isCon® System Manual

Version 2.0

OBO BETTERMANN

To be used for the OBO isCon® system

THINK CONNECTED.

Section 1. About this manual

Target group

- This installation manual is intended for specialists who are specially qualified and trained in installing lightning protection systems.

Section 1.1 Using the installation manual

- This system manual is based on the standards in force at the time of writing (March 2012). If the relevant standards are amended, then the instructions and planning aids that are based on them become invalid.
- This system manual is intended as a basis for planning, installing, servicing and repairing the isCon® system and has no claim to be complete.
- Read this installation manual once through before starting work. In particular, please observe the safety instructions.
- Keep all documents delivered with the isCon® system in a safe place so that you can consult them whenever necessary.
- The manufacturer will not accept liability for any damage caused by non-observance of this manual.
- Regional and seasonal conditions are not taken into account.
- To find out more about planning and installation of the OBO isCon® system, it is advisable to take a comprehensive training course.

Section 1.2 Explanation of safety instructions

The following safety and general instructions are used in this manual.

WARNING

Type of hazard

Indicates a potentially hazardous situation. If not avoided, it can lead to death or very serious injury.

CAUTION

Type of hazard

Indicates a potentially hazardous situation. If not avoided, it can lead to slight or moderate injury, or material damage.

Attention

Type of hazard

Indicates a potentially damaging situation. If not avoided, it can lead to damage to the product or surroundings.

Note

Indicates important information and tips.

Section 2. General safety instructions

Observe the following general safety instructions and information when working with the OBO isCon® system:

- In the event of a lightning strike, lethal currents can pass through the lightning protection system. Never work on elements of the lightning protection system during a thunderstorm or if there is a risk of a thunderstorm.
- Lethal voltages can occur when working on electrical equipment. Never work on parts that are live. Wear suitable protective clothing and comply with all the required safety guidelines.
- The jacket of the black OBO isCon® conductor may not be cut into or damaged. Any break in the black outer conductive layer will cause the conductor to stop functioning.
- After installation, clean swarf from around the connections in order to prevent shorting between the connection element and the equipotential bonding system in the event of a lightning strike. Otherwise the function of the insulated conductor is not guaranteed.
- Only the jacket of the grey isCon® conductor may be painted. It does not have any electric properties that can be impaired by painting.
- Due to the production process, there may be sharp edges on metal objects. Wear suitable protective gloves to prevent cuts.
- Take any necessary fire protection regulations into account when installing function maintenance systems. This manual does not address any fire protection standards that may have to be observed. Read the OBO fire protection guidelines (available separately, item number: 9134859) for more information.

Section 3. General information

This chapter addresses the following topics:

The increasingly complex demands made by architects and their customers mean that planners of lightning protection systems need sound technical knowledge about installing these systems in accordance with the standards. In order to ensure that the lightning protection system works perfectly in the event of a strike, it must be specially tailored to the building structure. At the same time, the electromagnetic compatibility of the installed electrical systems must be ensured. The separation distance in the external lightning conductor plays an important part in this.

The OBO isCon® conductor has been designed to make adhering to the separation distance easy and safe – even for complex building structures.

Go to www.iscon.obo-bettermann.com and subscribe to OBO isCon® newsletter to keep abreast of the latest developments. The newsletter contains updates to the installation manual, information on new products and other interesting information on the OBO isCon® system.

Section 3.1 Proper use

- This system manual is intended for qualified persons who are specially qualified and trained in installing lightning protection systems. These people are referred to from here on as lightning protection experts.
- All the tasks may only be performed by lightning protection experts who have been specially trained in the installation of standard-compliant lightning protection systems. Lightning protection experts must be familiar with the relevant local lightning protection standards and general engineering practices.
- In order to install the OBO isCon® system, components from the OBO range must be used, as safe installation is otherwise not guaranteed.
- The OBO isCon® conductor is suitable for use outdoors and can be routed to the first potential connection on roofs, in walls, under plaster, in façade installations and in buildings.
- Only the light grey OBO isCon® conductor can be laid in soil. The light grey jacket protects it from weathering and damage underground.
- If you need more information on using the OBO isCon® conductor in conditions not described here, please contact your OBO partner.

Section 3.2 Declaration of conformity

Components for lightning protection systems are not subject to any EC directive. Instead, OBO provides the manufacturer's declarations of conformity for each component of the lightning protection system. These declarations of conformity certify compliance with the listed standards and documentation, but contain no assurance of properties.

Individual certifications for lightning protection components can be found on the OBO website at **http://www.obo-bettermann.com/de**.

Section 3.3 Standards

Observe, among others, the following standards when planning, installing, servicing and repairing lightning protection systems:

- DIN EN 62305-1 (IEC 62305-1), Protection against lightning – Part 1: General principles
- DIN EN 62305-2 (IEC 62305-2), Protection against lightning – Part 2: Risk management
- DIN EN 62305-3 (IEC 62305-3), Protection against lightning – Part 3: Physical damage to structures and life hazards
- DIN EN 62305-4 (IEC 62305-4), Protection against lightning – Part 4: Electrical and electronic systems within structures
- DIN EN 62561-1 (IEC 62561-1), Lightning protection system components (LPSC) – Part 1:
  Requirements for connection components
- DIN EN 62561-2 (IEC 62561-2), Lightning protection system components (LPSC) – Part 2:
  Requirements for conductors and earth electrodes
- DIN EN 62561-4 (IEC 62561-4), Lightning protection system components (LPSC) – Part 4:
  Requirements for conductor fasteners

Section 4. Technical data

Section 4.1 Structure of the isCon® conductor

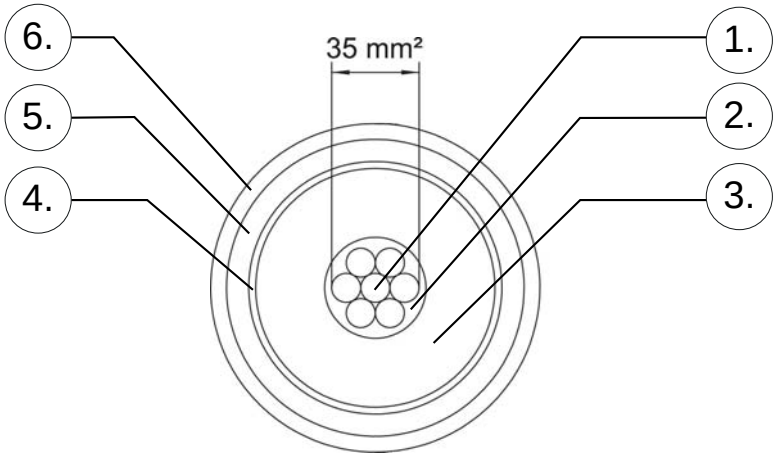

Fig. 1 Diagram of the structure of the isCon® conductor

No.	Designation
1	Round cable, multicore, 35 mm², Cu
2	Inner conductive layer, VPE
3	Insulation, VPE
4	Outer conductive layer, VPE
5	Outer jacket, EVA (low conductivity)
6	Outer jacket, light grey (on isCon 750 LGR only)

Table 1 Diagram of the structure of the isCon® conductor

Type	isCon 750 SW	isCon 750 LGR
Colour	Black	Light grey
Equivalent separation distance, air	≤ 750 mm	≤ 750 mm
Equivalent separation distance, solid building material	≤ 1500 mm	≤ 1500 mm
Equivalent separation distance, mixed building material	See DIN EN 62305-3 supplement 1	
External diameter	23 mm	26 mm
Round cable, multicore, Cu	35 mm²	35 mm²
Cable weight	approx. 649 kg/km	approx. 868 kg/km
Temperature range for routing	min. 0 °C, max. 40 °C	min. 0 °C, max. 40 °C
Operating temperature	max. 70 °C	max. 70 °C
Bend radius (min. 15x D)	min. 345 mm	min. 390 mm
Tensile strength	1,750 N	1,750 N

Table 2 Overview of isCon® 750 SW and 750 LGR conductors

Section 4.2 Zero halogens

The OBO isCon® conductor is made of halogen-free materials which do not produce corrosive gases if they burn. This improves personal safety and does not lead to corrosive gases in the event of a fire. These gases can be much more harmful than the fire itself. For example, when PVC cable insulation burns, it produces chlorine gas that forms hydrochloric acid in combination with extinguishing water. The hydrochloric acid then permeates the concrete and corrodes the steel reinforcement.

Section 4.3 Reaction to fire

The OBO isCon® conductor is flame-retardant, as demonstrated according to DIN EN 60332-1-2. Flame-retardant cables do not allow fires to spread far beyond their origin and to extinguish themselves when the igniting flame is removed. Fires can spread along non-flame-retardant cables within a few minutes.

Section 4.4 Weathering resistance

The outer jacket of the OBO isCon® conductor is made of highly ageing-resistant EVA (ethylene vinyl acetate).

