66 | yellow |

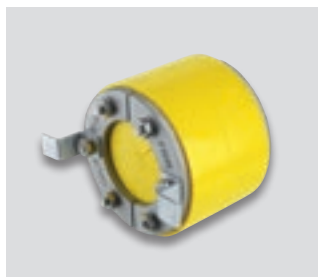
|                 |     |     |          |    |    |   |      |        |
|-----------------|-----|-----|----------|----|----|---|------|--------|
| <b>3 cables</b> |     |     |          |    |    |   |      |        |
| <b>19953160</b> | 160 | 135 | 3 x 7-42 | 64 | 30 | 1 | 1.36 | yellow |

|                 |     |     |          |    |    |   |      |        |
|-----------------|-----|-----|----------|----|----|---|------|--------|
| <b>4 cables</b> |     |     |          |    |    |   |      |        |
| <b>19954110</b> | 110 | 92  | 4 x 7-18 | 64 | 30 | 1 | 0.70 | yellow |
| <b>19954160</b> | 160 | 135 | 4 x 7-36 | 64 | 30 | 1 | 1.36 |        |

|                 |     |     |          |    |    |   |      |        |
|-----------------|-----|-----|----------|----|----|---|------|--------|
| <b>6 cables</b> |     |     |          |    |    |   |      |        |
| <b>19956160</b> | 160 | 135 | 6 x 7-30 | 64 | 30 | 1 | 1.36 | yellow |



## Kabu®-IN DD



- Cable sealings for Kabuflex R plus
- Internal conduit sealing
- Two-piece
- Gas-tight and water pressure tight up to 1.5 bar with Kabuflex R plus 750 co2ntrol
- Material: PUR/EPDM – V2A compressive flanges
- Visual inspection of the tightening torque
- Segmented cable sealing insert
- Radon-tight



| Cat. no. | Type | Outside Ø [mm] | Cable Ø [mm] | Height [mm] | Sealing width [mm] | Packing unit [pcs.] | Packing unit weight [kg] | Colour |
|----------|------|----------------|--------------|-------------|--------------------|---------------------|--------------------------|--------|
| 1 cable  |      |                |              |             |                    |                     |                          |        |
| 19961075 | 75   | 61             | 7-24         | 94          | 60                 | 1                   | 0.40                     | yellow |
| 19961090 | 90   | 74             | 7-36         | 94          | 60                 | 1                   | 0.56                     |        |
| 19961110 | 110  | 92             | 7-48         | 94          | 60                 | 1                   | 0.84                     |        |
| 4 cables |      |                |              |             |                    |                     |                          |        |
| 19964110 | 110  | 92             | 4 x 7-18     | 94          | 60                 | 1                   | 0.98                     | yellow |

## Kabu®-BV



- End plug for Kabuflex R plus
- Gas-tight and water pressure-tight up to 0.5 bar with Kabuflex R plus, up to 0.3 bar with Kabuflex R
- Installation without tools
- Material: PUR/EPDM – V2A compressive flanges
- Visual inspection of the tightening torque
- Radon-tight



| Cat. no. | Type | Outside Ø [mm] | Height [mm] | Sealing width [mm] | Packing unit [pcs.] | Packing unit weight [kg] | Colour |
|----------|------|----------------|-------------|--------------------|---------------------|--------------------------|--------|
| 19950063 | 63   | 50             | 64          | 30                 | 1                   | 0.18                     | yellow |
| 19950075 | 75   | 61             | 64          | 30                 | 1                   | 0.26                     |        |
| 19950090 | 90   | 74             | 74          | 30                 | 1                   | 0.52                     |        |
| 19950110 | 110  | 92             | 74          | 30                 | 1                   | 0.58                     |        |
| 19950160 | 160  | 135            | 81          | 30                 | 1                   | 1.23                     |        |

