CONNECT AND PROTECT

# nVent ERICO Isolated Downconductor ISOnV Installation Instructions

nVent
ERICO

# Contents

# 1. Safety/Warnings

**SAFETY INSTRUCTIONS:** All governing codes and regulations and those required by the job site must be observed. Always use appropriate safety equipment such as eye protection, hard hat, and gloves as appropriate to the application.

Due to ongoing research into the phenomena of lightning, lightning protection technology and product improvement, nVent reserves the right to alter any information and specifications contained herein at any time without notice.

The nVent ERICO Isolated Downconductors (ISOnV) system uses a specialized lightning protection downconductor, that during operation may be subjected to impulse currents of over 100,000 Amps and voltages of up to 700,000 V may be developed.

Reliable operation is dependent upon correct design and installation in accordance with IEC 62305 series and nVent instructions.

The insulated downconductor must not be damaged in handling, installation or service. The downconductor sheath is a specialized semi-conductive material requiring connection to the equipotential bonding system of the building in accordance with these instructions. This sheath is fragile and damage to the sheath may require replacement of the cable.

Fully refer to installation instructions prior to handling and installation. Do not assume that traditional lightning protection or HV cable practices apply.

These products should be installed as part of an IEC 62305 series integrated lightning protection system (LPS).

Lightning is a statistical phenomena where 100% protection is virtually impossible to achieve, and certainly, is not economically practical. However, correct installation is essential for the maximum level of safety.

Only install system during storm-free periods. Do not install in close proximity to overhead power lines. Do not expose personnel to electromagnetic radiation sources such as live transmission equipment during installation.

# 1. Safety/Warnings

1. nVent ERICO products shall be installed and used only as indicated in nVent ERICO product instruction sheets and training materials. Instruction sheets are available at www.nVent.com and from your nVent ERICO customer service representative.

2. nVent ERICO products must never be used for a purpose other than the purpose for which they were designed or in a manner that exceeds specified load ratings.

3. All instructions must be completely followed to ensure proper and safe installation and performance.

4. Improper installation, misuse, misapplication or other failure to completely follow nVent's instructions and warnings may cause product malfunction, property damage, serious bodily injury and death.

# 2. Isolated LPS Design

This section gives a brief introduction to isolated LPS design. More details can be found in the standards referenced.

Note that throughout this document various terms are used. It may be helpful to refer to the Glossary at the end of this document for an explanation of these terms.

## 2.1 STANDARDS

The ISOnV system is designed to comply with the requirements of the IEC 62305-3 and IEC TS 62561-8 Lightning Protection System (LPS) standards. The IEC 62305 series of standards provides a comprehensive approach to Lightning Protection System design, and part 3 of that series (IEC 62305-3) covers physical damage to structures, addressing both non-isolated LPS and isolated LPS. The ISOnV conductors and associated accessories are assessed to these standards and provide an innovative method for implementing an isolated LPS that has a number of benefits.

## 2.2 EXPLANATION AND CALCULATION OF SEPARATION DISTANCE

### 2.2.1 Separation Distance

A fundamental requirement of implementing an isolated LPS is a good understanding of separation distance. Put simply, separation distance is the minimum distance between a point on the LPS conductor network and another conductive part that must be observed to avoid an undesired flashover from the LPS system to that conductive part, potentially causing damage. Such an undesired flashover is sometimes known as dangerous sparking.

This flashover is caused by the voltage rise on the LPS conductor network that occurs due to lightning current flow. The voltage is greatest (and hence separation distance requirement is greatest) at the top of the structure at the actual air terminations, and decreases on the lower parts of the building closer to the earth termination system. The voltage rise is most pronounced where single individual downconductors are used, and is markedly reduced where many downconductors share the lightning current.

Examples of this are given of in Section 2.4.

The calculation of the separation distance, s, is explained in the standard and is as follows.

$$s = \frac{k_i}{k_m} \times k_c \times l$$

where:

$k_i$ depends on the chosen class of LPS (see below).

$k_m$ depends on the electrical insulation material (see below).

$k_c$ depends on the (partial) lightning current flowing on the air termination and the downconductor. Calculation of $k_c$ can be a relatively complex, depending on the interconnection arrangement of conductors and downconductors.

$l$ is the length, in metres, along the air termination and the downconductor from the point where the separation distance is to be considered to the nearest equipotential bonding point or the earth termination system.

Note that the length l along the air termination and downconductor system can be ignored (assumed to be zero) where the structure is continuously conductive (for example, a metal framed structure with bonded metallic roofing).

The values of the parameters are as follows.

| Class of LPS | $k_i$ |
|---|---|
| I | 0.08 |
| II | 0.06 |
| III and IV | 0.04 |

| Material | $k_m$ |
|---|---|
| Air | 1 |
| Concrete, brick, wood | 0.5 |

| Number of Downconductors n | $k_c$ |
|---|---|
| 1 (only in case of an isolated LPS) | 1 |
| 2 | 0.66 |
| 3 and more | 0.44 |

Table 1 - Parameters used in separation distance calculation

NOTE - Values for $k_c$ shown apply for all type B earthing arrangements and for type A earthing arrangements (see section 2.4 for an explanation of these earthing arrangements), provided that the earth resistance of neighboring earth electrodes do not differ by more than a factor of 2. If the earth resistances of single earth electrodes differ by more than a factor of 2, $k_c$ = 1 is to be assumed. In practice, often a more detailed calculation of $k_c$ is carried out using computer software.

So, in summary, separation distance is the minimum distance between a point on the LPS conductor network and another conductive part that must be observed to avoid an undesired flashover from the LPS system to that conductive part. To keep the calculation simple, the distance can be calculated for air, and if a conductive path is being considered (i.e. through a wall, or along a surface), the required distance is doubled.

The standards give example calculations for different situations to clarify how the technique is applied.

### 2.2.2 Insulated conductors

In practice, it can be difficult to maintain the required separation distance. To do so can require inconvenient routing of the conductors, or possibly elevating the conductor with insulating supports. In addition, it can be difficult to verify the presence, or otherwise, of any earthed items behind surfaces or within structural elements that would violate the required separation distance.

To simplify these issues, an insulated conductor can be used. The performance of the insulation is tested in a laboratory, with the result being expressed as the conductor having an equivalent separation distance to that provided by that distance of air. The test is specified in the standards and specifications previously mentioned.

The application of such a cable is relatively straightforward. The separation distance (in air) is calculated for various points on the lightning protection system. For those parts of the LPS where the insulated conductor is to be used, it must be ensured that:

The calculated separation distance (in air) ≤ the conductor's equivalent separation distance

If this is so, the insulated conductor can be used in that part of the LPS, and the usual physical separation required does not apply. That is, the conductor can directly mount against earthed items without risk of dangerous sparking.

nVent manufactures two insulated conductors, having equivalent separation distances of 0.50 m, and 0.70 m.

## 2.3 AIR TERMINATION SYSTEM

The start of an LPS design using the ISOnV system begins by ensuring coverage of the building or facility using the Protection Angle Method, Rolling Sphere Method, or a combination of both. The ISOnV system inherently uses masts and longer rods, thus enabling greater protective areas with fewer rods, with any of these methods. This aspect of the design is similar for both an isolated and non-isolated system, but the isolated system design uses only dedicated air terminations, rather than including natural elements of the building, to ensure isolation of the LPS in the area where isolation is required.

Examples of the Protection Angle Method, Rolling Sphere Method, and a combination of both methods are shown here.

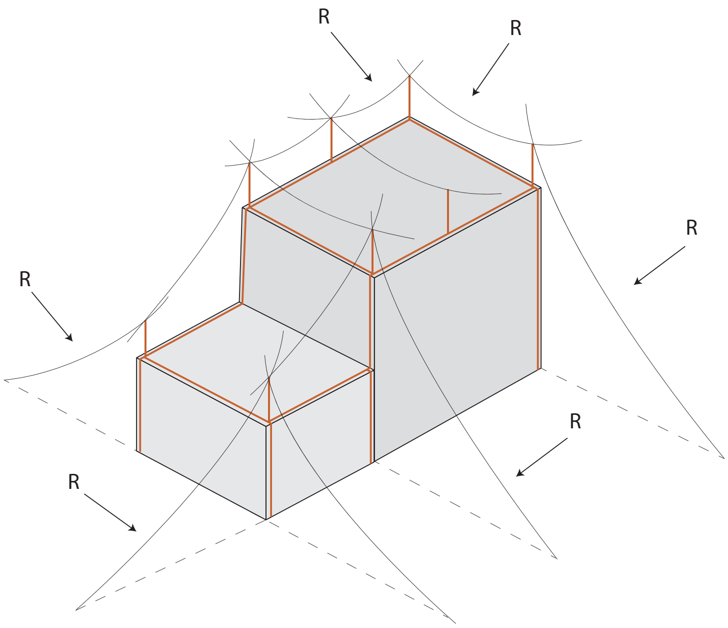



Figure 1 - Rolling Sphere method

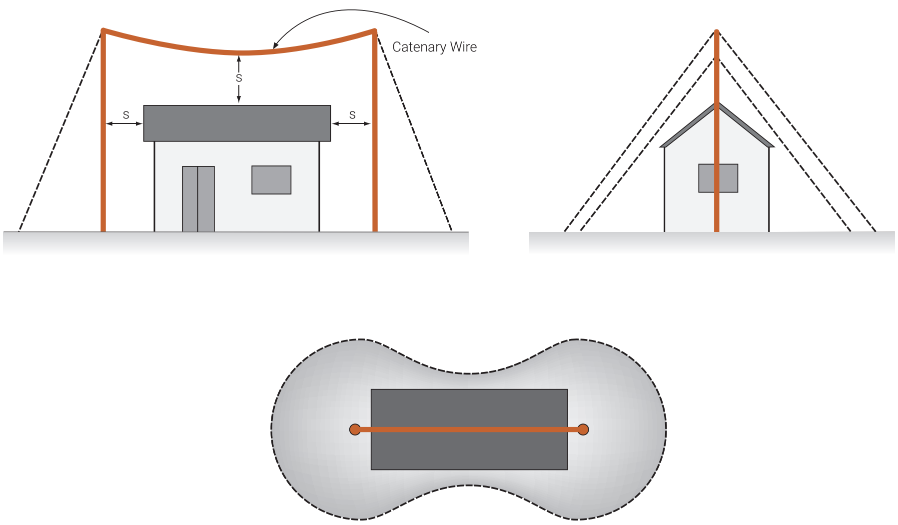



Figure 2 - Protection Angle Method

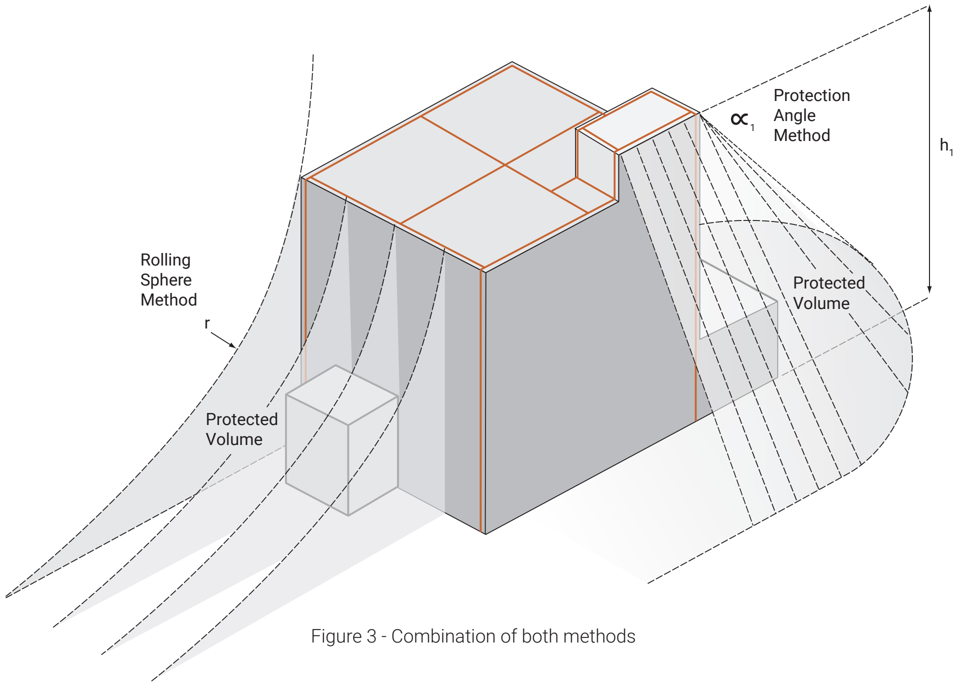



Figure 3 - Combination of both methods

## 2.4 EARTH TERMINATION SYSTEM

The IEC 62305-3 standard identifies two basic types of earth termination systems.

The Type A arrangement has earth electrodes installed outside the structure to be protected connected to each downconductor, and these earth electrodes do not form a closed loop.

The Type B arrangement comprises either a ring conductor external to the structure to be protected, or a foundation earth electrode forming a closed loop. Such earth electrodes may also be meshed, often being embedded in the concrete of a building foundation. The intention is that the potential difference between parts of the earth termination system is minimized.

More details of these earthing arrangements are given in the standard, but the basic idea is given in these illustrations. The type of earth electrode system is important when isolated LPS are used, and affects the calculation of separation distance.