The resistance to weathering was confirmed by the following tests:

- Ozone resistance according to DIN EN 60811-2-1 Section 8
- Sunlight resistance test according to UL 1581 Section 1200
- Resistance to cold according to DIN EN 60811-1-4 Section 8.5

Section 4.5 isCon® system accessories

Product	OBO item number	Features	Batch size
isCon® conductor, black			
isCon 750 SW	5408 00 2	Cross-section 35 mm², 23 mm Ø	25 m
isCon 750 SW	5408 00 4		100 m
isCon 750 SW	5408 00 6		250 m
isCon® conductor, light grey			
isCon 750 LGR	5407 99 5	Cross-section 35 mm², 26 mm Ø	25 m
isCon 750 LGR	5407 99 7		100 m
Installation material			
Cable stripper, isCon stripper	5408 00 9		1
Replacement blade, isCon cut	5408 01 1	34 mm	5
Connection element, isCon connect*	5408 02 2	Size 10 mm	2
Potential connection, isCon PAE	5408 03 6	Size 7-25 mm Ø	2
VA cable bracket			
isCon H VA	5408 05 6	Size 23 mm Ø	50
isCon H 26 VA	5408 05 4	Size 26 mm Ø	50
StarQuick PA cable bracket			
SQ-20 SW	2146 16 4	Black, dimensions: 23 mm (D)	50
SQ-25 LGR	2146 20 7	Light grey, dimensions: 26 mm (D)	50
starQuick nut M6, SQ M6	2146 50 9	Light grey, thread M6	100
starQuick anchor M6, SQ PP	2351 70 6	6 mm Ø, 30 mm (L)	50
VA cable bracket with tightening strap			
isCon HS VA	5408 05 2	Size 23 mm Ø	10
isCon HS 26 VA	5408 06 8	Size 26 mm Ø	10
PA cable bracket with tightening strap			
isCon HS PA	5408 05 4	Black, size 23 mm Ø	10
isCon HS 26 PA	5408 06 6	Light grey, size 26 mm Ø	10
M-Quick cable bracket PA			
M-Quick M25 SW	2153 78 7	Black, tensioning range 20-25 mm	50
M-Quick M32 LGR	2153 73 4	Light grey, tensioning range 25-32 mm	50
Adapter for flat roof cable holder, 165 MBG UH	5218 88 2	Black, size 8mm rd	25
VA roof cable bracket, sloping roof			
isCon H280 VA	5408 04 7	Installation height 55 mm, size 23 mm Ø	25
isCon H280 26 VA	5408 07 4	Installation height 55 mm, size 26 mm Ø	25
PA roof cable bracket, sloping roof			
isCon H280 PA	5408 04 9	Black, size 23 mm Ø	25
isCon H280 26 PA	5408 07 2	Light grey, size 26 mm Ø	25

* The isCon connect is supplied with 2 end pieces + 2 heat-shrink sleeves + locking adhesive + allen key

Product	OBO item number	Features	Batch size
Spacer			
Spacer, isCon DH	5408 04 3	Tensioning range 23-26 mm	2
FangFix10 stone	5403 11 7	10 kg stone, Ø 289 mm, concrete, frost-proof, stackable	1
FangFix edge protection	5403 12 4	Edge protection with built-in anchor, suitable for FangFix10 stone	10
Insulated interception rod			
isFang 4000	5408 94 2	Total length: 4000 mm, V2A/GFRP, 40 mm Ø	1
isFang 6000	5408 94 6	Total length: 6000 mm, V2A/GFRP, 40 mm Ø	1
isFang 4000 AL	5408 94 3	Total length: 4000 mm, aluminium/GFRP, 40 mm Ø	1
isFang 6000 AL	5408 94 7	Total length: 6000 mm, aluminium/GFRP, 40 mm Ø	1
Stand for insulated interception rod			
isFang 3B-100 AL	5408 96 6	Footprint: 1.3 x 1.4 m, 40 (D), aluminium	1
isFang 3B-150 AL	5408 96 7	Footprint: 1.7 x 1.9 m, 40 (D), aluminium	1
isFang 3B-100	5408 96 8	Footprint: 1.3 x 1.4 m, 40 (D), V2A	1
isFang 3B-150	5408 96 9	Footprint: 1.7 x 1.9 m, 40 (D), V2A	1
Installation accessories for insulated interception rod			
Potential connection clip for installation on an isFang, 927 2 6-K	5057 59 9	Size: 3/8-4", V2A	10
Connection plate for one isCon® conductor	5408 02 6	Dimensions: 16 x 8-10 mm (1 connection), V2A	1
Connection plate for two isCon® conductors	5408 02 8	Dimensions: 16 x 8-10 mm (2 connections), V2A	1
Strip clip for fastening the isCon® conductor to insulated interception rods	2332 78 4	Dimensions: 7.6 x 380 mm, black, PA	100
Insulated interception rod for internal isCon® conductor			
isFang IN 4000	5408 93 4	Total length: 4000 mm, 50 mm Ø, AL/GFRP	1
isFang IN 6000	5408 93 6	Total length: 6000 mm, 50 mm Ø, AL/GFRP	1
Insulated interception rod for internal isCon® conductor with side outlet			
isFang IN-A 4000	5408 93 8	Total length: 4000 mm, 50 mm Ø, AL/GFRP	1
isFang IN-A 6000	5408 94 0	Total length: 6000 mm, 50 mm Ø, AL/GFRP	1
Interception rod stand (for insulated rod) with side outlet			
isFang 3B-100-A	5408 93 0	Footprint: 1.3 x 1.4 m, V2A, 50 mm Ø	1
isFang 3B-150-A	5408 93 2	Footprint: 1.7 x 1.9 m, V2A, 50 mm Ø	1

Product	OBO item number	Features	Batch size
Concrete base for interception rod stand			
FangFix16 stone	5403 22 7	16 kg stone, Ø 365 mm, concrete, frost-proof, stackable	1
FangFix edge protection	5403 23 8	Edge protection with through-hole, suitable for FangFix16 stone	10
Threaded rod, isFang 3B-G1	5408 97 1	270 mm, V2A, for 1 FangFix concrete base	3
Threaded rod, isFang 3B-G2	5408 97 2	340 mm, V2A, for 2 FangFix concrete base	3
Threaded rod, isFang 3B-G3	5408 97 3	430 mm, V2A, for 3 FangFix concrete base	3
Interception rod support for wall and pipe installation			
isFang support for wall installation	5408 95 2	Distance to wall: 15 mm, V2A	2
isFang support for wall installation	5408 95 0	Distance to wall: 80 mm, V2A	2
isFang support for wall installation	5408 95 4	Distance to wall: 200-300 mm, V2A	2
isFang support for pipe installation	5408 95 6	For existing pipes of Ø 50-300 mm, V2A	2
isFang support for pipe installation	5408 95 8	For existing pipes of Ø 40-50 mm, V2A	2
isFang support for pipe installation	5408 96 0	For existing pipes of Ø 50-60 mm, V2A	2
isFang support for pipe elbow installation	5408 96 4	For existing pipe elbow of 50 x 50 mm	2
General accessories			
Information panel	5408058	Width: 100mm, length: 150 mm	1
Cleaning cloth	5408060	Cellulose polypropylene paper, impregnated with 2.8 ml solution, size: 140 x 200 mm	50

Table 3 Overview of isCon® components

Section 5. Planning the installation

Section 5.1 Calculating, checking and maintaining the separation distance

Note *If the lightning protection system has not yet been specified by the regulatory authority, the insurer or the customer, the lightning protection planner should use the risk assessment procedure described in EN 62305-2 to check whether the building structure needs to equipped with a lightning protection system.*

Procedure:

1. Check the separation distance according to DIN EN 62305-3 (IEC 62305-3) section 6.3 at the connection point of the isCon® conductor. Measure the length (l) from the connection point of the isCon® conductor to the next stage of the lightning protection equipotential bonding system (such as the earthing system).
2. Check that the calculated separation distance (s) is less than the equivalent separation distance listed for the isCon® conductor.
3. If it is more than the listed equivalent separation distance, you must install additional conductors.
   - If you install multiple parallel conductors, the current will be divided. The reduced division coefficient k_c means that the calculated separation distance (s) is also reduced.
   - We recommend installing the conductors at least 20 cm apart. This minimises the magnetic fields and prevents the conductors from affecting each other.
   - If conductors are laid directly beside each other, the inductance of the overall system is not reduced by the factor n and the coefficient k_c is not reduced accordingly.
   - Install the conductors as far apart as the conditions allow. Ideally, the second conductor should be connected to earth on the opposite side of the building.

LPS – lightning protection class	Number of arresters	Length when s = 0.75 m
I	1	-
	2	14.20 m
	3 and more	21.30 m
II	1	12.50 m
	2	18.94 m
	3 and more	28.40 m
III + IV	1	18.75 m
	2	28.40 m
	3 and more	42.61 m

Table 4 Maximum length of the isCon® conductor when s = 0.75

Note *The values in the table apply to all type B earthing electrodes and to type A earthing electrodes with an earthing resistance differs from the neighbouring electrodes by a factor of less than 2. If the earthing resistance of individual electrodes differs by more than a factor of 2, then $k_c = 1$ should be assumed (source: Table 12* IEC 62305-3*:2010).*

Note *If the conductors are longer, the conditions of the building must be assessed individually by a lightning protection expert. An exact calculation of the separation distance determines the possible use of the isCon® conductor.*

