

# Mounting instructions

isCon® lightning protection system

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**isCon® lightning protection system**

*Mounting instructions*

isCon® is a registered brand of OBO Bettermann Holding GmbH & Co. KG

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# 1 About these instructions

## 1.1 Target group



These mounting instructions are intended for specialists who are qualified to erect lightning protection systems, e.g. lightning protection specialists. These specialists must know the lightning protection standards applicable at the mounting location, as well as the generally recognised rules of technology.

## 1.2 Relevance of these instructions

These instructions are based on the standards valid at the time of compilation (December 2024).

Please read the instructions carefully before starting mounting. We will not accept any warranty claims for damage caused through non-observance of these instructions.

Any images are intended merely as examples. Mounting results may look different.

All the documents supplied with the product must be stored in an easily accessible location, so as to be available when information is required.

To find out more about planning and mounting the product, we recommend a comprehensive training course.

## 1.3 Types of warning information



**WARNING**

### Type of risk!

Shows a risky situation. If the warning information is not observed, then serious or fatal injuries may occur.



**CAUTION**

### Type of risk!

Shows a risky situation. If the warning information is not observed, then medium or minor injuries may occur.

**ATTENTION**

### Type of risk!

Shows a risky situation. If the warning information is not observed, then damage to the product or the surroundings may occur.

### Note!

*Indicates important information or assistance.*

## 1.4 Basic standards and regulations

- IEC/EN 62305-1 ED 3  
Protection against lightning Part 1: General principles
- IEC/EN 62305-2 ED 3  
Protection against lightning Part 2: Risk management

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- IEC/EN 62305-3 ED 3  
Protection against lightning – Part 3: Protection of structural facilities and persons
- IEC/EN 62305-4 ED 3  
Protection against lightning – Part 4: Electrical and electronic systems within structures.
- IEC/EN 62561-1 ED 3  
Lightning protection system components – Part 1: Requirements for connection components
- IEC/EN 62561-2 ED 3  
Lightning protection system components – Part 2: Requirements for conductors and earth electrodes
- IEC/EN 62561-4 ED 3  
Lightning protection system components – Part 4: Requirements for conductor fasteners
- DIN 18014-2023, Earthing systems for buildings
- IEC TS 62561-8:1-2018, Lightning Protection System Components (LPSC) – Part 8: Requirements for components for isolated LPS
- DIN 18531-1, Waterproofing of roofs, balconies and walkways – Part 1: Non-utilised and utilised roofs – Requirements and principles for execution and design
- IEC 60332-1-2, Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable

## 1.5 Applicable documents

- For declarations of conformity, see [www.obo-bettermann.com](http://www.obo-bettermann.com)

## 2 Intended use

The OBO isCon® system is a lightning protection system for the external lightning protection of buildings and systems, which, in the case of direct lightning strikes, can arrest the lightning surge currents into the earth, thus protecting the building, the system and people against the impacts of the lightning strike, e.g. fires, mechanical building damage and lethal impulse voltage/currents.

The cables and connection elements of the isCon® system are suitable for indoor and outdoor areas. The lightning protection system is not designed for extreme weather conditions, such as continuous hail, snow or sandstorms. Such weather conditions can seriously reduce the lifespan of the isCon® system.

The connections of the isCon® system are not suitable for static mechanical loads.

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The system is not designed for any purpose other than the one described here.

If the system is installed and used for another purpose, any liability, warranty or damage claims shall be rendered null and void.

If you require information on the use of the OBO isCon® system for something other than the conditions of use described here, please speak to your OBO contact.

## 3 Safety

### 3.1 General safety information

Observe the following general safety information:

- The work may only be carried out by lightning protection specialists who have been trained for the installation of standard-conformant lightning protection systems.
- If there is a lightning strike, lethal currents can flow through the lightning protection system. Never work on the elements of the lightning protection system during a thunderstorm or if there is a risk of one.
- Lethal voltages can occur during the handling of electrical resources. Never work on parts through which power is flowing. Wear suitable protective clothing and comply with all the required safety guidelines.
- To install the OBO isCon® system, use only components of the OBO product range, as otherwise there is no guarantee that safe installation is possible.
- The production method means that metallic objects may have areas with sharp edges. Wear suitable protective gloves to avoid cutting injuries.
- When erecting systems for maintaining electrical functionality, take the necessary fire protection regulations into account. These instructions do not mention any fire protection standards which are to be complied with.
- The OBO fire protection guide (article number: 9134859) provides more information on this. The conductor system and any possible fire insulation must be matched.
- Take into account the risk of flooding, local fire prevention measures, accident prevention regulations and rescue routes at the location.

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### 3.2 Personal protective equipment

List of personal protective equipment to be used:



Use hand protection



Wear safety shoes

## 4 Necessary tools

List of required tools:

- isCon stripper 2
- Cable knife
- Spanner

## 5 System description

### 5.1 Basic principles

Without any additional countermeasures, the high voltage pulses will cause arcing on insulation surfaces. This effect is termed a creep flash-over. When the so-called creep discharge inception voltage has been exceeded, surface discharge is initiated, which can bridge a gap of several metres. To avoid dangerous arcing between conductive parts (electrical systems, pipelines, etc.), the maintenance of the separation distance is a key requirement when planning and implementing a lightning protection system.

These days, the roof level of building complexes is used as an installation area for air-conditioning, ventilation, transmission and energy collection systems, meaning that the structural features may be in the way of the required spacing between the air-termination systems and the electrical installations.

The isCon® insulated lightning protection system is used to maintain the required separation distance. Depending on the design, after the first potential connection behind the connection element on the air-termination rod, the isCon® conductor reflects an equivalent separation distance of up to 0.45–0.9 metres in the air or double that in solid matter. This means that installation is possible directly on metallic and electrical structures. If there is a direct lightning strike, the incoming energy is arrested through the isCon® conductor to the building's earthing system. There is no direct arcing between the conductor and the building to be protected.

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The isCon® lightning protection system is a high-voltage-resistant, insulated conductor according to IEC/EN 62305-3. The isCon® system is tested according to IEC TS 62561-8 and has an arresting capacity of 150–200 kA lightning surge current (10/350 µs), depending on the conductor used. It consists primarily of the following components:

- isCon® conductor
- Insulated air-termination rods
- isCon® connection elements
- System accessories for fastening (tripod stand, support and holder)
- System accessories for connection

## 5.2 isCon® conductor

According to IEC/EN 62305-3, the insulated isCon® conductor implements a separation distance of 0.45–0.9 metres in the air and 0.9–1.8 metres in the case of solid materials, depending on the product design. The isCon® conductor is equipped with an external semi-conductive jacket, allowing it to limit high lightning voltage pulses against a reference potential by creating a connection between the external semi-conductive jacket and the building's equipotential bonding, which is not energised with lightning current, in the area of the connection element.

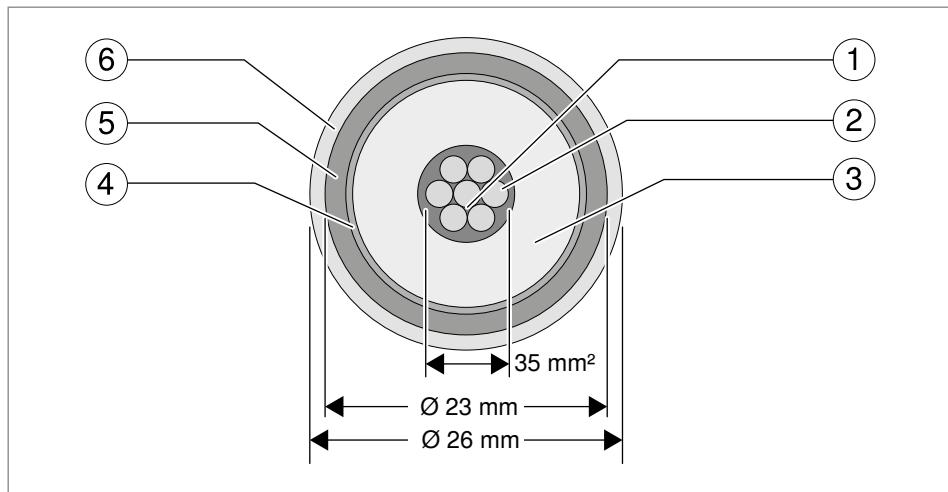
The isCon® conductor is flame-resistant according to IEC 60332-1-2, weather-resistant and halogen-free. It is suitable for routing in external areas and can be routed on roofs, in walls, in concrete, in facade installations or in buildings.

The isCon® conductor is sold by the metre and in five variants:

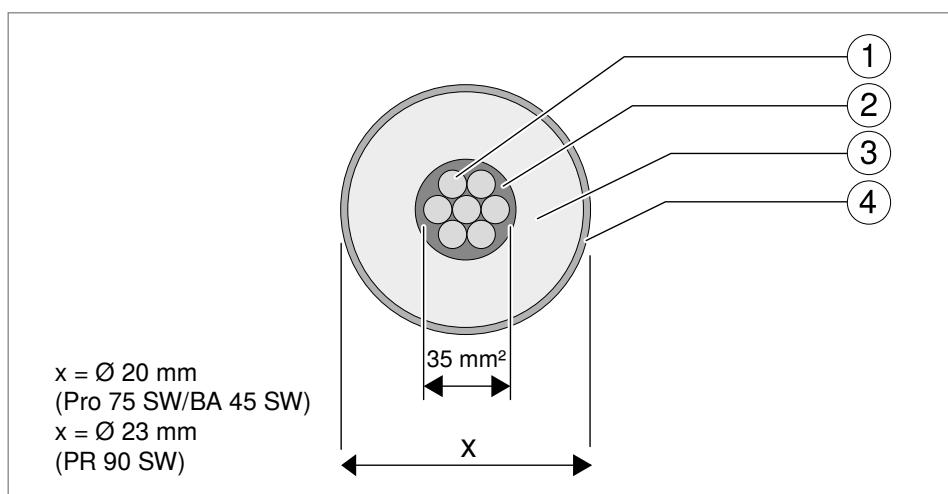
Conductor type	Feature	Item number
isCon® PR 90 SW (Premium)	Black	5408017, 5408018
isCon® Pro 75 SW (Professional)	Black	5408008
isCon® Pro+ 75 SW (Professional plus)	Black	5408002, 5408004, 5408006
isCon® Pro+ 75 GR	Grey	5407995, 5407997
isCon® BA 45 SW (Basic)	Black	5408014

**Tab. 1:** Product variants, isCon® conductor

The grey isCon® conductor (isCon Pro+75GR) is also suitable for routing in the earth. The grey conductor was tested according to IEC EN 62305-3 with a pulse voltage of min. 100 kV (1.2/50 µs) in rain and can be used up to a length of max. 5 m for touch protection. If the conductor is not used as touch protection, then coloured painting, e.g. with facade paint, is also possible. As the external grey jacket is non-conductive, it must be removed in the contact areas.



**Fig. 1:** Schematic diagram of the isCon® conductors Pro+ 75 SW and Pro+ 75 GR



**Fig. 2:** Schematic diagram of the isCon® conductors Pro 75 SW, BA 45 SW and PR 90 SW

- ① Round conductor, multi-wire, 35 mm<sup>2</sup>, Cu
- ② Inner conductive layer
- ③ Insulation
- ④ Black, weakly conductive layer
- ⑤ Protective jacket
- ⑥ External jacket, grey

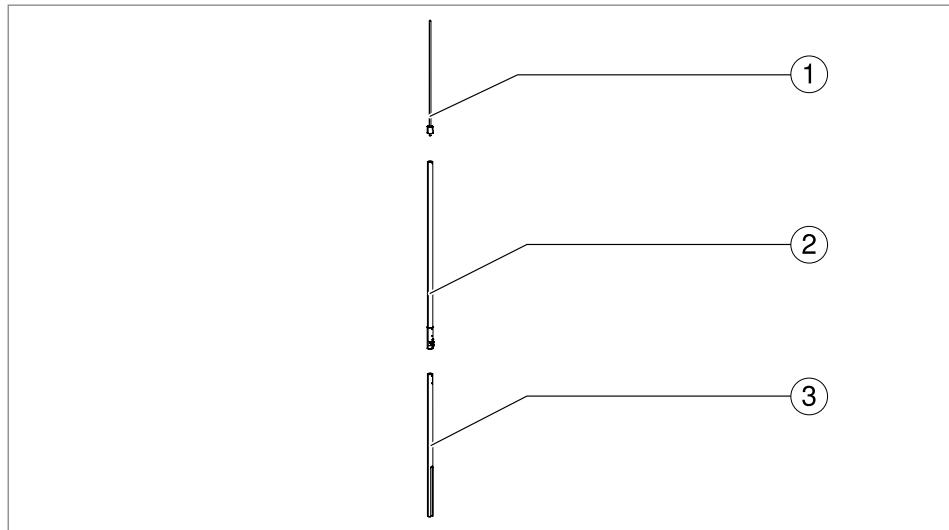
The isCon® conductor may only be connected to air-termination rods or forwarding systems using system-tested OBO connection elements (see also “5.4 isCon® connection elements” on page 14).

Type	isCon BA 45 SW	isCon Pro 75 SW	isCon Pro+ 75 SW	isCon Pro+ 75 GR	isCon PR 90 SW		
Colour	Black	Black	Black	Grey	Black		
Equivalent separation distance, air (cm)	≤ 45	≤ 75	≤ 75	≤ 75	≤ 90		
Equivalent separation distance, solid materials (cm)	≤ 90	≤ 150	≤ 150	≤ 150	≤ 180		
Equivalent separation distance, mixed materials	See IEC/EN 62305-3						
External diameter	~ 20 mm	~ 20 mm	~ 23 mm	~ 26 mm	~ 23 mm		
Round conductor, multi-wire, Cu	35 mm <sup>2</sup>						
Cable weight	~ 0.570 kg/m	~ 0.570 kg/m	~ 0.694 kg/m	~ 0.868 kg/m	~ 0.666 kg/m		
Temperature range for routing	min. -5 °C, max. 40 °C						
Operating temperature	min. -30 °C, max. 70 °C						
Bend radius	Min. 200 mm	Min. 200 mm	Min. 230 mm	Min. 260 mm	Min. 230 mm		
Maximum tensile load	1,750 N						
Routing in the earth	No	No	No	Yes	No		
Can be painted over	No	No	No	Yes (does not apply when used as touch protection)	No		
Touch protection	No	No	No	Yes	No		
Weathering resistance (UV-stabilised)	Ozone-resistant according to IEC/EN 60811-2-1 Section 8 Sunlight resistance test according to UL 1581 Section 1200 Coldness impact resistance according to IEC/EN 60811-1-4 Section 8.5						
Fire load (kWh/m)	3.3		4.3	5.1	4.2		
Fire behaviour: self-extinguishing	n/a	n/a	Yes	Yes	n/a		
Lightning current carrying capacity (Class/I <sub>imp</sub> (kA))	H1/150	H1/150	H1/150	H2/200			
Testing certificate according to IEC TS 62561-8	yes						
Halogen-free	yes						
Softener	None						

**Tab. 2:** Technical data of the isCon® conductors

## 5.3 Insulated air-termination rods

The insulated air-termination rods of the isCon® system come in three parts and consist of the air-termination rod (length 1,000 mm), the insulated central rod (length 1,500 mm) and the retaining rod.

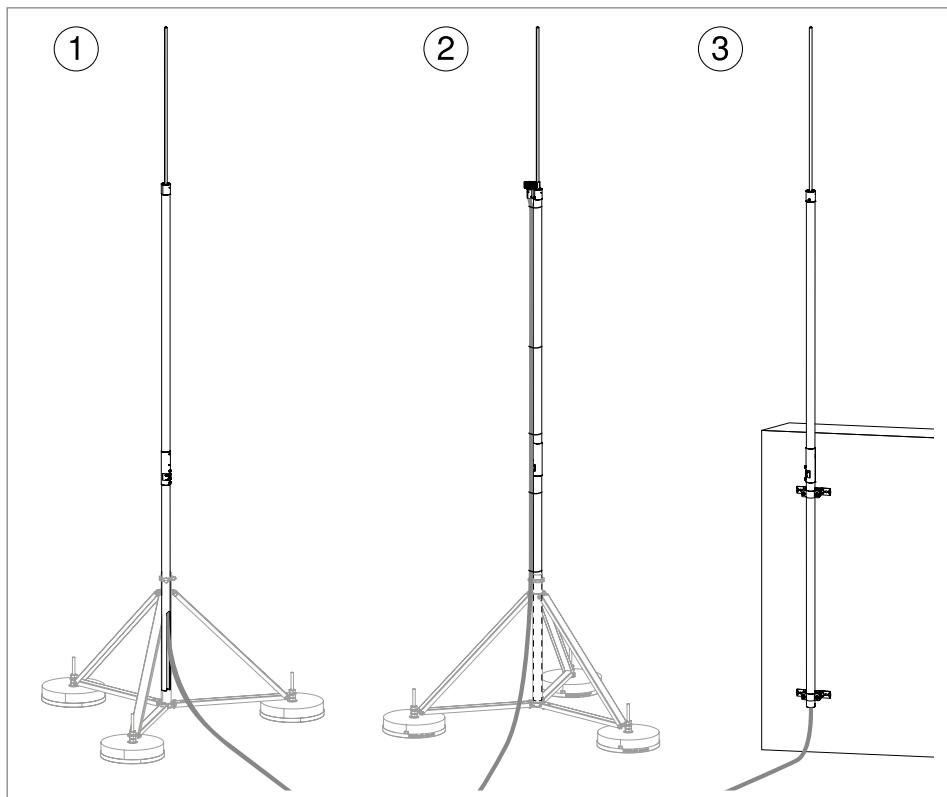


**Fig. 3:** Air-termination rod components

- ① Air-termination rod
- ② Insulated central rod
- ③ Retaining rod

The metallic components of the rods are made of aluminium or stainless steel (V2A). The insulated central rod is made of glass-fibre-reinforced plastic (GRP) and allows sufficient spacing of the arresting components (connection element at the bottom end of the air-termination rod) to all roof structures. In addition, it guarantees a sufficient distance of 1,500 mm to the equipotential bonding, which is connected at the bottom end of the insulated rod (see also Fig. 12 No. 4).

The system comprises three types of air-termination rods. This means it can be used in different mounting situations.



**Fig. 4:** Three air-termination rod types (without potential connection)

- ① Air-termination rod with internal isCon® conductor and side exit
- ② Air-termination rod with external isCon® conductor
- ③ Air-termination rod with internal isCon® conductor and bottom exit

Type	Item number	Overall length [m]	Diameter [mm]	Material	Type (Fig. 4)	Corresponding air-termination rod stand
isFang IN-A L4	5408874	4,000	50	Alu/GRP	①	isFang 3B-100-A
isFang IN-A L6	5408876	6,000	50	Alu/GRP		isFang 3B-150-A
isFang IN-A L8	5408878	8,000	50	Alu/GRP		isFang 3B-250-A
isFang IN-A L10	5408880	10,000	50	Alu/GRP		isFang 3B-250-A
isFang 4000 AL	5408943	4,000	40	Alu/GRP	②	isFang 3B-100-A
isFang 6000 AL	5408947	6,000	40	Alu/GRP		isFang 3B-150-A
isFang 4000	5408942	4,000	40	V2A/GRP		isFang 3B-100-A
isFang 6000	5408946	6,000	40	V2A/GRP		isFang 3B-150-A
isFang IN L4	5408854	4,000	50	Alu/GRP	③	To be fastened with support system
isFang IN L6	5408856	6,000	50	Alu/GRP		
isFang IN L8	5408858	8,000	50	Alu/GRP		
isFang IN L10	5408860	10,000	50	Alu/GRP		

**Tab. 3:** Technical data of the isCon® air-termination rods

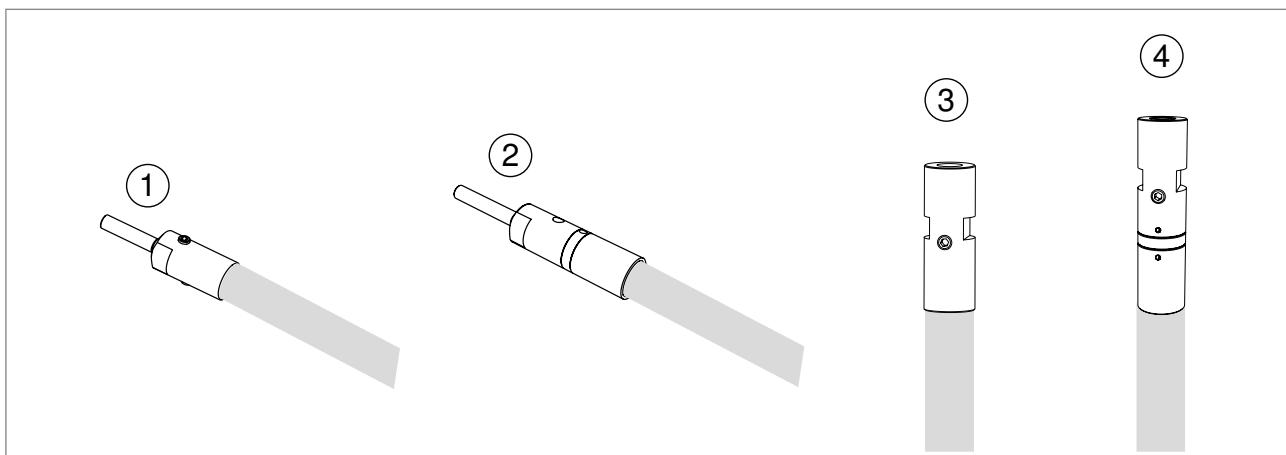
Contact OBO Customer Service about other air-termination rod variants.

## 5.4 isCon® connection elements

Using the isCon® connection element, you can connect OBO isCon® conductors to forwarding systems, e.g. to the insulated OBO isFang air-termination rod system or to a separate ring conductor or earthing system using a connection terminal. At the same time, an electrical connection is created between the copper core and the black, weakly conductive layer or protective jacket of the isCon® conductor. The grub screws in the connection element are pre-coated with a reactive screw lock made of two components. The components of the coating react automatically on turning in and stick down the grub screws. If the screws are released once more, the components are separated again and the grub screws are locked again the next time they are screwed in. The screw lock is fully hardened after six hours, and is then considered a permanent connection.

The isCon IN... connection elements allow the connection of internal isCon® conductors in isFang air-termination rods.

The isCon ASE 23 and isCon ASE IN 23 possess an adaptive switching element (ASE), which allows an insulation test.



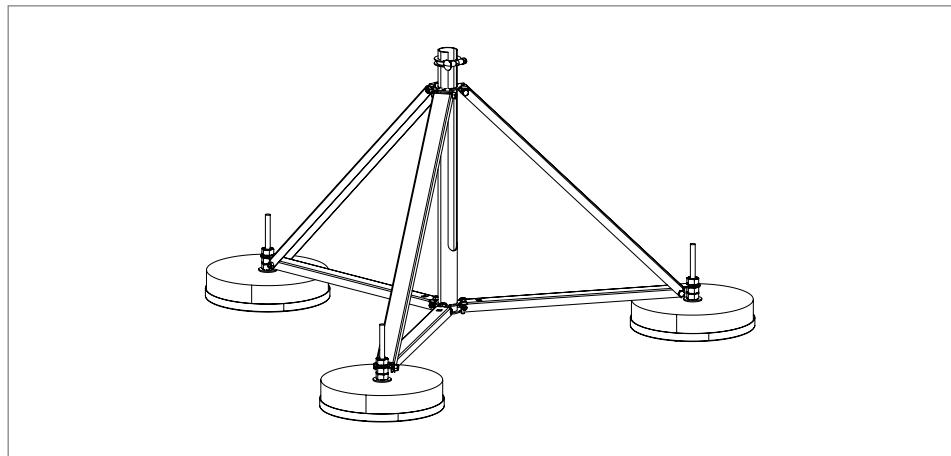
**Fig. 5:** isCon connection elements

No.	Product	Type	Item no.	Features
①	Connection element	isCon connect isCon con 2 isCon con PRE	5408022 5408021 5408023	Connection elements for external isCon® conductors.
②	Connection element with adaptive switching element	isCon ASE 23	5408080	Connection elements for external isCon® conductors with the option of insulation testing.
③	Connection element, internal	isCon IN connect isCon IN con 2 isCon IN con PRE	5408024 5408019 5408020	Connection element for internal isCon® conductors.
④	Connection element with adaptive switching element, internal	isCon ASE IN 23	5408082	Connection element for internal isCon® conductors with the option of insulation testing.

## 5.5 System accessories for fastening

Tripod stands (see section 5.5.1) or supports for wall or pipe mounting (see section 5.5.2) can be used to fasten the isCon® air-termination rods. In addition, the system offers special holders for the isCon® conductor (see section 5.5.3).

### 5.5.1 Tripod stand



**Fig. 6:** Tripod stand with concrete blocks

The isCon® system contains folding tripod stands of different sizes to allow the isFang air-termination rods to be mounted on flat roofs, for example. The tripod stands allow the erection of the air-termination rods without penetrating the building structure with bolts/anchors.

Instead, the tripod stands are weighed down with concrete blocks. The number of blocks required is dependent on the height of the air-termination rod and the wind speed zone.

**Note!**

*You can find further information on wind speed zones in the OBO TBS lightning protection guide (order no.: 9131970) and national directives.*

The use of a tripod stand can compensate for a slope in the roof surface of up to 5° (see also Fig. 45 on page 49). To protect the roof surface and if there is the risk of softeners escaping from the roof film, it may be wise to place a protective film/support mat under the concrete blocks of the air-termination rod stand. We recommend contacting the roofer about this.