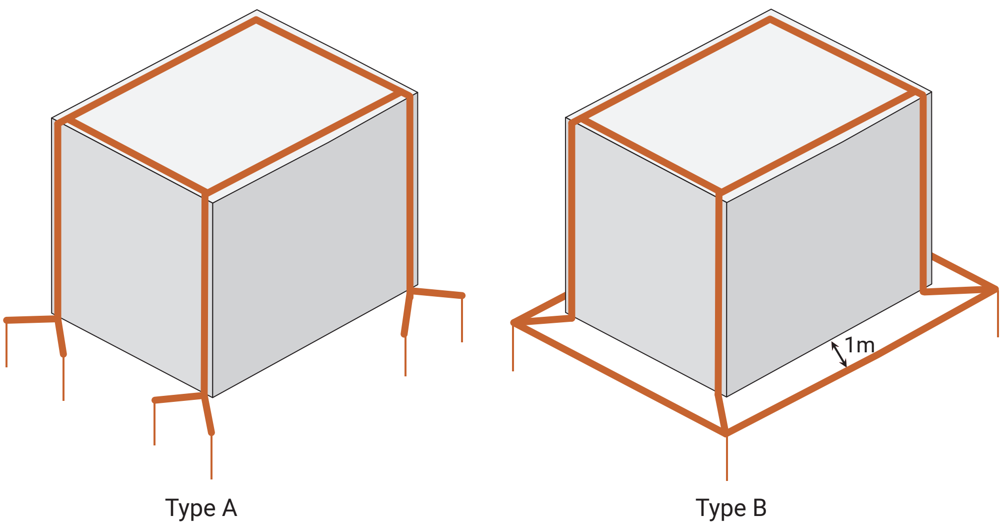



Figure 4 - Type A and Type B earthing arrangements

# 2. Isolated LPS Design

## 2.5 ISOLATED SYSTEM EXAMPLES

### 2.5.1 Separate downconductors

In this example, each air termination rod has its own dedicated downconductor, noting that the use of a single downconductor for an isolated LPS air termination is permissible according to the standard. All the lightning current resulting from a strike to the air termination passes down that dedicated downconductor. In this case, the calculation of the separation distance at any point of that downconductor is simple, and is calculated from the previous formula given for separation distance, given that $k_m = 1$, $k_c = 1$, and $k_i$ is in accordance with chosen class of LPS. If the equivalent separation distance of the cable is not to be exceeded, then the maximum individual conductor lengths are as follows.

| Conductor | Class of LPS | | |
|---|---|---|---|
| | I | II | III and IV |
| ISONV50 | 6.3 m | 9.4 m | 12.5 m |
| ISONV70 | 8.8 m | 13.1 m | 17.5 m |

Table 2 - Maximum conductor length for individual non-interconnected conductors

Two examples are given using this approach.

The first example consists of a taller modern concrete reinforced building, complete with bonded metallic roofing. Careful attention has been made during building construction to ensure all concrete reinforcement is electrically interconnected, along with interconnection to the metallic roof cladding and supports, exposed metallic building elements, and connected into the building foundation earthing system. The building itself is inherently protected against direct lightning strikes, but sensitive electrical equipment has been installed on a mast on the rooftop. While the equipment and mast could be bonded into the building LPS system, it has been decided to avoid direct lightning currents flowing through the equipment by installing an isolated LPS system on the mast to protect that equipment, which will bond into the main building LPS system at the base of the mast. In this example, the length of isolated conductor required was 8 metres, and the LPS Class was level I, so ISONV70 was chosen (8 m is less than the maximum 8.8m allowable for ISONV70).

In this second example, a relatively compact building containing sensitive communications equipment needs to be protected. In addition to the sensitive building contents, exposed antenna systems have been installed on the rooftop. Four air termination rods are installed at each building corner, and the rolling sphere method confirms protection of the building and rooftop installations. The length of each downconductor to the building foundations is 6 metres. ISONV50 conductor was used, achieving an LPS Class I level of protection.

Note that the earthing system at the base of each downconductor can be of either Type A or Type B.

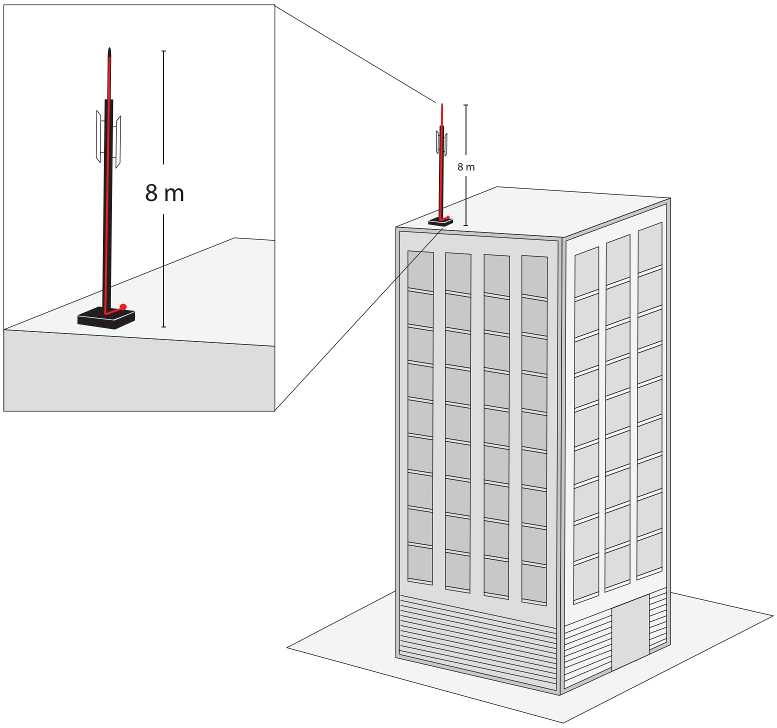



Figure 5–Separate downconductors (example 1)

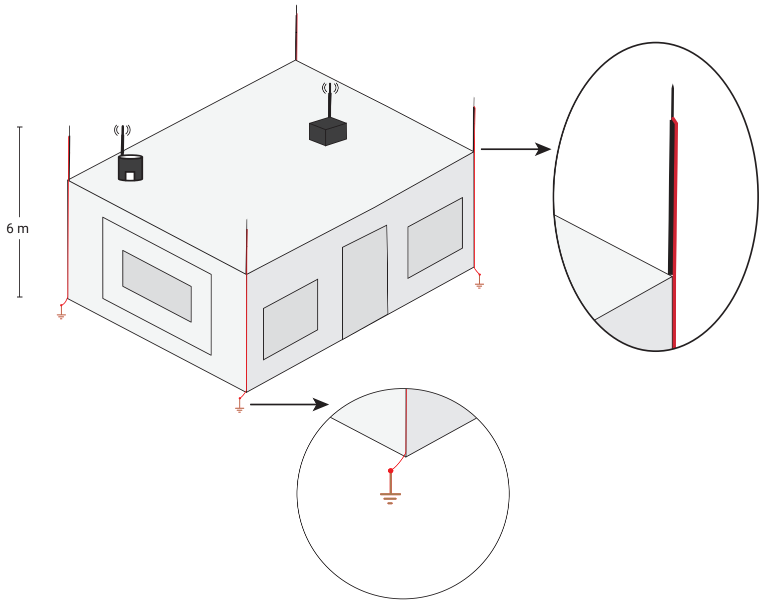



Figure 6–Separate downconductors (example 2)

# 2. Isolated LPS Design

### 2.5.2 Complete building coverage

In this example, the building is significantly larger. There are a number of rooftop communication systems with antennas and PV arrays. A relatively quick analysis shows that running individual downconductors from each air termination exceeds the maximum cable length allowable. The air terminations are now interconnected, thus splitting the current via many paths, and in turn reducing the $k_c$ factor, and hence the separation distance required. In this example, the building is 30 m x 30 m in plan view and 3 stories high (10 m high). Air terminations are installed at each corner, at the middle of each side, and one in the centre, for a total of 9 air terminations in a 3 x 3 array. The dimensions of the resulting system are as shown in the illustration. Note that, as explained in Sections 2.2 and 2.4, a Type B earthing system has been employed to ensure a good equipotential connection at the base of each downconductor.

Allowing for the heights of the air terminations, computational software calculated the separation distances for the corner, edge, and center air terminations to be as follows.

| Air Termination | Class of LPS | | |
|---|---|---|---|
| | I | II | III and IV |
| Corners | 0.56 m | 0.42 m | 0.28 m |
| Edges | 0.48 m | 0.36 m | 0.24 m |
| Centres | 0.60 m | 0.45 m | 0.30 m |

Table 3 - Separation distances required at each Class of LPL

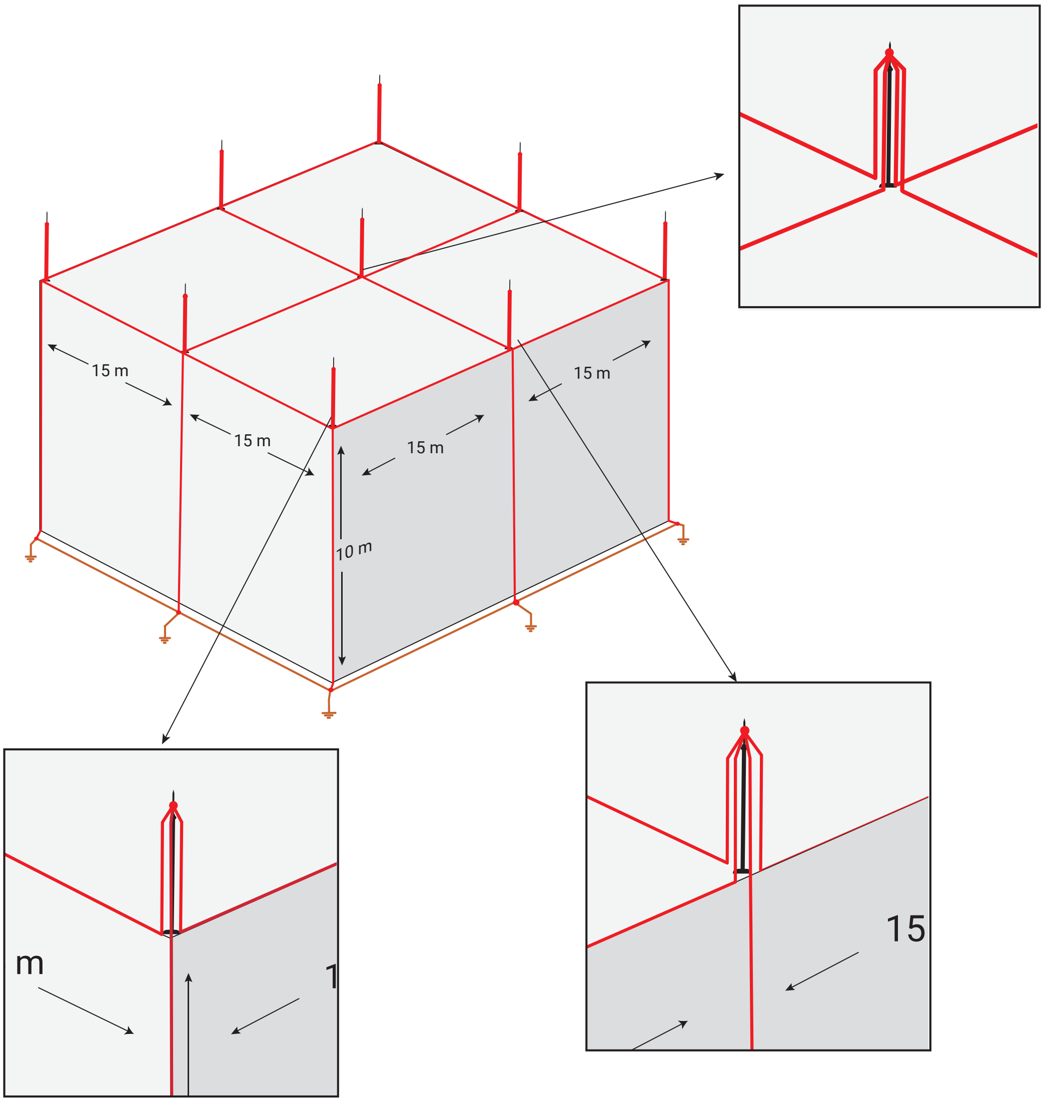



Figure 7–Complete building coverage

# 2. Isolated LPS Design

### 2.5.3 Connecting to lower non-isolated LP systems

In this situation, equipment on a rooftop is required to be protected by an isolated LPS, but the whole building is not in need of a complete isolated LPS. It may make good economic sense to connect the isolated rooftop LPS into the non-isolated LPS covering the remainder of the building. There are two cases, depending on whether the building is conductive or not.

**Building is conductive**

This situation has been covered by the first example in Section 2.5.1, and is an excellent cost-effective application of the ISOnV system.

**Building is non-conductive**

In this example, the building is a masonry (non-conductive) building, and only the rooftop conductors use the ISOnV system. The separation distances are as calculated before, in Table 2. Note that since the building is non-conductive, the separation distance at the start of the ISOnV conductors (shown as point A in the illustration) has been calculated to be 0.3 m, and so electrical equipment needs to be located away from these points.

Since the main building downconductors are not isolated, care needs to be exercised to ensure no electrical services are located within the separation distance that applies at any particular point near those downconductors. This separation distance applies for internal conductors on the inside of the wall near these downconductors as well.

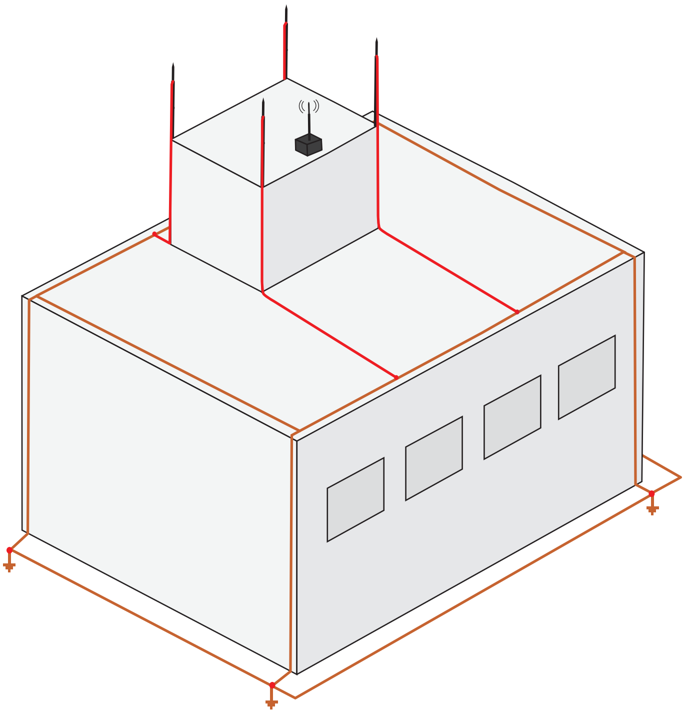


Figure 8–Connecting to lower non-isolated LP systems

### 2.5.4 Protection of specific items or people

In some non-isolated LPS installations, the separation distance might only be violated at a particular item. In this instance, a length of insulated conductor can be used at that point. Sufficient length would have to be provided on each side of the item.

Another similar case would be where people are unavoidably near a downconductor, and the clearance does not exceed the separation distance. Such a case might be as shown in the following figure.

In this case, the downconductors in the vicinity of people could use insulated conductors. In this case, the isolated downconductor could be run in a non-metallic PVC pipe to help prevent physical damage to the conductor.