## Kabu®-Seal



- Conduit sealings for Kabuflex R plus
- For core drill holes and casings
- Gas-tight and water pressure-tight up to 1.5 bar
- Material: EPDM/PUR - V2A compressive flange
- Visual inspection of the tightening torque
- Radon-tight



| Cat. no. | Type | Outside Ø [mm] | Inside Ø [mm] | Core drill hole [mm] | Height [mm] | Sealing width [mm] | Packing unit [pcs.] | Packing unit weight [kg] | Colour |
|----------|------|----------------|---------------|----------------------|-------------|--------------------|---------------------|--------------------------|--------|
| 19965063 | 63   | 98             | 64            | 100                  | 60          | 40                 | 1                   | 0.57                     | yellow |
| 19965075 | 75   | 123            | 76            | 125                  | 60          | 40                 | 1                   | 0.95                     |        |
| 19965090 | 90   | 123            | 92            | 125                  | 60          | 40                 | 1                   | 0.64                     |        |
| 19965110 | 110  | 148            | 111           | 150                  | 60          | 40                 | 1                   | 0.94                     |        |
| 19965125 | 125  | 198            | 127           | 200                  | 80          | 60                 | 1                   | 2.60                     |        |
| 19965160 | 160  | 198            | 162           | 200                  | 80          | 60                 | 1                   | 1.52                     |        |
| 19965200 | 200  | 298            | 202           | 300                  | 80          | 60                 | 1                   | 5.76                     |        |

## Wall collar set



- Conduit sealings for Kabuflex R plus
- For embedding in concrete
- Gas-tight and water pressure-tight up to 3 bar
- Material: EPDM
- Incl. tightening strap and tightening locks
- Radon-tight

| Cat. no. | Type      | Outside Ø [mm] | Inside Ø from to [mm] | Core drill hole [mm] | Height [mm] | Packing unit [pcs.] | Packing unit weight [kg] | Colour |
|----------|-----------|----------------|-----------------------|----------------------|-------------|---------------------|--------------------------|--------|
| 19960040 | 40        | 136            | 38-42                 | ~250                 | 60          | 1                   | 0.27                     | black  |
| 19960050 | 50        | 150            | 48-53                 | ~250                 | 60          | 1                   | 0.31                     |        |
| 19960063 | 63        | 160            | 60-64                 | ~250                 | 60          | 1                   | 0.36                     |        |
| 19960075 | 75        | 170            | 71-80                 | ~250                 | 60          | 1                   | 0.41                     |        |
| 19960090 | 90        | 182            | 84-92                 | ~300                 | 60          | 1                   | 0.44                     |        |
| 19960110 | 110       | 205            | 108-116               | ~300                 | 60          | 1                   | 0.47                     |        |
| 19960120 | 120 / 125 | 217            | 120-130               | ~300                 | 60          | 1                   | 0.52                     |        |
| 19960160 | 160       | 255            | 154-166               | ~350                 | 60          | 1                   | 0.71                     |        |
| 19960175 | 175       | 272            | 175-190               | ~350                 | 60          | 1                   | 0.78                     |        |

## FRH round cable protectors



- To protect all types of underground cables
- Safe recognition thanks to red signal colour
- Suspension for connection
- Material: PVC
- Temperature range -5 °C to +60 °C
- Can be joined together as required

| Cat. no. | Type | Length [mm] | Width [mm] | Height [mm] | Packing unit [m] | Packing unit weight [kg] | Pallet content [m] | Colour |
|----------|------|-------------|------------|-------------|------------------|--------------------------|--------------------|--------|
| 18040040 | 40   | 1,000       | 44         | 42          | 1                | 0.25                     | 1500               | red    |
| 18040050 | 50   | 1,000       | 54         | 52          | 1                | 0.26                     | 1500               |        |
| 18040060 | 60   | 1,000       | 62         | 70          | 1                | 0.30                     | 1500               |        |
| 18040080 | 80   | 1,000       | 82         | 70          | 1                | 0.43                     | 1,000              |        |
| 18040100 | 100  | 1,000       | 102        | 70          | 1                | 0.50                     | 1,000              |        |

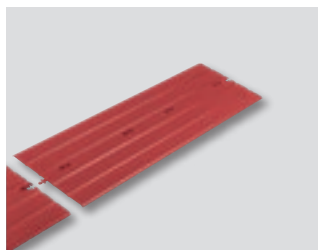
## FHA cable protectors



- To protect all types of underground cables
- Safe recognition thanks to red signal colour
- Suspension for connection
- Material: PVC
- Temperature range -5 °C to +60 °C
- Can be joined together as required

| Cat. no. | Type | Length [mm] | Width [mm] | Height [mm] | Packing unit [m] | Packing unit weight [kg] | Pallet content [m] | Colour |
|----------|------|-------------|------------|-------------|------------------|--------------------------|--------------------|--------|
| 18140110 | 110  | 1,000       | 112        | 25          | 1                | 0.30                     | 1500               | red    |
| 18140120 | 120  | 1,000       | 122        | 25          | 1                | 0.32                     | 1500               |        |
| 18140160 | 160  | 1,000       | 162        | 25          | 1                | 0.40                     | 1500               |        |
| 18140180 | 180  | 1,000       | 182        | 25          | 1                | 0.48                     | 1,000              |        |
| 18140200 | 200  | 1,000       | 202        | 25          | 1                | 0.56                     | 1,000              |        |