Scope of delivery of the air-termination rod stand:

- Tripod stand
- Crossbar for potential connection with bolt, nut and lock washer
- Brief instructions

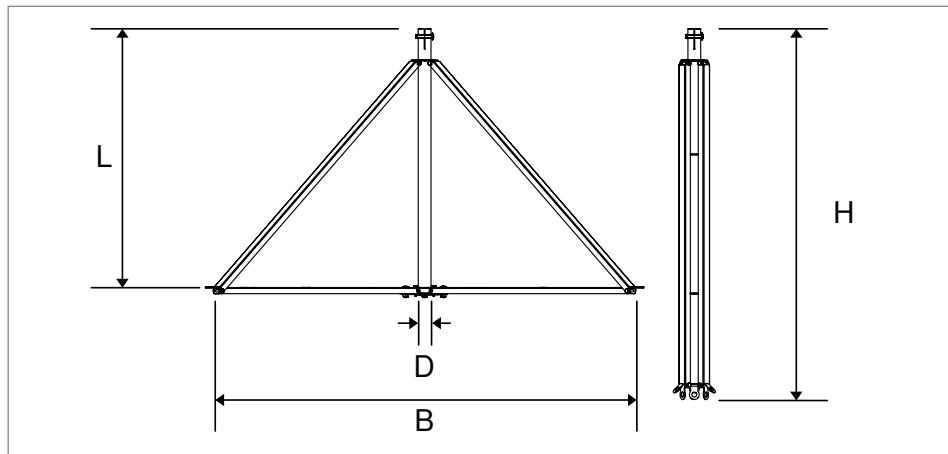


Fig. 7: Dimensions of the tripod stands, see Tab. 5

Type	Item no.	Dimension B mm	Dimension D mm	Dimension L mm	Dimension H mm	Material
With side exit for internal isCon® conductor						
isFang 3B-100-A	5408930	1,026	50	600	885	V2A
isFang 3B-150-A	5408932	1,500	50	900	1,275	V2A
isFang 3B-250-A	5408902	2,900	50	1,450	2,055	V2A
With bottom exit or for external isCon® conductor						
isFang 3B-100 AL	5408966	1,000	40	600	885	Alu
isFang 3B-150 AL	5408967	1,500	40	900	1,275	Alu
isFang 3B-100	5408968	1,000	40	600	885	V2A
isFang 3B-150	5408969	1,500	40	900	1,275	V2A

Tab. 5: Technical data of the tripod stands

The concrete blocks weigh approx. 16 kg and are screwed to the bottom of the unfolded tripod stand. The concrete blocks can be stacked to increase the stand weight (e.g. for increased wind speeds) (see Fig. 8). Additional concrete blocks can be mounted internally in the tripod stands of diameter 1,500 mm (unfolded).

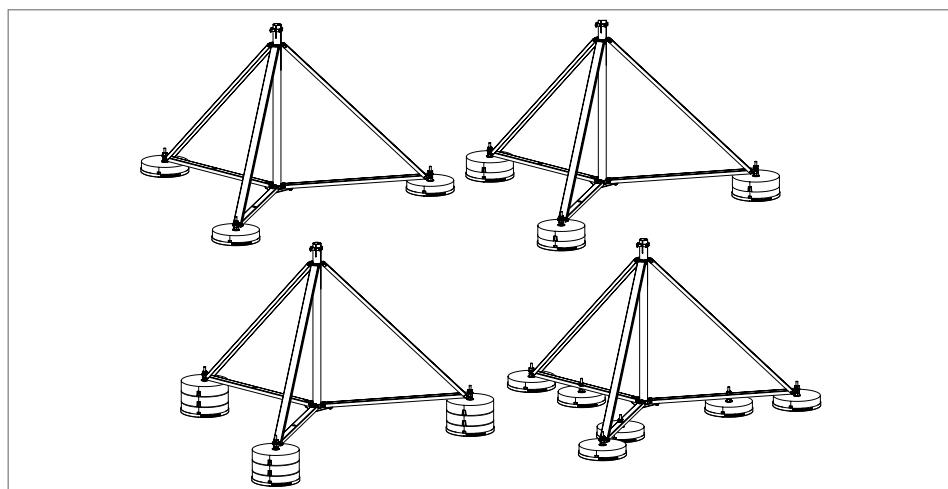
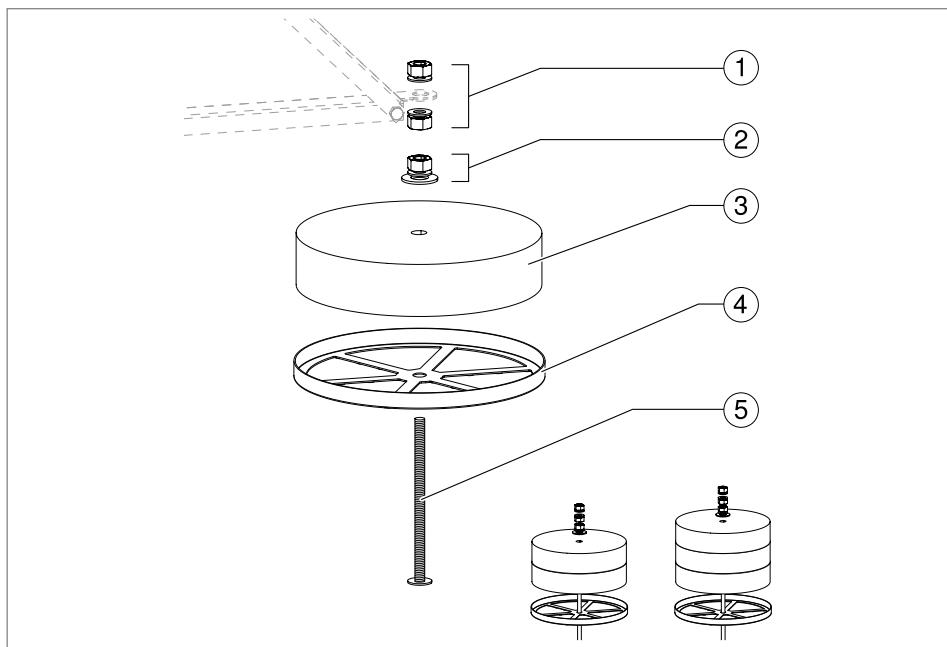


Fig. 8: Increasing the stand weight by stacking the concrete blocks



**Fig. 9:** Concrete base with fastenings

- ① Hexagonal nuts (with washers) for height compensation
- ② Lock nut (with washer and plate)
- ③ Concrete base
- ④ Edge protection
- ⑤ Threaded rod

Product	Type	Item no.	Features	Material
Concrete base	F-FIX-S16	5403227	Weight: 16 kg; Ø 365 mm; stackable	Concrete, frost-resistant
Edge protection for concrete block 16 kg	F-FIX-B16 3B	5403238	Edge protection with gland hole	Polyamide
Threaded rod	isFang 3B-G1	5408971	270 mm, for 1 concrete block <sup>1)</sup>	V2A
Threaded rod	isFang 3B-G2	5408972	340 mm, for 2 concrete blocks <sup>1)</sup>	V2A
Threaded rod	isFang 3B-G3	5408973	430 mm, for 3 concrete blocks <sup>1)</sup>	V2A
Threaded rod	isFang 3B-G4	5408905	500 mm, for 4 concrete blocks <sup>1)</sup>	V2A

**Tab. 6:** Technical data of the concrete blocks with accessories

<sup>1)</sup> Number of concrete blocks for mounting on a flat surface. For height compensation in an inclined position, select a longer threaded rod if necessary (see Fig. 45 on page 49).

Nuts and washers are included in the scope of delivery of the threaded rods.

### 5.5.2 Air-termination rod support for isFang mounting

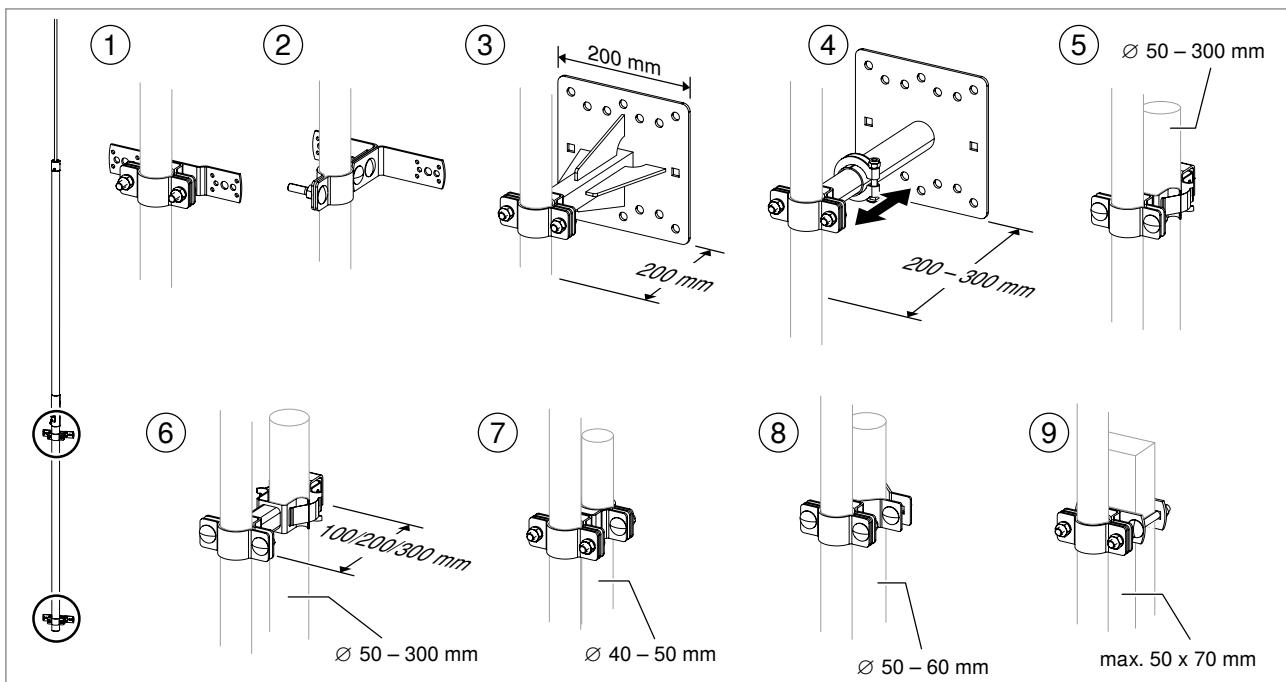


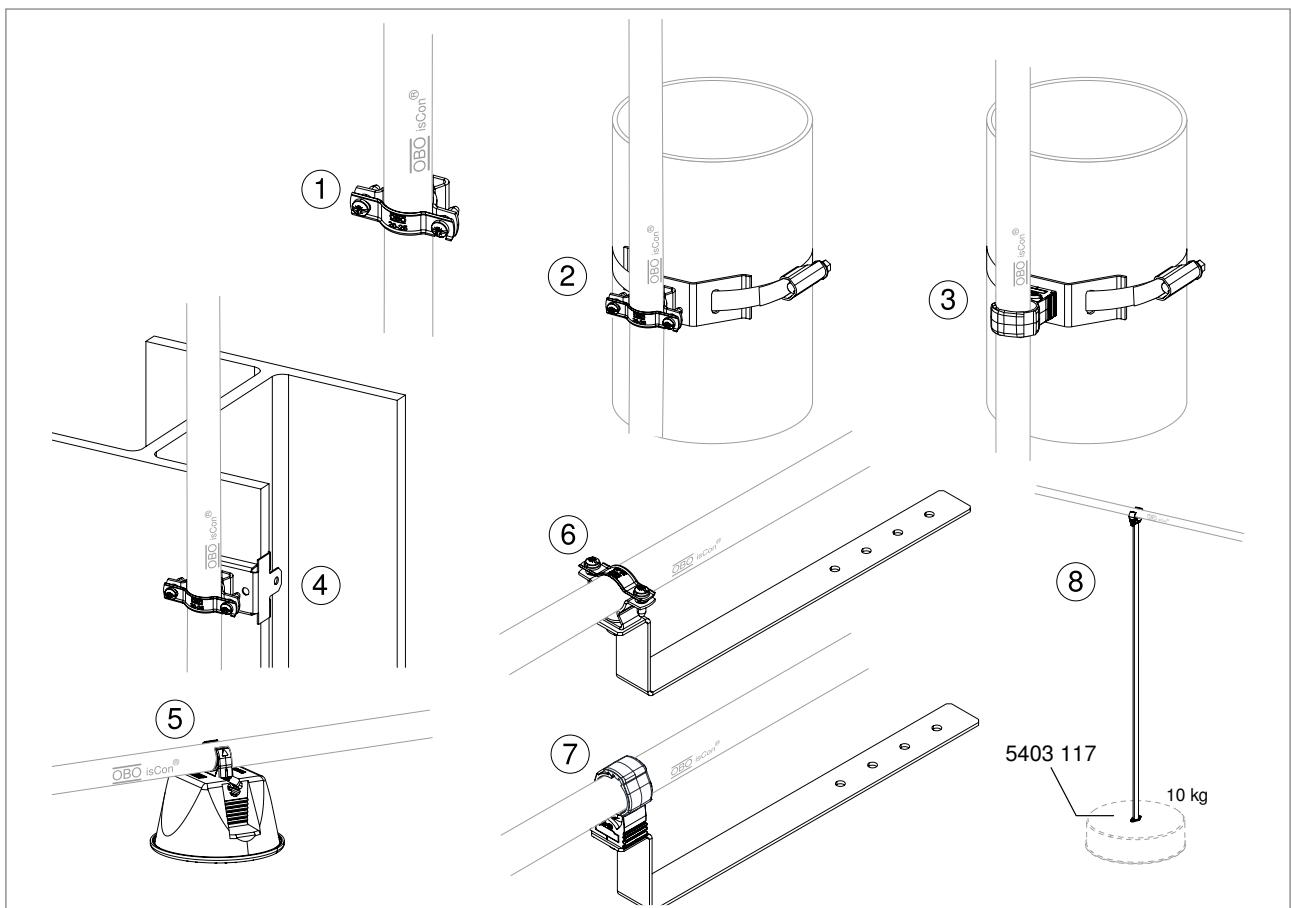
Fig. 10: Support for wall or pipe mounting of the isFang air-termination rods

No.	Type	Item no.	Ø isCon air-termina-tion rod [mm]	Features	Material
①	isFang TW30	5408952	40/50	Surface mounting, distance from wall 30 mm	V2A
②	isFang TW80	5408950	40/50	Surface mounting, distance from wall 80 mm	V2A
③	isFang TW200 12	5408910	40/50	Surface mounting, distance from wall 200 mm	V2A
④	isFang TW200	5408954	40/50	Surface mounting, variable distance from wall 200–300 mm	V2A
⑤	isFang TR100	5408956	40/50	Tightening strap clip for round construction pipes of Ø 50–300 mm; distance to pipe 40 mm	V2A
⑤	isFang TR100 100	5408955	40/50	Tightening strap clip for round construction pipes of Ø 50–300 mm; distance to pipe 100 mm	V2A
⑤	isFang TR100 200	5408957	40/50	Tightening strap clip for round construction pipes of Ø 50–300 mm; distance to pipe 200 mm	V2A
⑥	isFang TR100 300	5408959	40/50	Tightening strap clip for round construction pipes of Ø 50–300 mm; distance to pipe 300 mm	V2A

No.	Type	Item no.	$\varnothing$ isCon air-termination rod [mm]	Features	Material
⑦	isFang TS40-50	5408958	40/50	Pipe strip clip for round construction pipes of $\varnothing$ 40–50 mm; distance to pipe 40 mm	V2A
⑧	isFang TS50-60	5408960	40/50	Pipe strip clip for round construction pipes of $\varnothing$ 50–60 mm; distance to pipe 30 mm	V2A
⑨	isFang TS50x50	5408964	40/50	Pipe strip clip for square construction pipes of max. 50 x 70 mm; distance to pipe 30 mm	V2A

**Tab. 7:** Technical data of the isCon® supports

### 5.5.3 Holders for the isCon® conductors



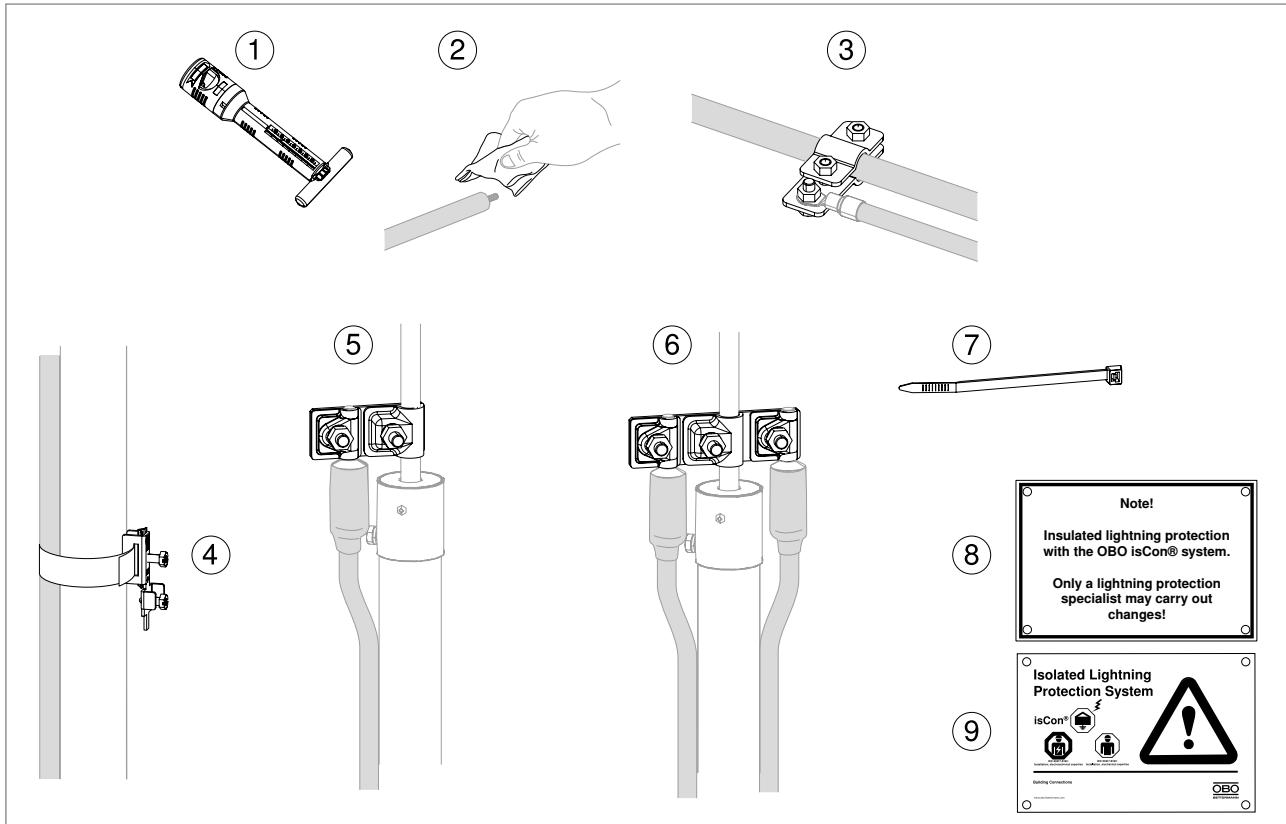
**Fig. 11:** Holders for the isCon® conductor

No.	Product	Type	Item no.	Features
①	Conductor holder for isCon® conductor	isCon H VA isCon H 26 VA	5408056 5408064	$\varnothing$ 20 + $\varnothing$ 23 mm; V2A $\varnothing$ 26 mm; V2A
②	VA conductor holder with tightening strap	isCon HS VA isCon HS 26 VA	5408052 5408068	$\varnothing$ 20 + $\varnothing$ 23 mm; V2A; 2 m tightening strap $\varnothing$ 26 mm; V2A; 2 m tightening strap
③	PA conductor holder with tightening strap	isCon HS 26 PA	5408066	$\varnothing$ 26 mm; PA grey; 2 m tightening strap

No.	Product	Type	Item no.	Features
④	Terminal for steel support with 1, bolt M16x6 and washer	TKI 13-6	1483587	Galvanised terminal with M6 internal thread to fasten an isCon H VA conductor holder with M16x6 bolt
⑤	Roof conductor holder with adapter and M-Quick conductor holder	165 MBG 8-10 165 MBG UH M-Quick M25 SW M-Quick M25 LGR	5218700 5218882 2153787 2153734	PA/PE roof conductor holder, filled with frost-resistant concrete Clamping range of M-Quick conductor holder ..SW: 20–25 mm, for ...LGR: 25–32 mm
⑥	VA roof conductor holder for pitched roof	isCon H280 VA isCon H280 26 VA	5408047 5408074	Ø 20 + Ø 23 mm; V2A Ø 26 mm; V2A
⑦	Roof conductor holder PA for pitched roofs	isCon H280 PA isCon H280 26 PA	5408049 5408072	Ø 23 mm; PA black Ø 26 mm; PA grey
⑧	Spacer for stand-off routing of the isCon® conductor	isCon DH	5408043	Material: GRP; clamping range Ø 23–26 mm; height 1,000 mm, can be shortened; for mounting on FangFix concrete block, 10 kg, with edge protection

**Tab. 8:** Technical data of the holders for the isCon® conductor

## 5.6 System accessories for connection



**Fig. 12:** Accessories for connecting the isCon® conductor

No.	Product	Type	Item no.	Features
①	Stripping tool	isCon stripper 2	5408013	To remove the insulation of the isCon® conductor (see “7.1.3 Revealing the copper core for connection” on page 34)
②	Cleaning cloth	isCon EPPA 004	5408060	Cellulose polypropylene paper with abrasive sides, doused with impregnation solution, for cleaning the external jacket of the isCon® conductor
③	Potential connection terminal	isCon PAE	5408036	Potential connection of the isCon® conductor; fit Ø 17–25 mm, V2A
④	Potential connection clip	927 2 6-K	5057599	Potential connection on the air-termination rod for external isCon® conductor; fit 3/8 – 4", V2A
⑤	Connection plate for one isCon® conductor	isCon AP1-16 VA	5408026	16 x 8–10 mm, V2A
⑥	Connection plate for two isCon® down-conductors	isCon AP2-16 VA	5408028	16 x 8–10 mm, V2A
⑦	Strip clip	555 7.6x380 SWUV	2332784	Black; weatherproof, length approx. 380 mm
⑧	Information sign for labelling of the lightning protection system	isCon HWS	5408058	Self-adhesive, with 4 fastening holes Ø 6.5 mm
⑨	Information sign for labelling of the lightning protection system	isCon HWS EN	5408059	Self-adhesive, with 4 fastening holes Ø 6.5 mm

**Tab. 9:** System accessories for connection

## 6 Planning an installation

When planning the lightning protection of buildings, take the following aspects and possible activities into account:

- Determine the protection area, the required height and the arrangement of the air-termination rods, according to IEC/EN 62305-3.
- Calculate the necessary separation distance (see „6.2 Calculating, checking and maintaining the separation distance“ on page 26).
- In the area of the GRP pipe, a distance X (calculated separation distance) must be kept from all sides.
- Calculate the number of isCon® conductors and air-termination systems according to the lightning protection class and required conductor length (see „6.3 Conductor lengths and lightning protection classes“ on page 27).
- Check the carrying capacity of the mounting area, on which the isCon® system is mounted.
- Additional measures are required for installations in potentially explosive areas (see „6.4 Installation in potentially explosive areas“ on page 29) and on soft-covered roofs (see „6.5 Soft-covered roofs“ on page 30).
- When erecting air-termination rods, take the appropriate wind speed zones into account. You can find further information in the OBO TBS lightning protection guide and national directives.
- Ensure that there is equipotential bonding (see „7.8 Attaching the potential connection“ on page 54).

**Note!**

*You can find additional detailed planning aids on lightning and surge protection systems in the OBO TBS lightning protection guides (order no.: 9131970).*

**Note!**

*To guarantee the functionality of the isCon® lightning protection system, tested components of the OBO delivery range must be used.*

## 6.1 Schematic diagram of the isCon® system using the example of the isCon Pro+ 75 SW

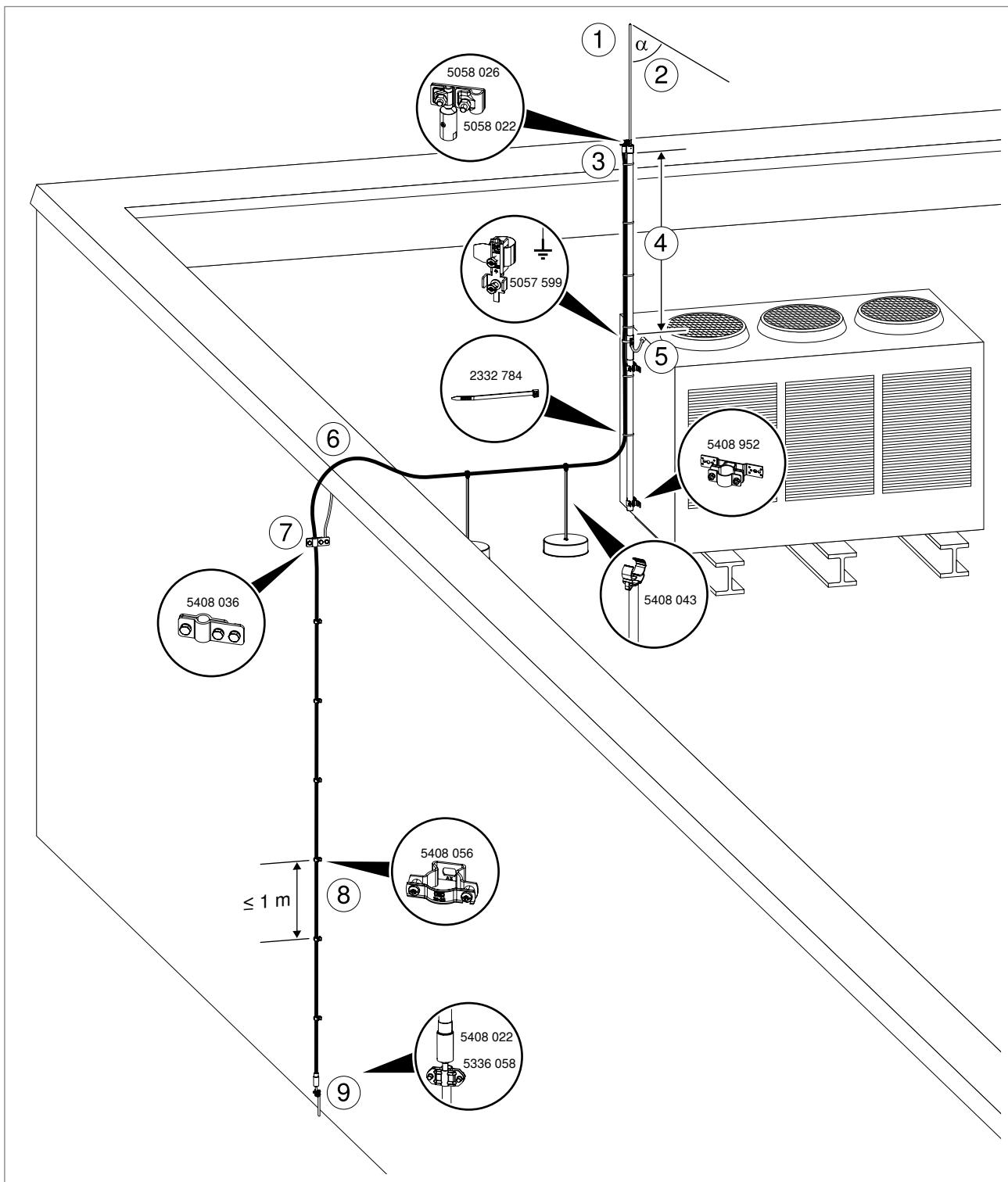


Fig. 13: Installation of the isCon® system using the example of the Pro+ 75 SW conductor

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## ① Air-termination system

IEC/EN 62305-3 Section 5.2 must be taken into account when planning the design of the air-termination system. The height and arrangement of the air-termination system must be designed in such a way that the objects to be protected are located in the protection area.