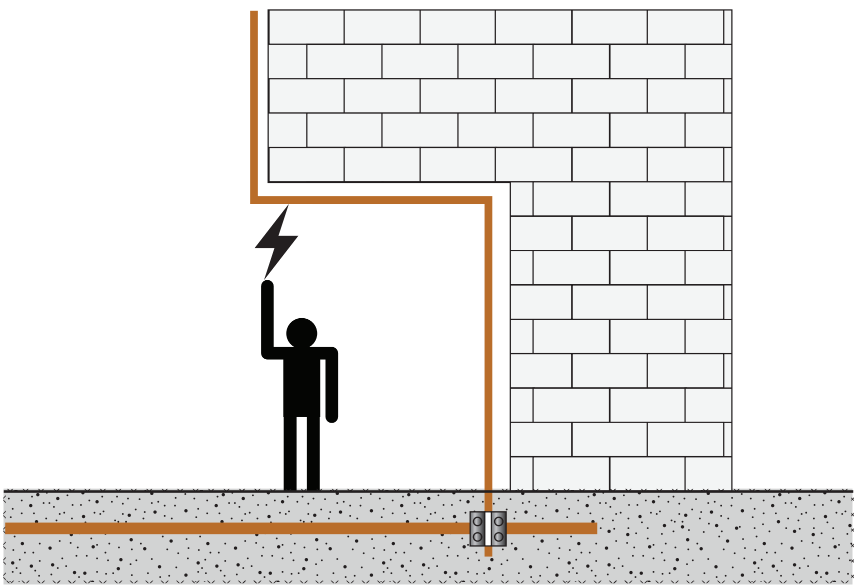


Figure 9–Flashover to people

# 3. System Overview

The system consists of insulated masts supporting lightning rods that provide the protective areas over the building, and interconnected insulated downconductors to maintain the system isolation. Note that the mast always is used with an inside conductor, and may have from 1 to 4 outside conductors.

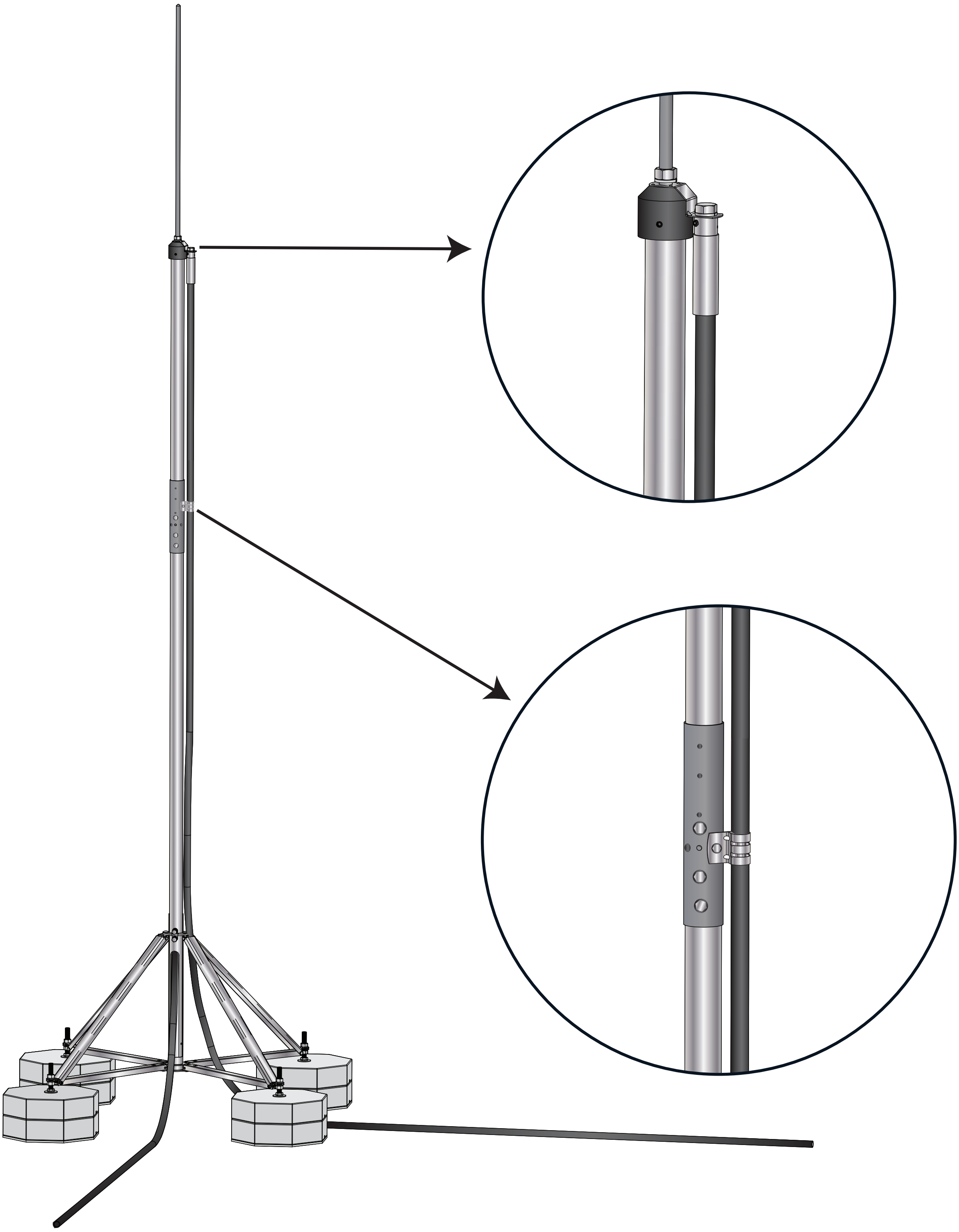


Figure 10–ISOnV air terminal support arrangement

# 3. System Overview

## 3.1 AIR TERMINATION RODS

The air terminals are available in lengths of 0.5, 1.0, 1.5, and 2.0 meters, and are chosen depending on overall height required by the LPS design. All are available in aluminium, with the 1.5 and 2.0 meter rods also available in V2A (304) grade stainless steel.

They have M16 threaded bases to allow them to connect into the mast cap and upper termination.

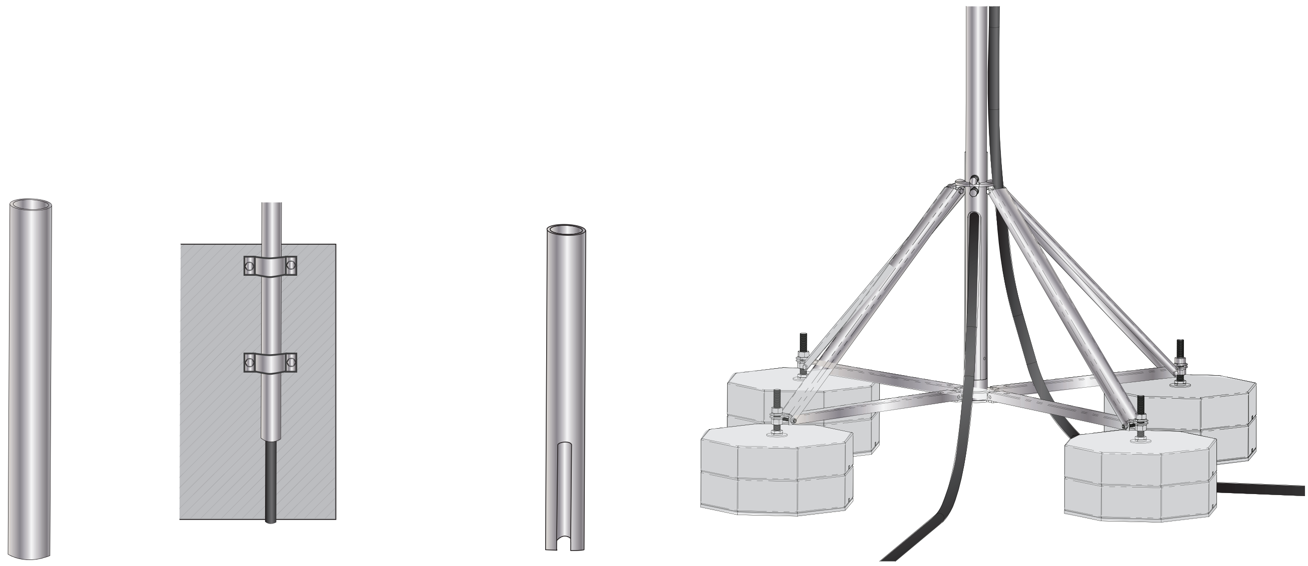
## 3.2 UPPER MAST ASSEMBLY

The selected air terminal connects to a pre-assembled upper mast assembly, consisting of a mast cap, a 2 meter fiberglass mast, and a V2A (304) grade stainless steel coupler. The overall length of this assembly is 2.3 meters, and the coupler contains an internal equipotential bond device for electrically bonding an internal downconductor. It is possible to mount additional downconductors down the outside of this upper mast assembly, but an internal downconductor is always required.

## 3.3 LOWER SECTION, AND MOUNTING ARRANGEMENTS

The lower mast section is constructed of aluminium, and comes in three choices of length – 1.1, 2.4, and 3.7 meters. This lower mast section is supported in a number of possible ways. It can utilize a 4-leg free-standing mast stand (as shown above), or be attached to a supporting pole or wall section.

The lower mast sections are available in two types - with or without an opening (outlet) to allow the internal cable to exit out the side. Generally, when the lower mast section is fastened to a supporting pole or wall section, the internal cable simply exits the mast section out the bottom, and thus there is no need for a side opening. Lower mast sections used with mast stands, however, do need to have the opening.



(a) (b)

Figure 11 – Lower mast section (a) without outlet, and (b) with outlet

# 3. System Overview

## 3.4 INSULATED DOWNCONDUCTORS

The insulated downconductors used in the system have a specially designed layered insulation that provides both the electrical insulation and voltage control. They are tested according to the requirements of IEC TS 62561-8, and have equivalent separation distances as follows:

| Downconductor | Equivalent Separation Distance |
|---|---|
| ISOnV50 | 50 cm (0.5 m) |
| ISOnV70 | 70 cm (0.7 m) |

Table 4 - ISONV downconductor equivalent separation distances

Each of these ISOnV insulated downconductors achieve the highest lightning current carrying capability classification, having been tested to the H2 (200kA) Class tests.

Care must be exercised during installation not to damage the conductor insulation and maintain the required system isolation.

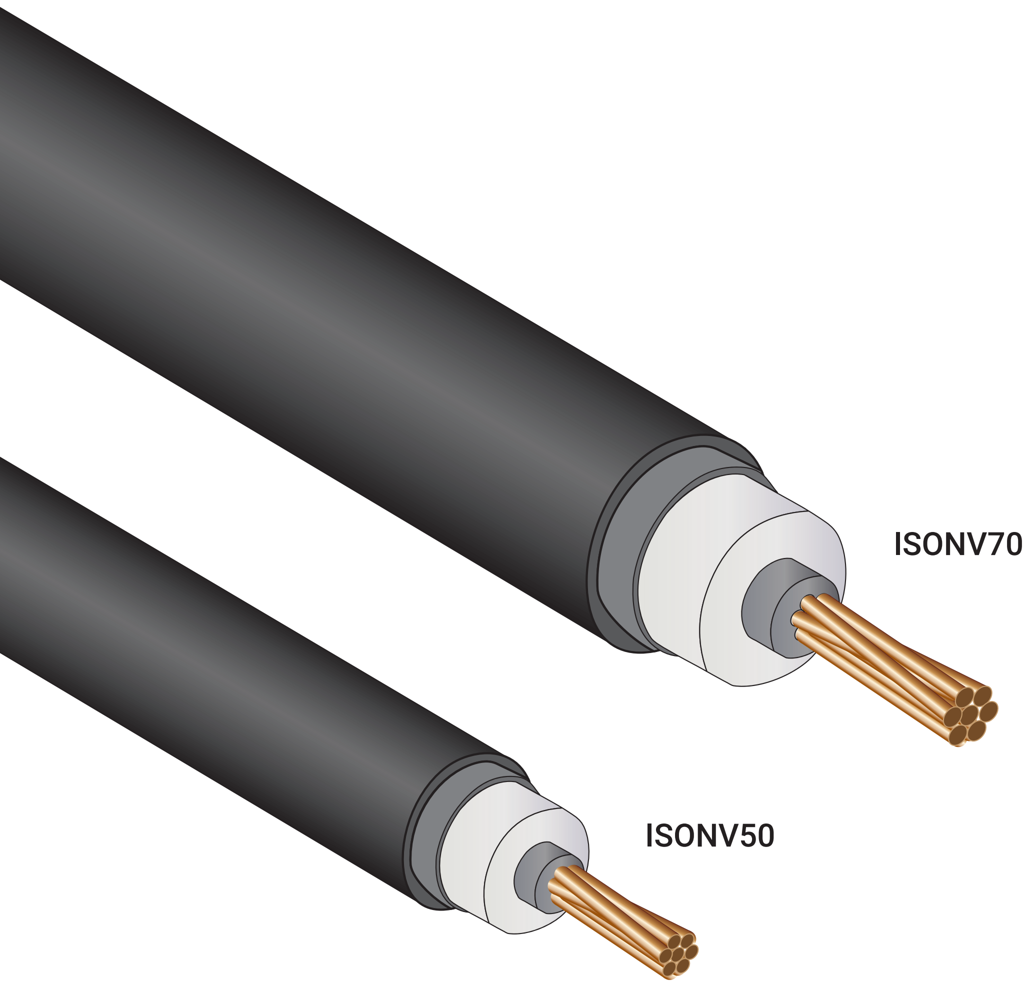



Figure 12– ISONV70 (above) and ISONV50 (below)

# 4. Installation Details

## 4.1 UPPER TERMINATION

The upper termination components are supplied in two kits, depending on whether the termination is for an insulated downconductor installed on the inside or outside of the mast. The kit contents for both these variants are shown in the mast assembly figure.

Regardless of which kit is used the actual upper termination is created the same way, as follows.

### Clean the end of the downconductor

First clean the end of the downconductor with a cleaning cloth in the first 150 mm.

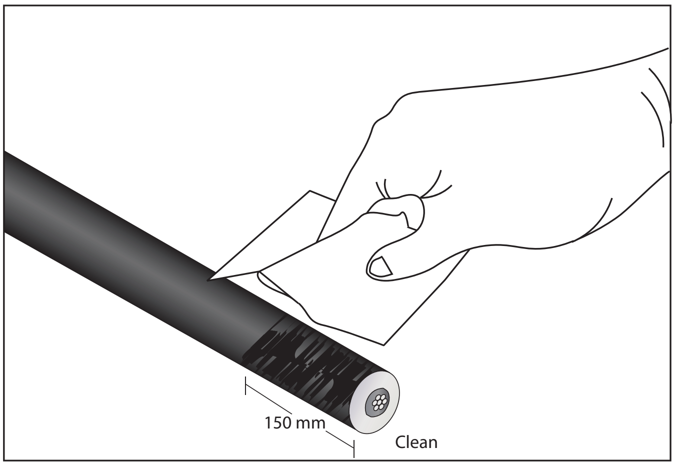



Figure 13 - Conductor area to clean

### Strip the downconductor

Set the strip length on the special stripping tool to 30 mm. Then twist the tool clock-wise to strip the insulation, exposing 30 mm of the inner conductor.