Section 5.2 Elements of the isCon® system

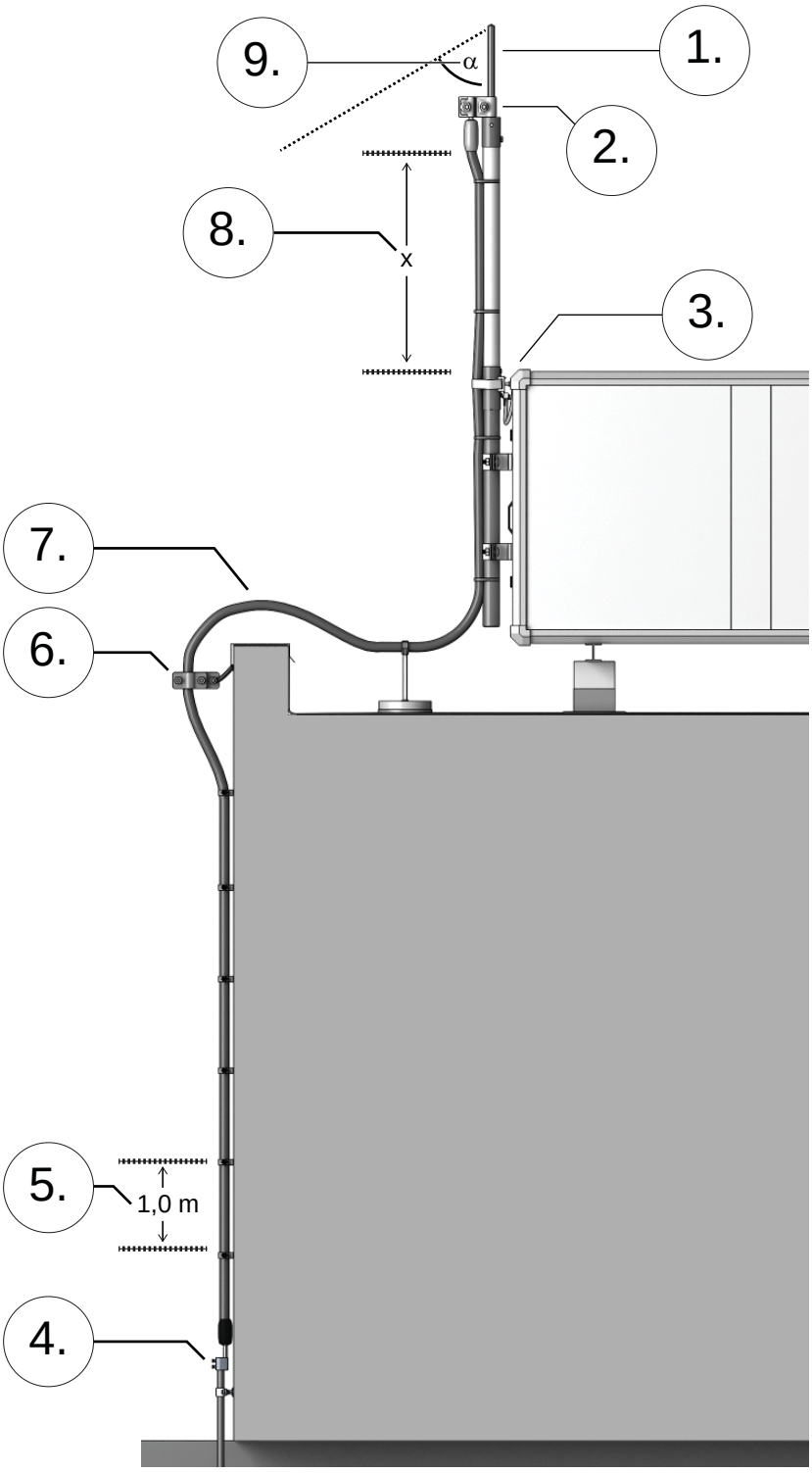

Fig. 2 Example installation of the isCon® system

1. Air termination system
   - Take DIN EN 62305-3 (IEC 62305-3), section 5.2, into account when designing the air termination system. Plan the height and arrangement of the air termination system so that the area to be protected is within the protected space.
2. Connection element
   - Only connect the connecting element to the air termination system or the next down conductor of the external lightning protection system.

3. Potential connection
   - Position the potential connection as described in “Section 6.3 Installing the potential connection” on page 26. The potential connection must be connected to the equipotential bonding system with copper of at least 6 mm² or material with equivalent conductance.
4. Separation distance s ≤ 15 cm
   - If the calculated separation distance s ≤ 15 cm, a potential connection can be omitted.
5. Conductor fastenings
   - Fasten the conductor with the specified fastenings. The fastenings should be spaced a metre apart at the most.
6. Additional potential connections
   - After the initial potential connection using the potential connection element, you can connect the isCon® conductor to multiple parts of the building through which lightning current is not conducted. See also “Section 6.5 Installing additional potential connections” on page 28.
7. Bend radius
   - Note the minimum bend radius of the cables when laying them. The minimum bend radius of the black isCon® conductor is 345 mm and the minimum bend radius of the grey isCon® conductor is 390 mm.
8. Required separation distance to the first potential connection
   - Make sure no electrically conductive or earthed components are situated within the separation distance from the potential connection. These include metal building components, cable brackets and reinforcements.
9. Protected space
   - Lay the conductor entirely within the space protected by the air termination system.

Note *Before designing the lightning protection system, find out about the function, general design and location of the building.*

Note *When installing the system in buildings, take any specified protective measures, such as a division into fire compartments, into account. Read the OBO fire protection guidelines (available separately, item number: 9134859) for more information.*

Section 5.3 Installation for Class II lightning protection

For Class II lightning protection systems (DIN EN 62305/IEC 62305-3), the lightning current can be safely carried from the air termination system to a downstream earthing system with a single isCon® conductor. When using the connection plate, note that the tightening torque is 24 Nm.

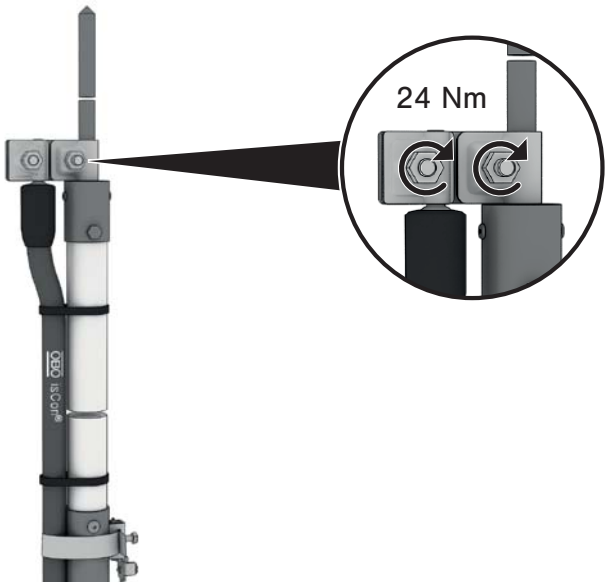

Fig. 3 Tightening torque for Class II lightning protection

Section 5.4 Installation in potentially explosive areas

Planners, fitters and inspectors of lightning protection systems in potentially explosive areas must be able to demonstrate the following requirements and expertise:

- General principles of explosion protection
- General principles of protection classes and equipment labelling
- Technical rules for operational safety
- Testing, maintenance and repair requirements, as well as familiarity with the required equipment and techniques
- Importance of work clearance systems and safe electrical disconnection in explosion hazard areas

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

- DIN EN 62305-3 – Annex D – “Further information on lightning protection systems for structures with a risk of explosion”
- VDE 0185-305-3 – Supplement 2 – “Additional information for special structures”

For systems with explosion zone 2 and 22, supplementary sheet 2 (VDE 0185-305-3, Point 4.3) states that an explosive atmosphere will only occur in rare, unforeseen circumstances. Therefore, it is possible to position air termination systems in explosion zones 2 and 22, taking Annex D of DIN EN 62305-3 (IEC 62305-3) into account.

When installed in explosive zones, the isCon® conductor must be connected to the equipotential bonding system at regular intervals after the potential connection. See Section 6.4 on page 27 for further information.

Section 5.5 Soft roofs

Soft roofs, such as thatched roofs, are especially prone to fire and require extra protection from lightning.

To meet the customer's aesthetic requirements, we recommend using an insulated lightning protection system with the isCon® conductor on soft roofs. Use the interception rod for internally laid conductors (type isFang IN) for erecting the air termination system. The grey version of the isCon® conductor guarantees a very high degree of protection and can be safely laid under a soft roof.

Have a roofer assist in making the roof penetration and the insulated interception rod watertight. Fasten the insulated interception rods to the roof structure using suitable brackets (isFang TW..).

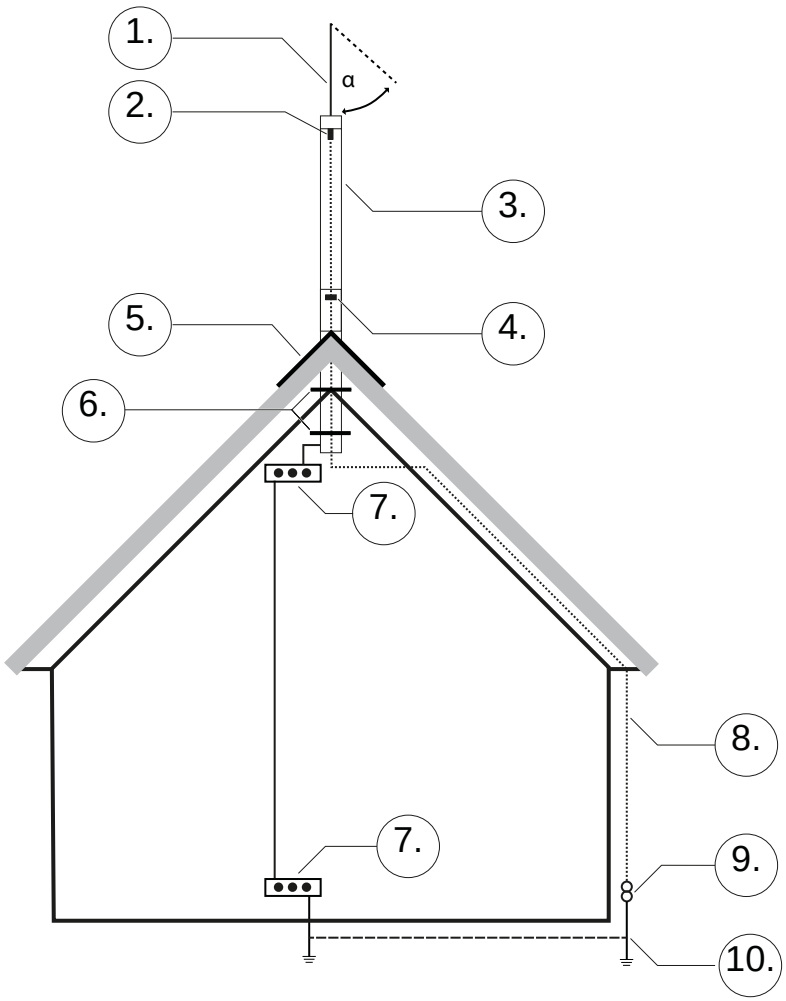

Fig. 4 Example installation: soft thatched roof

Key:

1. Interception rod
2. isCon® connection element
3. Insulated interception rod for isCon® conductor laid inside the building
4. isCon® potential connection
5. Roof penetration
6. Fastening clips for insulated interception rod
7. Equipotential bonding rail
8. Insulated isCon® conductor
9. Separator
10. Earthing system

Section 5.6 Installation in various wind load zones

Fig. 5 Wind load zones in Germany

Zone	Wind speed in km/h
1	127
2	145
3	162
4	185

Table 5 Maximum wind speeds according to DIN 1055-4

Note *The number of FangFix stones used for stabilising the interception rod stand depends on the wind load zone and the height of the interception rod.*

Tables 5 and 6 show the configuration for wind load zones 1 and 2 in the following conditions:

1. Building not higher than 20 m
2. Not more than 400 m above sea level
3. No ice formation

Height of interception rod, material: aluminium	Spreading width of tripod stand	Number of 16 kg FangFix stones	Number of FangFix edge protectors	Length of threaded rod
4 m, item no.: 5401864	1 m, Al, item no. 5408966 1 m, VA, item no. 5408968	3 stones item no.: 5403227	3 x edge protectors item no. 5403238	3 x 270 mm item no.: 5408971
4.5 m, item no.: 5401866	1 m, Al, item no. 5408966 1 m, VA, item no. 5408968	3 stones item no.: 5403227	3 x edge protectors item no. 5403238	3 x 270 mm item no.: 5408971
5 m, item no.: 5401868	1 m, Al, item no. 5408966 1 m, VA, item no. 5408968	6 stones item no.: 5403227	3 x edge protectors item no. 5403238	3 x 340 mm item no.: 5408972
5.5 m, item no.: 5401870	1 m, Al, item no. 5408966 1 m, VA, item no. 5408968	6 stones item no.: 5403227	3 x edge protectors item no. 5403238	3 x 340 mm item no.: 5408972
6 m, item no.: 5401872	1.5 m, Al, item no. 5408967 1.5 m, VA, item no. 5408969	6 stones item no.: 5403227	3 x edge protectors item no. 5403238	3 x 340 mm item no.: 5408972
6.5 m, item no.: 5401874	1.5 m, Al, item no. 5408967 1.5 m, VA, item no. 5408969	6 stones item no.: 5403227	3 x edge protectors item no. 5403238	3 x 340 mm item no.: 5408972
7 m, item no.: 5401876	1.5 m, Al, item no. 5408967 1.5 m, VA, item no. 5408969	9 stones item no.: 5403227	3 x edge protectors item no. 5403238	3 x 430 mm item no. 5408973
7.5 m, item no.: 5401878	1.5 m, Al, item no. 5408967 1.5 m, VA, item no. 5408969	9 stones item no.: 5403227	3 x edge protectors item no. 5403238	3 x 430 mm item no.: 5408973
8 m, item no.: 5401880	1.5 m, Al, item no. 5408967 1.5 m, VA, item no. 5408969	9 stones item no.: 5403227	3 x edge protectors item no. 5403238	3 x 430 mm item no.: 5408973

Table 6 FangFix stones required for interception rod systems in wind load zones 1 and 2, aluminium

Height of interception rod	Spreading width of tripod stand	Number of 16 kg FangFix stones	Number of FangFix edge protectors	Length of threaded rod
4 m, GFRP/Al, item no. 5408943 4 m, GFRP/VA, item no. 5408942	1 m, Al item no. 5408966 1 m, VA item no. 5408968	3 stones, item no. 5403227	3 x edge protectors item no. 5403238	3 x 270 mm item no. 5408971
6 m, GFRP/Al, item no. 5408947 6 m, GFRP/VA, item no. 5408946	1 m, Al, item no. 5408966 1 m, VA, item no. 5408968	6 stones, item no. 5403227	3 x edge protectors item no. 5403238	3 x 340 mm item no. 5408972

Table 7 FangFix stones required for insulated interception rod system in wind load zones 1 and 2, GFRP/VA or GFRP/Al

Section 6. Installing the system

Electric shock!

A lightning strike can cause lethally high voltage in the lightning protection system.

Never carry out work on the lightning protection system during thunderstorms, and do not install interception rods in the direct vicinity of high-voltage lines.

Section 6.1 Cutting and stripping the isCon® conductor

The isCon® conductor is available by the metre in two versions: the black isCon® conductor and the light grey isCon® conductor with additional protective jacket. The light grey isCon® conductor is suitable for laying in concrete or in the ground. It can also be painted.

Cut the isCon® conductor to the required length on site using standard wire cutters or a cable saw. Strip the copper core to a length of 25 mm using the isCon stripper.

Note *To determine the required distance (x) between the connection element and the potential connection, see “Section 6.3 Installing the potential connection” on page 26.*

Procedure:

1. Cut the isCon® conductor to the required length.
2. Stripping:

- If you are using the light grey isCon® conductor, continue with Section 6.1.1.
- If you are using the black isCon® conductor, continue with Section 6.1.2.

Section 6.1.1 Stripping the light grey isCon® conductor

To install the connection element and the equipotential bonding element, you must first strip the light grey jacket around the contacts.

Note

Do not cut into the black cable jacket.

Video instructions

Procedure:

1. Adjust the cutting depth of the cable knife so that only the light grey jacket is cut.
2. Turn the cable knife by 360° around the light grey jacket to cut it.

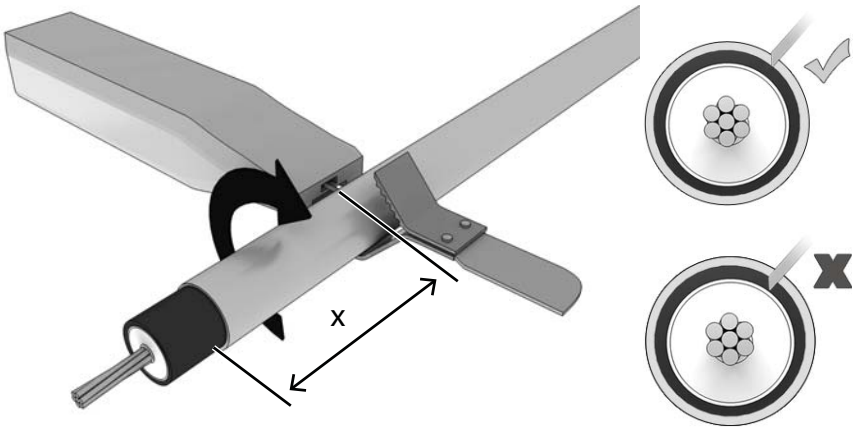

Fig. 6 Adjusting and cutting

3. Leave the cable knife on the cable and cut the along jacket up to the length required for the potential connection. For the required length (x) see Section 6.3 on page 26.
4. Turn the cable knife another 360° around the cable.

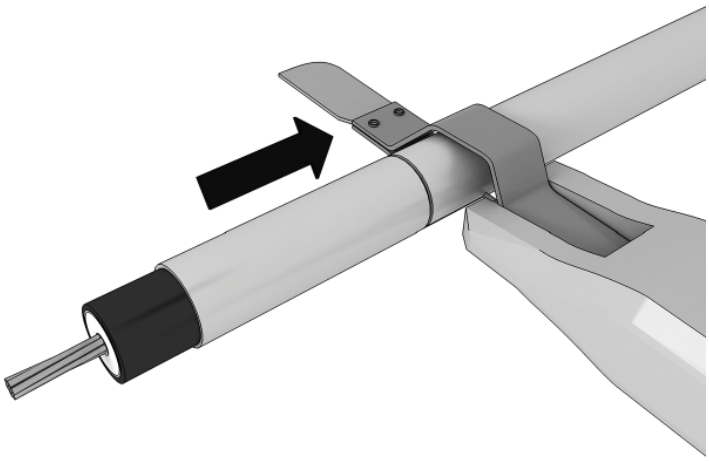

Fig. 7 Cutting lengthways

5. Remove the blade from the cable.
6. Pull off the light grey cable jacket.

- **Continue with Section 6.1.2.**

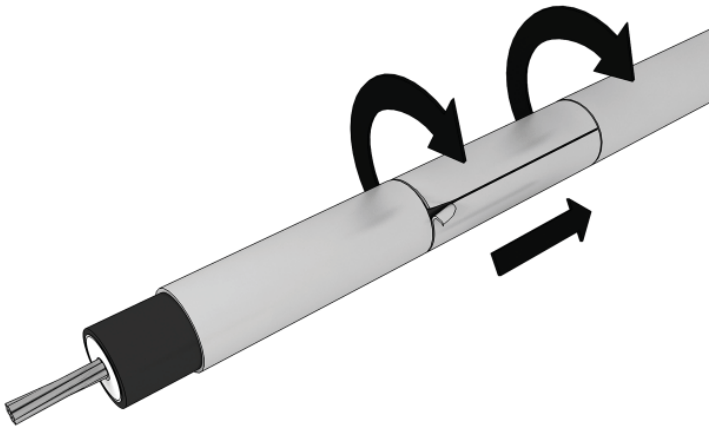

Fig. 8 Removing the cable jacket

Section 6.1.2 Stripping the black isCon® conductor

Video instructions

Procedure:

1. Adjust the cutting depth of the cable knife so that copper core is not cut.

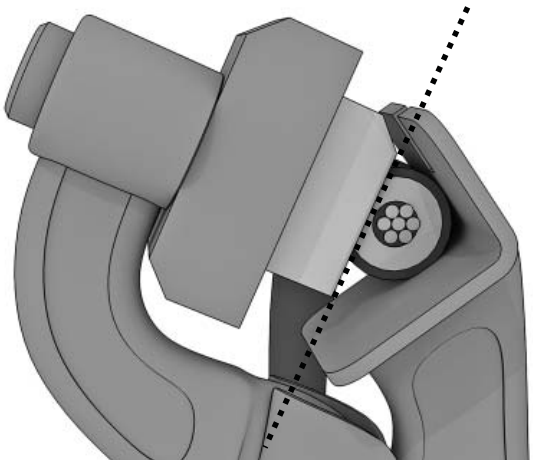

Fig. 9 Adjusting the cutting depth of the stripper

2. Place the stripper on the cable and cut into the cable jacket after 25 mm.
3. Turn the stripper 360° around the cable jacket.

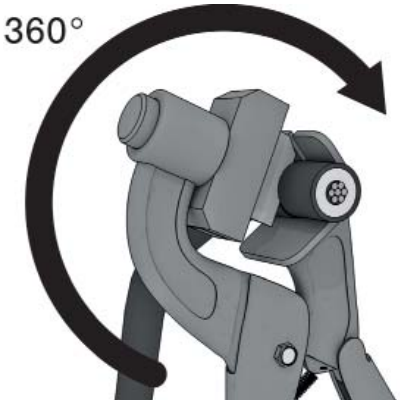

Fig. 10 Making a 360° cut into the cable jacket

4. Turn the blade head of the stripper by pressing the locking button.
5. Cut the cable lengthways on the opposite side.

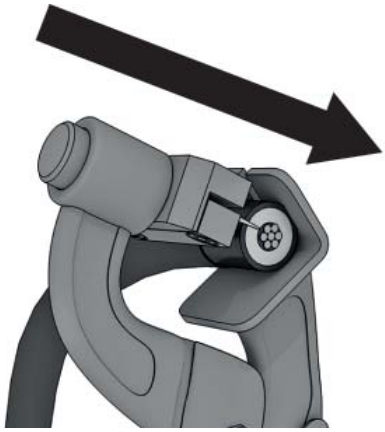

Fig. 11 Cutting the cable jacket lengthways

6. Lay the copper core bare by turning the stripper to pull off the black cable jacket.

Fig. 12 Laying the copper core bare

7. Clean the black cable jacket from grease or swarf around the contact area after laying the copper core bare (for example with an isCon EPPA 004 cleaning cloth).

Section 6.2 Installing the connection element

Video instructions

Use the isCon® connect element to connect the copper core used for operation to the low-conductivity black cable jacket.

How to fit the connecting element:

1. Remove the stud screws from the connection element.
2. Screw the connection element (spanner width 27) onto the cable.

Fig. 13 Screwing on the connection element

3. Check that the element is screwed on far enough You must be able to see the copper core completely in the screw hole.
4. Apply locking adhesive to the stud screws.

Fig. 14 Applying locking adhesive

5. Tighten the stud screws to approximately 5 Nm.

Fig. 15 Tightening the stud screws

6. Position the heat-shrink sleeve so that the connection element and the cable transition are completely covered.
7. Shrink on the sleeve with a hot air blower or a gas burner.

Fig. 16 Attaching the heat-shrink sleeve

8. Allow the connection element to cool down.

Section 6.3 Installing the potential connection

Note *If you are using the light grey isCon® conductor, you must remove the grey cable jacket before installing the potential connection. Install the potential connection with the black cable jacket which is underneath the light grey jacket. See Section 6.1.1 for further information.*

After the first potential connection behind the connection element, the isCon® conductor replaces an equivalent separation distance of up to 0.75 in air in accordance with IEC 62305-3. This means installation on metallic and electrical structures is possible. There is no direct arcing between the conductor and the object to be protected.

The potential connection can therefore be made via metallic and earthed structures on roofs, general earthed components of the building structure or the protective earth conductor of the low voltage system.

If the calculated separation distance is 0.75 metres, then install the potential connection element 1.5 metres after the connection element.

If the calculated separation distance (s) is less than 0.75 metres, the distance between the potential connection clip and the connection element (x) can be reduced. Use the **formula x = s * 2** to calculate the minimum required distance (x).

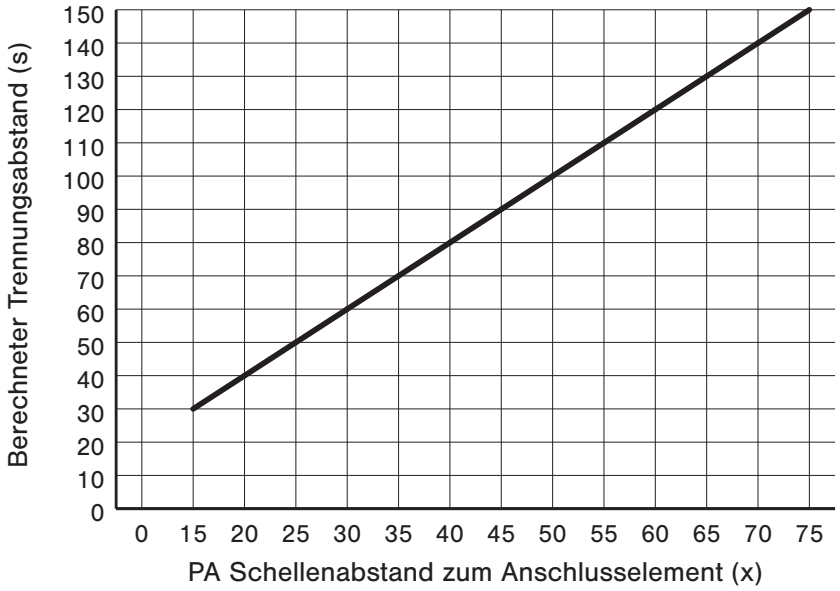

Fig. 17 ***Minimum required distance between the potential connection clip and the connection element***

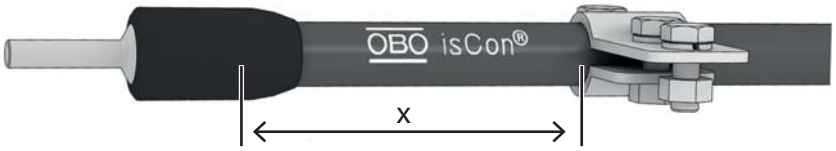

Fig. 18 ***Distance between the connection element and the potential connection element***

Please observe the following basic rules:

- Do not position any electrically conducting or earthed components within the calculated separation distance from the potential connection. This includes metal building components, cable brackets and reinforcements.
- Connect the potential connection element to the equipotential bonding system using copper of at least 6 mm² or material of equivalent conductance.

Beware of lightning current conducted into the building!

If a lighting strike during a thunderstorm causes lightning current to be conducted into the building, it can destroy appliances, start fires and pose a life-threatening hazard.

If there is a lightning strike, lightning current may not flow through the equipotential bonding system; it must remain within the protected area of the lightning protection system.

Section 6.4 Installing additional equipotential bonding connections in areas at risk of explosions

The following instructions apply in addition to those in Section 6.3 for installations in areas at risk of explosions.

Connect the OBO isCon® conductor in explosion zones 1 and 21 to the equipotential bonding system at regular spacings (0.5 metres) after the first potential connection. To do this, ensure contact between the black cable jacket and metal cable brackets, such as isCon H VA or PAE.

How to connect the isCon® conductor to the equipotential bonding system at regular distances:

When laying the cable parallel to earthed metal building structures (such as electrically conductive, connected metal façades, steel structures or bars):

1. Use isCon H VA cable brackets to fasten the conductor to the building structure.
2. Connect the metal building structure to the equipotential bonding system or the earthing system.

When laying the cable parallel to non-conducting building structures (such as stone, concrete or wood):

1a. Fasten isCon H VA cable brackets to electrically conducting connection struts laid in parallel (for example flat conductors). Continue with step 2.

1b. Connect the equipotential bonding element at regular intervals to parallel metal pipes (equipotential bonding conductors). Continue with step 2.

2. Connect the connection struts or the pipe to the equipotential bonding system or the earthing system.

Section 6.5 Installing additional potential connections

If the isCon® conductor crosses, or is laid parallel to, metal installations, we recommend additional measures to improve the equipotential bonding.