### Note!

*If there is a lightning strike, the upstand on the edge of the flat roof (parapet) must not carry lightning current and must therefore be completely in the protection angle of the lightning protection system.*

## ② Protection area

Along the whole of its length, the conductor must be located in the protection area of the air-termination system.  $\alpha$  = Protective angle according to IEC/EN 62305.

## ③ Connection element

Only the connection element may be connected to the air-termination system or the onward-leading conductor of the external lightning protection.

## ④ Required separation distance to the first potential connection

No electrically conductive or earthed parts may be located in the area of the potential connection within the radius of the calculated separation distance. These include metallic construction parts, conductor holders and reinforcements.

## ⑤ Potential connection

The potential connection must be installed in the manner described in „7.8 Attaching the potential connection“ on page 54. The potential connection element must be connected to the equipotential bonding with  $\geq 6 \text{ mm}^2 \text{ Cu}$  or an equal conductivity.

## ⑥ Bend radius

When routing conductors, do not go below the minimum bend radii.

## ⑦ Additional potential connections

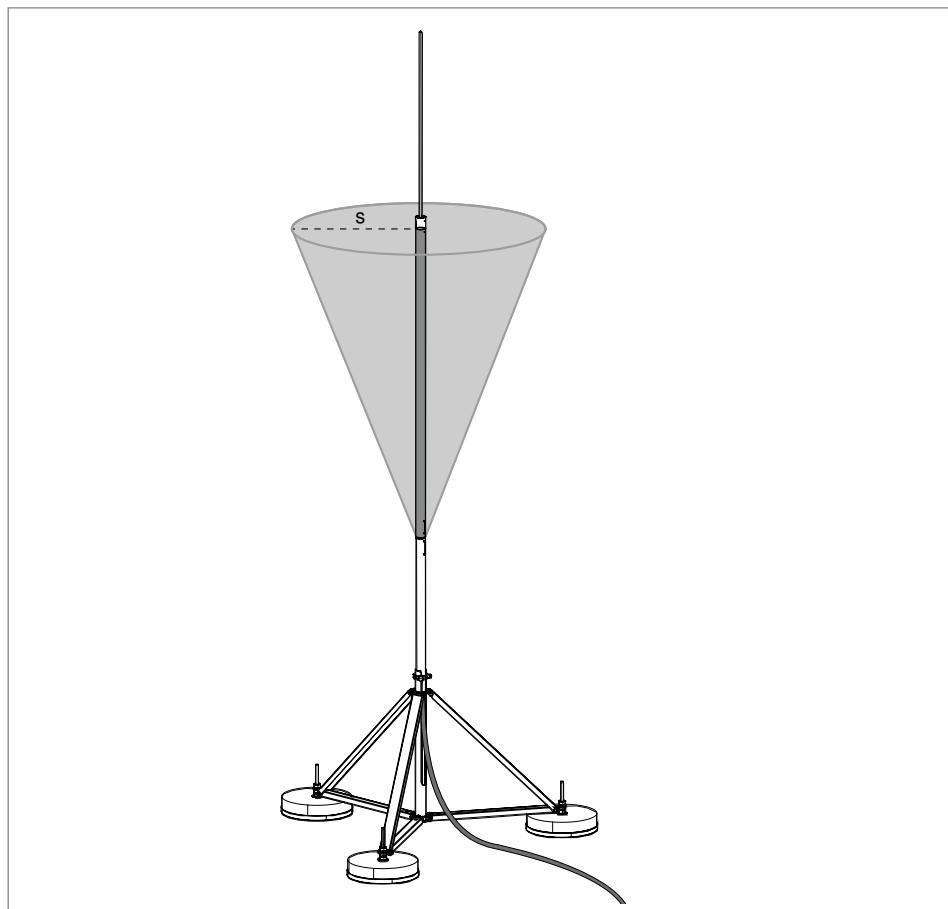
After the first potential connection using the potential connection element, the isCon® conductor can be connected multiple times with the earthed components of the structure, through which the lightning current does not flow. See also „7.8.5 Installing additional potential connections“ on page 61.

## ⑧ Conductor fastening

The isCon® conductor must be fastened using the installation material indicated. The maximum distance between the fastenings is 1 metre.

## ⑨ Separation distance of $s \leq 20$ cm through the air

A potential connection is not required for a calculated separation distance of  $s \leq 20$  cm through the air.



**Fig. 14:** Required separation distance  $s$  in the area of the insulated central rod (GRP)

**Note!**

*The required separation distance  $s$  in the area of the insulated central rod (GRP) may vary depending on the distance to the upper connection point.*

**Note!**

*Before designing the lightning protection system, obtain information on the function, general design and location of the structure.*

**Note!**

*During routing in buildings, pay attention to the specified protection measures, e.g. division into fire sections. See the OBO fire protection guide (item number: 9134859) for more information.*

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## 6.2 Calculating, checking and maintaining the separation distance

### Note!

*If the approval authorities, the insurance company or the customer have not yet specified whether the building in question should be protected by a lightning protection system, the planner should carry out a risk evaluation according to IEC/EN 62305-2, which will indicate whether a lightning protection system is required or not.*

1. Calculate the separation distance at the connection point of the isCon® conductor according to IEC/EN 62305-3 Section 6.3. Measure the distance (l) from the connection point of the isCon® conductor to the next level of the lightning protection equipotential bonding, e.g. earthing system, metal parapet of a building with electrically connected metal facade or steel reinforcement (high-rise building).
2. Check whether the calculated separation distance (s) is less than or equal to the specified equivalent separation distance of the isCon® conductor.

If the specified equivalent separation distance is exceeded, you must install additional conductors:

- The current is split up if you install multiple insulated conductors in parallel. The reduced current division coefficient  $k_c$  thus also reduces the calculated separation distance (s).
- Install the conductors at least 20 cm apart. This keeps the magnetic fields to a minimum, preventing the conductors from influencing each other.
- When conductors are routed directly beside one another, the inductivity of the total arrangement is not reduced by the factor n, and the current division coefficient  $k_c$  is not reduced accordingly.
- Install the conductors as far apart from each other as possible, if the installation conditions permit this. Ideally, the second conductor should be run to the ground on the other side of the building.

## 6.3 Conductor lengths and lightning protection classes

The possible length of an isCon® conductor can be calculated using the following formula, according to the calculated separation distance (s), the lightning protection class ( $k_i$ ), the number of conductors used ( $k_c$ ) and the electrical insulation ( $k_m$ ) (see IEC/EN 62305-3):

$$L(m) = \frac{s \cdot k_m}{k_c \cdot k_i}$$

The following Tab. 10 offers an example of the maximum possible lengths of the isCon® conductor at a separation distance  $s = 0.75$  m in air. Should the conductor lengths shown there be insufficient for the construction project, we recommend having a lightning protection specialist carry out a detailed calculation of the factor  $k_c$  using the building data. The above formula shows that longer conductor lengths are possible with a greater number of conductors and thus the reduction of the factor  $k_c$ .

			Basic	Pro Pro+	Premium
LPS – lightning protection class*	Max. lightning current peak value	Number of down-conductors	Length at $s \leq 0.45$ m in air	Length at $s \leq 0.75$ m in air	Length at $s \leq 0.90$ m in air
I	200 kA	1	–	–	11.25
		2	8.52	14.20	17.05
		3 and more	12.78	21.31	25.57
II	150 kA	1	7.50	12.50	15.00
		2	11.36	18.94	22.73
		3 and more	17.05	28.41	34.09
III+IV	100 kA	1	11.25	18.75	22.50
		2	17.05	28.41	34.09
		3 and more	25.57	42.61	51.14

**Tab. 10:** Maximum length of the isCon® conductors in air

\* LPS lightning protection classes according to IEC/EN 62305

### Note!

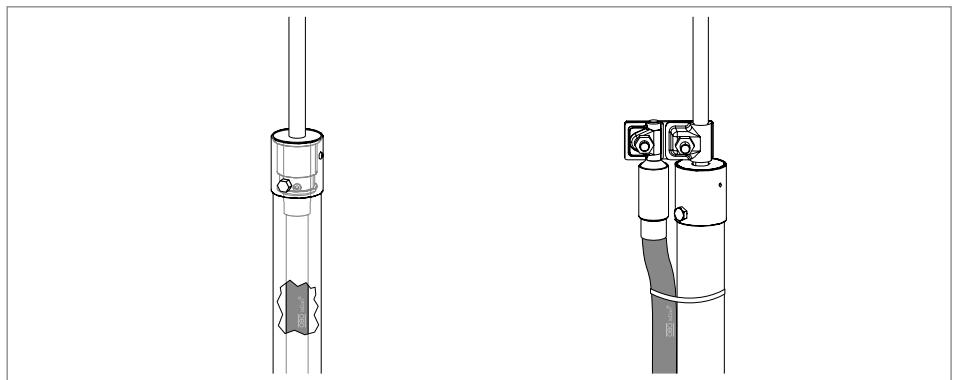
*The values in the table apply to all type B earth rods and for type A earth rods, in which the earth resistance of the neighbouring earth electrodes differs by less than a factor of 2. If the earther resistance of individual electrodes deviates by more than a factor of 2,  $k_c = 1$  should be assumed (source: IEC/EN 62305-3:2011, Table 12).*

## Installation for lightning protection class II

As the isCon Pro, isCon Pro+ and isCon Basic systems have a tested arresting capacity of 150 kA lightning surge current (10/350  $\mu$ s), a lightning protection system of lightning protection class II can run the lightning current safely from the air-termination system to another arresting system with a single isCon® conductor (depending on the required cable length, see Tab. 10).

## Installation for lightning protection class I

In a lightning protection system of lightning protection class I, one isCon® Premium conductor can be used from the air-termination unit up to the arresting system to implement the separation spacing (depending on the required conductor length, see Tab. 10).



**Fig. 15:** One isCon® conductor for lightning protection class II/I

## 6.4 Installation in potentially explosive areas

The isCon Pro+ conductor is ignition-free and can thus be used in lightning protection systems, which are to be located in potentially explosive areas. Here, the isCon® Pro+ conductor may be run through the areas of Ex zone 1/2 and 21/22.

If necessary, an appropriate DEKRA test report can be obtained from your OBO contact.

**Note!** *The system operator must divide a structure into Ex zones (see IEC 60079-10-1 and 2).*

When planning and running a lightning protection system through Ex zones, the following rules must particularly be taken into account:

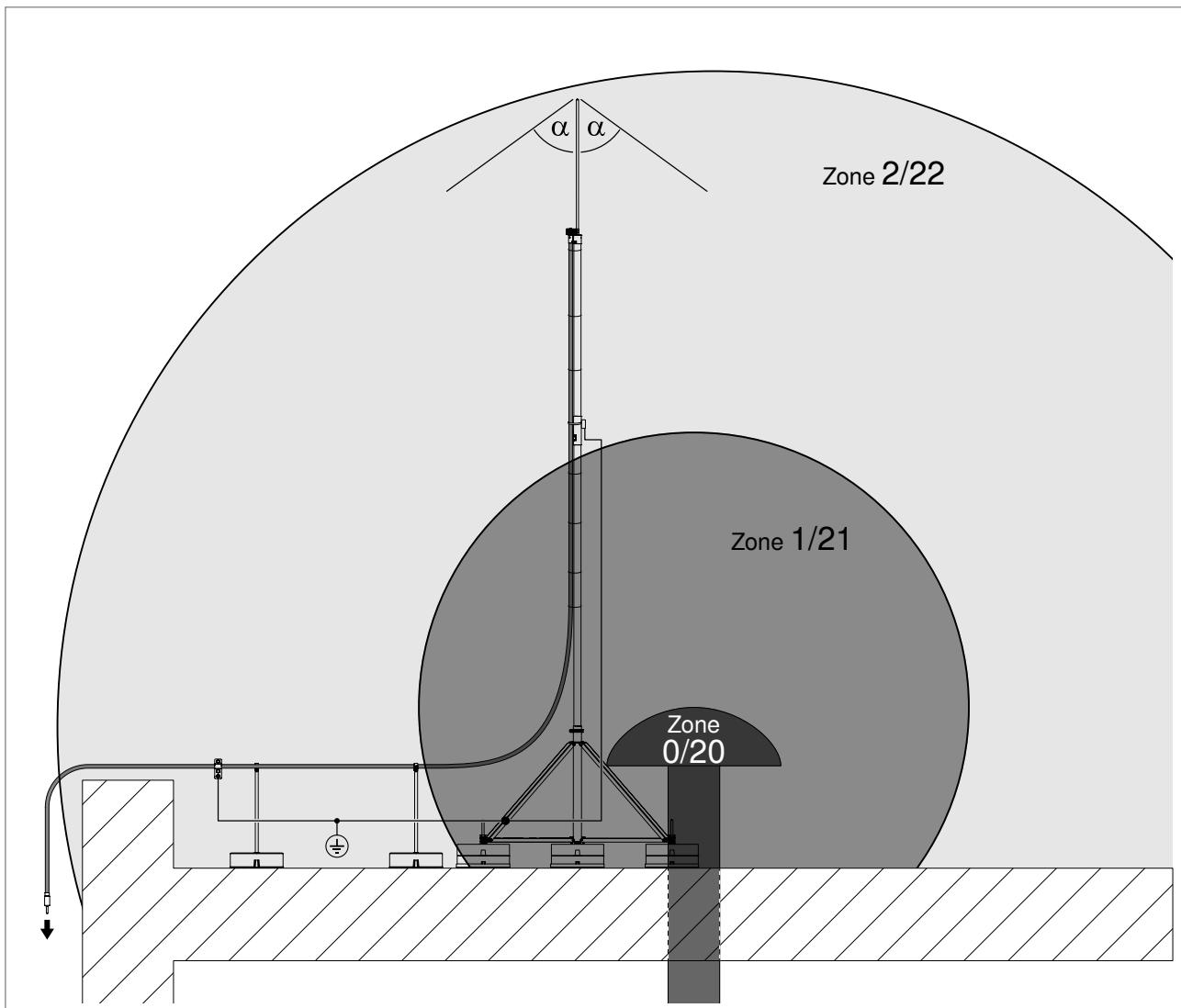
- IEC/EN 62305-3 – Appendix D – "Additional information for lightning protection systems for structure in areas with the risk of explosion"
- IEC/EN 62305-3 – Supplement 2 – "Additional information for special building structures"

According to this, planners, craftspeople and testers of lightning protection systems must meet the following requirements and levels of knowledge in potentially explosive areas:

- General principles of explosion protection
- General principles of protection ratings and device labelling
- Technical rules for hazardous substances (TRGS 800,751)
- Technical rules for operational safety (TRBS 2152)
- Testing, maintenance and repair requirements and knowledge of the appropriate technologies and devices
- Meaning of work permission systems and safe electrical separation of explosion protection in potentially explosive areas

For Ex systems with Ex zone 2 and 22, Supplementary sheet 2 (VDE 0185-305-3, Point 4.3) states that a potentially explosive atmosphere will only occur in rare, unforeseen circumstances. Therefore, it is possible to position air-termination units in Ex zones 2 and 22, taking Appendix D in IEC/EN 62305-3 into account.

In the case of installations in potentially explosive areas, you must connect the isCon® Pro+ conductor beyond the potential connection to the equipotential bonding at regular intervals. See „7.8.6 Creating additional equipotential bonding for isCon Pro+ in potentially explosive areas“ on page 61 for more information.

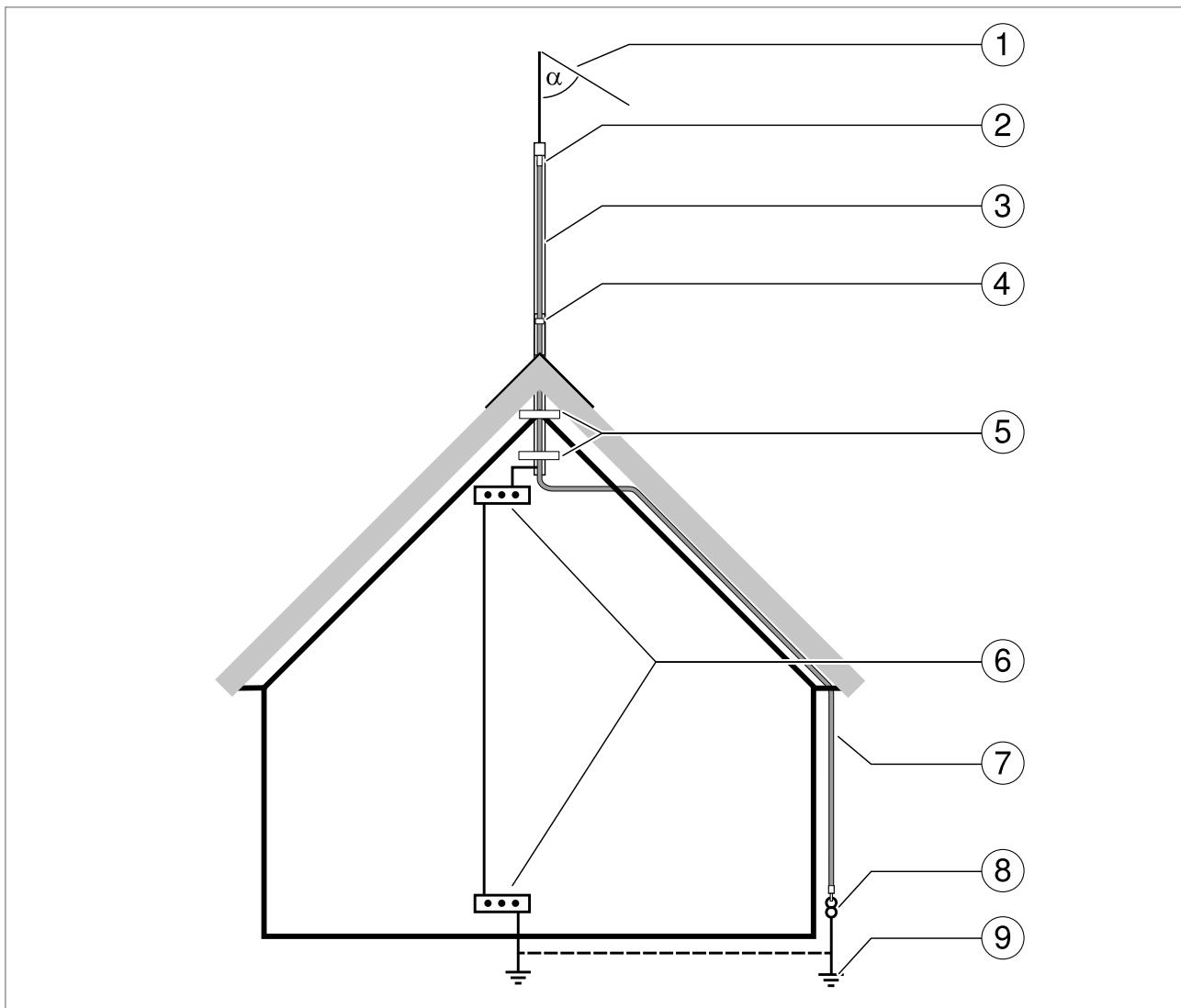


**Fig. 16:** Example of the installation of the isCon Pro+ conductor in the Ex zones of a potentially explosive area

## 6.5 Soft-covered roofs

Soft-covered roofs, for example straw, reed or thatched roofs, are particularly at risk of fire and require increased protection against lightning strikes. Here, the isCon® system, e.g. with internal conductor (type isFang IN), can be included discreetly in the building's appearance as an air-termination system. The grey variant of the isCon® conductor guarantees a high degree of protection and can be routed safely under the soft roof.

Consult a roofer in order to have the insulated air-termination rod routed in a waterproof manner. Fasten the insulated air-termination rod to the roof structure using suitable supports (type isFang TW..).



**Fig. 17:** Installation example: Soft-covered roof

- ① Air-termination rod
- ② isCon® connection element
- ③ Insulated air-termination rod for internal isCon® conductor
- ④ isCon® potential connection
- ⑤ Support for wall mounting
- ⑥ Equipotential busbar
- ⑦ isCon® conductor
- ⑧ Separator
- ⑨ Earthing system

## 7 Installing the isCon® system

### **WARNING**

#### **Risk of electric shock!**

If there is a lightning strike in the lightning protection system, lethal voltages can occur in the system. Do not work on the lightning protection system during a thunderstorm or if there is the risk of one, and do not install air-termination masts in the immediate vicinity of high-voltage cables.

The isCon® system is installed in the following steps:

- Preparation of the isCon® conductor for the mounting of connection elements and equipotential bonding
- Mounting of the connection elements
- Assembly of the air-termination rods and connection of the isCon® conductors
- Connection to the equipotential bonding

### 7.1 Preparing the isCon® conductor

The isCon® conductor is sold by the metre and in five variants:

Conductor type	Item number
isCon PR 90 SW	5408018
isCon Pro 75 SW	5408008
isCon Pro+ 75 SW	5408002, 5408004, 5408006
isCon Pro+ 75 GR	5407995, 5407997
isCon BA 45 SW	5408014

**Tab. 11:** Product variants of the isCon® conductor

#### 7.1.1 Shortening the isCon® conductor

- Determine the required conductor length, as described in „6.3 Conductor lengths and lightning protection classes“ on page 27.
- Shorten the isCon® conductor on-site to the required length using standard cable cutters or a saw.

### 7.1.2 Stripping the grey external jacket (isCon Pro+ 75 GR)

In the case of the isCon Pro+ 75 GR conductor, before attaching connection elements and elements for potential connection, remove the grey external jacket in the contact area, so that the connection comes into contact with the protective jacket.

#### ATTENTION

#### Risk of damage!

The black, weakly conductive layer may not be removed, as otherwise the connection to the building's equipotential bonding can be interrupted. In the case of the grey external jacket, maintain a maximum cutting depth of 1.5 mm.

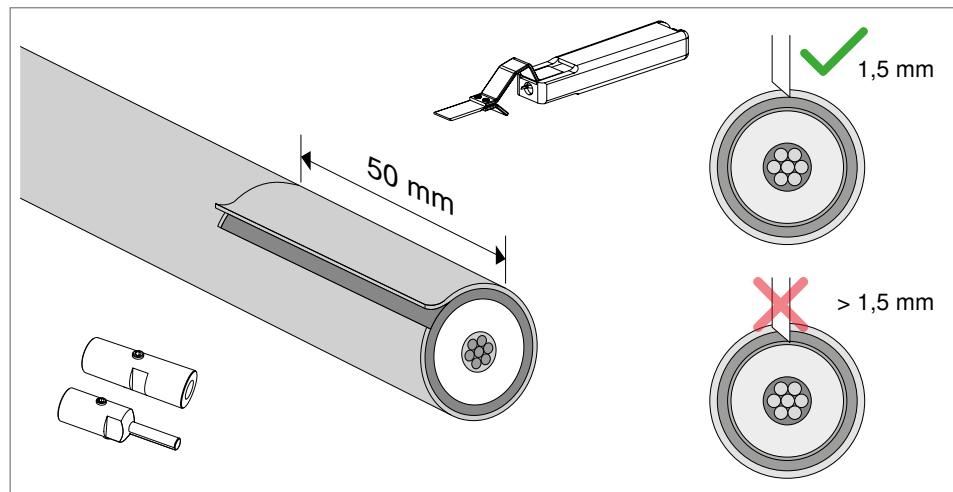


Fig. 18: Cutting and removing the grey outer jacket in the contact area

1. To mount the connection elements, at the ends of the isCon® conductor, remove 50 mm of the grey external jacket with a cable knife. Maximum cutting depth: 1.5 mm.

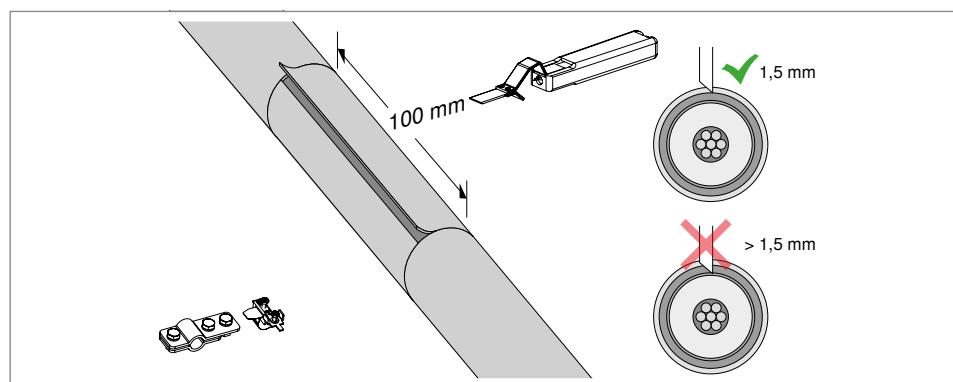


Fig. 19: Releasing the grey outer jacketing within the cable routing

2. Using a cable knife, remove the grey external jacketing in the contact area of equipotential bonding elements along a length of 100 mm.