## FPL cable cover plates



- To protect all types of underground cables
- Safe recognition thanks to red signal colour
- Suspension for connection
- Material: PVC
- Temperature range -5 °C to +60 °C
- Can be joined together as required

| Cat. no. | Type | Length [mm] | Width [mm] | Height [mm] | Packing unit [m] | Packing unit weight [kg] | Pallet content [m] | Colour |
|----------|------|-------------|------------|-------------|------------------|--------------------------|--------------------|--------|
| 18240120 | 120  | 1,000       | 126        | 7           | 1                | 0.32                     | 1500               | red    |
| 18240180 | 180  | 1,000       | 186        | 7           | 1                | 0.32                     | 1500               |        |
| 18240200 | 200  | 1,000       | 204        | 7           | 1                | 0.48                     | 1500               |        |
| 18240250 | 250  | 1,000       | 254        | 7           | 1                | 0.65                     | 1,000              |        |
| 18240300 | 300  | 1,000       | 304        | 7           | 1                | 0.78                     | 750                |        |

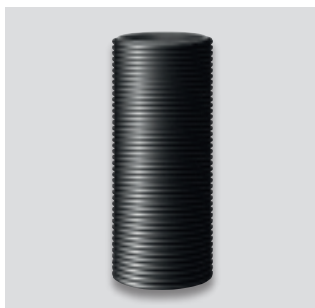
## FTWB warning tape



- Warning tape for early detection during earthworks
- Warns of underground cables and conduits
- Material: PE
- Inscription: "Achtung Starkstromkabel" (Caution: High-voltage cable)

| Cat. no. | Spool content [m] | Tape width [mm] | Thickness [mm] | Packing unit [pcs.] | Packing unit weight [kg] | Colour |
|----------|-------------------|-----------------|----------------|---------------------|--------------------------|--------|
| 18410000 | 250               | 40              | 0.15           | 1                   | 1.7                      | yellow |

## Furowell



- Underground installation
- For all types of poles, masts and rods
- Preparation for charging poles and stands
- Structured-wall design for high stability
- Material: PE (DN 500 made of PP)
- Easy lateral drilling of connection openings using commercially available hole saws

| Cat. no.  | Technical specifications | Outside Ø [mm] | Inside Ø [mm] | Length [mm] | Packing unit [pcs.] | Packing unit weight [kg] | Pallet content [pcs.] | Colour |
|-----------|--------------------------|----------------|---------------|-------------|---------------------|--------------------------|-----------------------|--------|
| 29510250  | DN 250                   | 293            | 253           | 0.8         | 1                   | 2.60                     | 22                    | black  |
| 29510350  | DN 350                   | 400            | 345           | 0.8         | 1                   | 5.20                     | 12                    |        |
| 29511250  | DN 250                   | 293            | 253           | 1.0         | 1                   | 3.25                     | 22                    | black  |
| 29511300  | DN 300                   | 346            | 300           | 1.0         | 1                   | 4.10                     | 12                    |        |
| 29511350  | DN 350                   | 400            | 345           | 1.0         | 1                   | 6.50                     | 12                    |        |
| 29510500* | DN 500                   | 571            | 497           | 1.0         | 1                   | 13.00                    | 2                     |        |
| 29512250  | DN 250                   | 293            | 253           | 1.5         | 1                   | 4.88                     | 11                    | black  |
| 29512350  | DN 350                   | 400            | 345           | 1.5         | 1                   | 9.75                     | 6                     |        |

\* with yellow inside and incl. screwed transparent cover as protection against dirt during the construction phase