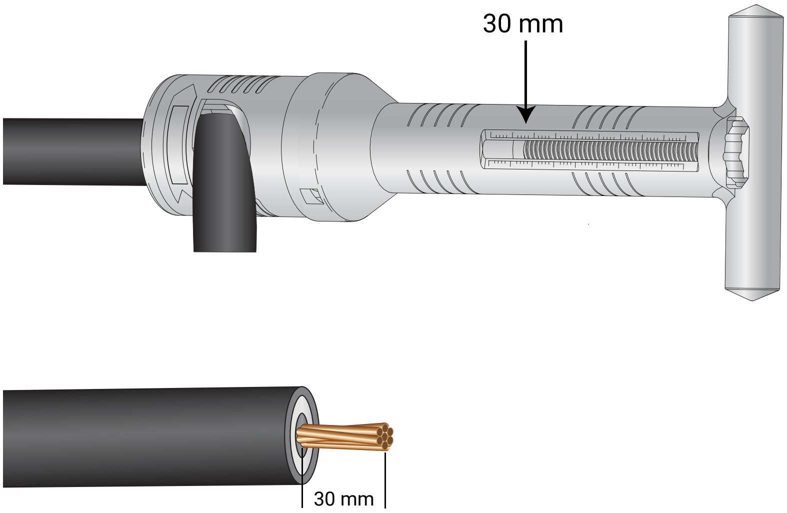



Figure 14 - Stripping of the conductor

# 4. Installation Details

**Attach the upper termination piece**

Use a 19 mm wrench to screw the upper termination piece clockwise onto the end of the cable, checking that the conductor strands are visible through each screw hole.

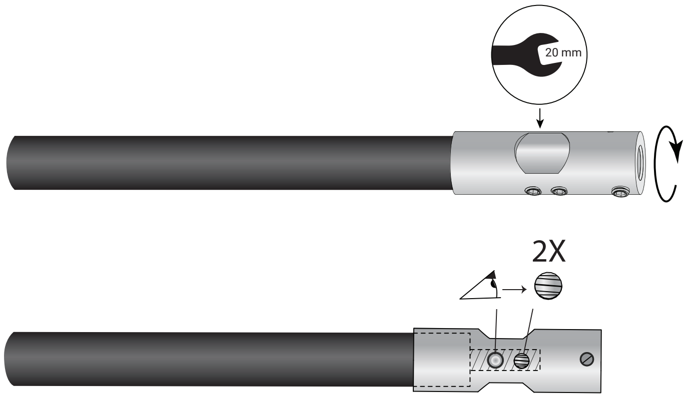



Figure 15 - Attaching the upper termination piece

Tighten the two conductor fixing screws to 5 Nm, using the supplied hex key tool.

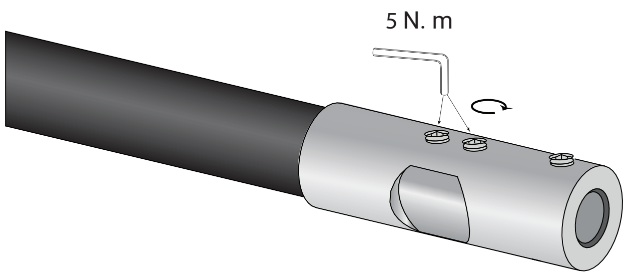



Figure 16–Tighten fixing screws

**Apply heat shrink tubing**

Finally, using a gas torch or heat gun, slide the heat shrink tubing over the upper termination piece, ensuring that the two screws just tightened are covered, while the screw needed to fasten the air termination must remain uncovered. Secure the heat shrink tubing 15mm from the end of the coupler. Carefully heat the heat shrink tubing from the coupler end to the conductor, end leaving no trapped air. Do not burn the heat shrink tubing. Some melted adhesive may appear at the ends of the heated tubing – this is normal.

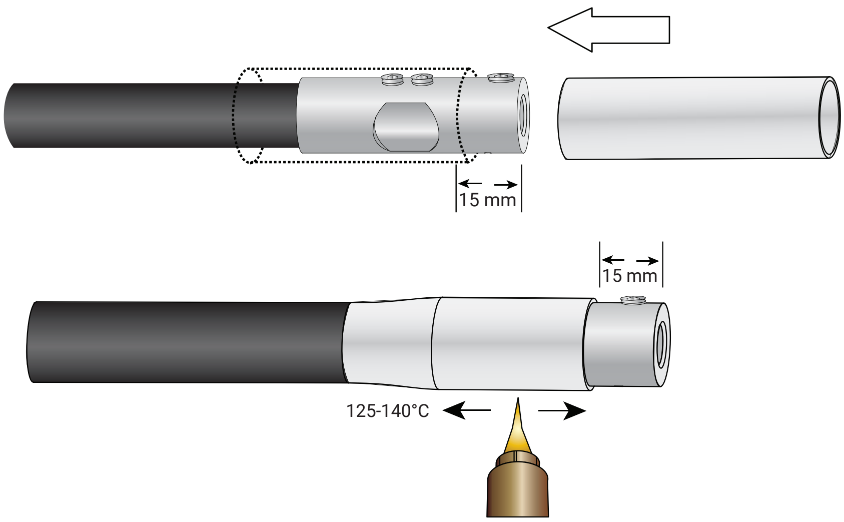
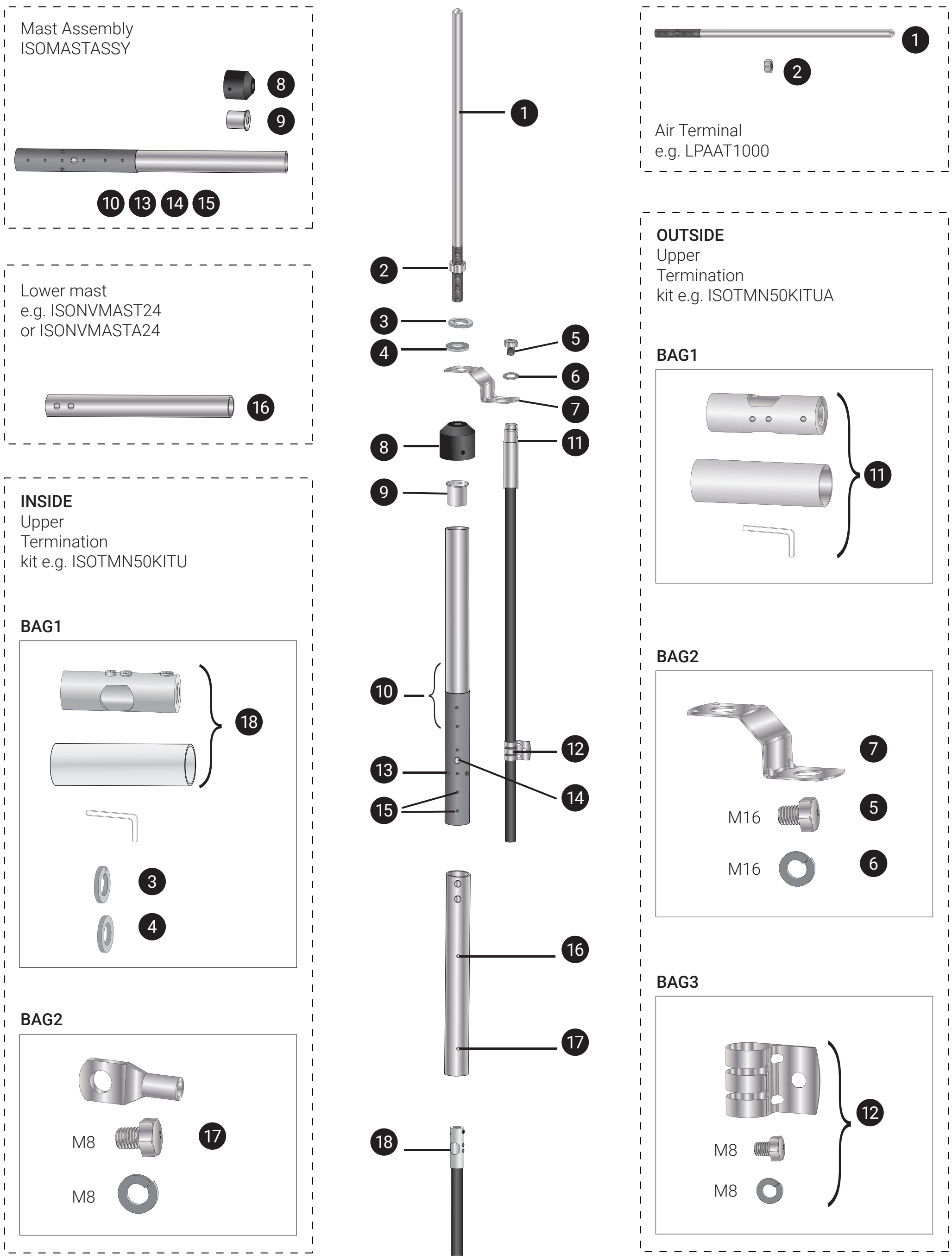



Figure 17 - Applying heat shrink tubing

# 4. Installation Details

## 4.2 ASSEMBLY AND DOWNCONDUCTOR POSITIONING

For a mast assembly, one terminated downconductor is mounted inside the supporting mast, and additional terminated downconductors may be mounted outside the supporting mast, depending on the system design. The following figure shows the parts and how they are supplied.




**The numbered parts are:**

1. **Air terminal**
2. **Air terminal locking nut**
3. **Split locking washer**
4. **Flat washer**
5. **External ISONV termination bolt (*)**
6. **Split locking washer (*)**
7. **Multi downconductor adaptor (*)**
8. **Mast cap**
9. **Stabilizer**
10. **Upper mast assembly**
11. **Externally mounted terminated ISOnV downconductors (*)**
12. **Externally mounted ISOnV downconductor Equipotential Bond (*)**
13. **Mounting hole for external equipotential bond**
14. **Internal Equipotential Bond tightening bolt (Black)**
15. **Lower mast section fixing bolts**
16. **Lower mast section**
17. **Mast earthing connection (**)**
18. **Terminated internal ISOnV downconductor**

Figure 18–Exploded view of mast assembly

(*) These parts used if an externally mounted downconductor is used.
(**) Required to be connected if lower mast section is not earthed through the mounting arrangement used.

# 4. Installation Details

**The assembly process is as follows:**


Figure 19–Join the upper and lower mast pieces

**a.** Regardless of the number of downconductors on the mast, begin by laying the parts on a horizontal surface.

**b.** Insert the lower mast section (16) into the upper mast assembly (10), and tighten the two lower mast section fixing bolts (15) to a torque 6 N.m.

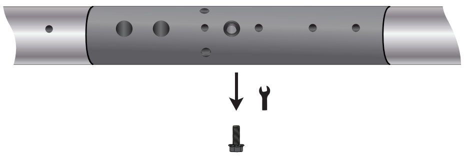


Figure 20–Temporarily remove the internal Equipotential Bond bolt

**c.** Temporarily remove the internal Equipotential Bond tightening bolt (14).
This bolt is colored black to avoid confusion.


Figure 21–Pass the internal conductor through mast

**d.** Pass the terminated internal ISOnV downconductor (18) through the joined lower mast section (16) and the upper mast assembly (10).

# 4. Installation Details

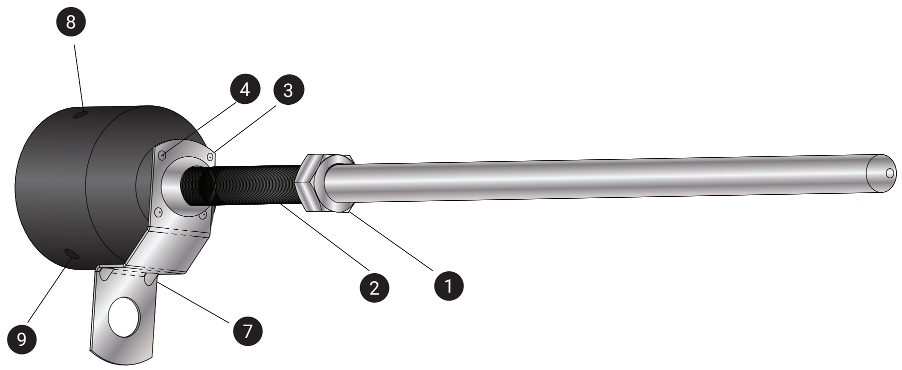



Figure 22–Loosely assemble the air terminal pieces

**e.** Twist the air terminal locking nut (2) completely up the threaded section of the air terminal (1), and pass the threaded end of the air terminal (1) through the split locking washer (3), the flat washer (4), the multi downconductor adaptors (7) if present, the mast cap (8), and the stabilizer (9).

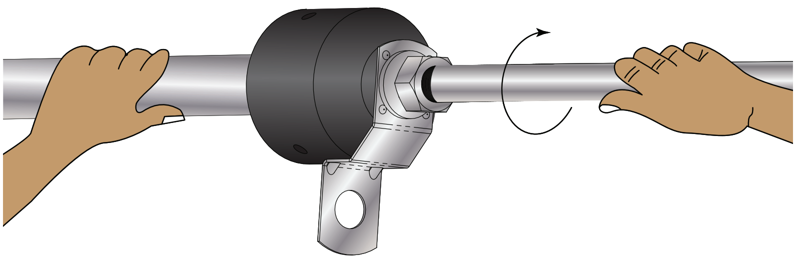


Figure 23–Fasten conductor to the air terminal by hand

**f.** While holding the downconductor end (18) with one hand, screw the air terminal (1) clockwise to screw it into the upper termination on the internal ISOnV downconductor (18). Tighten as firmly as possible by hand.