### 7.1.3 Revealing the copper core for connection

#### CAUTION

##### Risk of injury!

There are sharp blades in the cutting head of the stripping tool isCon stripper 2. Do not reach into the cutting head of the stripping tool isCon stripper 2!

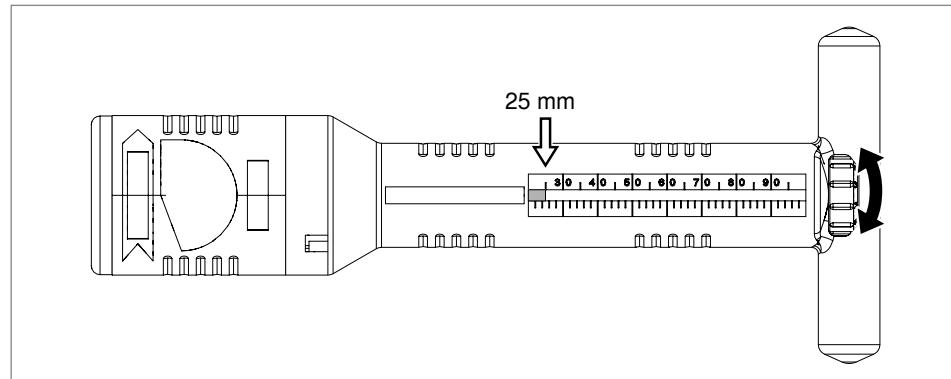


Fig. 20: Adjusting the stripping length

1. Using the stripping tool isCon stripper 2, adjust the stripping length to 25 mm.

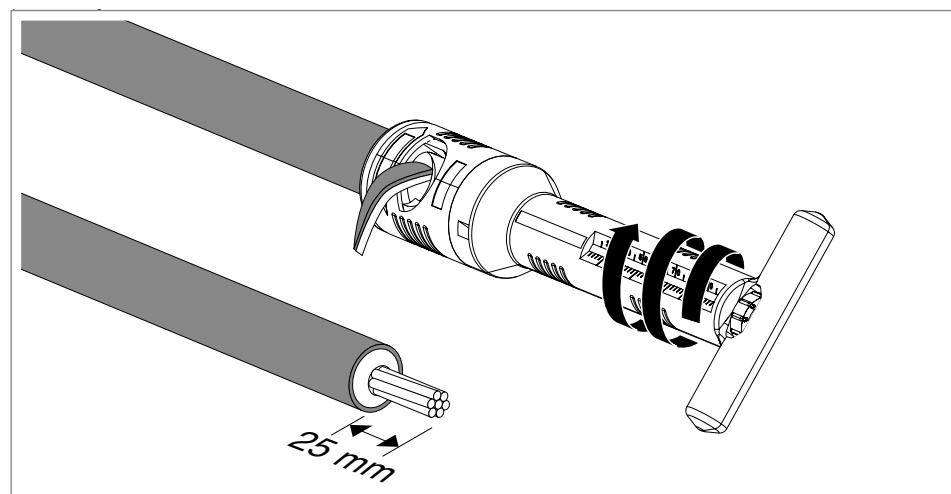


Fig. 21: Cutting the insulation

2. Insert the isCon® conductor into the cutting head and, with slight pressure, turn the handle in a clockwise direction until the preset length of the insulation has been cut off.

#### WARNING

##### Risk of function loss!

If there is a lightning strike, connection faults can lead to devices being destroyed, fires triggered and human lives being endangered. After stripping, ensure an even cut edge. Remove any excess by hand.

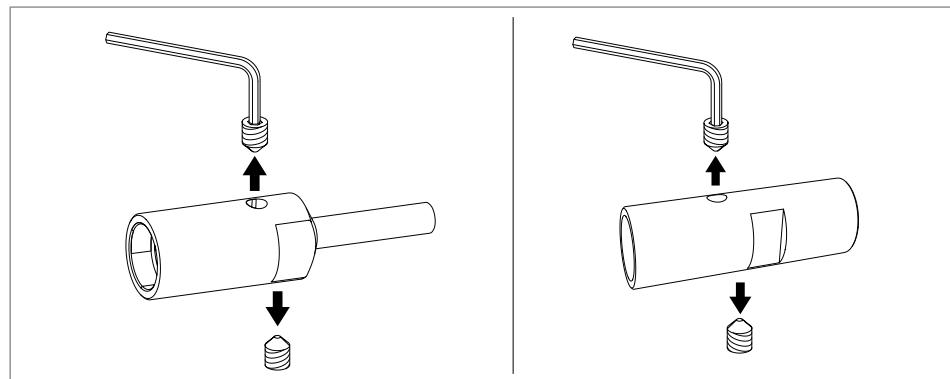
## 7.2 Mounting isCon® connection elements

All the isCon® connection elements are mounted according to the same principle.

**Note!**

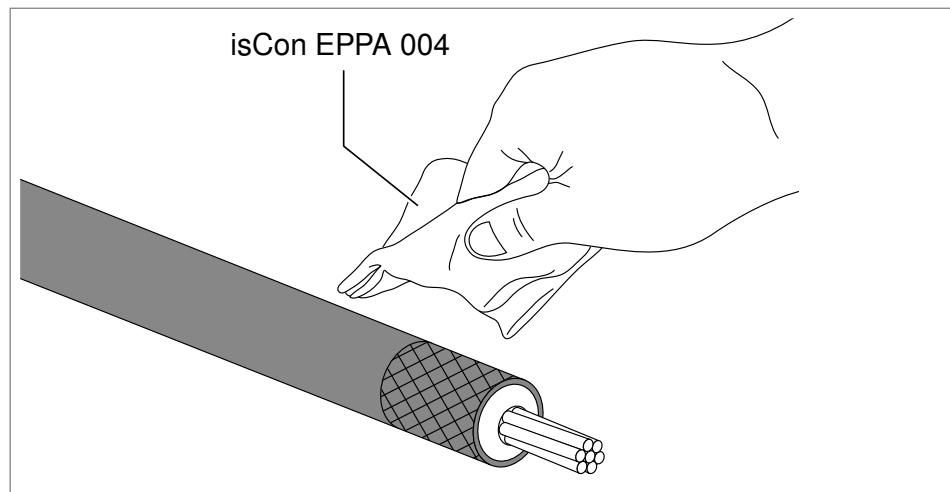
*The isCon ASE... connection elements must be checked with an insulation measuring device for correct function before mounting:*

- *Insulation test at 500 V: Correct value  $\geq G\Omega$*
- *Insulation test at 1,000 V: Correct value  $\leq G\Omega$*



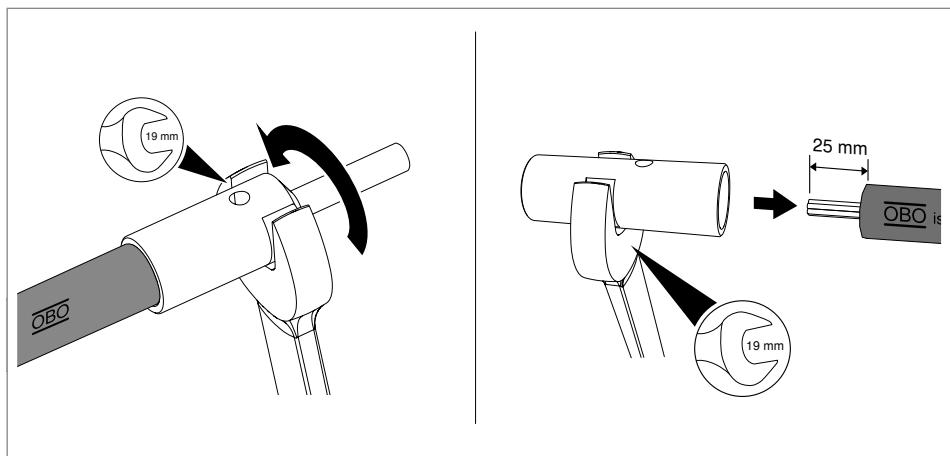
**Fig. 22:** Removing the grub screws

1. Remove the grub screws from the connection element using the Allen key.



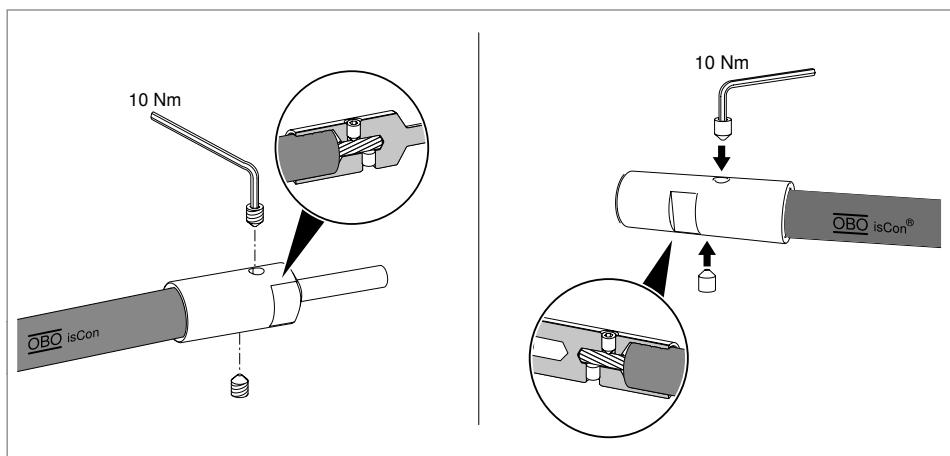
**Fig. 23:** Using a cleaning cloth

2. Free the front area of the black, weakly conductive layer or protective jacket from impurities and grease using a cleaning cloth (e.g. OBO item no. 5408060).



**Fig. 24:** Screwing on the connection element

3. Using a fork wrench (WAF 19 mm), screw the connection element onto the isCon® conductor, until the copper core can be seen completely in the two screw holes.

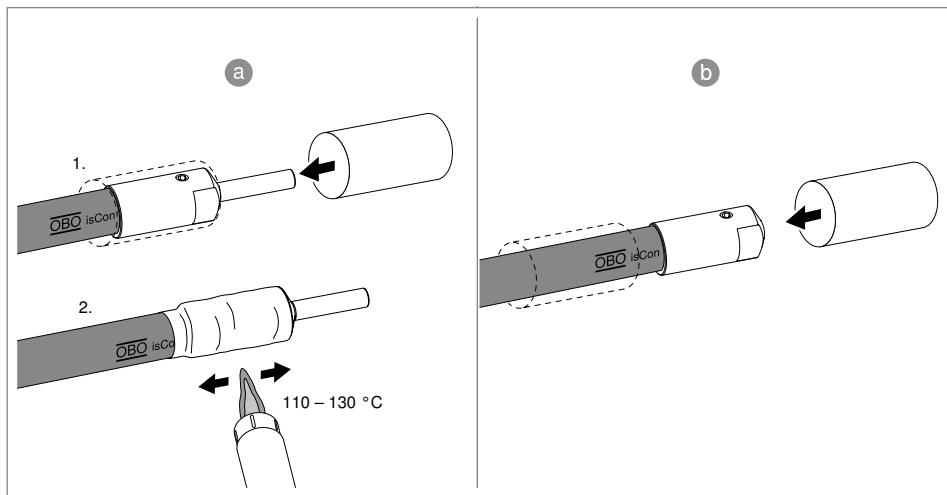


**Fig. 25:** Tightening the grub screws

4. Tighten both grub screws with approx. 10 Nm.

**Note!**

*The yellow, reactive screw lock of the grub screws in the connection element requires approx. 6 hours to harden fully. Only when the screw lock has fully hardened is an increased releasing torque required to release the screws again. This screw connection is then considered a permanent connection.*



**Fig. 26:** Pull on heat-shrinkable sleeve

5. **a** With external connection elements isCon connect, isCon con 2, isCon con PRE and isCon ASE 23:  
Pull the heat-shrinkable sleeve on in such a way that the connection element and conductor transition are enclosed completely. Using a gas torch or hot air at approx. 120 °C, shrink the heat-shrinkable sleeve and let it cool.
- b** With internal connection elements isCon IN connect, isCon IN con 2, isCon IN con PRE and isCon ASE IN 23:  
Pull the heat-shrinkable sleeve on so that the connection element is exposed. Shrinking is done after the air-termination rod has been installed (see chapter „7.3 Assembling the air-termination rod with internal isCon® conductor“ on page 38).

**Note!**

*In the case of the isCon® ASE 23 connection element, when the conductor is routed, the labelling panel for the testing office must be stuck on at the last fastening point.*

### 7.3 Assembling the air-termination rod with internal isCon® conductor

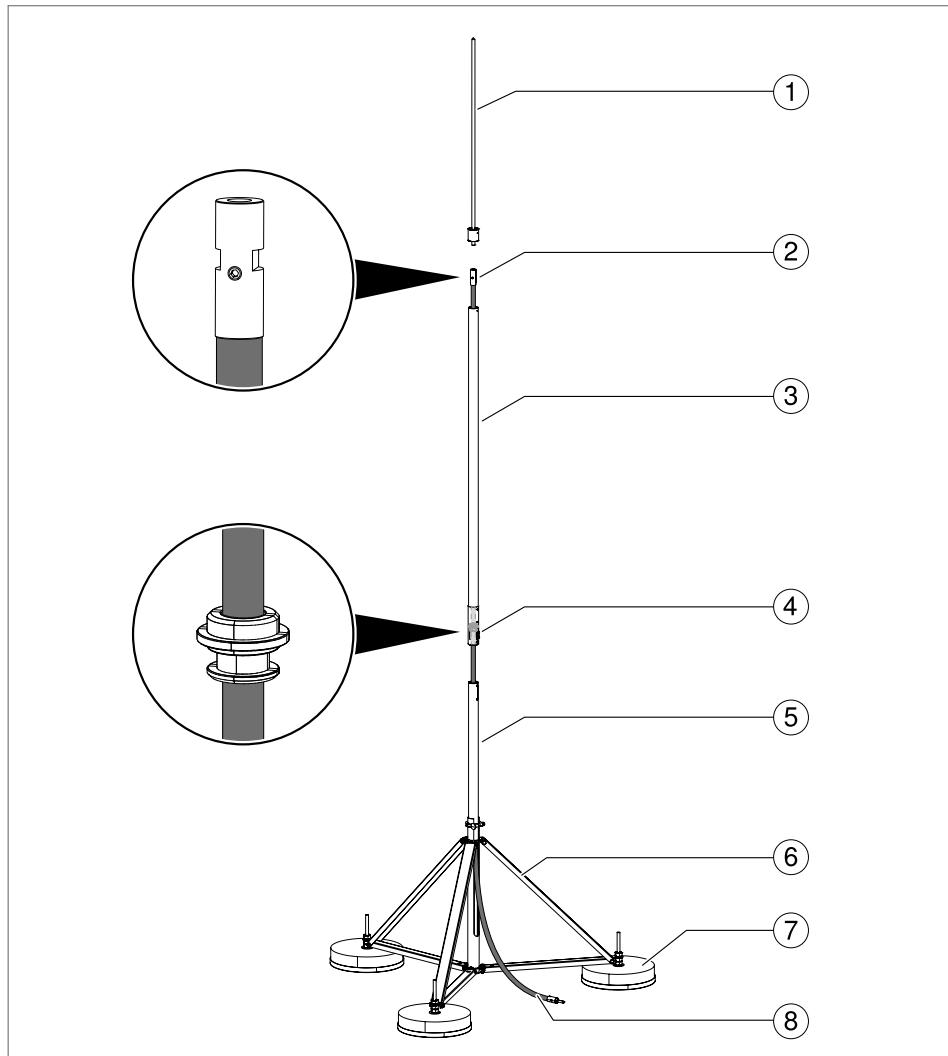


Fig. 27: isFang air-termination rod with internal isCon® conductor

- ① Air-termination rod
- ② Internal connection element
- ③ Insulated central rod
- ④ Potential connection with potential connection element
- ⑤ Retaining mast with side exit
- ⑥ Air-termination rod stand with side exit
- ⑦ Concrete base with edge protection
- ⑧ Internally routed isCon® conductor with connection element

## Assembling the air-termination rod

### Note!

Before assembling the air-termination rod, the isCon® conductor must be prepared in the manner described in „7.1 Preparing the isCon® conductor“ on page 32 and an internal connection element mounted as described in „7.2 Mounting isCon® connection elements“ on page 35.

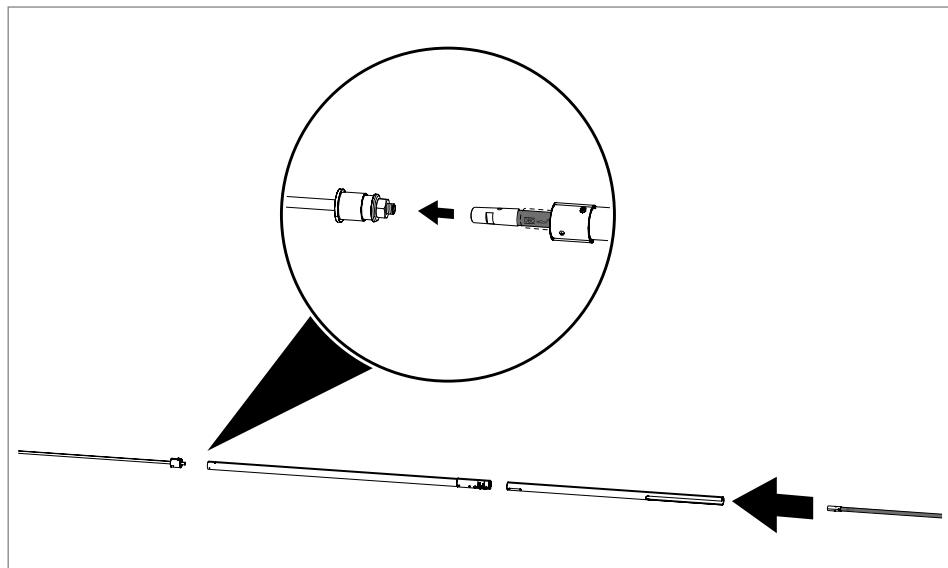


Fig. 28: Pushing the isCon® conductor through the air-termination rod

1. Lay all three parts of the air-termination rod on the ground.
2. From below, run the isCon® conductor through the retaining rod and the central rod.

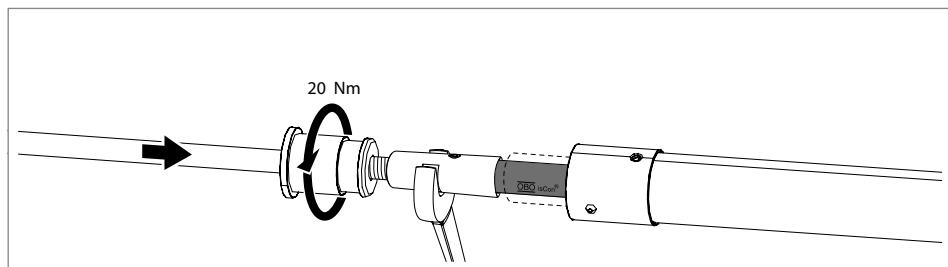
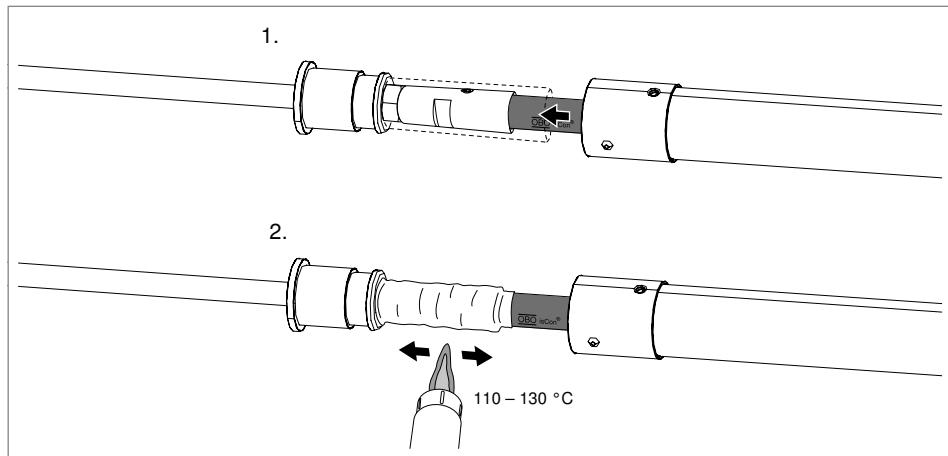


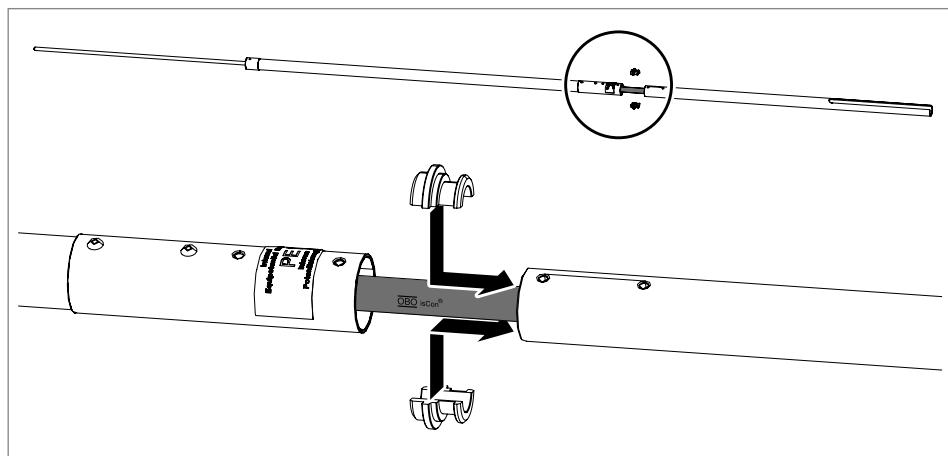
Fig. 29: Screwing the air-termination rod to the connection element

3. Fix the connection element with a fork wrench (WAF 19 mm). Place another fork wrench (WAF 19 mm) on the nut on the thread of the air-termination rod and screw the air-termination rod tight to the connection element with a torque of 20 Nm.



**Fig. 30:** Shrinking the heat-shrinkable sleeve

4. Pull the heat-shrinkable sleeve on in such a way that the connection element and conductor transition are enclosed completely. Using a gas torch or hot air at approx. 120 °C, shrink the heat-shrinkable sleeve and let it cool.

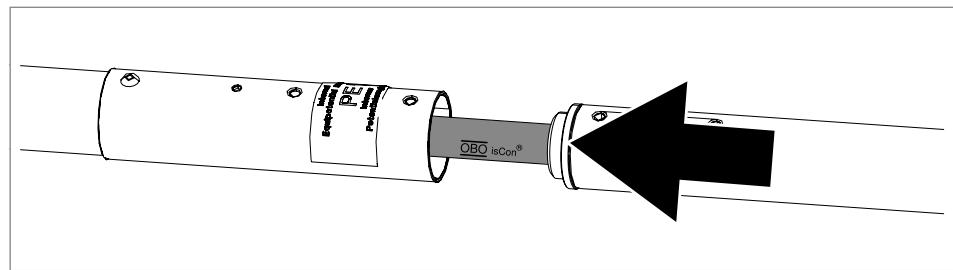


**Fig. 31:** Attaching the internal potential connection element

**Note!**

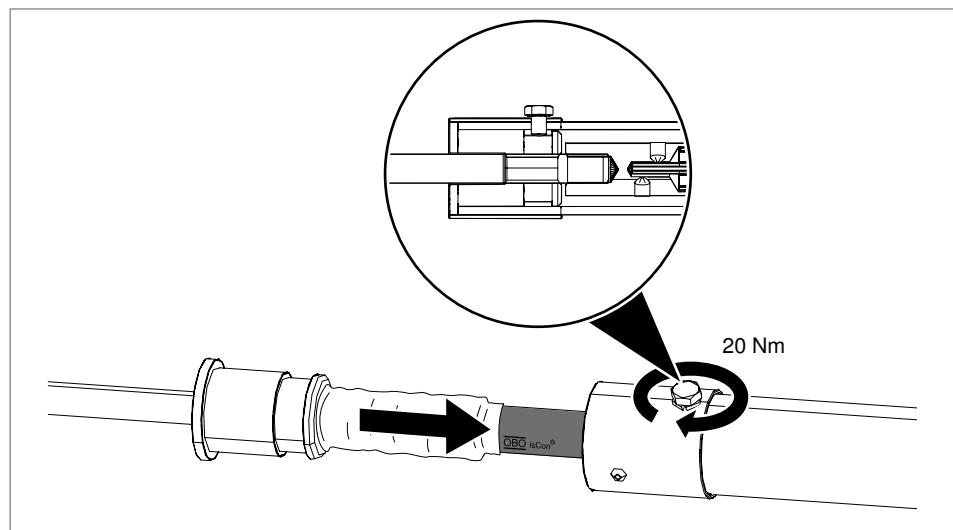
*The internal potential connection element consists of two half shells. These must be located in such a way that they surround the isCon® conductor and one of the half shells is located centrally beneath the screw holes, so that it can be pressed on using the side screw (see also Fig. 33).*

5. Place the two half shells of the potential connection element on the conductor and push them into the retaining pipe.



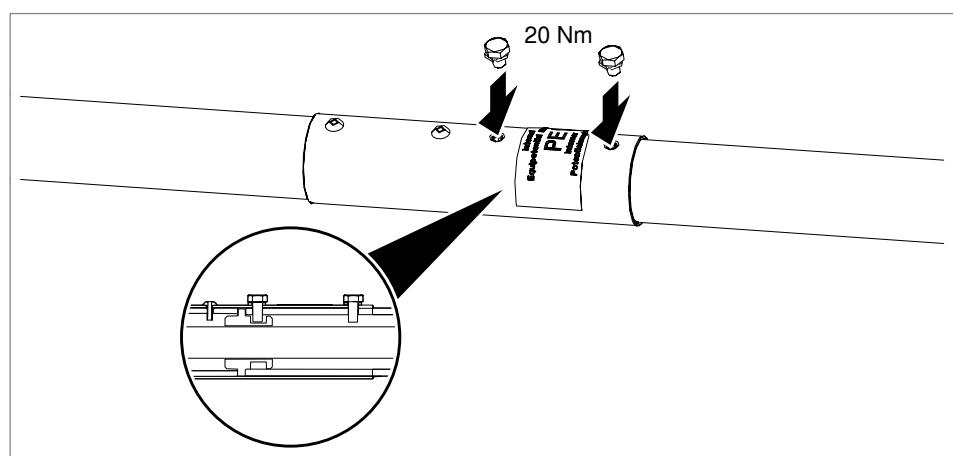
**Fig. 32:** Pushing the retaining rod into the central rod

6. Push the retaining rod as far as it will go into the central rod. In so doing, the opening for the left copper screw (see Fig. 33) may not point to the gap between the half shells of the potential connection, but centrally to one of the half shells. If necessary, turn the half shells accordingly.