## Furowell end cap



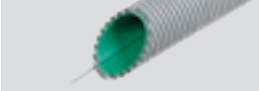
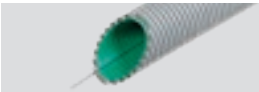
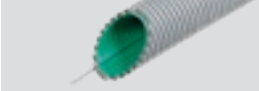
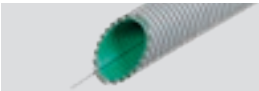
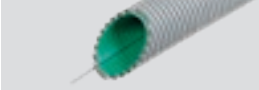
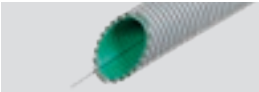
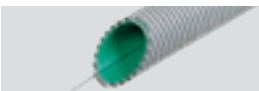
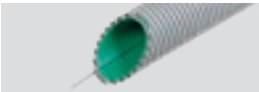
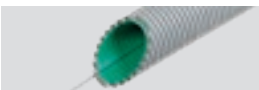
- Sandtight sealing
- Material: PE
- For all Furowell conduits

| Cat. no. | Technical specifications | Length [mm] | Width [mm] | Height [mm] | Packing unit [pcs.] | Packing unit weight [kg] | Colour |
|----------|--------------------------|-------------|------------|-------------|---------------------|--------------------------|--------|
| 29570250 | DN 250                   | 270         | 270        | 25          | 1                   | 0.09                     | yellow |
| 29570300 | DN 300                   | 346         | 346        | 66          | 1                   | 0.53                     | black  |
| 29570350 | DN 350                   | 400         | 400        | 80          | 1                   | 0.38                     |        |

## Kabuflex R plus 750 co2ntrol®



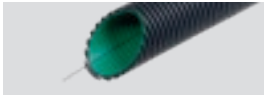
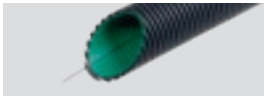
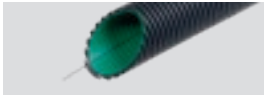
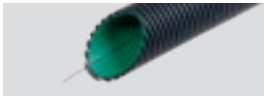
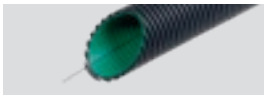
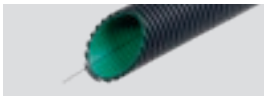
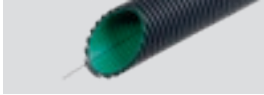
Classification N750  
DIN EN 61386-24

|                  |                                               |                                                                                                                                                                                                                                                                    |                              |                               |                               |
|------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------------------|-------------------------------|
| <b>1.5 bar</b>   | Wall lead-through according to VDE-AR-N 4100  |  +  +        | Kabuflex R plus 750 co2ntrol | Kabu-Seal                     | Kabu-IN DD                    |
| <b>1.5 bar</b>   | Floor feed-through according to VDE-AR-N 4100 |  +  +        | Kabuflex R plus 750 co2ntrol | Wall collar set               | Kabu-IN DD                    |
| <b>0.5 bar</b>   | Wall lead-through                             |  +  +     | Kabuflex R plus 750 co2ntrol | Kabu-Seal                     | Kabu-IN                       |
| <b>0.5 bar</b>   | Floor lead-through                            |  +  +  | Kabuflex R plus 750 co2ntrol | Wall collar set               | Kabu-IN                       |
| <b>0.5 bar</b>   | End plug                                      |  +                                                                                          | Kabuflex R plus 750 co2ntrol | Kabu-BV                       |                               |
| <b>0.5 bar</b>   | Sealing end cap                               |  +                                                                                          | Kabuflex R plus 750 co2ntrol | Kabuflex WD end cap           |                               |
| <b>0.5 bar</b>   | Coupling connection                           |  +  +  | Kabuflex R plus 750 co2ntrol | Transparent Kabuflex coupling | Kabuflex profile sealing ring |
| <b>sandtight</b> | Coupling connection                           |  +                                                                                          | Kabuflex R plus 750 co2ntrol | Transparent Kabuflex coupling |                               |
| <b>sandtight</b> | Cable plug                                    |  +                                                                                          | Kabuflex R plus 750 co2ntrol | Kabuflex KDS SD               |                               |