To do this, use the potential connection element to connect the isCon® conductor to these installations several times after the first potential connection, for example to cable trays, pipes or parapet plates.

Section 6.6 Installing the potential connection on the isFang interception rod

If you are using an insulated air termination rod, make the potential connection directly on the interception rod using the “927 2 6-K” potential connection clip. The potential connection clip is for earthing and fastening the conductor and for earthing the interception rod and tripod.

Please observe the following basic rules:

- Do not position any electrically conductive or earthed components within the calculated separation distance from the potential connection. This includes metal building components, cable brackets and reinforcements.
- Connect the potential connection element to the equipotential bonding system using copper of at least 6 mm² or material of equivalent conductance.

Also fasten the conductor as intervals of no more than 1 metre to the interception rod using non-metallic cable ties.

Observe the following rules if you are using an additional conductor to reduce the separation distance:

- The distance between the conductors on the insulated interception rod depends on the installation conditions of the rod (see Kapitel 5.2 on page 15).
- Install the conductors as far apart as conditions allow.

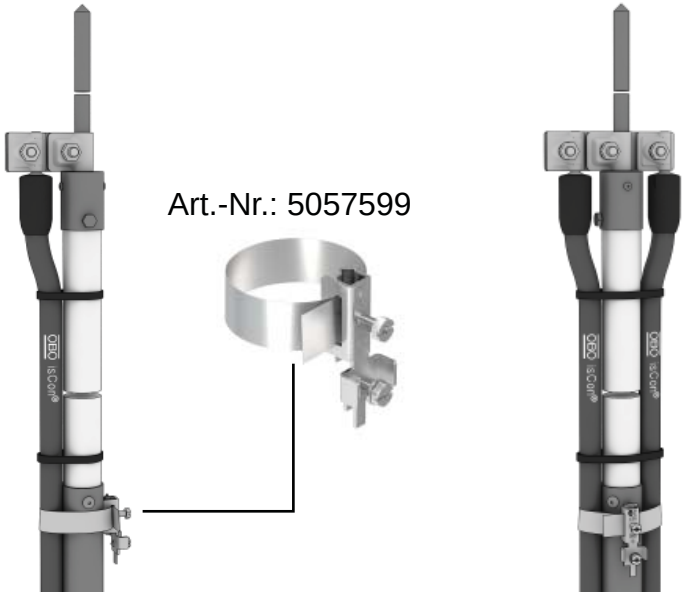

Fig. 19 Installing one or two conductors on the insulated isFang interception rod

Section 7. Installing the interception rod system

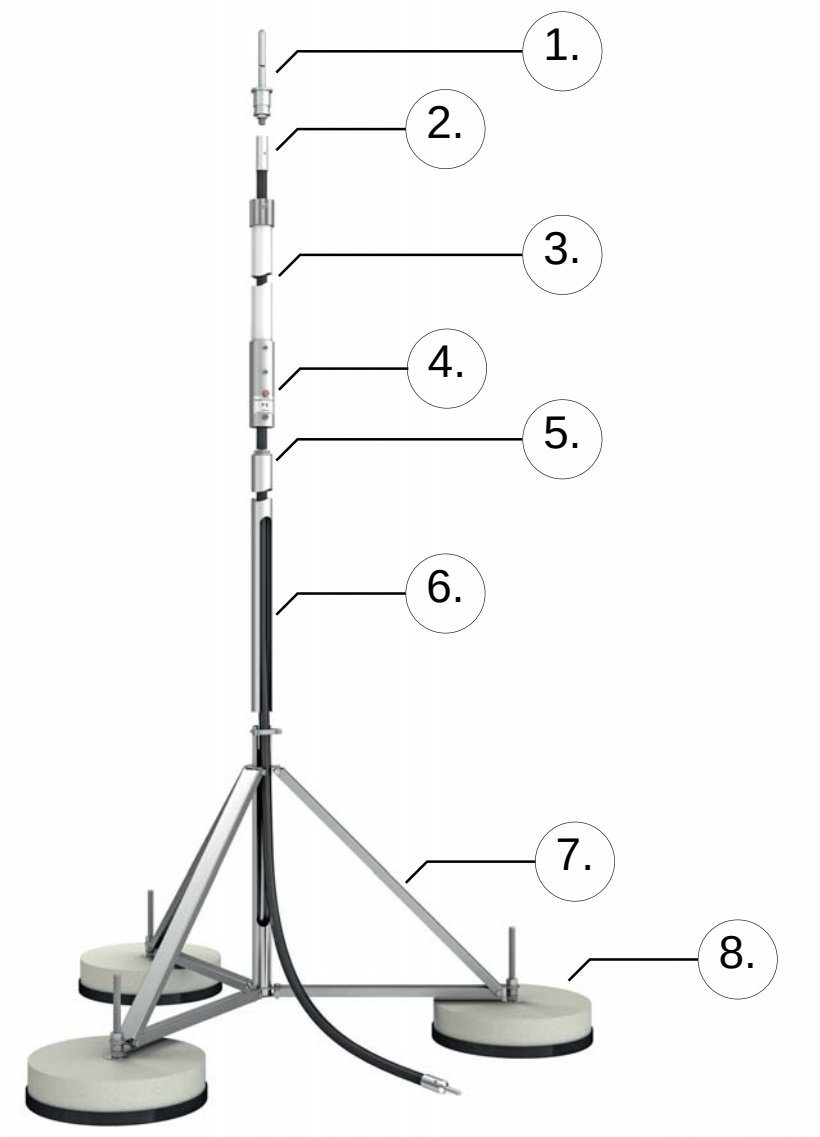

Fig. 20 isFang interception rod as installed with isCon® conductor laid inside

Component parts

1. Air termination rod
2. Connection element
3. Insulated interception rod
4. Potential connection
5. Potential connection element
6. Retaining mast with side outlet
7. Tripod stand with side outlet
8. Concrete base with edge protection

Calculate the protected area, the required height and the arrangement of the interception rods according to DIN EN 62305-3 (IEC 62305-3).

Connect the insulated interception rod to the equipotential bonding system with a copper wire of at least 6 mm^2 or material of equivalent conductance. Lightning current may not flow through the equipotential bonding system, which must remain within the protected area of the lightning protection system.

You can make the potential connection on the following building structures:

1. Metal and earthed structures on roofs
2. General, earthed parts of the building structure
3. Protective conductors of the low-voltage system

Note *Note the structural engineering conditions and wind loads (Section 5.6 on page 19) during installation and planning.*

Interception rod with side outlet	**Interception rod with bottom outlet**	**isFang bracket***	**Number of 16 kg FangFix stones F-FIX-S16**	**Number of FangFix edge protectors F-FIX-B16**	**Length of threaded rod isFang 3B-G...**
isFang IN-A 4000 Item no.: 5408938		isFang 3B-100-A Item no.: 5408930	6 pcs. Item no.: 5403227	3 pcs. Item no.: 5403238	3 x 340 mm Item no.: 5408972
	isFang IN 4000 Item no.: 5408934	isFang TW isFang TR... isFang TS...			
isFang IN-A 6000 Item no.: 5408940		isFang 3B-150-A Item no.: 5408932	9 pcs. Item no.: 5403227	3 pcs. Item no.: 5403238	3 x 430 mm Item no.: 5408973
	isFang IN 6000 Item no.: 5408936	isFang TW... isFang TR... isFang TS...			
*Number and position depend on the building structure					

Table 8 Arrangement in wind load zone 1 and 2

Section 7.1 Assembling the isFang interception rod

1. Remove the stud screws from the connection element.
2. Screw the isCon IN connect element all the way onto the conductor, which you have first stripped to a length of 25 mm.
3. Apply locking adhesive to the thread of the stud screws.
4. Screw the stud screws in (approx. 5 Nm) to make contact with the copper conductor.

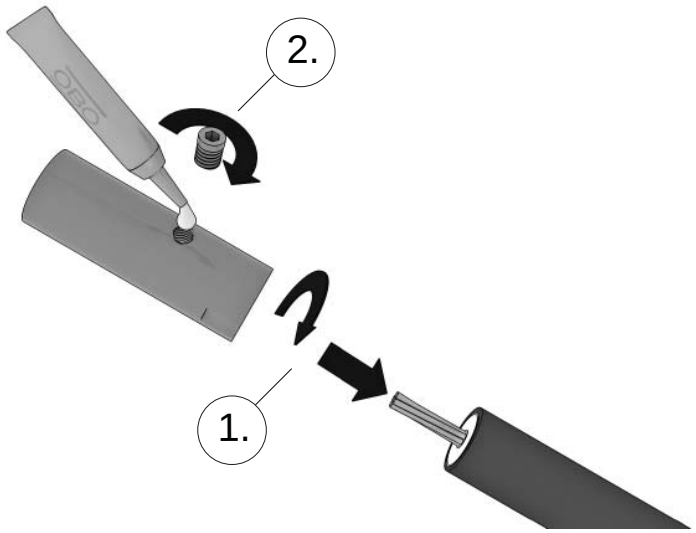

Fig. 21 Mounting the connection element

5. Lay all three parts of the air termination rod (see Fig. 22) on the ground.
6. Guide the isCon® conductor up through the first two elements.