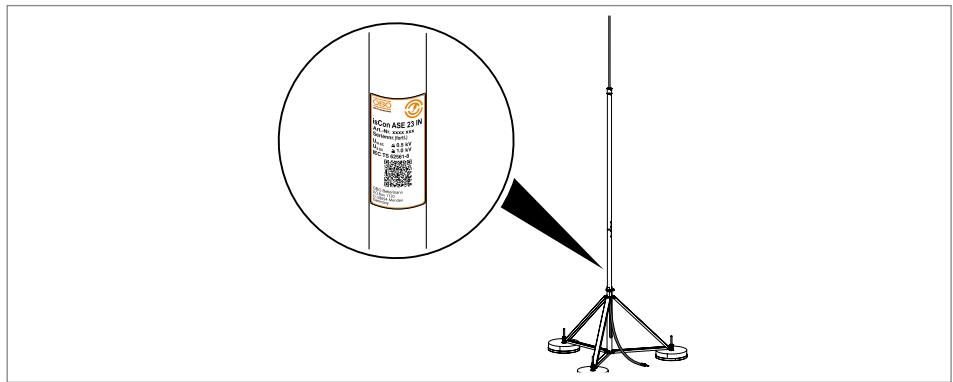
**Fig. 33:** Fixing the air-termination rod in the central mast

7. Insert the bottom part of the air-termination rod into the central mast and fix with the side screw (20 Nm).



**Fig. 34:** Connecting the insulated central rod and the retaining rod

8. Tighten the screws at the connection point of the central rod and the retaining rod (20 Nm).



**Fig. 35:** Sticking on the identification plate

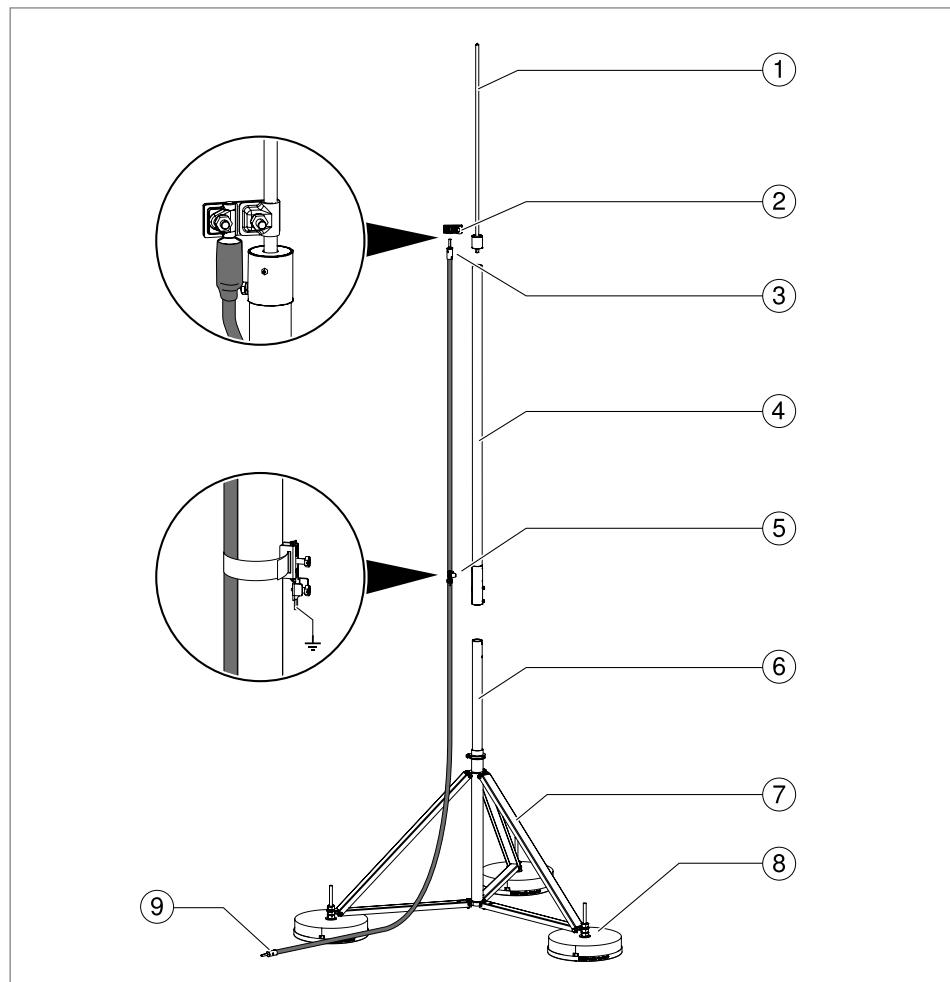
*Only for isCon ASE IN 23 connection element:*

9. Stick the identification plate to the air-termination rod.

Next steps:

- „7.5 Fastening the air-termination rod in the tripod stand“ on page 46 or „7.6 Fastening the air-termination rod to pipes, a wall or T support“ on page 52
- „7.7 Routing the isCon® conductor“ on page 53
- „7.8 Attaching the potential connection“ on page 54

## 7.4 Assembling the air-termination rod with external isCon® conductor



**Fig. 36:** isFang air-termination rod with external isCon® conductor

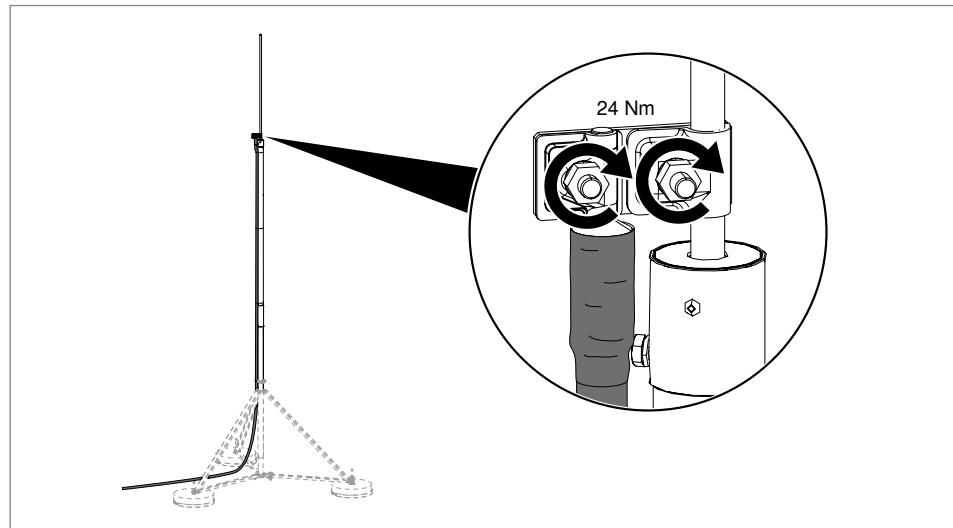
- ① Air-termination rod
- ② Connection plate
- ③ Top connection element
- ④ Insulated central rod
- ⑤ Potential connection with potential connection clip
- ⑥ Retaining rod
- ⑦ Air-termination rod stand
- ⑧ Concrete base with edge protection
- ⑨ isCon® conductor with connection element

## Fastening the isCon® conductor on the air-termination rod

### Note!

Before assembling the air-termination rod, the isCon conductor must be prepared in the manner described in „7.1 Preparing the isCon® conductor“ on page 32 and a connection element mounted as described in „7.2 Mounting isCon® connection elements“ on page 35.

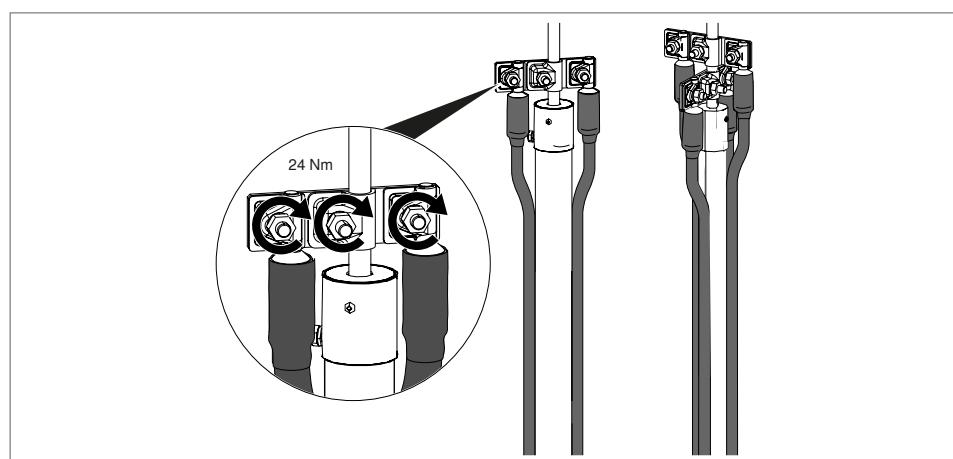
### For one isCon® conductor:



**Fig. 37:** Mounting the connection plate for one isCon® conductor on the air-termination rod

1. Mount the connection plate (type isCon® AP1-16 VA) at the bottom end of the air-termination rod, as shown in Fig. 36. Tightening torque: 24 Nm.
2. Mount the connection element of the isCon® conductor on the connection plate. Tightening torque: 24 Nm.

### For multiple isCon® conductors:

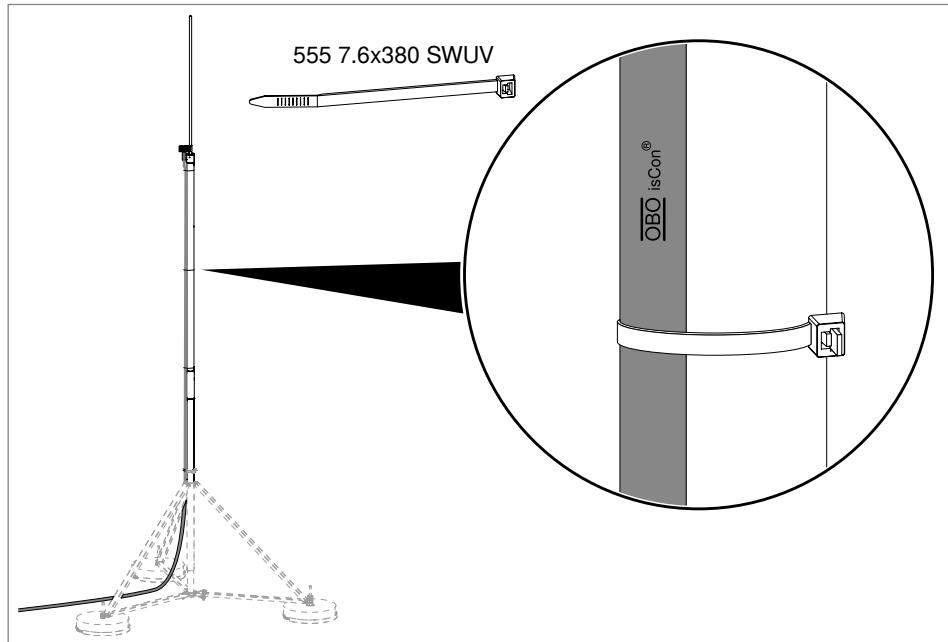


**Fig. 38:** Fastening multiple isCon® conductors on the mast

1. For 2 isCon conductors, use the connection plate for 2 conductors (type isCon AP2-16 VA). When connecting 4 conductors, mount 2 connection plates over each other (see Fig. 37).

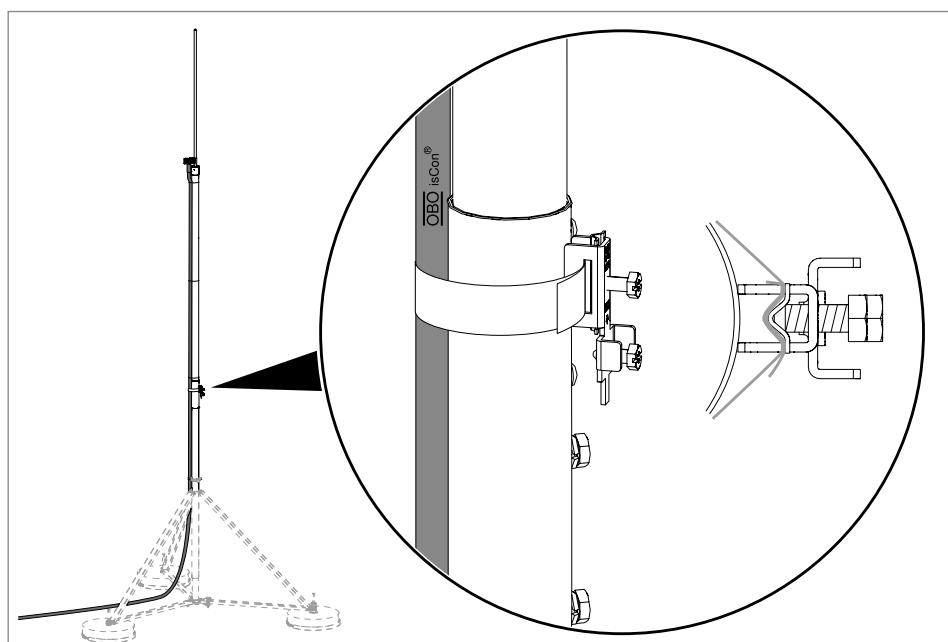
2. Mount the connection element of the isCon® conductor on the connection plate. Tightening torque: 24 Nm.
3. Run the conductors downwards on the air-termination rod, ideally opposite one another (see Fig. 37).
4. Install the conductors as far apart from each other as possible, if the installation conditions permit this.

### Fastening and potential connection



**Fig. 39:** Fastening the isCon® conductor on the air-termination rod using strip clips

1. In addition, fasten the isCon® conductor to the air-termination rod at a maximum distance of 1 metre through non-metallic strip clips (cable ties, type 555 7.6x380 SWUV).



**Fig. 40:** Fastening the potential connection clip to the air-termination rod

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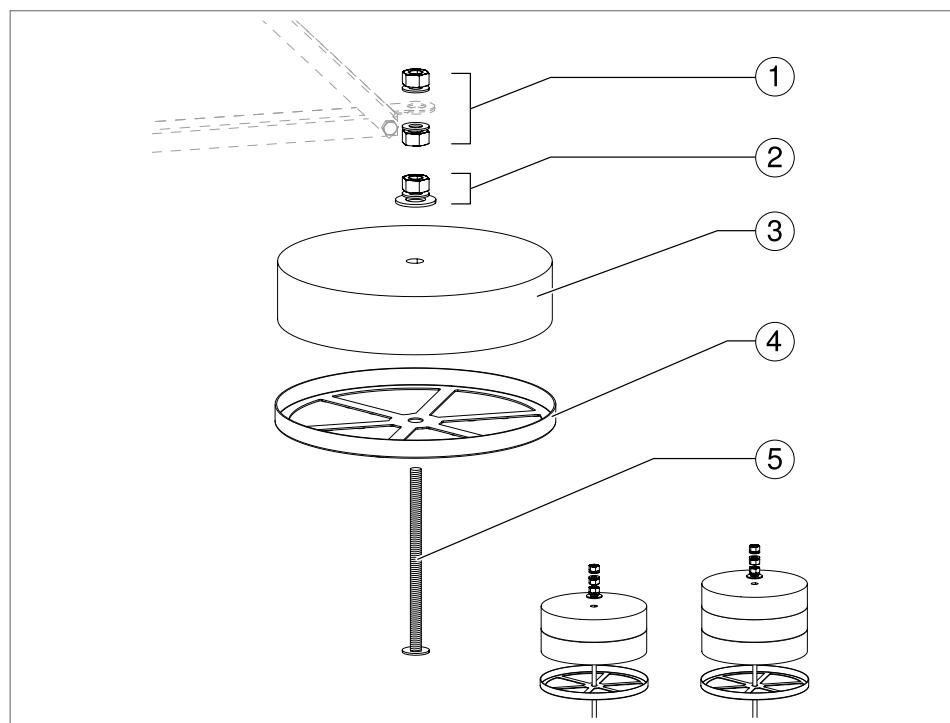
2. Fasten the potential connection clip (type 927 2 6-K) to the metallic element at the lower end of the insulated central rod.

Next steps:

- „7.5 Fastening the air-termination rod in the tripod stand“ on page 46 or „7.6 Fastening the air-termination rod to pipes, a wall or T support“ on page 52
- „7.7 Routing the isCon® conductor“ on page 53
- „7.8 Attaching the potential connection“ on page 54

## 7.5 Fastening the air-termination rod in the tripod stand

### 7.5.1 Mounting the concrete base



**Fig. 41:** Concrete base with fastenings

- ① Hexagonal nuts (with washers) for height compensation
- ② Lock nut (with washer and plate)
- ③ Concrete base
- ④ Edge protection
- ⑤ Threaded rod

From below, push the threaded rod through the opening of the edge protection and the concrete base and fix it with the lock nut.

## 7.5.2 Assembling the tripod stand

### CAUTION

#### **Risk of crushing when erecting the tripod stand!**

When erecting the tripod stand, hands and other limbs may be crushed by moving parts.

When erecting the tripod stand, do not reach between moving parts!

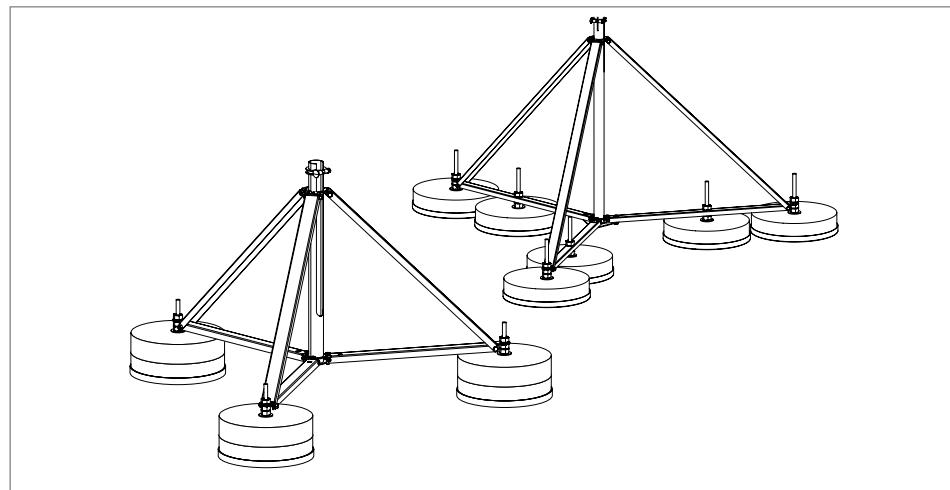
### ATTENTION

#### **Risk of damage!**

When multiple concrete bases are used, the heavy weight can lead to damage to the substrate. If necessary, place protective mats under the concrete base.

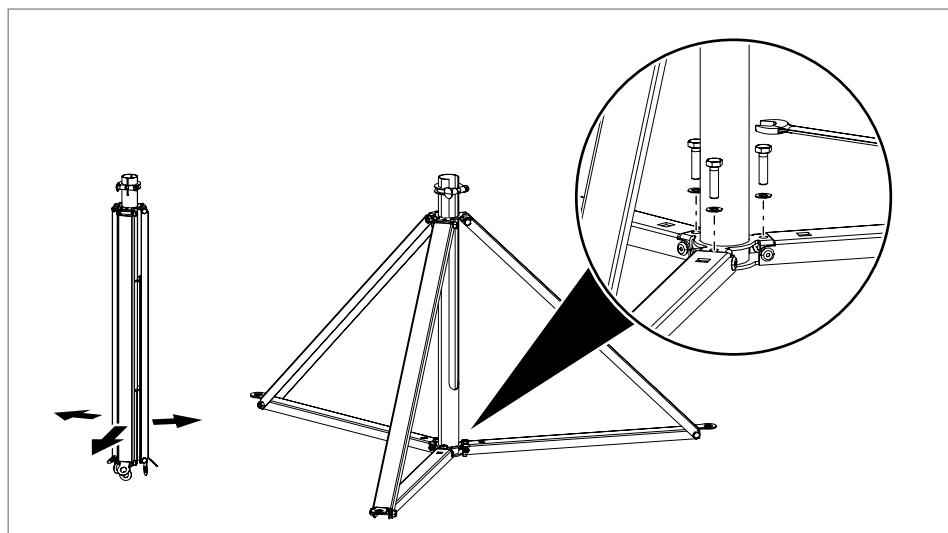
#### **Note!**

*To determine how many concrete bases must be used in the isFang air-termination rod system, we recommend asking a planning office to carry out the static calculations. You can find further information on wind speed zones in the OBO TBS lightning protection guide and national directives.*



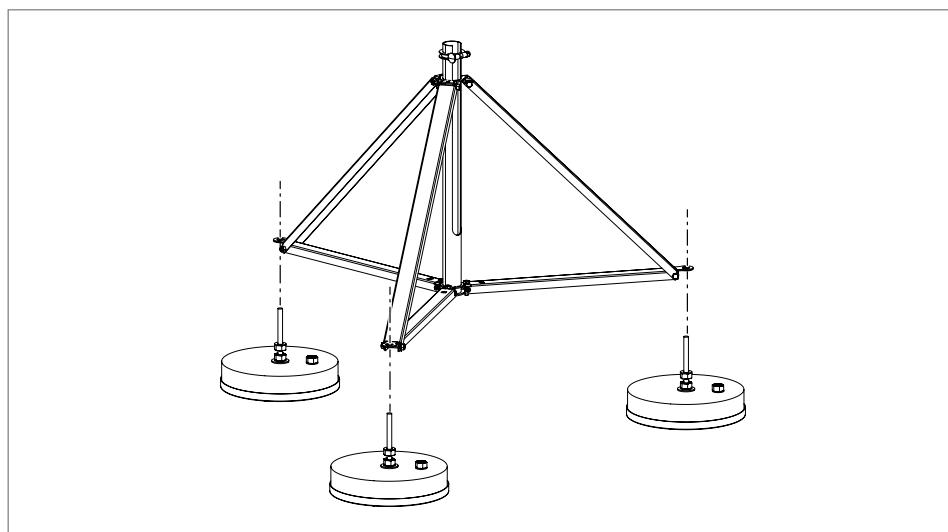
**Fig. 42:** Mounted concrete base

1. Remove the lock nuts on the threaded rods.



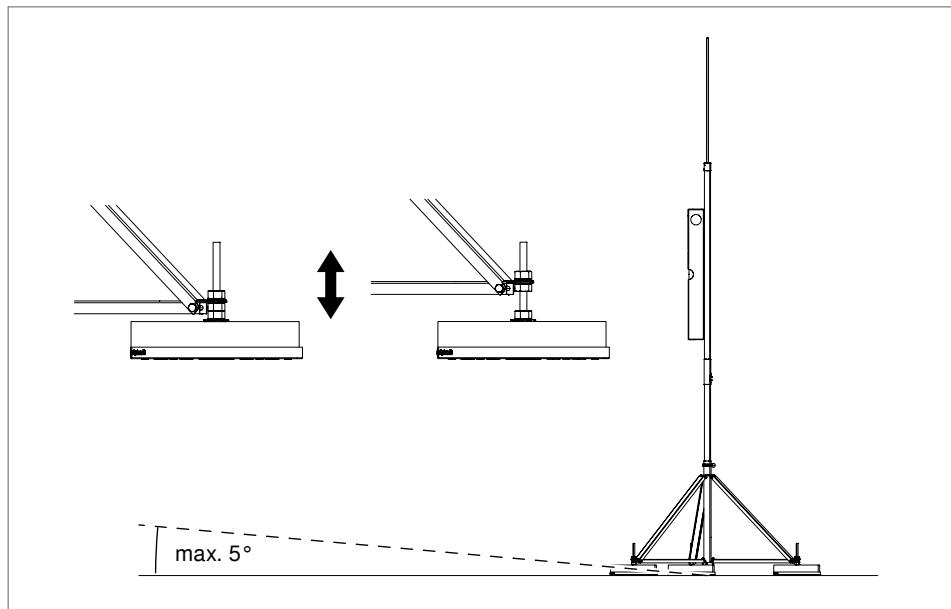
**Fig. 43:** Unfolding and fixing the tripod stand

2. Unfold the tripod stand.
3. Fix the tripod stand by screwing in the three locking screws and the spring washers.
4. Check that all the screws on the hinges fit tightly, and retighten as necessary.



**Fig. 44:** Positioning the tripod stand

5. Position the air-termination rod stand on the concrete bases.

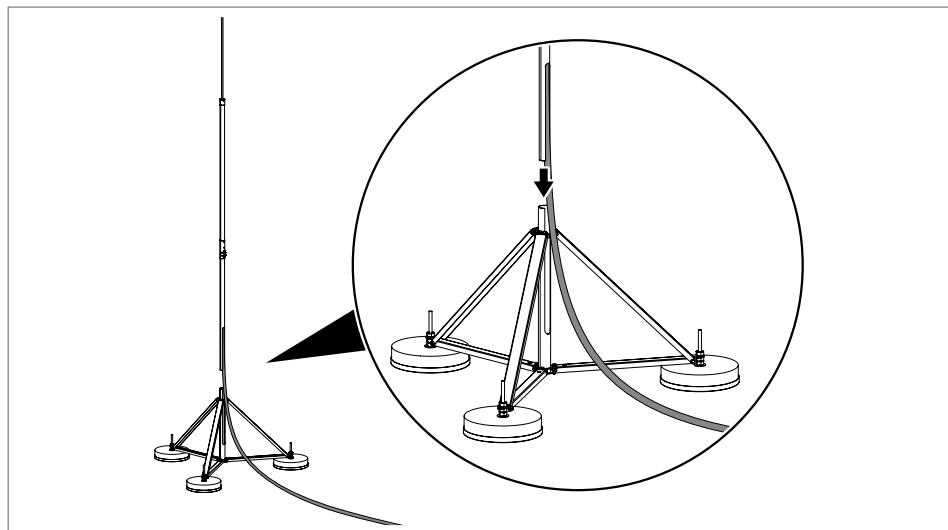


**Fig. 45:** Compensating for the roof slope

6. Determine the inclination of the tripod stand (depending on the slope of the roof) using a spirit level.
7. Compensate for the inclination of the tripod stand using the hexagonal height-compensation nuts (max. 5 degrees).
8. Tighten the lock nuts.