## Kabuflex R plus 450 co2ntrol®



Classification N450  
DIN EN 61386-24

|                  |                     |                                                                                                                        |   |                                                                                                                       |   |                                                                                                                        |
|------------------|---------------------|------------------------------------------------------------------------------------------------------------------------|---|-----------------------------------------------------------------------------------------------------------------------|---|------------------------------------------------------------------------------------------------------------------------|
| <b>0.5 bar</b>   | Wall lead-through   | <br>Kabuflex R plus 450<br>co2ntrol   | + | <br>Kabu-Seal                       | + | <br>Kabu-IN DD                      |
| <b>0.5 bar</b>   | Wall lead-through   | <br>Kabuflex R plus 450<br>co2ntrol   | + | <br>Kabu-Seal                       | + | <br>Kabu-IN                         |
| <b>0.5 bar</b>   | End plug            | <br>Kabuflex R plus 450<br>co2ntrol  | + | <br>Kabu-BV                        |   |                                                                                                                        |
| <b>0.5 bar</b>   | Sealing end cap     | <br>Kabuflex R plus 450<br>co2ntrol | + | <br>Kabuflex® WD end cap          |   |                                                                                                                        |
| <b>0.5 bar</b>   | Coupling connection | <br>Kabuflex R plus 450<br>co2ntrol | + | <br>Transparent Kabuflex coupling | + | <br>Kabuflex profile sealing ring |
| <b>sandtight</b> | Coupling connection | <br>Kabuflex R plus 450<br>co2ntrol | + | <br>Transparent Kabuflex coupling |   |                                                                                                                        |
| <b>sandtight</b> | Cable plug          | <br>Kabuflex R plus 450<br>co2ntrol | + | <br>Kabuflex KDS SD               |   |                                                                                                                        |

## Individual components

|                          |                                                                                                        |                          |                                                                                                   |                                                                                                   |                          |                                                                                                  |
|--------------------------|--------------------------------------------------------------------------------------------------------|--------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------------|--------------------------------------------------------------------------------------------------|
| <b>Up to<br/>3.0 bar</b> | <br>Wall collar set | <b>Up to<br/>1.5 bar</b> | <br>Kabu-IN DD | <br>Kabu-Seal | <b>Up to<br/>0.5 bar</b> | <br>Kabu-IN |
|--------------------------|--------------------------------------------------------------------------------------------------------|--------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------------|--------------------------------------------------------------------------------------------------|

### Note

0.3 bar tightness for Kabuflex S and R with Kabu-IN DD, Kabu-IN and Kabu-BV.

## Overview of standards

| Regulation                              | Title                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DIN 1610                                | Construction and testing of drains and sewers                                                                                                                                                                                                                                                                                            |
| DWA-A 139<br>(replaces ATV-DVWK-A 139)  | Worksheet Construction and testing of drains and sewers                                                                                                                                                                                                                                                                                  |
| ZTV A-StB 12<br>(replaces ZTV A-StB 97) | Supplementary technical terms and conditions of contract and guidelines for earthworks in traffic areas<br>( <i>Zusätzliche Technische Vertragsbedingungen und Richtlinien für Aufgrabungen in Verkehrsflächen</i> )                                                                                                                     |
| A 535a/b                                | Installation instructions for conduits and fittings made of high-density polyethylene (PE-HD) for underground cable conduits/telecommunication and microduct mono ( <i>Einbauanleitung für Rohre und Formstücke aus Polyethylen hoher Dichte (PE-HD) für erdverlegte Kabelschutzrohrleitungen/Telekommunikation und Microduct Mono</i> ) |
| A 515                                   | Conduits and fittings made of unplasticized polyvinyl chloride (PVC-U) for cable protection<br>( <i>Rohre und Formstücke aus weichmacherfreiem Polyvinylchlorid (PVC-U) für den Kabelschutz</i> )                                                                                                                                        |
| DIN 18300                               | German construction contract procedures (VOB) – Part C: General technical specifications in construction contracts (ATV) – Earthworks                                                                                                                                                                                                    |
| DIN 18303                               | VOB – Part C: ATV – Timbering to trenchwork                                                                                                                                                                                                                                                                                              |
| DIN 4124                                | Excavations and trenches – Slopes, planking and strutting breadths of working spaces                                                                                                                                                                                                                                                     |
| DIN EN 61386-1                          | Conduit systems for cable management – Part 1: General requirements                                                                                                                                                                                                                                                                      |
| DIN EN 61386-24                         | Conduit systems for cable management – Part 24: Particular requirements – Conduit systems buried underground                                                                                                                                                                                                                             |
| DIN VDE 0100-520                        | Low-voltage electrical installations – Part 5-52: Selection and erection of electrical equipment – Wiring systems                                                                                                                                                                                                                        |
| VDE-AR-N 4100                           | Technical Connection Rules for Low-Voltage (TAR low voltage)                                                                                                                                                                                                                                                                             |
| DIN 18012                               | Service connections for buildings – General planning criteria                                                                                                                                                                                                                                                                            |
| VDE-AR-N 4222                           | Requirements for the underground laying of cables and protective tubes for electrical power supply, communications engineering and street lighting                                                                                                                                                                                       |
| VDE-AR-N 4223                           | Building penetrations and their sealings for underground cables ( <i>Bauwerksdurchdringungen und deren Abdichtungen für erdverlegte Leitungen</i> )                                                                                                                                                                                      |
| DIN 18322                               | German construction contract procedures (VOB) – Part C: General technical specifications in construction contracts (ATV) – Underground cable laying work                                                                                                                                                                                 |
| DAfStb directive                        | Watertight concrete structures (WU directive) of the DAfStb, German Committee for Reinforced Concrete<br>( <i>Wasserundurchlässige Bauwerke aus Beton (WU-Richtlinie) des DAfStb, Deutscher Ausschuss für Stahlbeton</i> )<br>Wear class 1: permanently or temporarily pressing water<br>Wear class 2: soil moisture                     |
| DIN 18533                               | Waterproofing of elements in contact with soil<br>W1-E: Soil moisture and non-pressing water                                                                                                                                                                                                                                             |