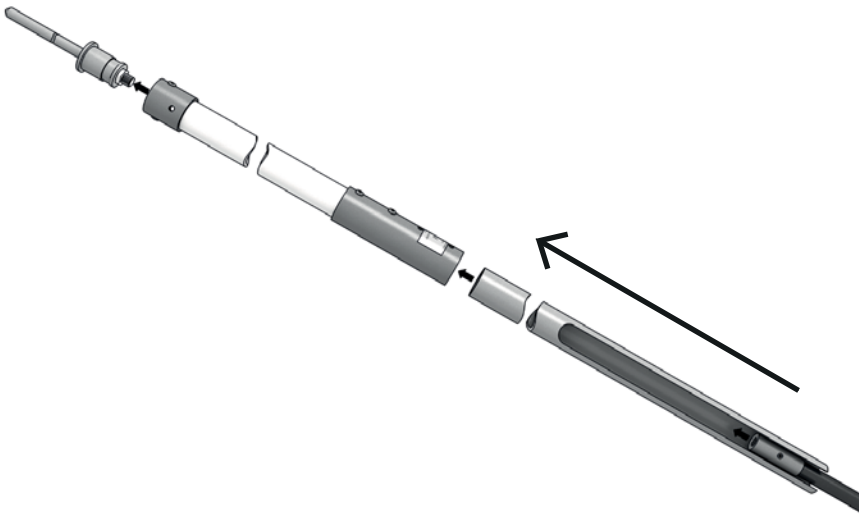

Fig. 22 Assembling the parts of the interception rod

7. Screw the air termination rod firmly to the connection element.

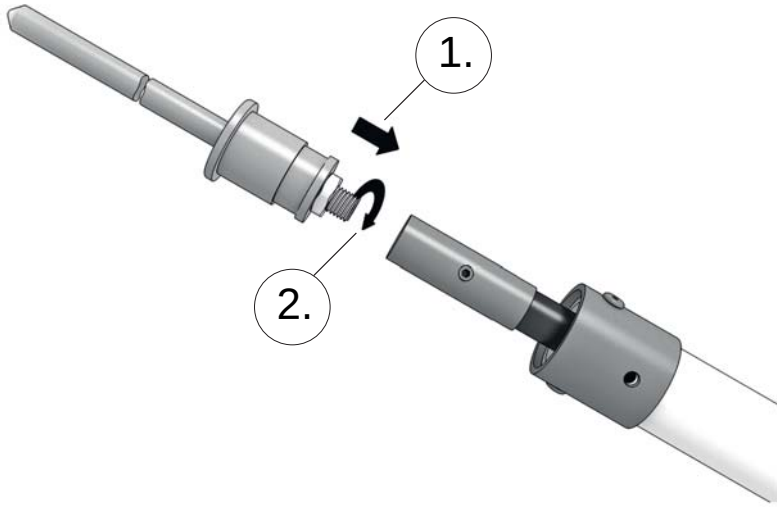

Fig. 23 Screwing the interception rod to the connection element

8. Insert the air termination rod into the interception rod.
9. Fasten the air termination rod using the bolt on the side (20 Nm).

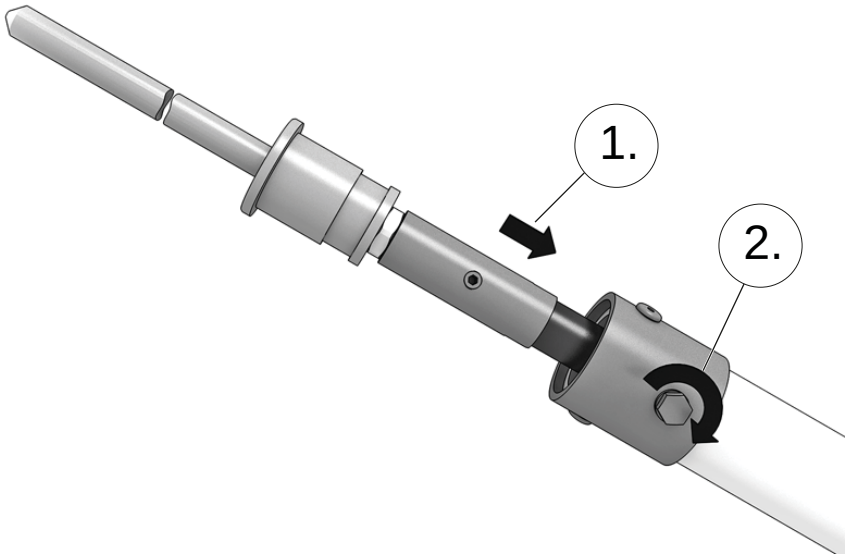

Fig. 24 Inserting the air termination rod in the interception rod

10. On both sides, push the potential connection onto the cable, hold it tight and push it into the retaining pipe (fig. 6).
11. Push the retaining pipe upwards to the stop. The opening for the upper copper bolt must not face towards the gap for the potential connection.
12. Screw the bolts tight (20 Nm).

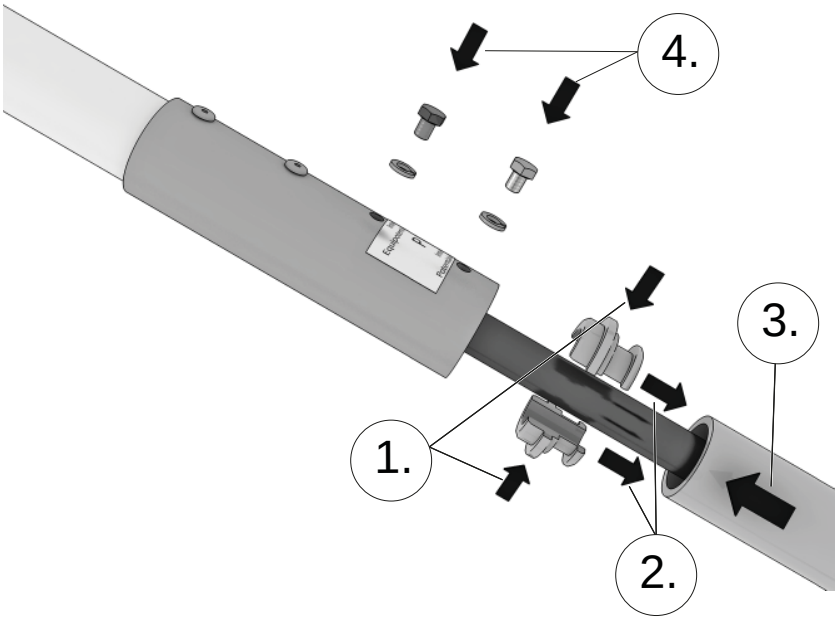

Fig. 25 Attaching the potential connection

Section 7.2 Mounting the concrete base

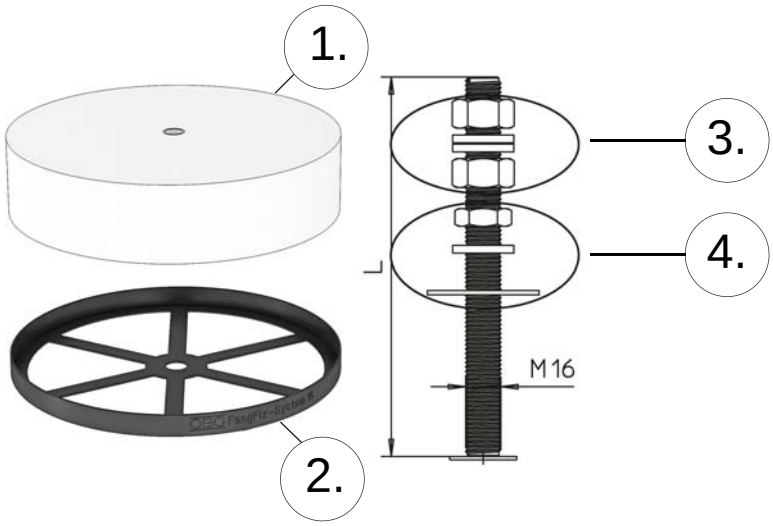

Fig. 26 Concrete base

Component parts:

1. Concrete base
2. Edge protection
3. Height compensation nuts (with washers)
4. Lock nut (with washer and plate)

Procedure:

1. Push the threaded rod up through the opening.
2. Position the concrete base on the threaded rod from above.
3. Fasten the concrete base using the lock nut.

Fig. 27 ***Mounting the concrete base on the edge protection***

Section 7.3 Erecting the interception rod stand

CAUTION

Beware of injury when erecting the tripod stand

Be careful not to crush your hands or limbs when erecting the tripod stand.

When erecting the tripod, do not hold the stand between its moving parts.

Note

To determine how many concrete bases need to be used in the isFang interception rod system, use Tabelle 6 and Tabelle 7 on page 20 or consult your planning office for structural engineering calculations.

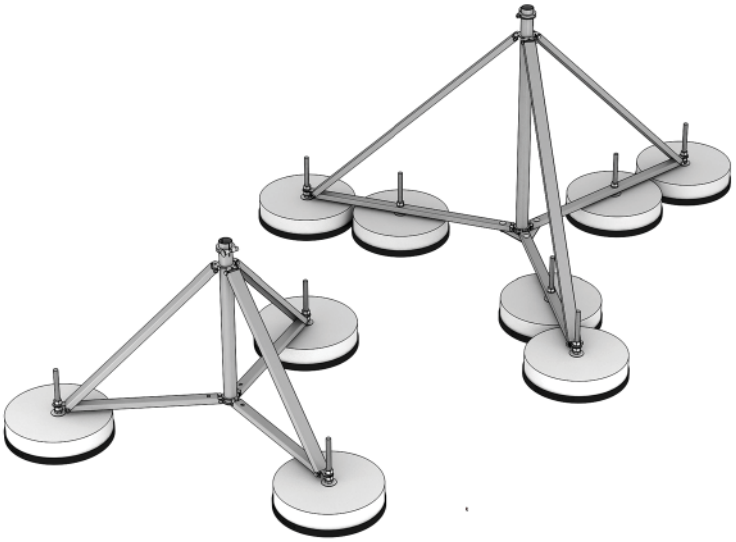

Fig. 28 ***Assembled concrete base in normal wind load zone (left) and high wind load zone (right)***

Procedure:

1. Remove the lock nuts from the threaded rods.
2. Open the interception rod stand.
3. Position the interception rod stand on the concrete bases.