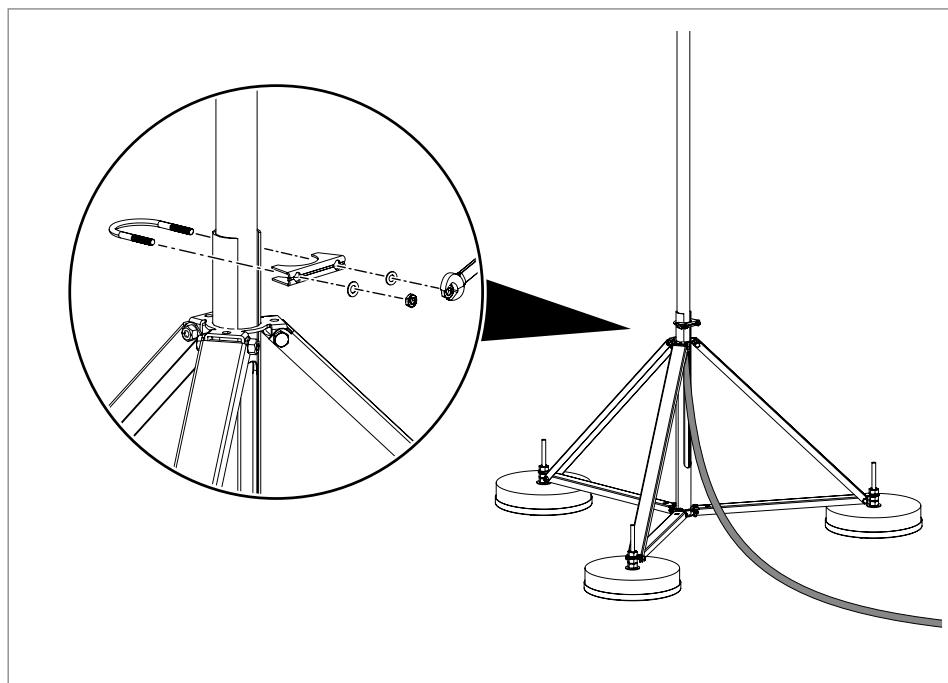
### 7.5.3 Fastening the air-termination rod in the tripod stand

#### Air-termination rod with internal isCon® conductor



**Fig. 46:** Inserting the air-termination rod in the tripod stand

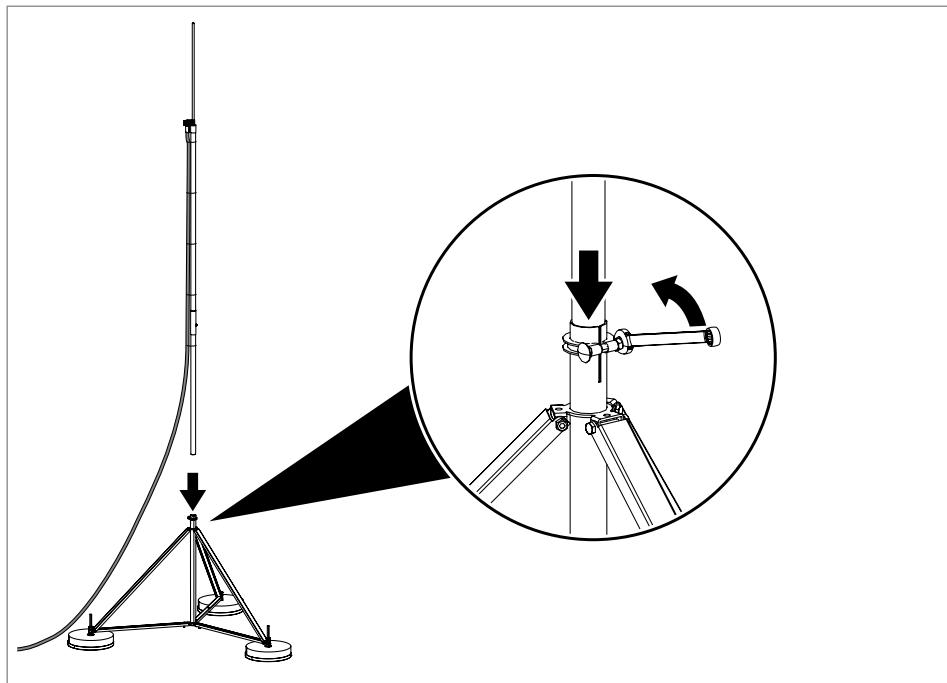
1. Insert the air-termination rod in the tripod stand from above.



**Fig. 47:** Fastening the air-termination rod in the air-termination rod stand

2. Tighten the clamp clip, thus fixing the air-termination rod.

## Air-termination rod with external isCon® conductor

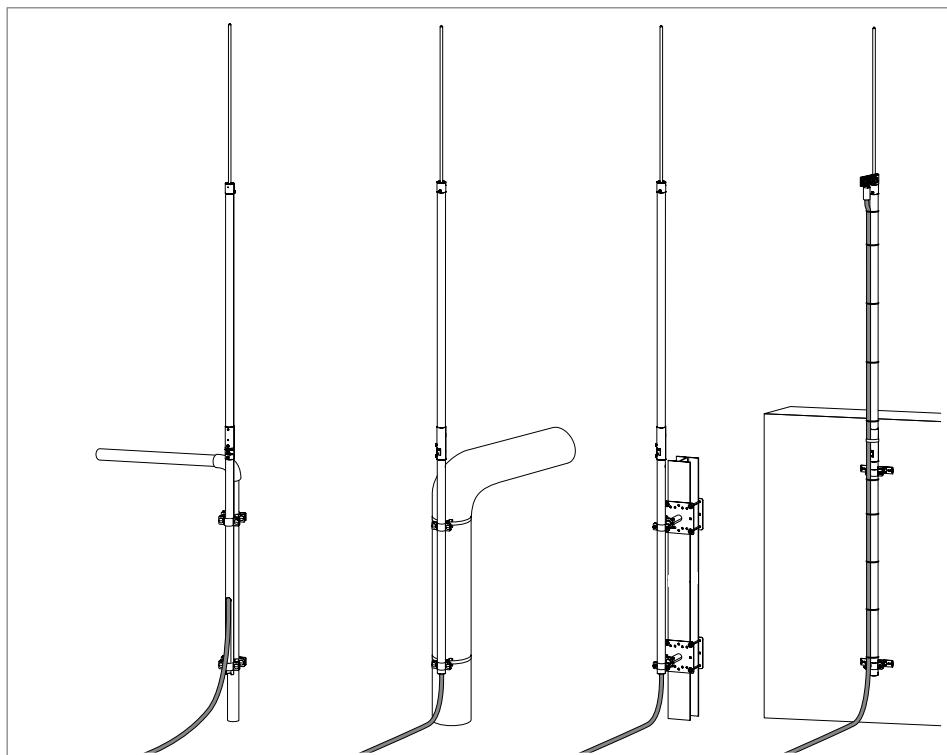


**Fig. 48:** Fixing the air-termination rod in the air-termination rod stand

1. Insert the air-termination rod into the air-termination rod stand from above.
2. Tighten the clamp clip, thus fixing the air-termination rod.
3. In addition, fasten the isCon® conductor to the air-termination rod stand using strip clips (cable ties), whilst maintaining the minimum bend radius (see Tab. 2 on page 11) of the isCon® conductor to the ground.

## 7.6 Fastening the air-termination rod to pipes, a wall or T support

The isCon® system can offer supports for fastening to pipes, walls or T supports for mounting isFang air-termination rods with air-termination rod stands (see „5.5.2 Air-termination rod support for isFang mounting“ on page 18). This applies to air-termination rods with openings at the side or the bottom, as well as to rods with an external isCon® conductor.



**Fig. 49:** Fastening air-termination rods to pipes, walls or T supports

Please note:

- Fasten the air-termination rod to the building structure using the supports listed in Tab. 7 on page 19 and suitable fastening materials.
- In the case of a non-metallic building structure, connect the equipotential bonding directly to the equipotential bonding of the air-termination rod (see „7.8 Attaching the potential connection“ on page 54).

**Note!**

*In the case of a metallic, earthed building structure, the equipotential bonding is created using the metallic fastening clips of the air-termination rod. No additional connection is required.*

## 7.7 Routing the isCon® conductor

When routing the isCon® conductor to the forwarding conductor system, observe the following information:

- The complete isCon® conductor must be located in the protection area of the lightning protection system.
- If there is a lightning strike, the upstand on the edge of the flat roof (parapet) must not carry lightning current and must therefore be completely in the protection angle of the lightning protection system.
- The black conductor may not be routed in the earth or painted. For routing in the earth or if painting is planned, use the grey isCon Pro+ 75 GR conductor.
- Only use the accessories for fastening (see „5.5.3 Holders for the isCon® conductors“ on page 19).
- The isCon® conductor may only be connected onward using the OBO connection elements of the appropriate isCon® variant.
- An isCon® conductor may not be extended.
- When making route changes, maintain the minimum bend radius (see Tab. 2 on page 11).
- Route the isCon® conductor in such a way that it cannot be damaged by sharp-edged objects.
- If the isCon® conductor is damaged, the entire section must be replaced, as otherwise the correct function cannot be guaranteed. This does not apply to the isCon® conductors Pro+ 75. The Pro+ 75 variants may exhibit any damage to the grey external jacket and/or protective jacket, if they are not used as touch protection. However, the protective jacket must also be continuously present, even in cases of damage, and have a thickness of 0.2 mm. The black, weakly conductive layer may not be damaged or interrupted.
- Ensure that the conductor is connected to the equipotential bonding of the structure as described in section 7.8. Create additional equipotential bonding for metallic objects which cross or run in parallel (see „7.8.5 Installing additional potential connections“ on page 61).
- Special measures must be complied with for routing in potentially explosive areas (see „6.4 Installation in potentially explosive areas“ on page 29).
- No point of the protective jacket or black, weakly conductive layer of the isCon® conductor may come into contact with parts carrying lightning current.
- Elements fastening the isCon® conductor may be spaced a maximum of 1 metre apart.

## 7.8 Attaching the potential connection

Energy is run through the connected isCon® conductor to the building's lightning conductor system. To prevent surface discharge moving away along the surface, the isCon® conductor must be connected to the equipotential bonding of the structure in the area of the two connection points.

The potential connection can be made via metallic and earthed roof structures, via generally earthed parts of the building structure and via the protective conductor of the low-voltage system.



### WARNING

#### Risk of function loss!

Metallic chips from the connection area of the conductor could cause a short circuit between the connection element and potential connection if there is a lightning strike.

This can disrupt the arresting function of the insulated conductor. Floating discharges may occur.

After installation, clean the connection area of metallic chips.



### WARNING

#### Danger of lightning currents entering the building!

If, during a thunderstorm, a lightning strike runs lightning currents into the building, the coupled currents can destroy devices, cause fires and endanger lives.

If there is a lightning strike, the equipotential bonding must not carry lightning current and must be in the protection angle of the lightning protection system.

#### Note!

*When using the grey isCon® conductor, the light grey external jacket must be removed before connecting the potential connection (see „7.1.2 Stripping the grey external jacket (isCon Pro+ 75 GR)“ on page 33).*

#### Note!

*Before attaching a potential connection element (e.g. clip), clean the black, weakly conductive layer or the protective jacket of the isCon® conductor of grease and other impurities to improve the electrical conductivity, e.g. using a cleaning cloth type isCon EPPA 004 (item No. 5408060).*

### 7.8.1 Installing the potential connection on an insulated air-termination rod

#### Note!

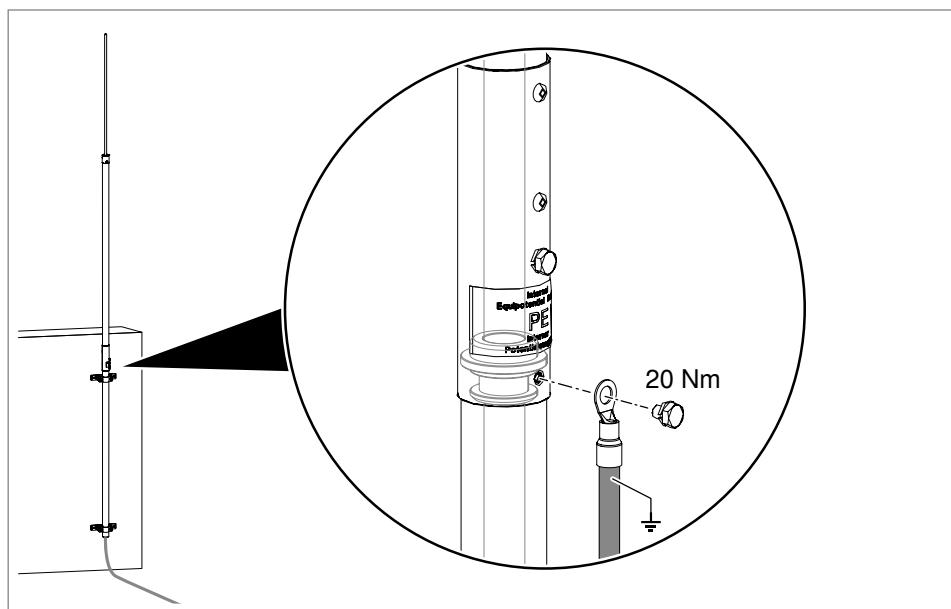
*The isCon® conductor of type isCon Basic 45 does not require equipotential bonding on the internal or external potential connection element.*

With a calculated separation distance of  $s \leq 0.75$  metres, a distance of  $x = 1.5$  metres must be maintained between the top connection element and the following connection for the equipotential bonding (see Fig. 13 on page 23, No. ④). The design of the isFang air-termination rod provides this distance through its 1.5 metre-long central rod.

The potential connection on the insulated air-termination rod must be designed differently for air-termination rods with internal and external conductor.

### Internal isCon® conductor

In the case of isFang air-termination rods with an internal isCon® conductor, the potential connection must be connected via the potential connection element, which is located internally (see also Fig. 30 and Fig. 33). The potential connection must be brought into contact with the potential connection element via the bottom screw and also with the black, weakly conductive layer or the protective jacket of the isCon® conductor.

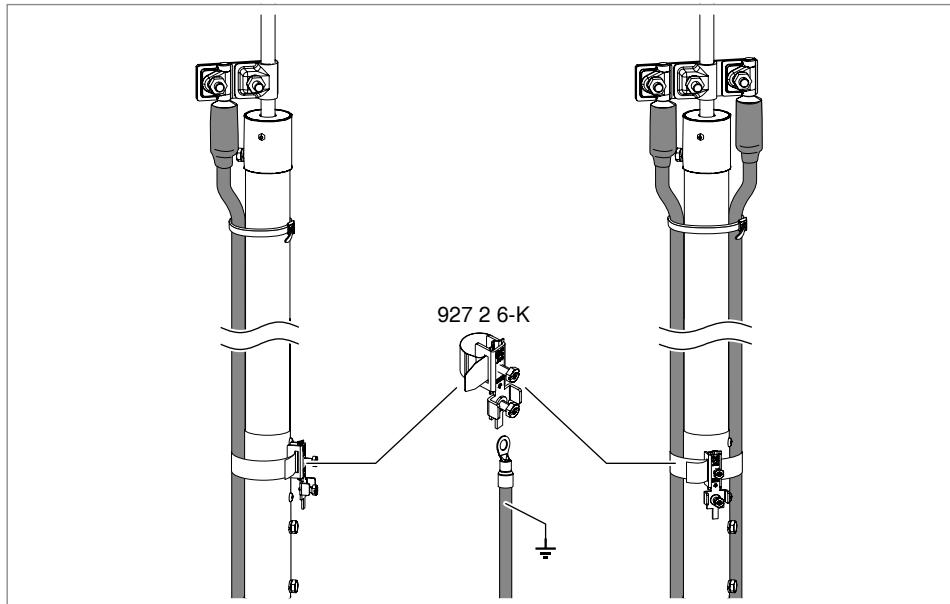


**Fig. 50:** Connecting the potential connection to the air-termination rod using a cable lug

1. Slacken the bottom screw as shown in Fig. 49.
2. Connect the protective equipotential bonding of the metallic object to be protected with the internal potential connection element, e.g. with a cable lug.
3. Tighten the bottom screw again (20 Nm).

## External isCon® conductor

In the case of isFang air-termination rods with an external isCon® conductor, the potential connection must be created using the potential connection clip, type 927 2 6-K. The potential connection clip is used both to fix the conductor and to earth it, as well as to earth the air-termination rod and the tripod stand.



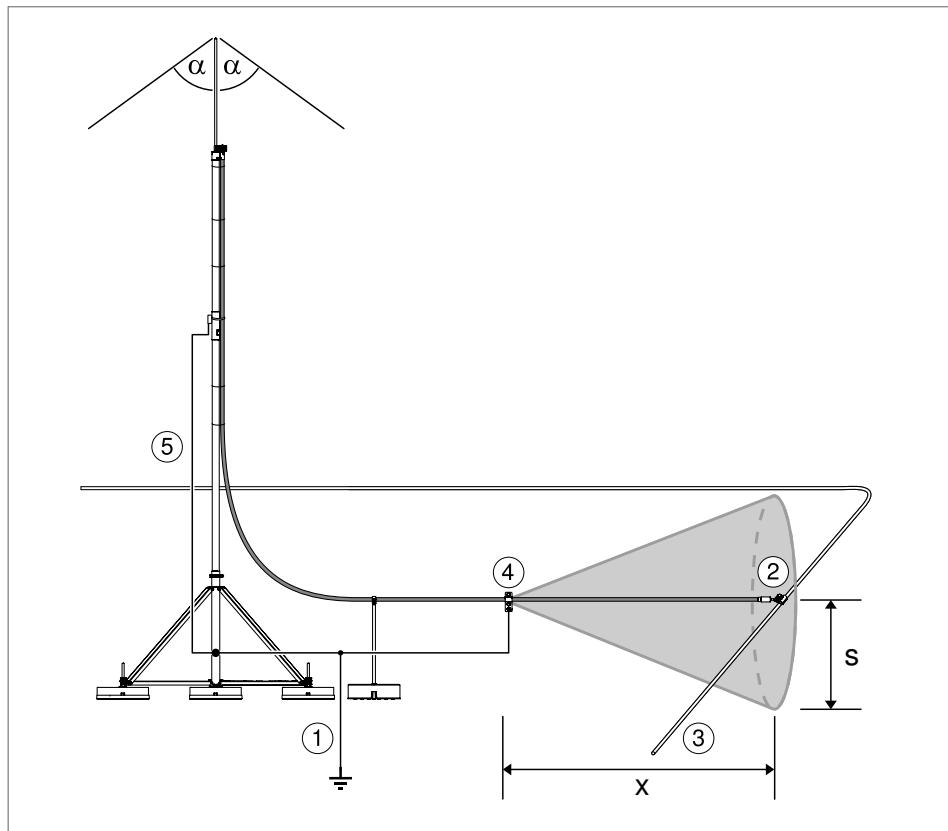
**Fig. 51:** Creating equipotential bonding on the air-termination rod with external isCon® conductor

### 7.8.2 Installing the potential connection on the end of the isCon® conductor

The black, weakly conductive layer of the isCon® conductor must be included in the protective equipotential bonding of the building to be protected (see Fig. 51 No. ①). It is important that a specific minimum distance (x) is maintained between the connection element of the isCon® conductor ② on the conductor carrying the lightning current ③ and the upstream potential connection terminal ④, in order to prevent surface discharge along the high-voltage-resistant isCon® conductor.

#### Note!

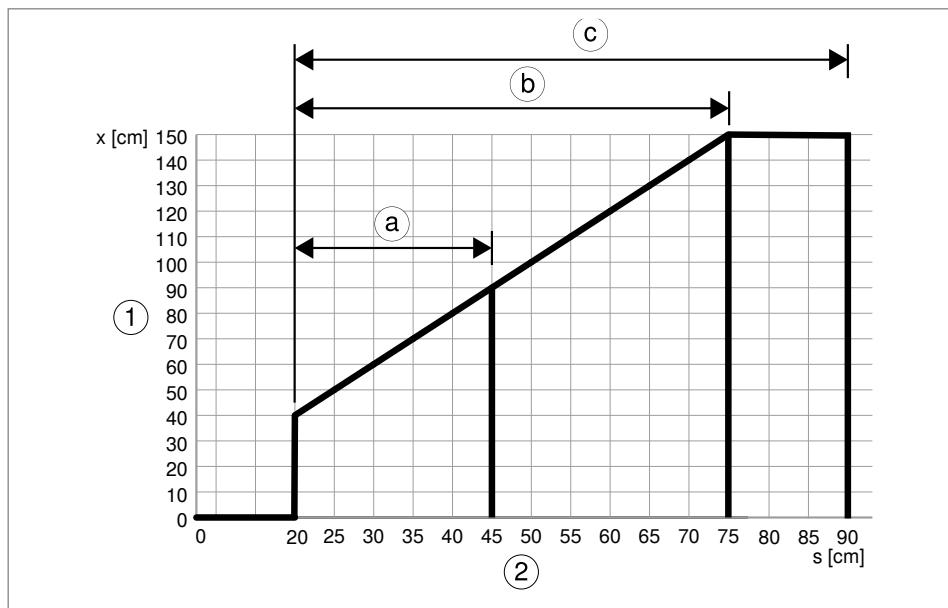
*When the isCon Basic 45 conductor is installed, there is no equipotential bonding connection on the air-termination rod ⑤ (see „7.8.1 Installing the potential connection on an insulated air-termination rod“ on page 54).*



**Fig. 52:** Minimum distance ( $x$ ) between the connection element and the equipotential bonding

**Note!**

*The minimum distance ( $x$ ) can be derived from the calculated separation distance (see „6.2 Calculating, checking and maintaining the separation distance“ on page 26). Use the **formula  $x = s * 2$** , in order to calculate the minimum distance ( $x$ ) necessary (see also Fig. 52).*



**Fig. 53:** Minimum required distance between the connection element and the potential connection terminal in air

- ① Clip distance (x) from the potential connection terminal to the connection element in centimetres
- ② Calculated separation distance (s) in centimetres
- ③
  - (a) isCon BA 45 SW
  - (b) isCon Pro+ 75 SW/GR and isCon Pro 75 SW
  - (c) isCon PR 90 SW

Example:

If the calculated separation distance is 60 cm, then the variants isCon® Pro, Pro+ or Premium can be used. Install the potential connection terminal 120 cm in front of the connection element.

**Note!**

*If the calculated separation distance is less than the appropriate tested equivalent separation distance in air, you can reduce the distance between the potential connection terminal and the connection element (x) accordingly.*

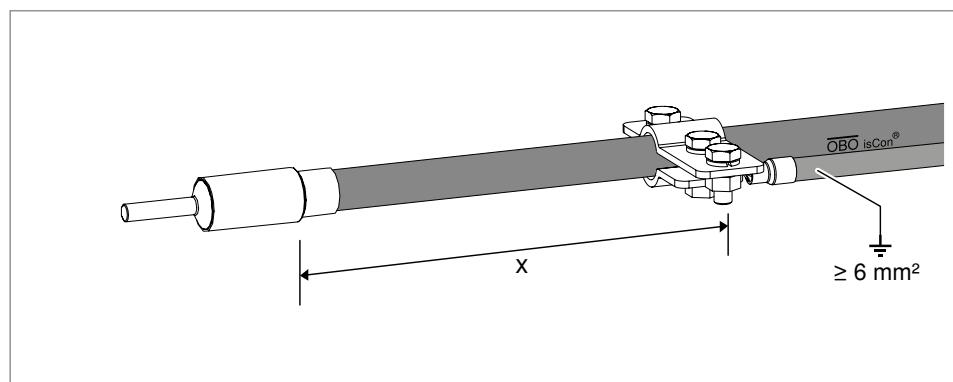
If the calculated separation distance 2 is less than 20 cm, then no additional potential connection is required in front of the rear connection element.

**Note!**

*The conductor type isCon BA 45 SW (Basic) can be routed with or without potential connection. If the conductor is routed without a potential connection, observe „7.8.3 Routing the isCon® conductor without potential connection (up to 45 cm separation distance)“ on page 60.*

In addition, observe the following when connecting the equipotential bonding:

- Do not locate any electrically conductive or earthed parts within the calculated separation distance  $s$  in the area between the potential connection and the connection element (see Fig. 51). These include, for example, metallic construction parts, conductor holders and assemblies.
- Connect the potential connection terminal to the equipotential bonding with  $\geq 6 \text{ mm}^2 \text{ Cu}$  or a material with identical conductivity (see Fig. 53).

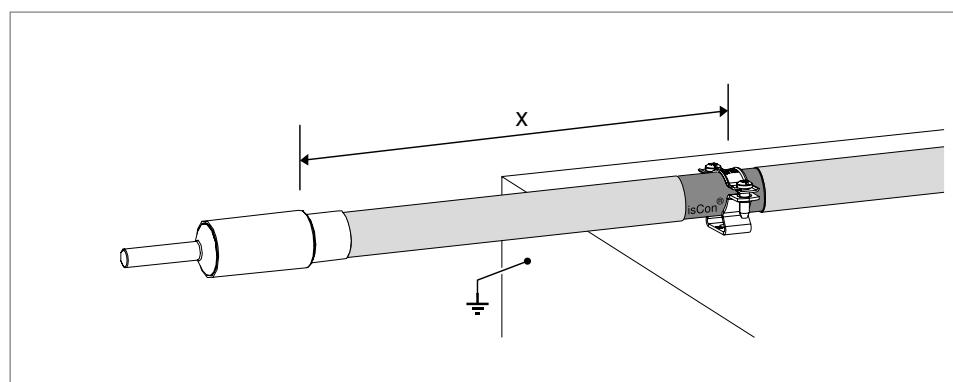


**Fig. 54:** Distance between the connection element and the potential connection terminal

With metallic, earthed substrates, use the metallic conductor holder. When screwed directly to the substrate, it also provides equipotential bonding.