## Material data

| Characteristics               | PE                           | Unit               |                 |
|-------------------------------|------------------------------|--------------------|-----------------|
| Density                       | approx. 0.95                 | g/cm <sup>3</sup>  | DIN 53 479      |
| Tear resistance               | 23–30                        | N/mm <sup>2</sup>  | DIN 53 455      |
| Elongation at break           | 300–1000                     | %                  | DIN 53 455      |
| Ball indentation hardness     | 30–65                        | N/mm <sup>2</sup>  | DIN 53 456      |
| Notch impact strength         | > 5                          | mJ/mm <sup>2</sup> | DIN 53 453      |
| Crystalline melting point     | 125–140                      | °C                 | Pol. microscope |
| Thermal conductivity          | 0.40–0.46                    | W/m · K            | DIN 52 612      |
| Lin. thermal expansion coeff. | 1.5 – 2.0 · 10 <sup>-4</sup> | K <sup>-1</sup>    | DIN 52 328      |
| Disruptive strength           | 800–900                      | kV/cm              | DIN 53 481      |
| Specific flow resistance      | approx. 10 <sup>16</sup>     | Ohm · cm           | DIN 53 482      |

# Contact

## Technical consulting

Hotline for user questions  
tfb.elektro@fraenkische.de

+49 9525 88-8123

Fax  
PC fax

+49 9525 88-2151  
+49 9525 88-92-...

## Export Sales



### Tamara Schneider

Phone +49 (0) 9525 88-2416  
tamara.schneider@fraenkische.de



### Lena Hümmer

Phone + 49 (0) 9525 88-2417  
lena.huemmer@fraenkische.de



### Sylvia McLain

Phone + 49 (0) 9525 88-2234  
sylvia.mclain@fraenkische.de

Fax  
PC fax

+49 (0) 9525 88-8179  
+49 (0) 9525 88-92-...