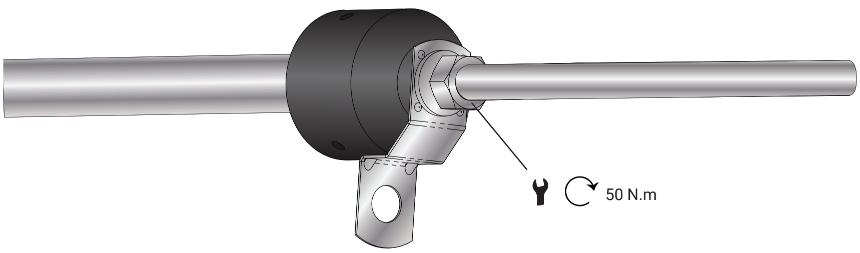



Figure 24–Tighten locking nut

**g.** Turn the air terminal nut (2) clockwise, and tighten to a torque 50 N.m.

# 4. Installation Details

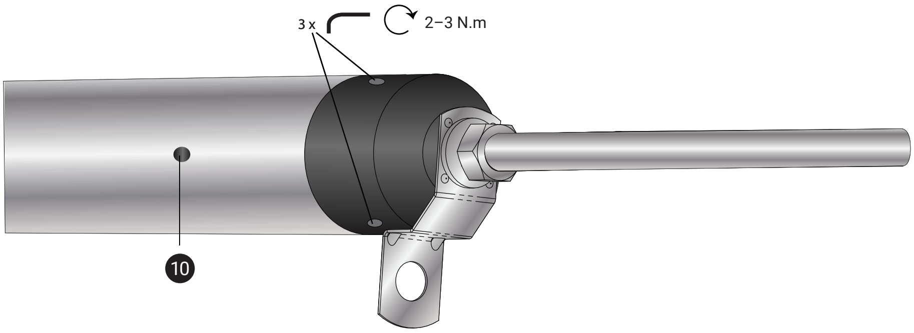



Figure 25–Fasten mast cap to the upper mast assembly

**h.** Push the mast cap (8) fully onto the top of the upper mast assembly (10), ensuring that the stabilizer (9) fits fully into the top of the upper mast assembly (10), and tighten the three fixing set screws on the mast cap (8) to a torque of 2-3 N.m, ensuring that any multi downconductor adaptors (7) line up with the holes for the externally mounted ISOnV downconductor equipotential bonds (13) below.

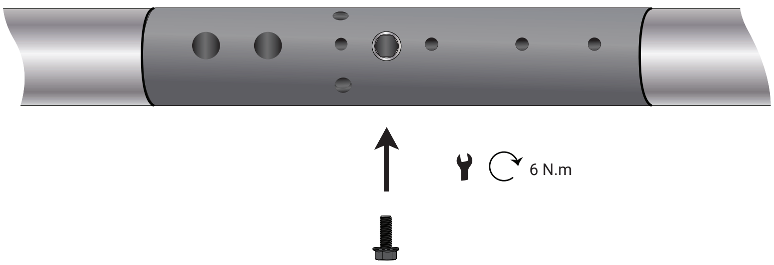



Figure 26–Reinsert the internal Equipotential Bond bolt and tighten

**i.** Replace the internal Equipotential Bond tightening bolt (14), removed in step c. above, and fully tighten to a torque of 6 N.m.

**If externally mounted terminated ISOnV downconductors (11) are to be installed, continue with the following steps:**

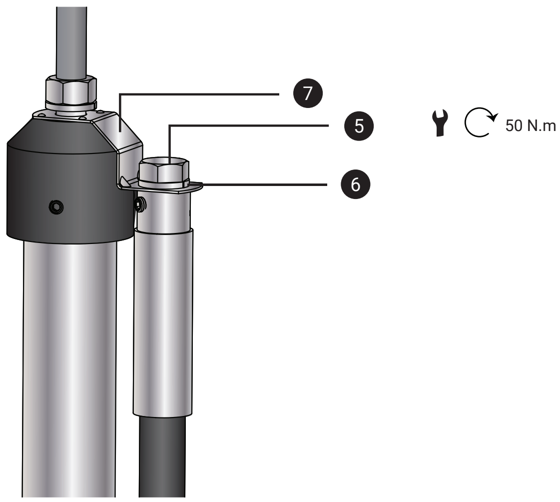



Figure 27–Attach any external conductors as required

**j.** Fix each externally mounted terminated ISOnV downconductor (11) to its multi downconductor adaptor (7) using the bolt (5) and split locking washer (6). Tighten to a torque of 50 N.m.

# 4. Installation Details

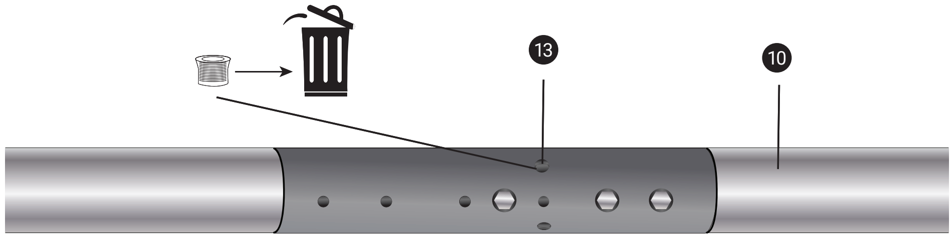



Figure 28–Remove and discard plastic thread protectors as required

**k.** Locate the appropriate threaded holes (13) in the coupling unit and remove the plastic thread protectors and discard.

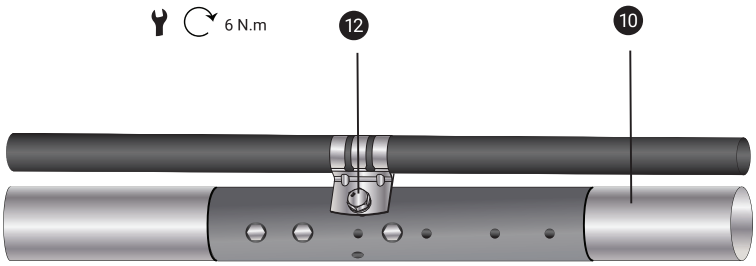



Figure 29–Fasten conductors to the mast using the external equipotential bond clamps

**l.** Squeeze the external equipotential bond clamps (12) over each ISOnV downconductor (11), and fasten to the coupling unit using the bolt and lock washer supplied with the external equipotential bonds (12). Tighten to a torque of 6 N.m.

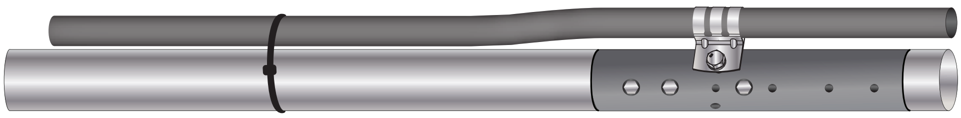


Figure 30–Fasten conductor to lower mast section as required

**m.** Apply stainless steel cable ties to fasten the ISOnV downconductors (11) to the lower mast section 16 as required. DO NOT overtighten, to avoid damage to the insulation!

To assist with part selection, the following table is provided:

| Part in Figure 18 | nVent ERICO Part Number |
|---|---|
| (1), (2) | e.g. LPAAT1000 (Air terminal) |
| (8), (9), (10), (13), (14), (15) | ISONVMASTASSY (Upper Mast Assembly) |
| (16) | e.g. ISONVMAST24 (2.4 m lower mast, for use with mast brackets), or ISONVMASTA24 (2.4 m lower mast, for use with mast stand) |
| (3), (4), (17), (18) | ISOTMN50KITU (Upper Termination Kit, Inside Mast) + ISONV50, or ISOTMN70KITU (Upper Termination Kit, Inside Mast) + ISONV70 |
| (5), (6), (7), (11), (12) | ISOTMN50KITUA (Upper Termination Kit, Outside Mast) + ISONV50, or ISOTMN70KITUA (Upper Termination Kit, Outside Mast) + ISONV70 |

In addition, see Section 6 “Ordering Guide”.

# 4. Installation Details

## 4.3 MOUNTING ARRANGEMENTS

Once the mast assembly is completed as per the previous section, the mounting arrangement needs to be implemented.

There are two basic arrangements – using masts stands, and using brackets.

### 4.3.1 Mast stands

The mast stands for the ISOnV system have four legs and mounting points, and are supplied folded up, ready to be unfolded on site.

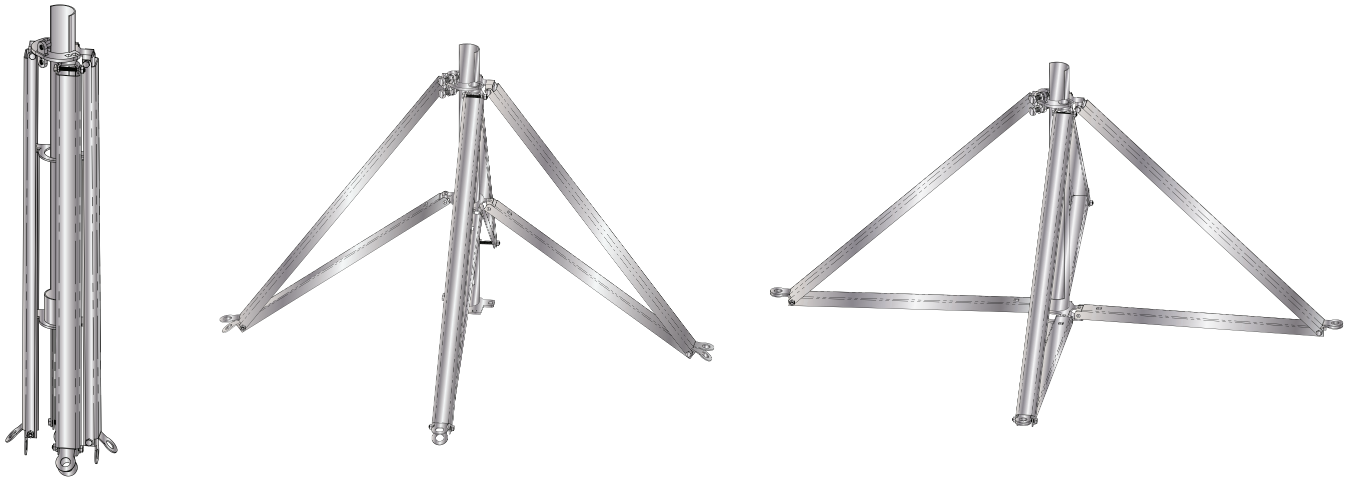


Figure 31–Unfolding the mast stand

The mast stands are available in three different sizes (1.0 m, 1.5 m, and 2.5 m) to suit total mast heights of 3.4 m, 4.7 m, and 6.0 m. Note that the air terminal lengths and height of any concrete blocks are additional to these mast heights.

On occasion, the roof construction may permit the mast stands to be directly mounted using suitable fastenings. Often, however, it is desirable to avoid puncturing the roofing membrane, or adequate direct mechanical fastening cannot be assured. In these cases, the mast stand is fitted with concrete blocks to provide solid positioning. The number and arrangement of these concrete blocks depends on the roof pitch and maximum wind speeds in the particular installation location. Each individual concrete block weighs 17 kg, and block stacks of 1 to 5 blocks, complete with foam base, connecting rod, and fastening hardware are available. Please contact nVent for engineering guidance.

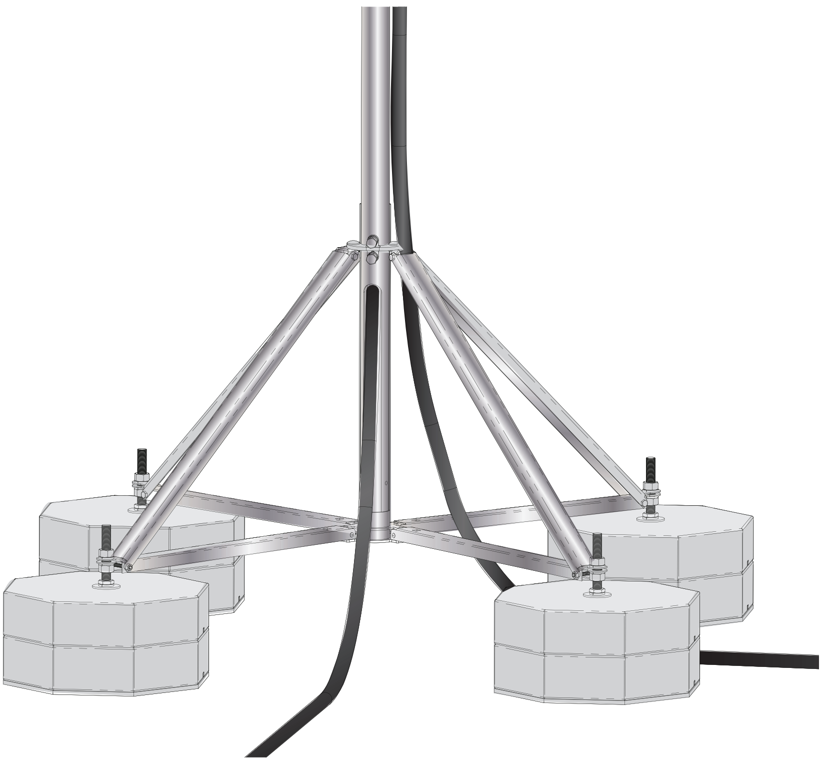


Figure 32–Concrete block arrangement on a horizontal location

# 4. Installation Details

When a horizontal installation is done with concrete blocks, the block arrangement is as follows:

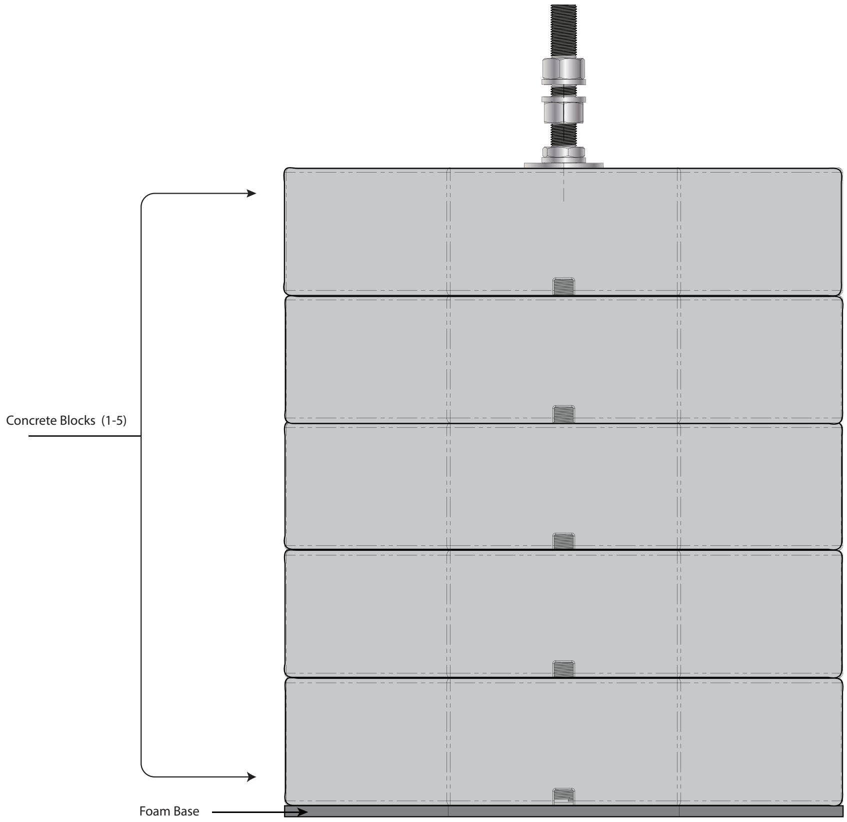



Figure 33–Concrete block stack for mast stand on a horizontal location

Fit the foam base and concrete blocks to the rod and tighten the washers and nut (as shown above) down onto the concrete stack to hold them securely in place. Tighten to 50 N.m.