**Note!**

*When using the grey isCon® conductor, the light grey external jacket must be removed in the area of the conductor holder (see „7.1.2 Stripping the grey external jacket (isCon Pro+ 75 GR)“ on page 33).*



**Fig. 55:** Equipotential bonding using isCon H VA conductor bracket on metallic substrate, grey external jacket removed in contact area.

### 7.8.3 Routing the isCon® conductor without potential connection (up to 45 cm separation distance)

The isCon® conductor can also be routed without a potential connection. When mounted without a potential connection, the minimum distance (x) must be complied with in both directions, starting from the last insulated spacer. There may be no electrically conductive parts within the perimeter of the calculated separation distance (s) (see Fig. 55).

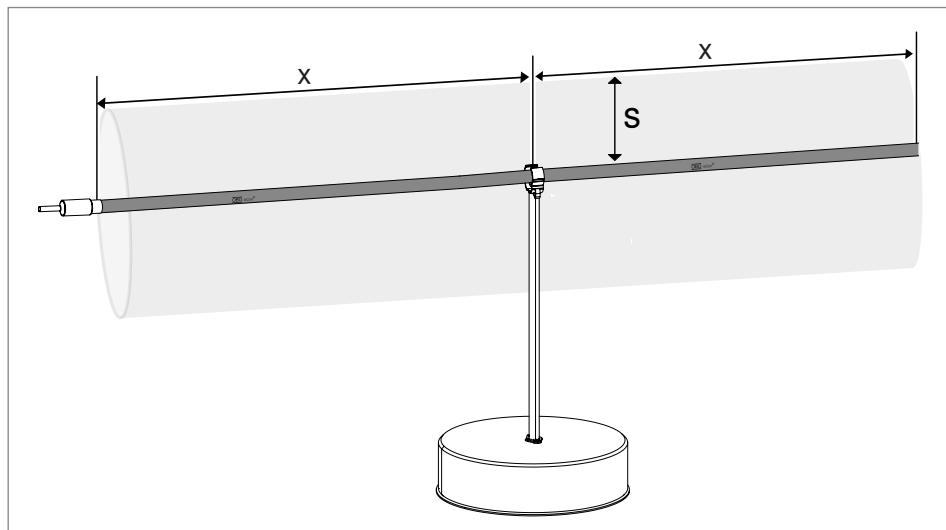


Fig. 56: Mounting variant for the isCon® conductor without potential connection

### 7.8.4 Including the tripod stand in the functional equipotential bonding

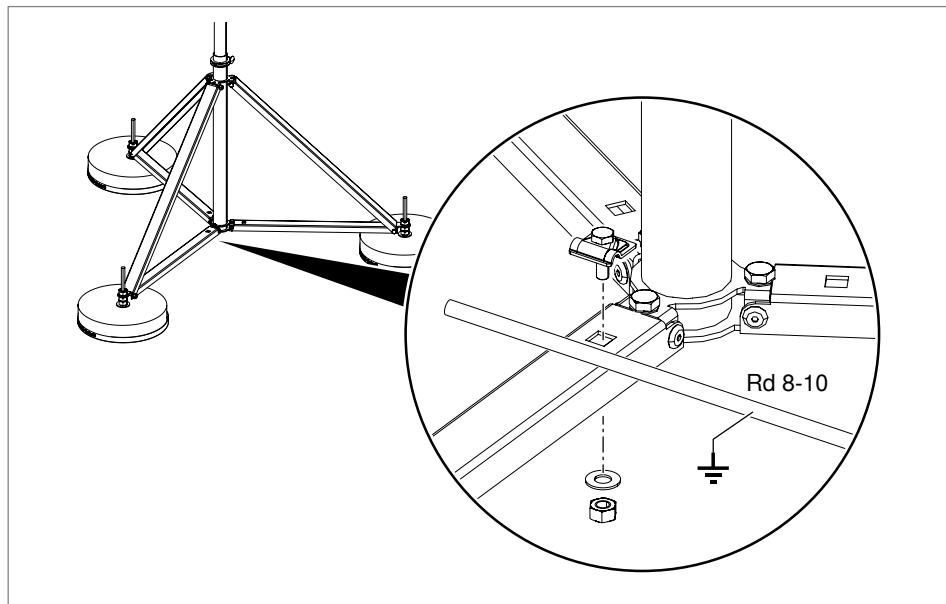


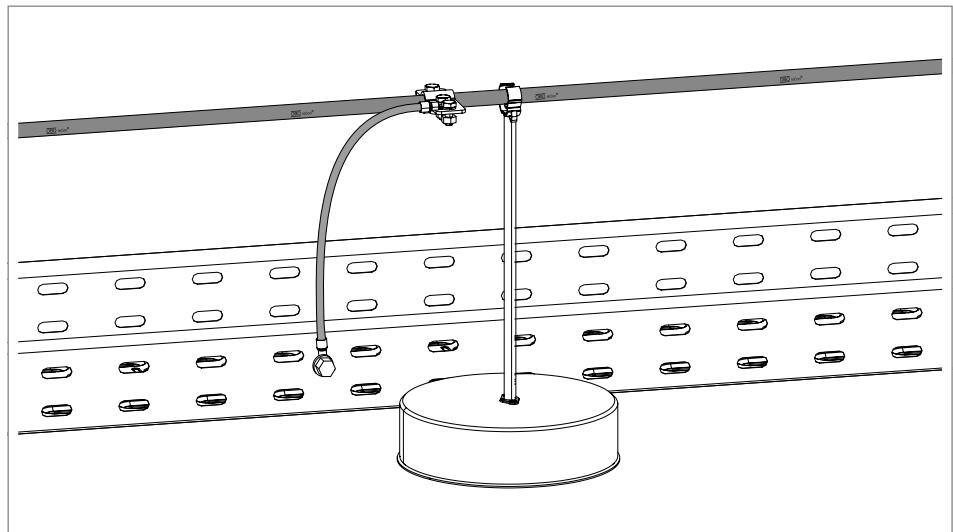
Fig. 57: Connection of the equipotential bonding to the insulated tripod stand

1. Fasten the crossbar (included in scope of delivery) to the air-termination rod and connect a round conductor Rd 8-10 to the equipotential bonding of the building.

### 7.8.5 Installing additional potential connections

If the isCon® conductor crosses earthed, metallic installations, or is run in parallel to them, then we recommend additional measures to improve the equipotential bonding.

To do this, connect the isCon® conductor multiple times with these installations, e.g. cable racks, pipelines or parapet plates, after the first potential connection using the potential connection element.



**Fig. 58:** Creating additional equipotential bonding

### 7.8.6 Creating additional equipotential bonding for isCon Pro+ in potentially explosive areas

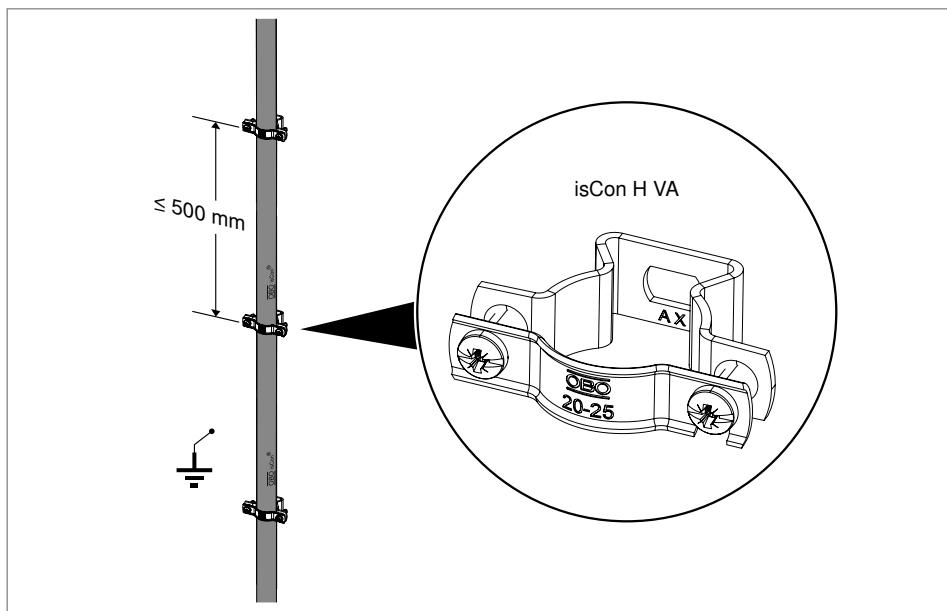
The following information explains the creation of the equipotential bonding of installations in potentially explosive areas. See also „6.4 Installation in potentially explosive areas“ on page 29.

In Ex zones 1 and 21, connect the isCon® conductor to the equipotential bonding at regular intervals ( $\leq 0.5$  metres). To do this, bring the protective jacket into contact with metallic conductor holders, e.g. isCon H VA or PAE.

#### Routing on earthed, metallic building structures

For routing along an earthed, metallic building structure (e.g. electrically conductive connected metal facades, steel structures or mesh structures):

- Use the metallic conductor holder to fasten the conductor to the building structure.
- Connect the metallic building structure with the equipotential bonding or with the earthing system.

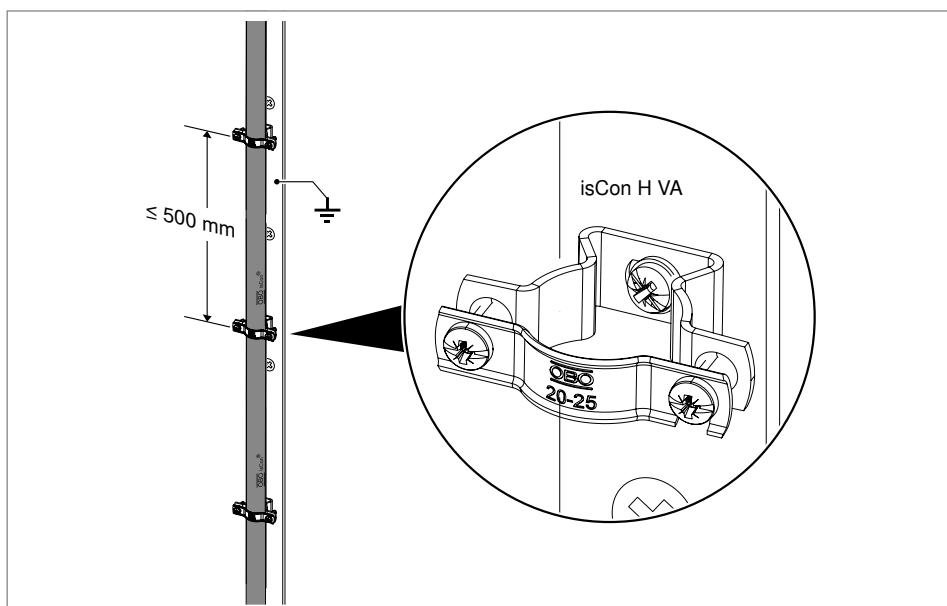


**Fig. 59:** Equipotential bonding of the isCon® conductor on a metallic surface in a potentially explosive area

### Routing on non-conductive building structures

When routed along a non-conductive building structure (e.g. stone, concrete or wood):

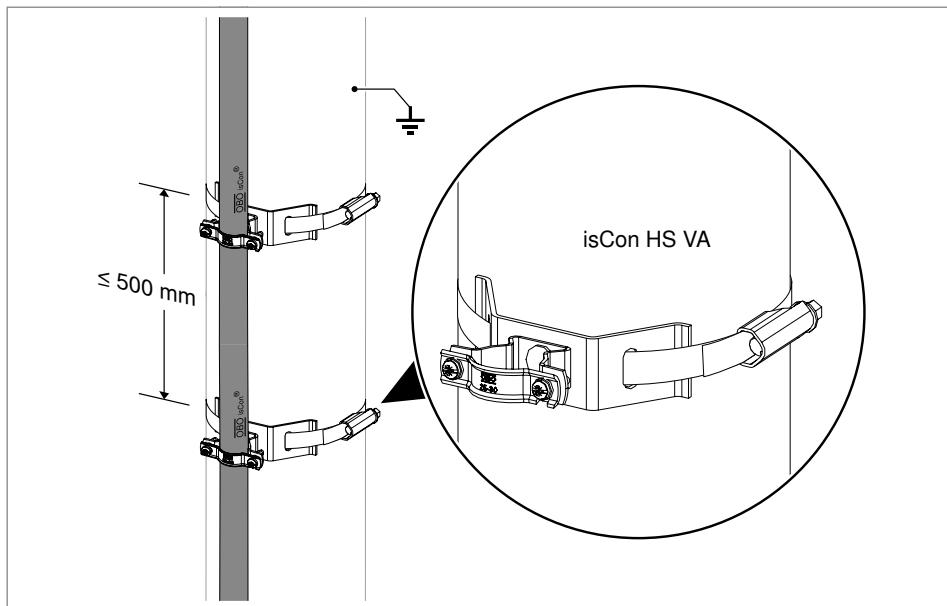
- Route electrically conductive connection rails (e.g. flat conductor, type 5052 V2A 30x3.5) parallel to the isCon® conductor, which connect it with the functional equipotential bonding of the building.
- Fasten the metallic isCon H VA conductor holder for the isCon® conductor to it.



**Fig. 60:** isCon® conductor in potentially explosive area with isCon H VA conductor bracket mounted on a flat conductor

## Routing along metallic pipes

Connect the potential connection element to metal pipes routed in parallel (equipotential bonding conductors) and connected to the building's equipotential bonding at regular intervals.



**Fig. 61:** Running the isCon® conductor on an earthed pipe in a potentially explosive area

## 8 Mounting variants

### 8.1 Separate lightning protection ring conductor

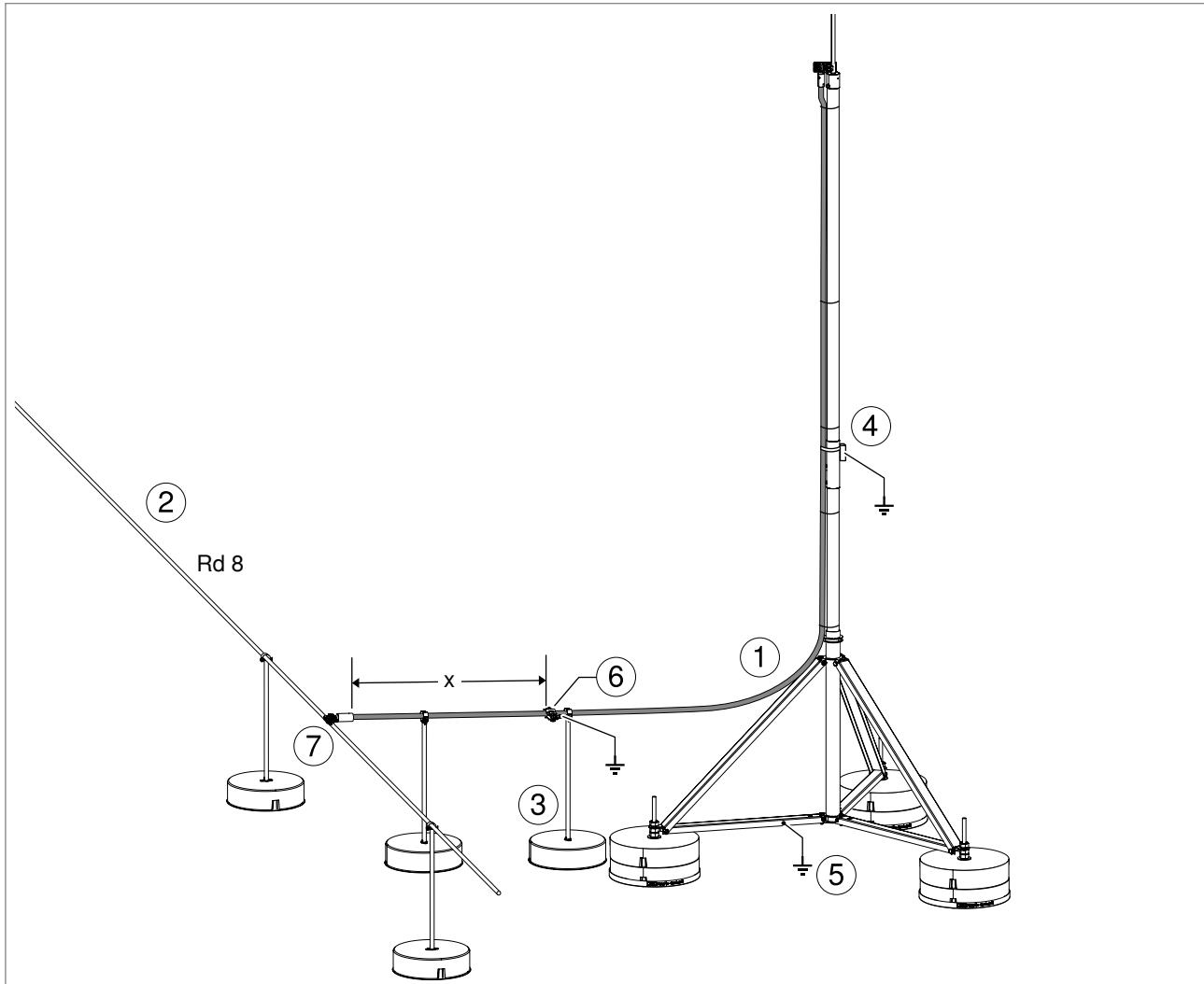
In the following example, the isCon® conductor ① is to be connected to a stand-off lightning protection ring conductor ②. For this, we recommend the air-termination rod stand with external isCon® conductor. This is shortened to the right height using spacers ③ (type isCon® DH), run to the ring conductor and connected, e.g. using Vario quick connectors.

The potential is connected to the protective equipotential bonding on the air-termination rod via the potential connection clip ④ (type 927 2 6-K). Alternatively, the potential can be connected at the air-termination rod stand ⑤, provided that the potential connection clip ④ is mounted, creating the electrical connection between the black, weakly conductive layer or the protective jacket of the isCon® conductor and the air-termination rod.

At the end of the isCon® conductor, the potential is connected with a potential connection terminal ⑥ (type isCon® PAE) to the lightning protection ring conductor in front of the connection element ⑦. The distance  $x$  (= separation distance  $s$  multiplied by two) between the potential connection terminal ⑥ and the rear connection element ⑦ should be noted.

**Note!**

The conductor type *isCon BA 45 SW (Basic)* can be routed with or without potential connection. If the conductor is routed without a potential connection, observe „7.8.3 Routing the *isCon*® conductor without potential connection (up to 45 cm separation distance)“ on page 60.



**Fig. 62:** *isCon*® conductor connected to stand-off ring conductor

## 8.2 Metallic roof parapet

If there is a metallic roof parapet ① which is used as a natural component of the lightning protection system, the *isCon*® conductor can be connected to it using a suitable OBO connection component ②.

The potential is connected to the protective equipotential bonding on the air-termination rod via the potential connection clip ③ (type 927 2 6-K). Alternatively, the potential can be connected at the tripod stand ④, provided that the potential connection clip ③ is mounted, creating the electrical connection between the black, weakly conductive layer or the protective jacket of the *isCon*® conductor and the air-termination rod.

The distance  $x$  (= separation distance  $s$  multiplied by two) between the potential connection terminal ⑤ and the rear connection element ⑥ should be noted.

**Note!**

The conductor type *isCon BA 45 SW (Basic)* can be routed with or without potential connection. If the conductor is routed without a potential connection, observe „7.8.3 Routing the *isCon*® conductor without potential connection (up to 45 cm separation distance)“ on page 60.

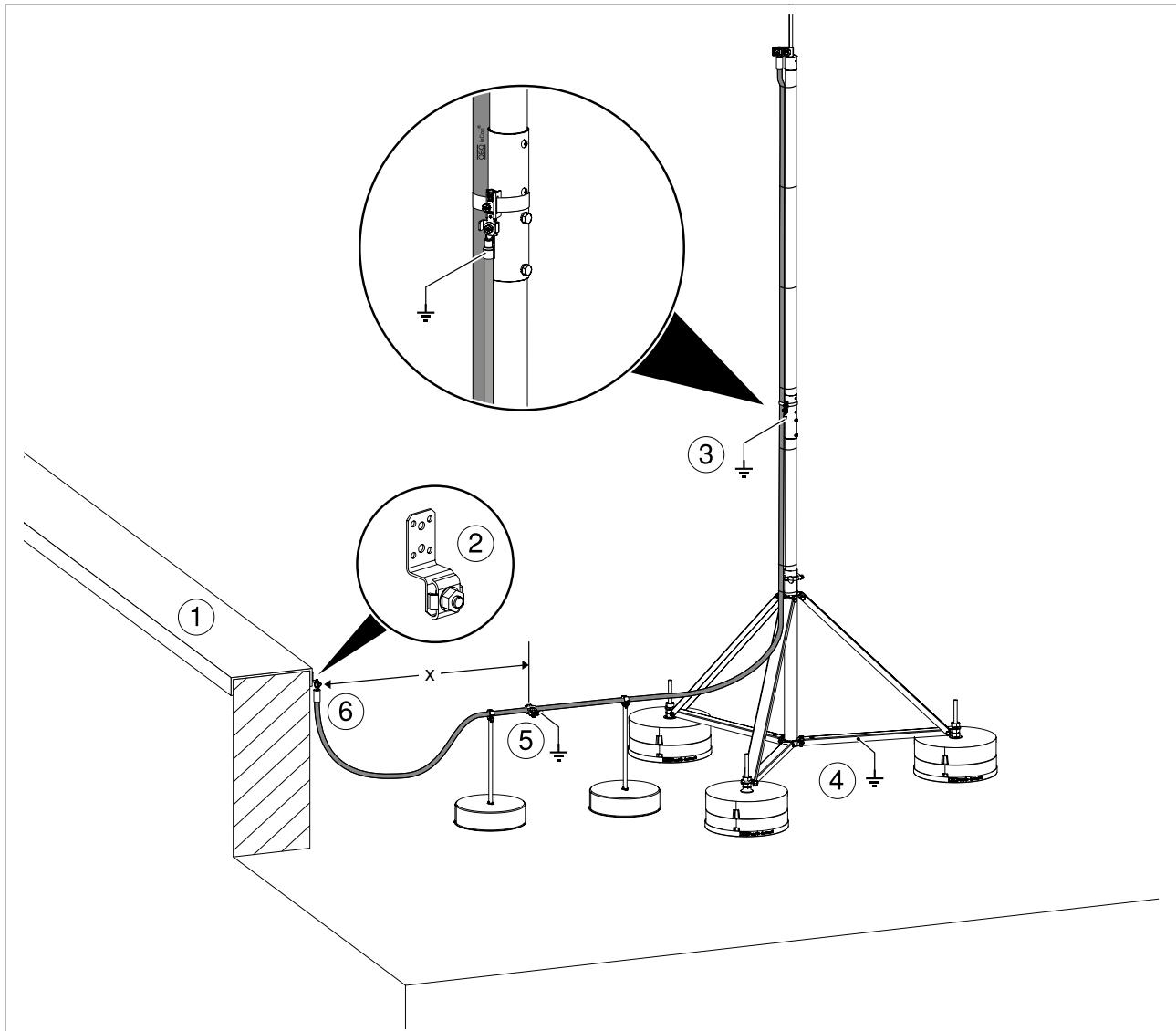


Fig. 63: *isCon*® conductor connected to metallic parapet

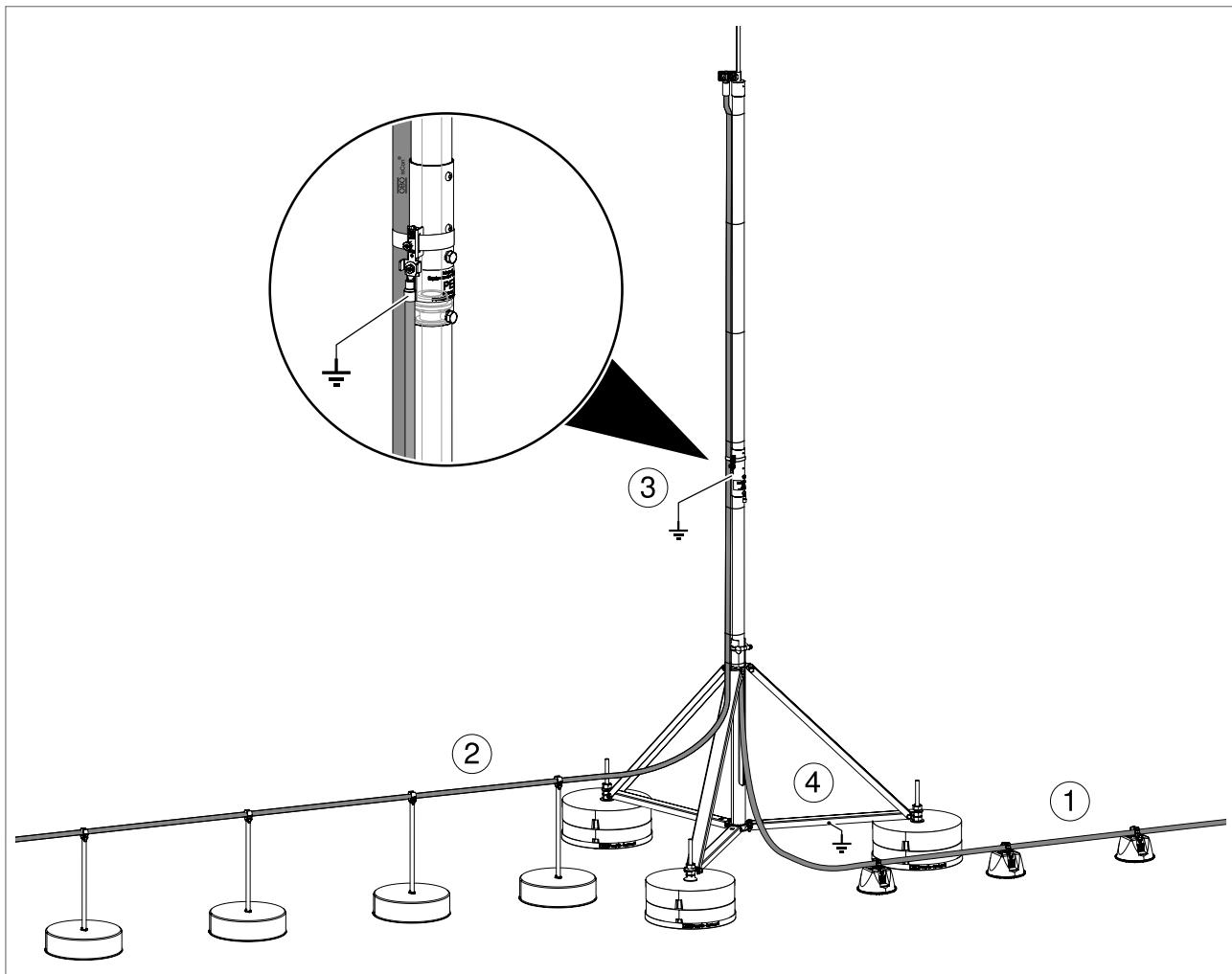
### 8.3 Internal and external isCon® conductor

The mounting example shows the use of an isFang air-termination rod with internal isCon® conductor ①, to which a second, external isCon® conductor ② is connected.