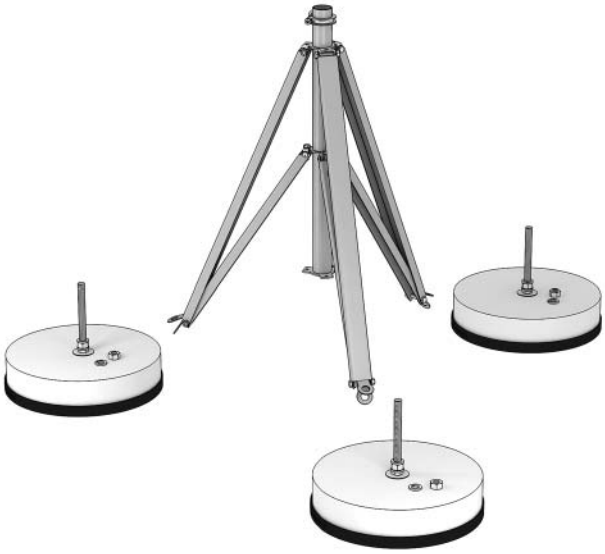

Fig. 29 Opening the tripod stand

4. Measure the inclination of the interception rod stand (depending on the roof inclination) using a spirit level.
5. Adjust the inclination of the interception rod stand (maximum possible compensation: 5°) using the height compensation nuts.
6. Tighten the lock nuts.

Fig. 30 Compensating for the roof inclination

- **If you are using an interception rod with a 50 mm diameter and side outlet, then continue with Section 7.4 on page 37.**

7. Lower the interception rod into the retaining apparatus of the stand.
8. Fasten the interception rod in place using the clamp clip.

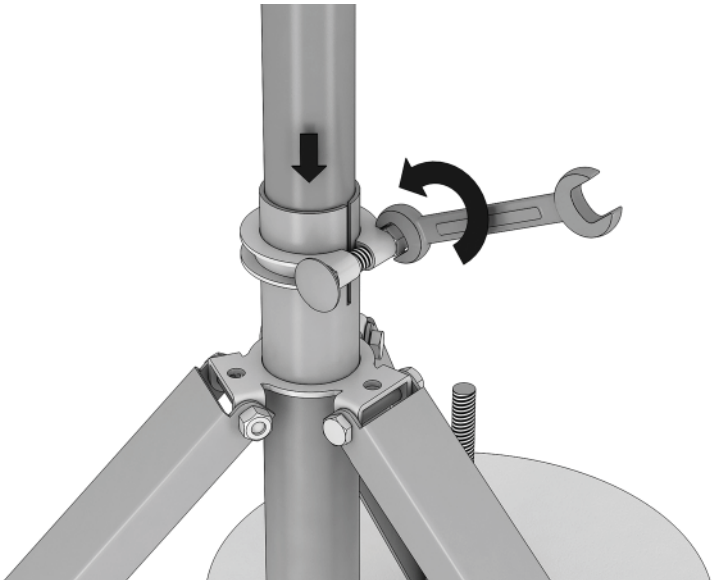

Fig. 31 Fastening the interception rod in the stand

- **If you are using an insulated interception rod, then continue with Section 7.3.1 on page 36.**
- **If you are using an aluminium interception rod, then continue with Section 7.3.2 on page 37.**

Section 7.3.1 Equipotential bonding for an insulated interception rod

Procedure:

1. Fasten the equipotential bonding system to the Rd 8-10 crossbar of the interception rod.

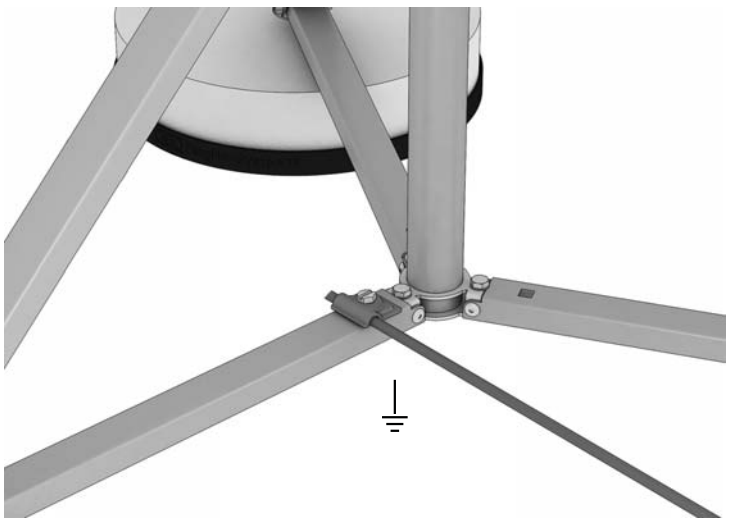

Fig. 32 Connecting the equipotential bonding to the insulated interception rod stand

Section 7.3.2 Connecting the stand for an aluminium interception rod to the lightning protection system

Procedure:

1. Fasten the round conductor of the lightning protection system to the Rd 8-10 crossbar of the interception rod.

Fig. 33 Connecting a non-insulated interception rod stand to the lightning protection system

Section 7.4 Erecting an interception rod with a side outlet in the tripod stand

Procedure:

1. Insert the interception mast into the tripod stand from above.
2. Fix the interception mast using the clamp clip.

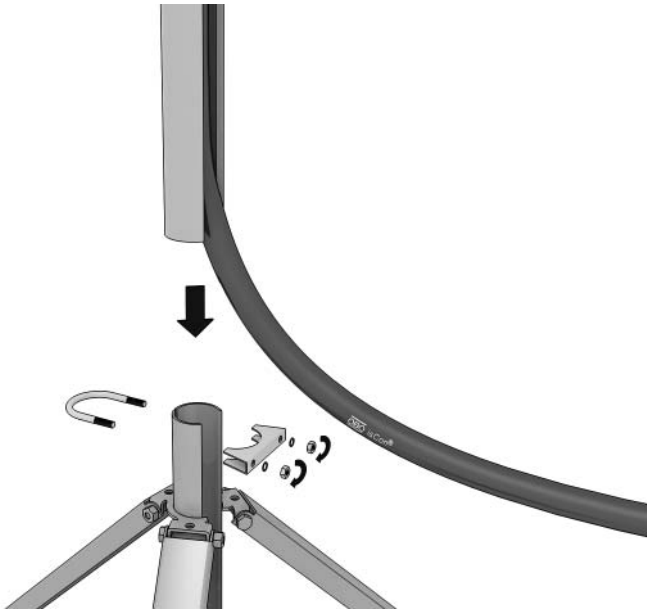

Fig. 34 Connecting the interception mast with tripod stand

3. Fasten the equipotential bonding system to the Rd 8-10 crossbar of the interception rod (see “Fig. 32 Connecting the equipotential bonding to the insulated interception rod stand” on page 36) or directly to the equipotential bond of the interception rod (see “Fig. 25 Attaching the potential connection” on page 33).

Section 7.5 Fastening the interception mast without a side outlet to the building structure

On insulated interception rods without a side outlet, the outlet for the isCon® conductor is at the bottom.

You can watch a video describing the procedure at www.iscon.obo-bettermann.com.

Procedure:

1. Fasten the interception mast without a side outlet to the building structure using suitable fastening clips.
2. On a metal building structure, the equipotential bond is made using the metal fastening clips of the interception rod as an aid. No additional cable is needed.
3. On a non-metal building structure, connect the equipotential bonding system directly to the equipotential bond on the interception rod (see “Fig. 25 Attaching the potential connection” on page 33).

Section 8. Test protocol for the OBO isCon® system

Tested building

Name

Contact

Number/street

Postcode/town

Telephone

	Question	Yes	No
1.	Have the connection elements been correctly fitted according to the installation instructions?		
2.	Is the entire length of the OBO isCon® conductor installed within the area protected by the air termination system?		
3.	Is the outer jacket of the black conductor free of damage?		
4.	Was the separation distance for the area to be protected calculated according to IEC 62305-3 (DIN EN 62305-3)?		
5.	Has the equivalent separation distance of s ≤ 0.75 m in air and s ≤ 1.5 m in solid building material been maintained?		
6.	Has the separation distance been maintained in the section between the connection element and the first potential connection of the OBO isCon® conductor?		
7.	Has the potential connection to the local equipotential bonding system for the object to be protected been made with an isCon®-PAE conductor of at least 6 mm^2?		
8.	Has the the minimum bending radius of 345 mm for the black conductor and 390 mm for the grey conductor been observed?		
9.	If the installation is supported on a stand, has the separation distance to the roof surface been maintained in the section up to the first equipotential bonding clip?		
10.	Are there no metal parts or cable brackets in the section up to the first equipotential bonding clip (the calculated separation distance to the conductor)?		

Only if the answer to all questions is “yes” are the manufacturer’s installation requirements fulfilled.

Place/date

Tester

Signature

www.obo-bettermann.com

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THINK CONNECTED.