Adjust the upper two nuts and split washers to the correct height, ensuring that the mast stand feet tabs are located between the two split washers. This adjustment allows for uneven surfaces. Once at the correct height, tighten the top nut down to a torque of 50 N.m.

Where the installed location is not horizontal, an adjustable angle fitting is available that accommodates a range of roof pitches.

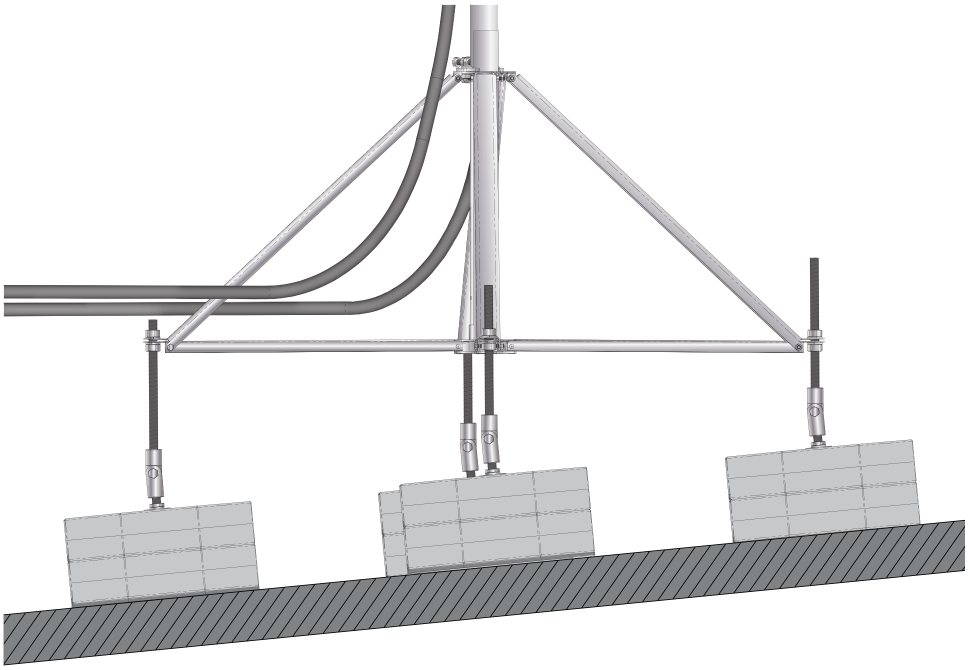


Figure 34–Concrete block arrangement on a sloping location

# 4. Installation Details

In this case the block stack comes with variable angle knuckle and rod height to suit the number of blocks. In addition, an extension rod set is used to provide the vertical rod connecting to the mast stand. These are available in different lengths to suit the particular roof and mast stand parameters. Please contact nVent for engineering guidance with regard to the maximum roof angle advisable and other recommendations with this sloping roof arrangement.

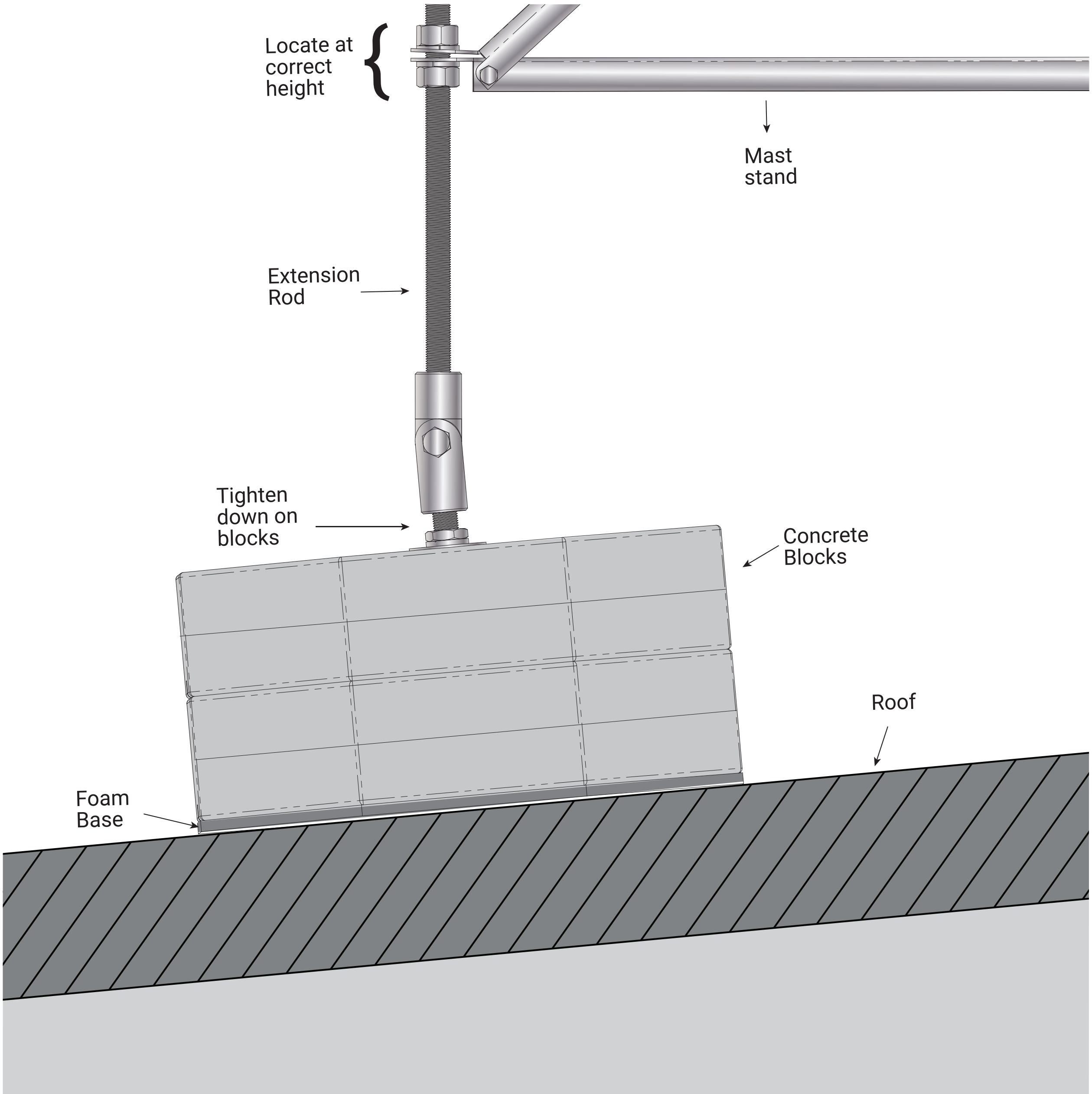



Figure 35–Extension rod used with Concrete block set with knuckle and rod

# 4. Installation Details

Once the mast stand is secured into its final location, the mast stand and conductors are added. The mast stands feature an easy standing procedure to allow the mast to be stood into place into the mast stand as shown in the following illustrations.

Fig 36a

Fig 36b

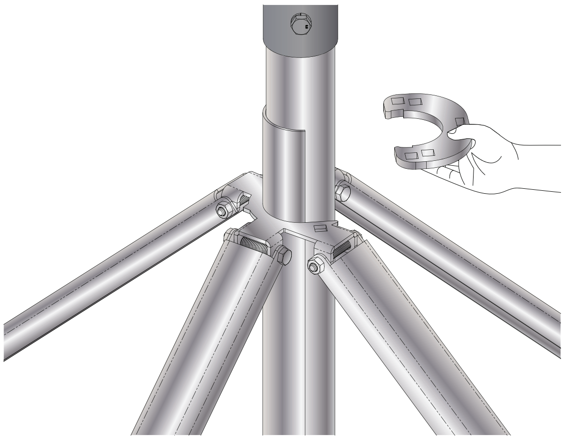


Fig 36c

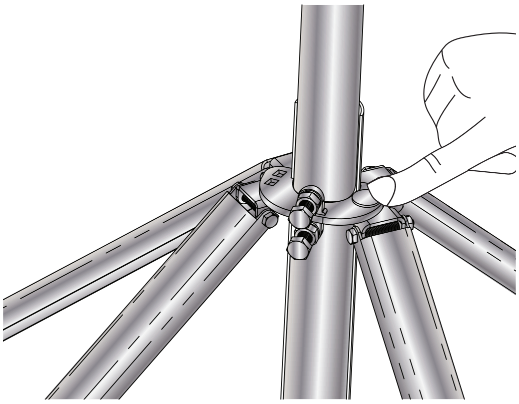


Fig 36d

Fig 36e

Figure 36–Fitting the mast to the mast stand

# 4. Installation Details

First the base of the lower mast section is placed into the receiving feature of the mast stand (Fig 36a). The mast is then stood up into position (Fig 36b). Note that safe working practices must be adopted to achieve this, and additional mechanical aids are often employed.

Once standing in place, a supporting collar is placed against the mast section and slid down into position (Fig 36c). Once in place, two bolts secure it in position (Fig 36d). Ensure the mast is rotated to the correct location to facilitate cable exit, then finally tighten the two lock bolts against the mast section (Fig 36e).

Note that just the lower mast is shown here for clarity. In practice, the mast will be fully assembled with conductors as per the above description. Ensure that the conductors are laid out properly in the appropriate direction before the lift, and are of sufficient length.

Raise the mast into position using safe working practices, and ensure that the ISOnV conductor is not damaged during the lift.


Figure 37–Raise the mast using safe working practices

# 4. Installation Details

### 4.3.2 Mast brackets

Instead of using a mast stand, it is often more convenient to utilize an aspect of the existing structure to mount the mast. There are a number of brackets available to suit fixing to walls, masts, railings, etc.

Generally, either two or three brackets are required to adequately support the mast, with a typical spacing between the outer brackets of 1 m. Please contact nVent for engineering guidance with regard to the location and quantity of brackets required, and the bracket fastener retaining strengths required under differing environmental conditions.

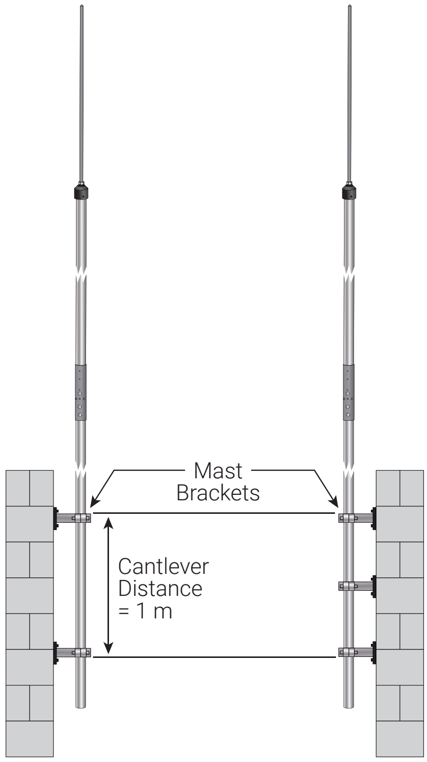



Figure 38–Typical bracket spacing requirement

**Mounting to a wall**

There are three smaller brackets available, giving an offset distance from the wall of 15, 80, and 200 mm.

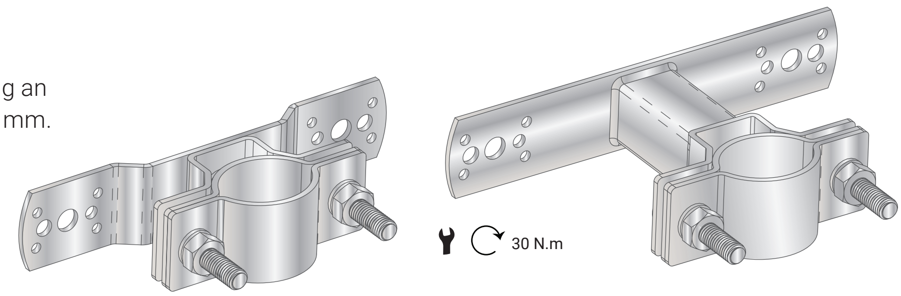



Figure 39–Smaller wall brackets

In addition, there is a larger bracket where the offset from the wall needs to be much larger. The bracket shown below gives an offset distance from the wall of 1000 mm.

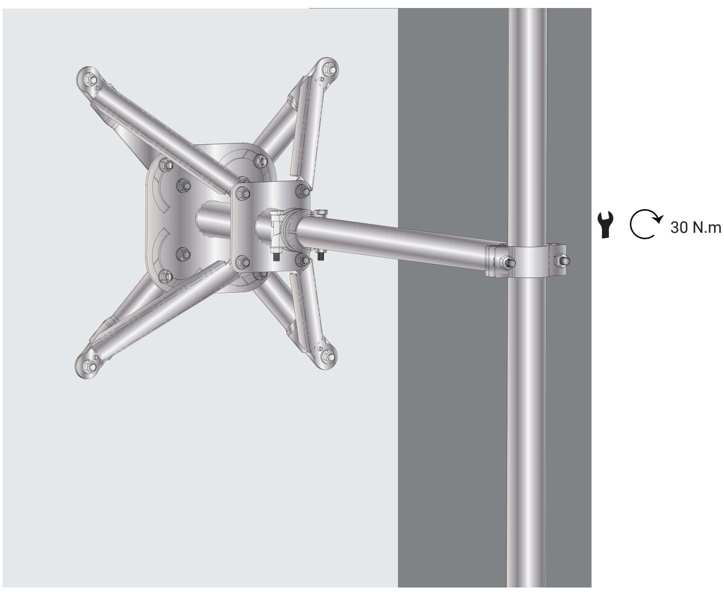



Figure 40–Large wall bracket

# 4. Installation Details

**Mounting to existing round items**

There are three dedicated brackets for this, suiting existing round items of diameters in the following ranges: 40-50 mm, 50-60 mm, and 70-80 mm

The existing items being mounted to must be assessed as being suitable to withstand the additional load of the added ISOnV mast structure.