**Note!**

*When using the grey isCon® conductor, the light grey external jacket must be removed before connecting the potential connection (see „7.1.2 Stripping the grey external jacket (isCon Pro+ 75 GR)“ on page 33).*

The potential connection clip ③ (type 927 2 6-K) must be mounted, in order to create an electrical connection between the black, weakly conductive layer or protective jacket of the external isCon® conductor and the air-termination rod. The potential is connected here. The internal potential connection element then means that the internal isCon® conductor is also connected with the potential connection. Alternatively, the potential can be connected at the air-termination rod stand ④, provided that the potential connection clip ③ is mounted.



**Fig. 64:** Internal and external isCon® conductor

## 8.4 Lightning protection class I

The mounting example shows a better division of the lightning current to two isCon® conductors through the use of an isFang air-termination rod with two external conductors ① and ②. The isCon® conductors are run on two separated ring conductors ③ and ④, which are run on opposite sides of the building. Alternatively, the air-termination system can be implemented with a single isCon® Premium conductor in lightning protection class 1.

The potential connection clip ⑤ (type 927 2 6-K) must be mounted, in order to create an electrical connection between the black, weakly conductive layer or protective jacket of the external isCon® conductor and the air-termination rod. The potential is connected here. Alternatively, the potential can be connected at the air-termination rod stand ⑥, provided that the potential connection clip ⑤ is mounted.

The distance  $x$  (= separation distance  $s$  multiplied by two) between the potential connection terminals and the rear connection elements should be noted.

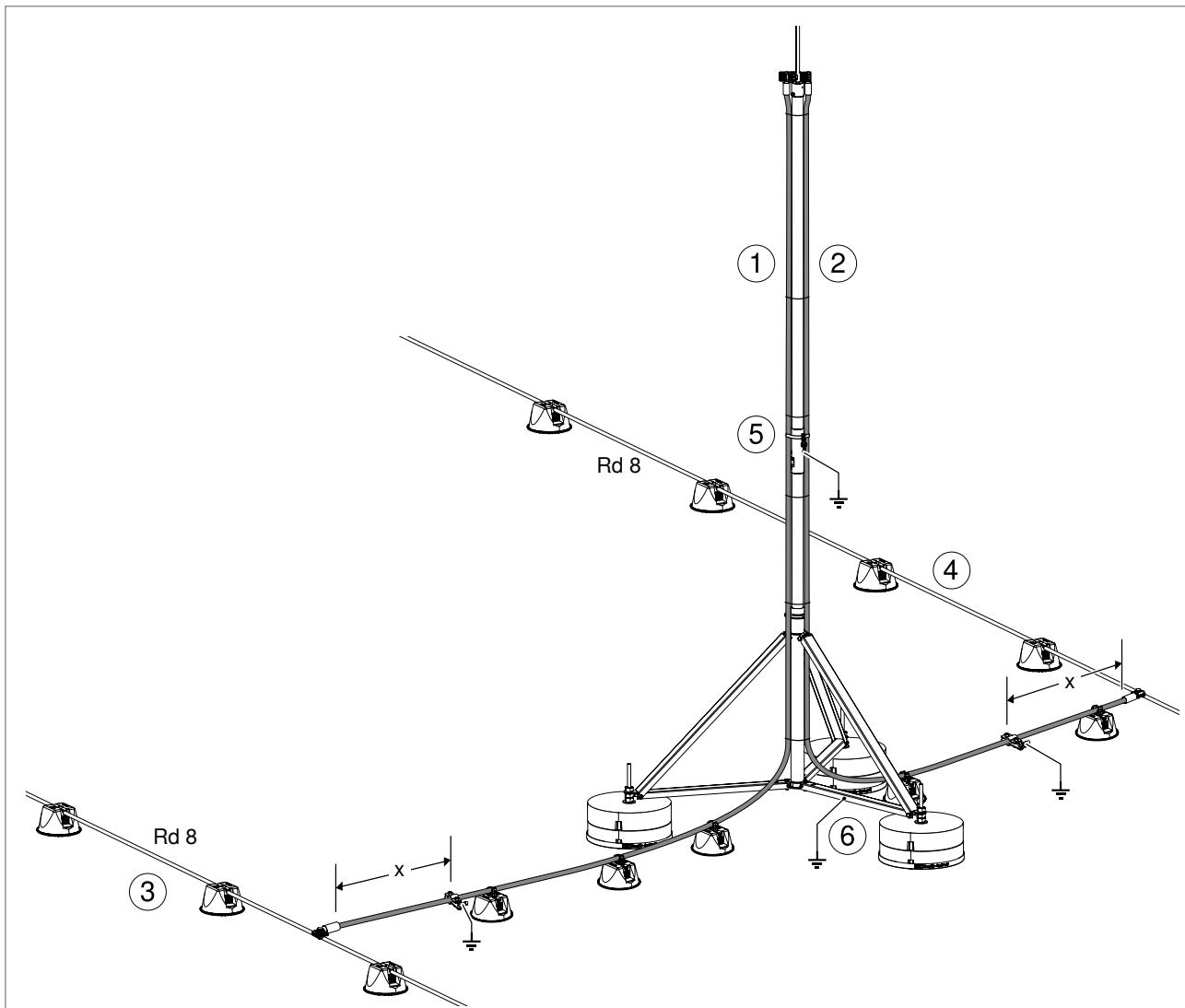
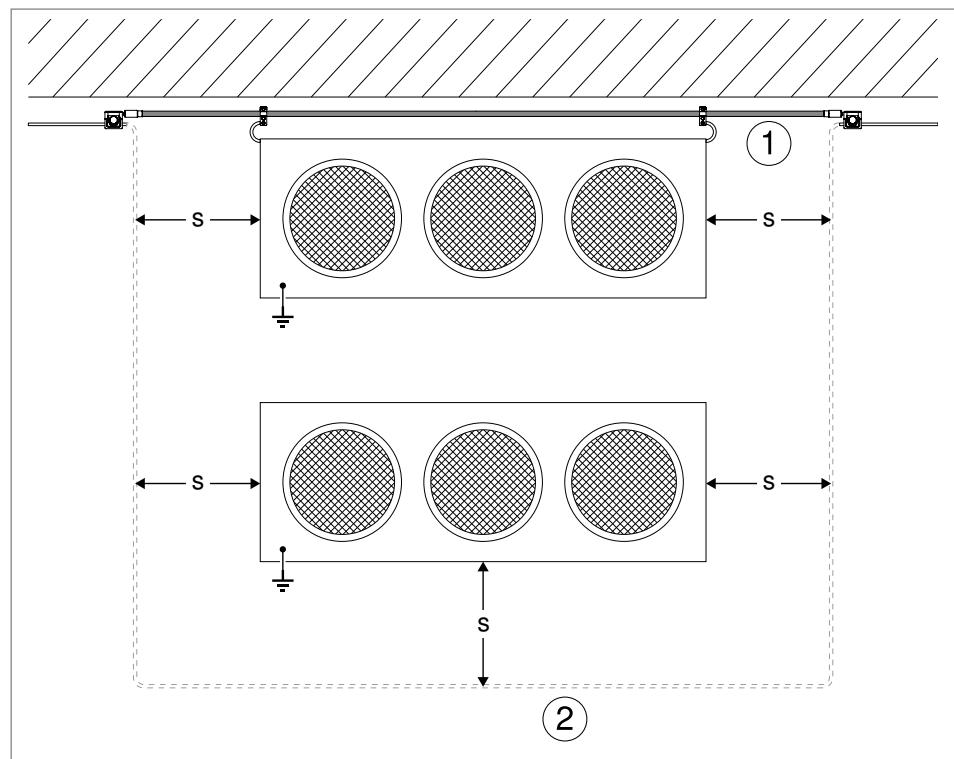


Fig. 65: Current division to two isCon® conductors, e.g. for lightning protection class I

## 8.5 isCon® conductor included in the ring conductor

In areas in which a conventional ring conductor would be difficult to install whilst maintaining the required separation distance ( $s$ ) (e.g. to roof structures) (see Fig. 65 No. ②), the isCon® conductor ① can be integrated into the mesh, provided that the calculated separation distance is less than or equal to the equivalent separation distance of the isCon® conductor used.



**Fig. 66:** Including the isCon® conductor in a conventional ring conductor

① isCon® conductor

② Conventional ring conductor with separation distance  $s$

## 8.6 Touch protection

The isCon® conductor Pro+ 75 GR can be used as protection against dangerous contact voltage. This is particularly required in areas with groups of people. The isCon® conductor Pro+ 75 GR was tested up to a length of max. 5 m with a pulse voltage of min. 100 kV (1.2/50  $\mu$ s) in rain and fulfills the requirements for touch protection according to IEC/EN 62305-3.



### WARNING

#### Risk of electric shock!

Energised parts

Replace metallic rain gutters, in direct proximity to the isCon® conductor Pro+ 75 GR, with plastic pipes.

### ATTENTION

#### Risk of damage!

When multiple concrete bases are used, the heavy weight can lead to damage to the substrate.

If necessary, place protective mats under the concrete base.

#### Installation of the touch protection

Always route the isCon® conductor Pro+ 75 GR so that it is vertical and remove any soiling on the conductor.

1. In the area to be protected, route the isCon® conductor Pro+ 75 GR to a length of at least 2.5 m plus the separation distance (s). This corresponds to a length of approx. 3–5 m. ①

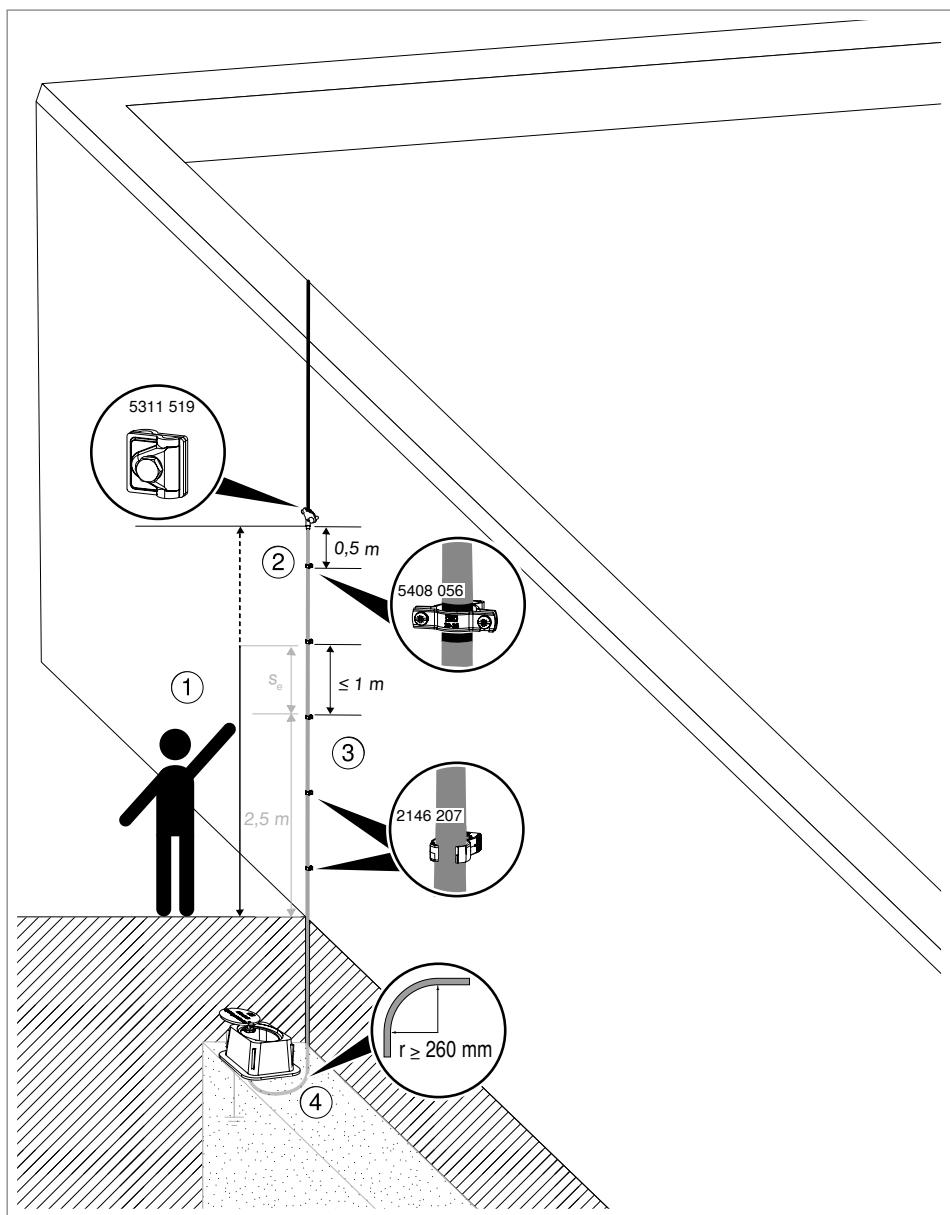
#### Note!

*With an increasing length of the isCon® conductor Pro+ 75 GR, the contact voltage occurring in the earth also increases.*

2. Remove the grey external jacket 0.5 m below the connector (see „7.1.2 Stripping the grey external jacket (isCon Pro+ 75 GR)“ on page 33) and fasten the first conductor holder (type isCon H VA) directly on solid masonry. ②

If a direct connection to solid masonry is not possible, a separate potential connection must be made using an earthed rain gutter or parapet.

3. Attach all further conductor holders (type isCon H 26 VA) at a distance of  $\leq$  1 m. ③
4. Maintain the minimum bend radius of 260 mm. ④



**Fig. 67:** Installation of the isCon® conductor Pro+ 75 GR as touch protection

## 9 Checking the lightning protection system

The entire lightning protection system must be tested according to IEC/EN 62305-3, Supplementary sheet 5.

**Note!**

*The test results must be placed in writing, for which the isCon test report can be used. It can be found at [www.obo-bettermann.com](http://www.obo-bettermann.com).*

Protection class	Visual inspection	Comprehensive test	Comprehensive test in critical situations <sup>1)</sup>
I and II	Annually	Every 2 years	Annually
III and IV	Every 2 years	Every 4 years	Annually

<sup>1)</sup> Critical situations include structures containing sensitive systems, or office and commercial buildings, or other places in which a large number of people meet.

**Note!**

*In the case of lightning protection systems in structures at risk of explosion, we recommend carrying out a visual inspection every 6 months.*

### 9.1 Carrying out a visual inspection

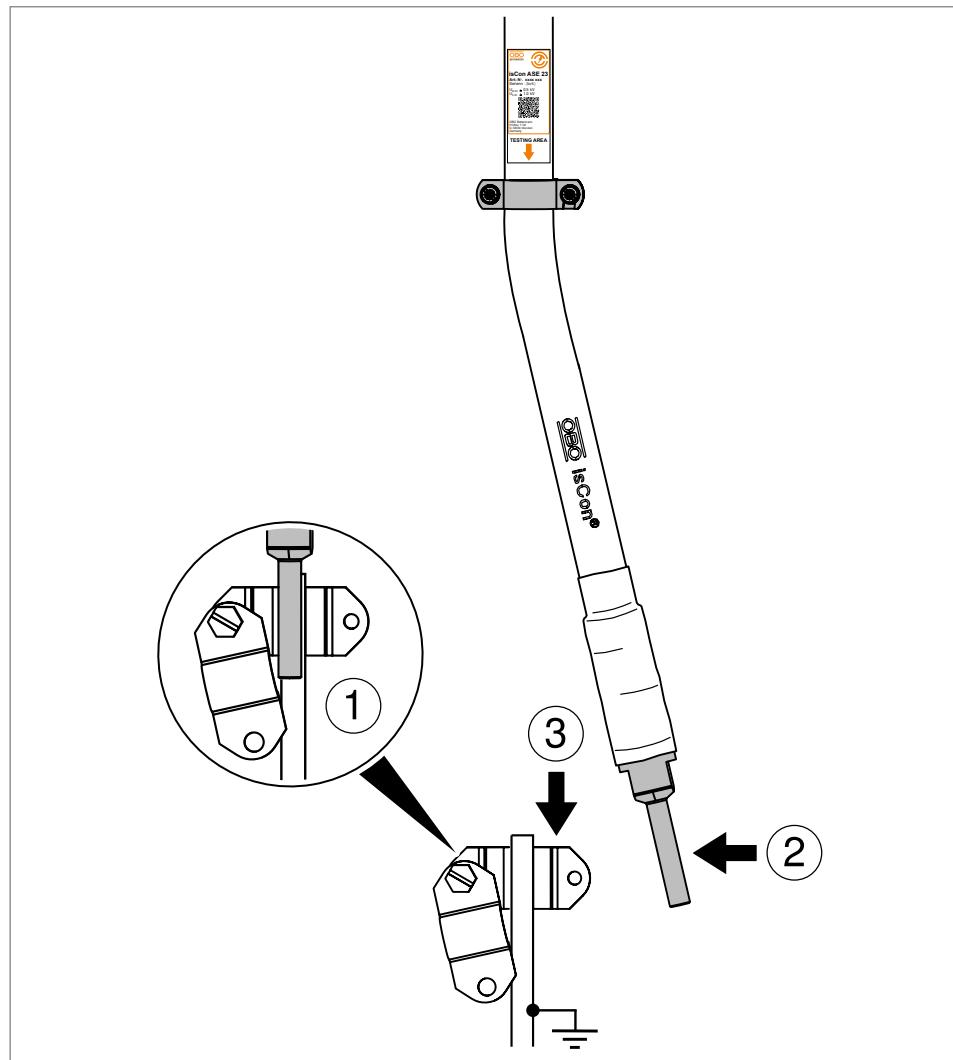
- Check that the black, weakly conductive layer of the isCon® conductor is undamaged. An interruption of this layer will prevent the conductor from functioning. In this case, replace the isCon® conductor.
- When using the isCon® Pro+ 75 GR conductors as touch protection, check that the grey external jacket is undamaged. Damage to this layer will prevent the conductor from functioning. In this case, replace the isCon® Pro+ 75 GR conductors.
- Check that the protective jacket of the isCon® Pro+ conductors is continuously present and has a material thickness of at least 0.2 mm. In this case, replace the isCon® Pro+ conductor. The grey external jacket may be interrupted and damaged. The protective jacket may be damaged but must be continuously present.
- Check that the potential connection cables and all connection components, in particular the potential connection elements, are undamaged. There must be a low-resistance connection between all the elements. If necessary, restore the flow.
- Check that the function of the holders and other mounting elements is not impaired. If necessary, retighten the screws.
- Check that only products of the isCon® system, such as connection elements, are used during mounting. Replace the parts which are not components of the isCon® system with appropriate products of the system.

- When using the isCon® Pro+ 75 GR conductor as touch protection, check whether it is soiled. If this is the case, remove it.

## 9.2 Carrying out a continuity and insulation test

### 9.2.1 Carrying out a continuity test

A continuity test of the isCon® conductor at the separation points must be carried out according to IEC/EN 62305-3.



**Fig. 68:** Carrying out a continuity test

**Note!**

*With meshed systems, the test sequence must be carried out at each separation point.*

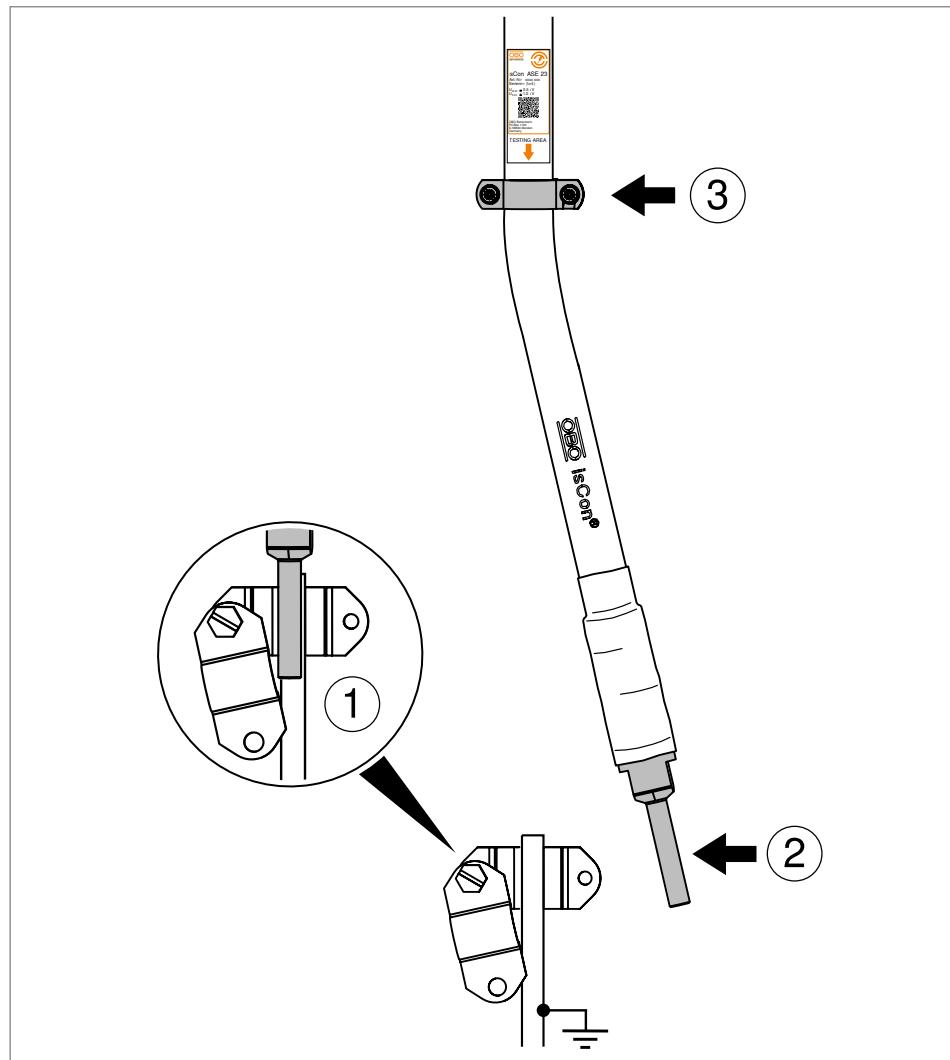
1. Open the separation point ①, in order to separate the conductor and earthing system from each other.
2. Using an ohmmeter, check the resistance value between the connection element ② and the opened earthing system ③.
3. If there is no continuity, then troubleshooting must be commenced.

### 9.2.2 Carrying out an insulation test

When using the Pro+ and Premium isCon conductors, ASE connection elements can be used to check the cable insulation. This allows the detection of items passing through the cable or mechanical penetrations, e.g. by nails or screws.

**Note!**

*An insulation test can only be carried out if an isCon ASE connection element is mounted on both sides of the isCon® conductor.*



**Fig. 69:** Carrying out an insulation test

1. Open all the separation points ① of the system to be checked.
2. Place the insulation measuring device between the connection element ② and testing point ③ or the nearest fastening clip.
3. Apply the test voltage of the insulation measurement device of 500 V DC for  $\geq 3$  s.
4. Continue according to the result:

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**Insulation measurement between the connection element and test point with 500 V DC for  $\geq 3$  s\***

<b>Result</b>	<b>Measured resistance</b>	
	$> 500 \text{ M}\Omega$ = Cable insulation given	$< 500 \text{ M}\Omega$ = DEFECTIVE
<b>Measure</b>	Function testing completed	Exchange the appropriate isCon conductor including isCon ASE connection elements

\* Due to the ASE technology used (adaptive switching element), the resistance value displayed on the insulation measuring device may vary.

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## 10 FAQ

- 1. May the air-termination rod in the GFK area be painted?**

→ No, the OBO isCon® system was subjected to a system test without painting according to IEC TS 62561-8. For this reason, no statement can be made, for example, on the material compatibility or influence of a coating on the properties of the field command termination.
- 2. May the air-termination rod in the metallic area be painted?**

→ No, perfect, low-ohmic contacting is particularly required for the air-termination rod. Painting of the metallic part of the air-termination rod, particularly in the area of the connection sleeves to the GFK area, to the tripod stand or PE metal screws, can damage the contacting, and the perfect function of the isCon® system would no longer be guaranteed.
- 3. What influence does a larger cross-section of the equipotential bonding conductor (e.g. 50 mm<sup>2</sup> instead of 6 mm<sup>2</sup>) have on routing distances and the induction effect to other conductor loops?**

→ A larger cross-section does not impair the function of the OBO isCon® system.
- 4. An isCon® conductor should be routed in a closed metal cable routing system (e.g. metal pipe/duct). Is routing in metal systems forbidden or can this take place under certain installation conditions.**

→ Routing within a metal pipe under the OBO isCon® command termination (equipotential bonding) is permitted. Ensure an appropriate potential connection of the pipes.

If cables, e.g. for power supply, are to be routed in parallel to the isCon® conductor (e.g. without a metallic duct), then inductive couplings into this system are possible. For this, the requirements and measures from IEC/EN 62305-4 are to be observed. It is recommended to switch these cables with suitable surge protective devices. OBO isCon® can only prevent direct galvanic coupling through isolation (arcing).

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**Building Connections**