## Austria

### Euro Unitech

#### Rainer Breineßl

Floridsdorfer Hauptstraße 1  
Floridotower, 4th floor  
1210 Vienna

Austria

Phone +43 (0)1 662 72 50 -13

Fax +43 (0)1 616 75 0

r.breinessl@eurounitech.at

www.eurounitech.at

## Netherlands

### Wessel Westrik

Mobile +31 (0) 615 002 238  
wessel.westrik@fraenkische.de

## Czech Republic / Slovakia

### Pavel Heřmanský

Mobile +420 (0) 602 43 55 97

Fax +420 (0) 325 65 50 31

pavel.hermansky@fraenkische-  
elektro-cz.com

www.fraenkische-elektro.cz

### Radek Štourač

Mobile +420 (0) 777 713 640

Fax +420 (0) 568 421 641

radek.stourac@fraenkische-  
elektro-cz.com

www.fraenkische-elektro.cz

### Tomáš Habán

Mobile +420 (0) 605 94 32 37

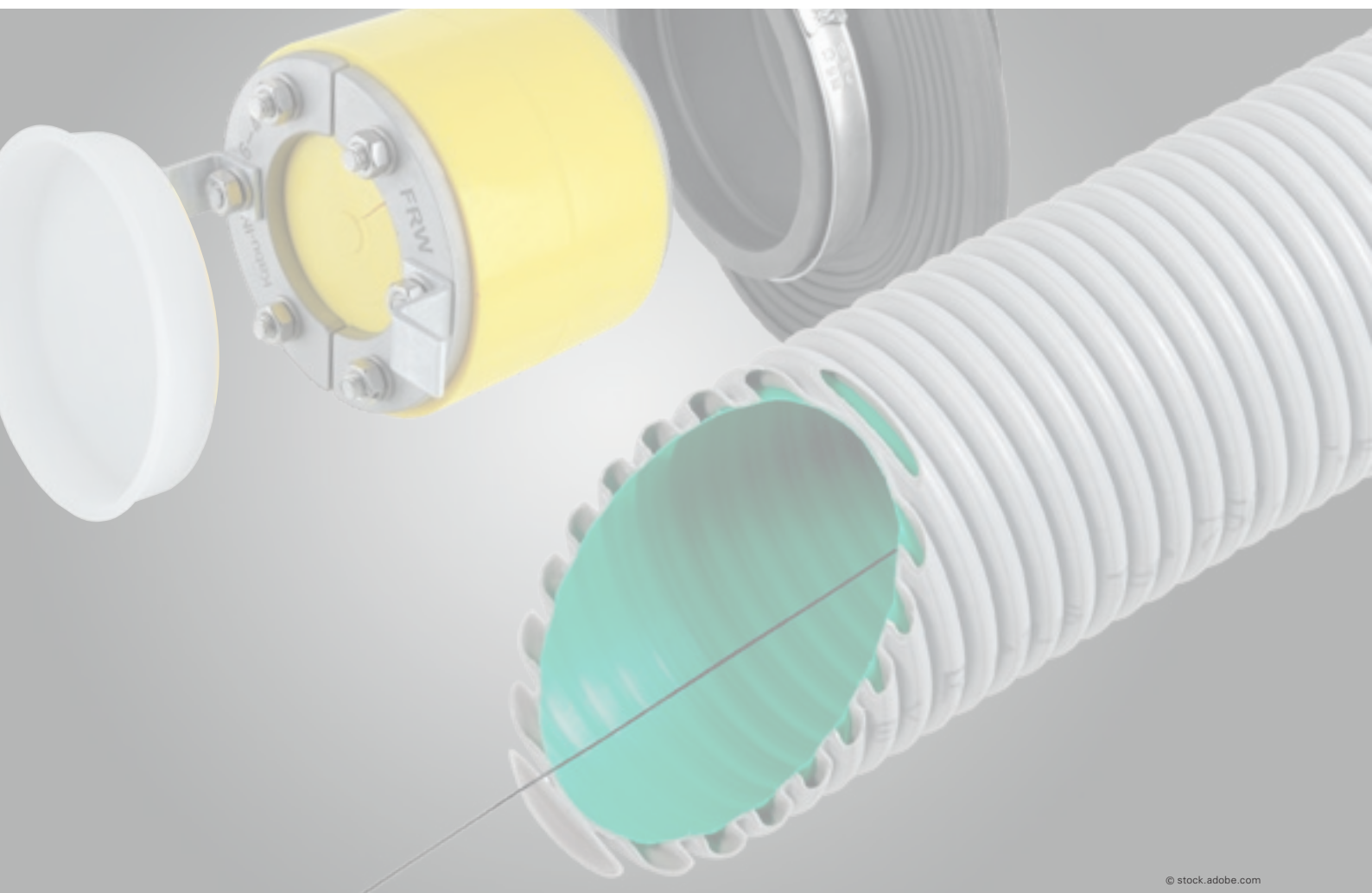
tomas.haban@fraenkische.de

www.fraenkische-elektro.cz

## Notes

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# FRÄNKISCHE

FRÄNKISCHE Rohrwerke Gebr. Kirchner GmbH & Co. KG | Hellinger Str. 1 | 97486 Königsberg/Germany  
Phone +49 9525 88-0 | Fax +49 9525 88-2413 | [marketing@fraenkische.de](mailto:marketing@fraenkische.de) | [www.fraenkische.com](http://www.fraenkische.com)

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