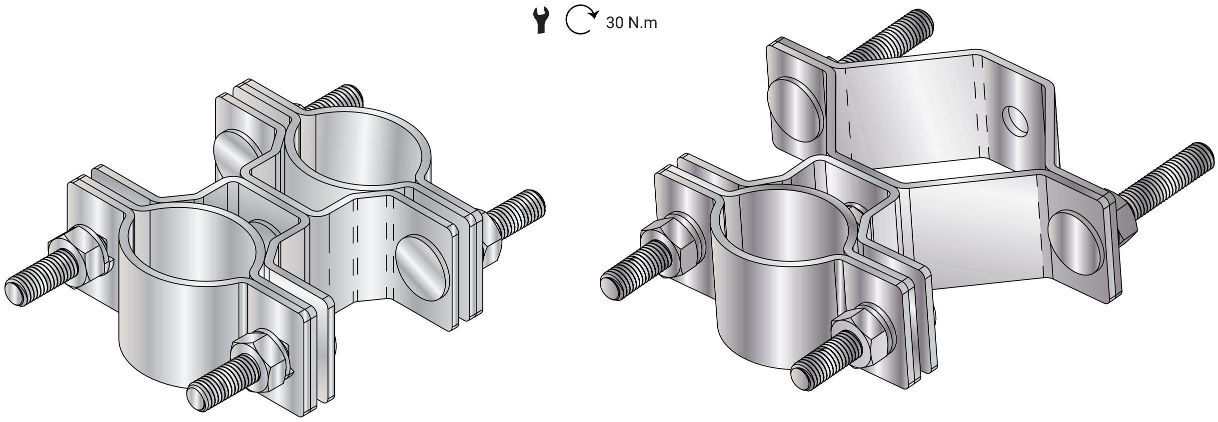



Figure 41–Round mast brackets

**Mounting to other items**

A strap and clamp arrangement is available to allow the mast to be fixed to larger round items or other irregular shaped support structures.

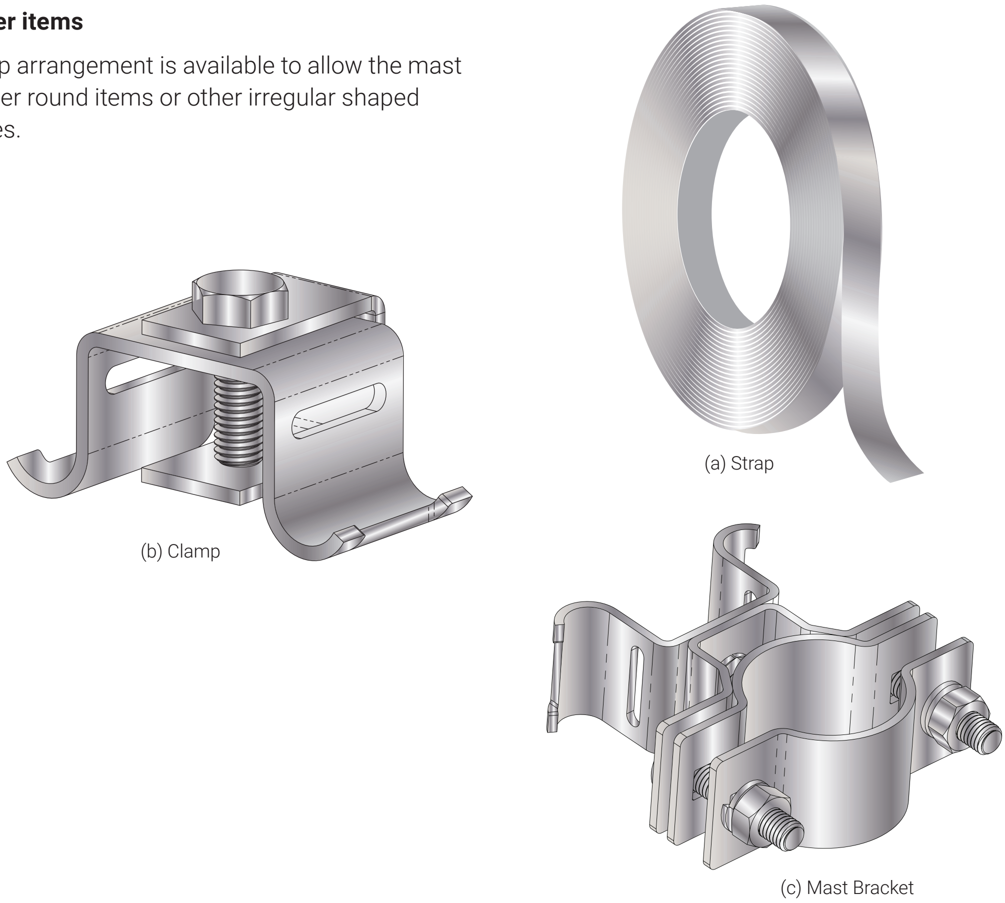



Figure 42–(a) Strap, (b) Clamp, and (c) Mast Bracket

# 4. Installation Details

The parts for this arrangement are shown above, and shown used together below.

The strap (a) is cut to the length required, and passed thought the mast bracket (c) and the ends overlapped through the clamp (b). Rotate the arrangement around the support structure until the fastener is in the correct position, then tighten the bolt in the clamp to press down on the overlapping straps, fixing them into place. Ensure that the strap ends extend beyond the clamp by at least 50 mm as shown below.

Figure 43–Installed arrangement on large round pole

Where the round support structure is greater than 600 mm in diameter, a second clamp (b)* should be added as shown above in Figure 30 and tightened, further tensioning the strap, to ensure that it is fixed firmly in place. For irregular shaped support structures additional clamps (b)* may be required.

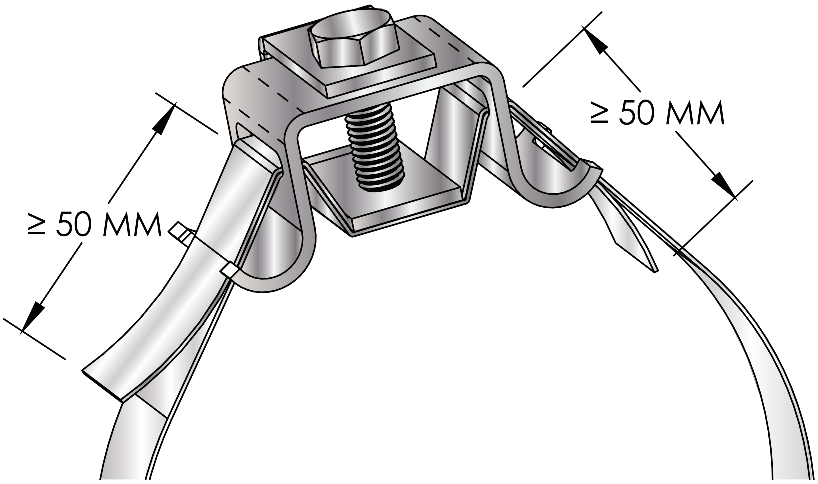



Figure 44–Overlap requirement of the strap ends in the clamp

# 4. Installation Details

### Mounting to rectangular profile supports

Finally, when mounting the mast to square or rectangular profile, the following fitting can be used.

The fitting can accommodate up to a maximum of 50 mm x 50 mm sized section.

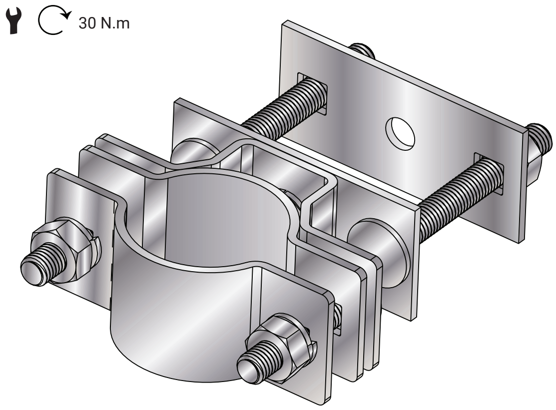



Figure 45–Fitting for mounting to a rectangular or square profile

### Equipotential bonding

Note that the lower metallic section of the mast must be connected to the equipotential bonding system of the building. Where the method used to fix the mast provides this connection (for example, where the mast is fastened to a railing that is bonded to the equipotential bonding system of the building) no additional measures need to be taken. However, where the mast is effectively isolated from the building earthing system (such as when using free standing masts), a bonding conductor must be connected from the mast stand to the equipotential bonding system of the building. Where this conductor is 8 mm or 10 mm diameter rod conductor, the mast stand clamp may be used, as shown in the following figure. Smaller conductors, such as the minimum 6 mm2 required, may be connected to the mast using the lug, washer and bolt as supplied with the inside upper termination kit (see figure 34).

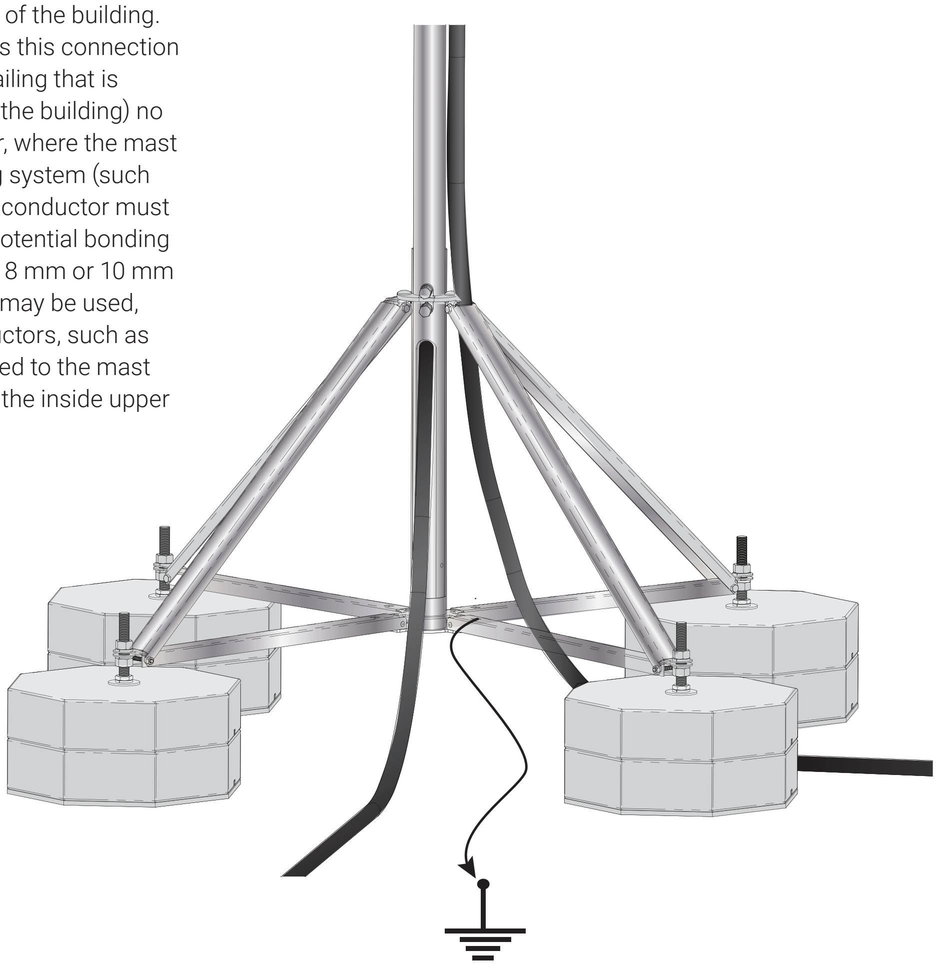


Figure 46–Connecting the bonding conductor

# 4. Installation Details

Where the mast does not use a mast stand, and is fixed to an existing structure (using one of the bracket methods previously described), and the structure mounting location is NOT connected to the building earthing system, a 6 to 16 mm² bonding conductor must be connected from the mast itself to the equipotential bonding system of the building, as shown in the following figure. Note that the lug, washer and bolt required are supplied with the inside upper termination kit, and the threaded hole is already present in the mast section.

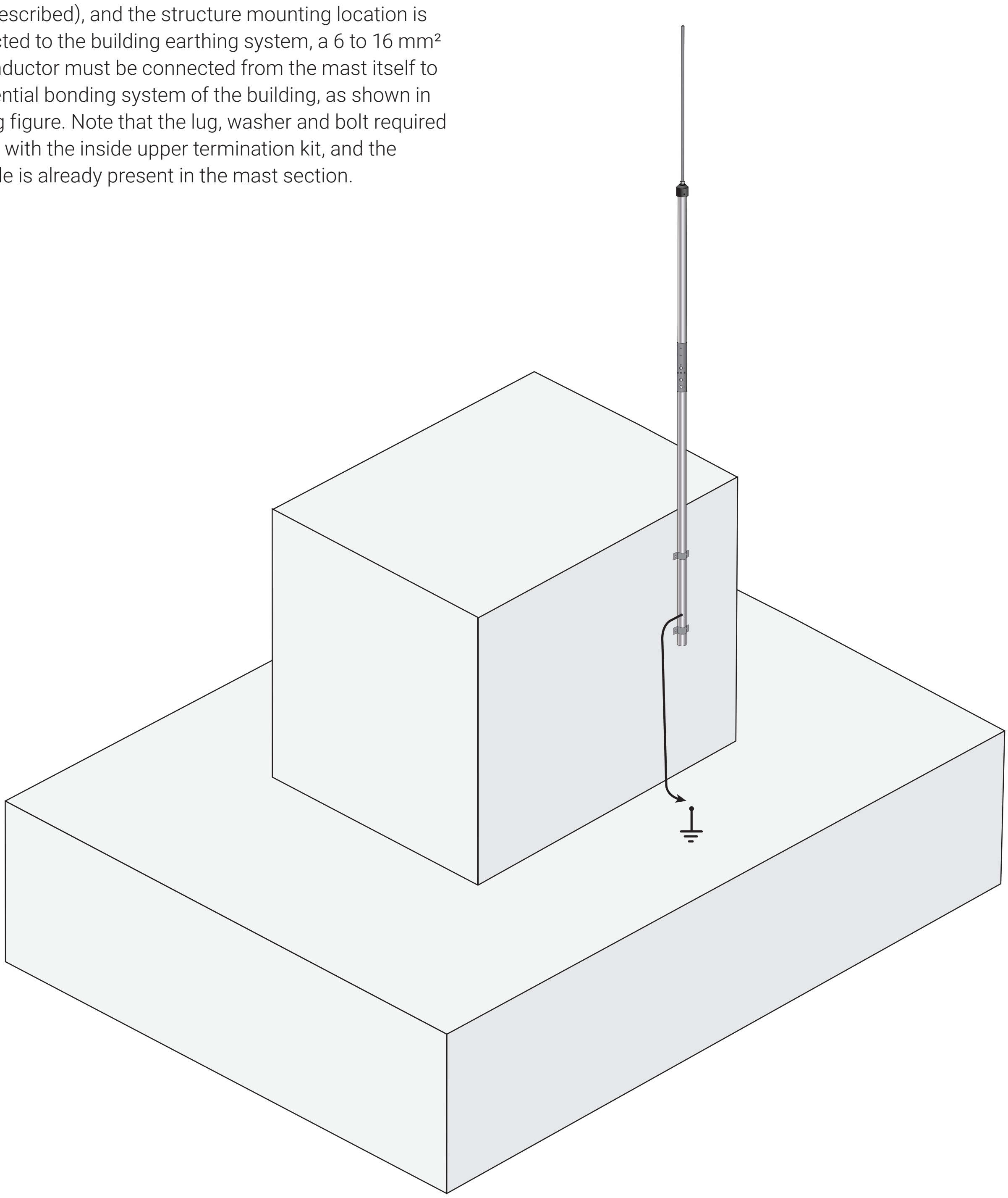


Figure 47–Connecting the bonding conductor to the lower mast section

# 4. Installation Details

## 4.4 CONDUCTOR FASTENING AND ROUTING

### Fastening

It is very important that the ISOnV cable is fastened at least every meter as per the requirements of IEC 62305-3.

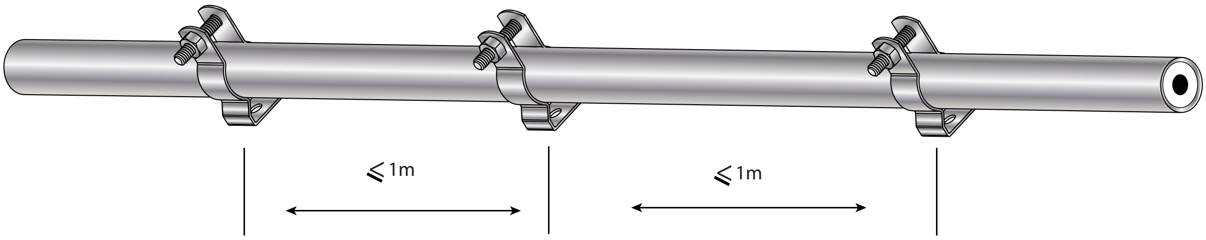



Figure 48–Fasteners must be adequately fastened

The basic fastener for the ISONV50 and ISONV70 cables is shown.

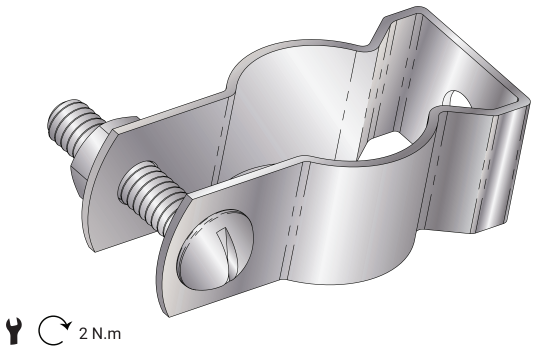
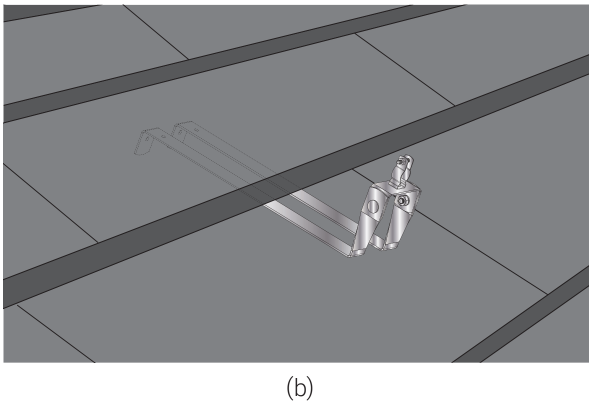
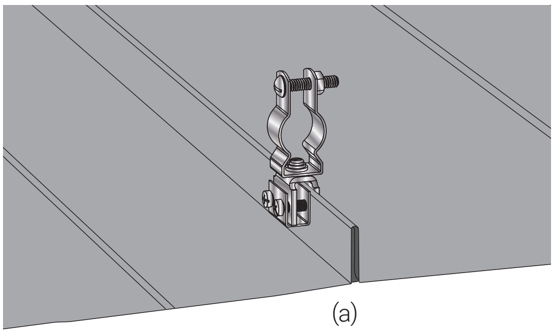



Figure 49–Fastener ISONVFS

This is fastened to the horizontal or vertical surface by user supplied hardware. The mounting hole size is 6 mm.

In addition, there are a number of specialty fastening solutions that use this basic fastener.



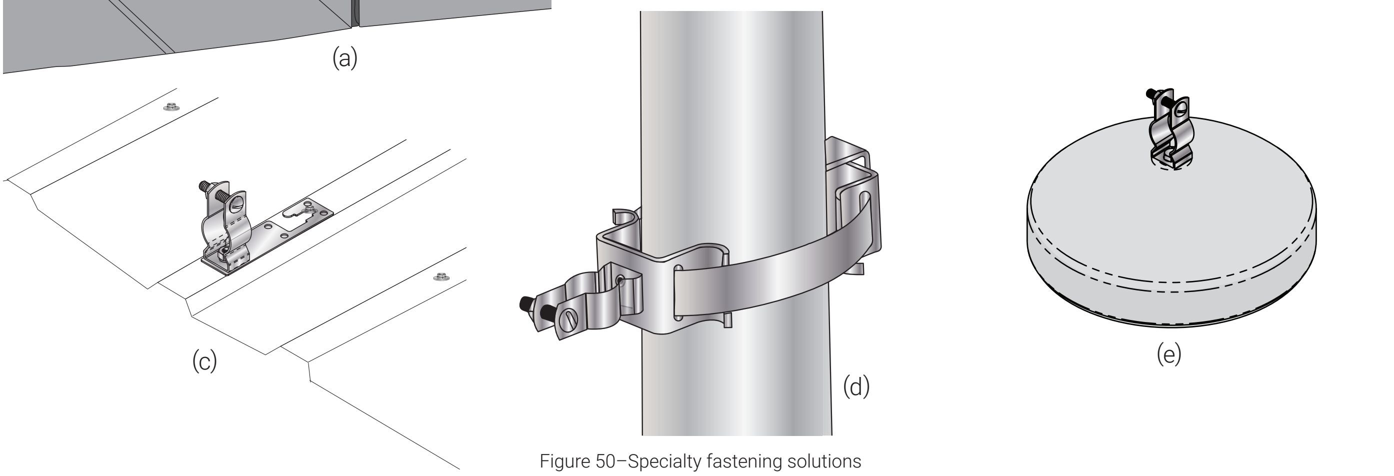




Figure 50–Specialty fastening solutions

# 4. Installation Details

The basic fastener can be rotated on these fastening solutions to suit different conductor orientations, and they are as follows:

a. ISONVSEAM – Clamps to the seam of roofing seams, and is fixed in place by the two clamping screws. Fits a seam with width up to 8 mm.

b. ISONVTILE – Fits underneath roofing tiles, being retained by the back edge of the tile.

c. ISONVCORR – Allows fixing to corrugated roofing systems. User supplied screws and waterproofing washers are used to suit the application.

d. ISONVSTRAPFS – Designed to be used with parts (a) and (b) from Figure 43 in the same mounting situation as shown in that Figure.

e. ISONVBLOCK4KG – The fastener is fixed with a 4 kg concrete block, with matching soft base, for use on flat roofs.

**Routing**

The cable is routed from air terminal mast to other air terminal masts or earth as per the design. It is important that the minimum bending radius of 400 mm is maintained.

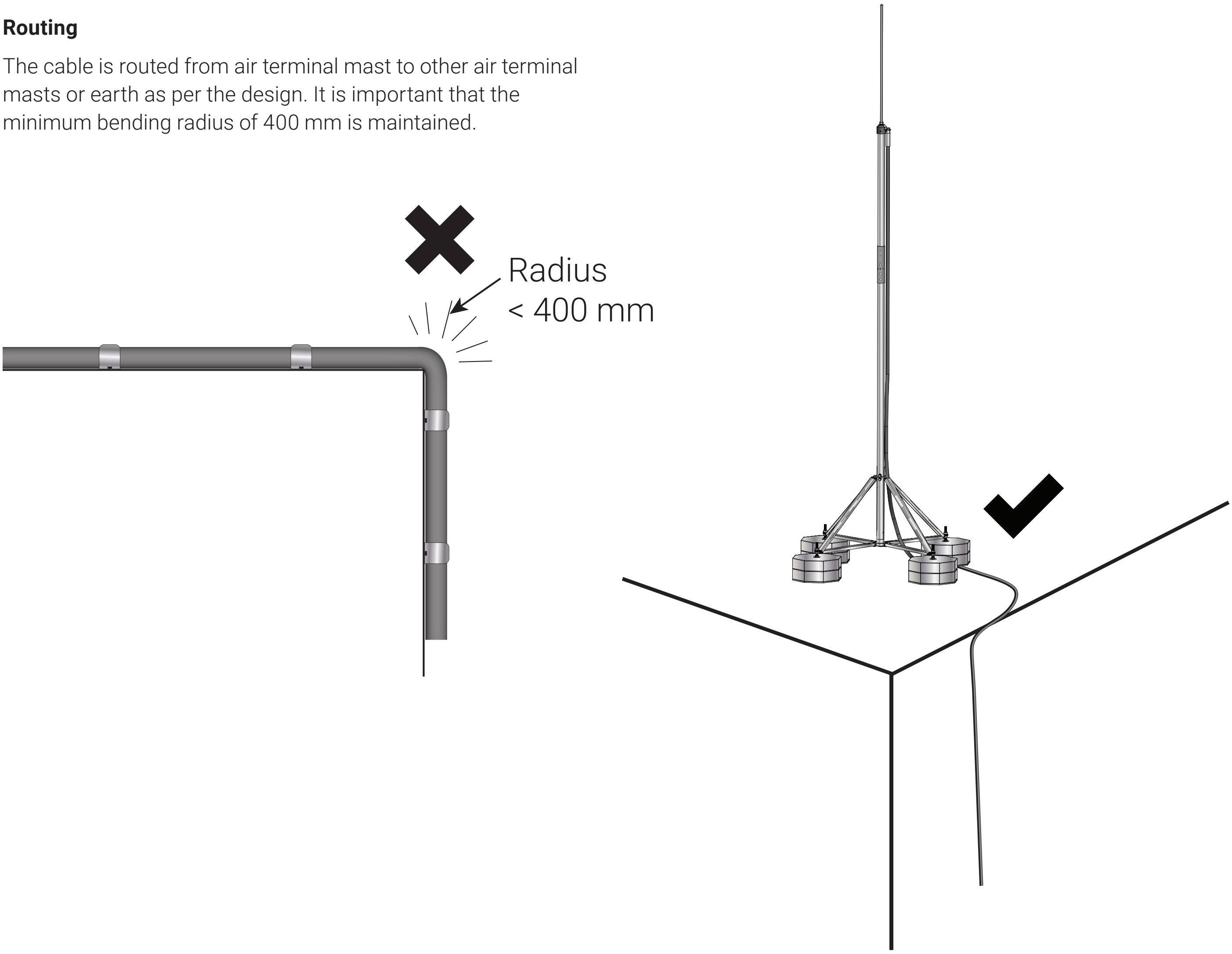



Figure 51–Maintain minimum bending radius requirements

# 4. Installation Details

## 4.5 LOWER TERMINATION

The lower termination is very similar to the upper termination, noting that the actual termination has a 10 mm diameter rod protrusion instead of a hole to receive an air termination. The kit contents are shown.

Lower Termination:

ISOTMN50KITL or ISOTMN70KITL

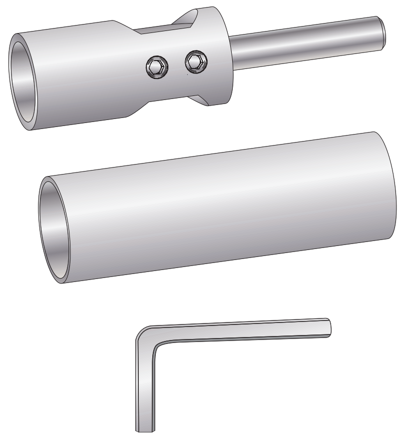


Figure 52–Lower termination kit contents

The lower termination is done in the same way as the upper termination, and the final termination should look as shown here:

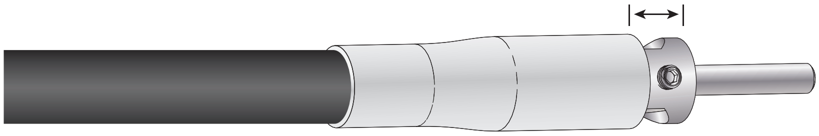



Figure 53–Completed lower termination

Having completed the lower termination, it is connected into the existing lightning protection system, or to the earth termination system. To facilitate this connection, there are two connection components that allow for interconnection with round conductor, flat tape, or a ground rod.

The plates can be rotated to match the orientation of the conductors to be joined. The four corner bolts should be tightened to a torque of 23 N.m.

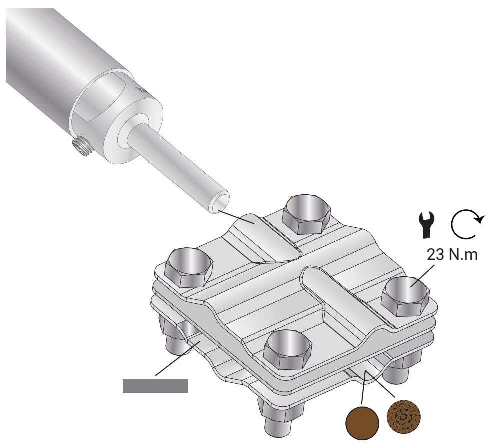
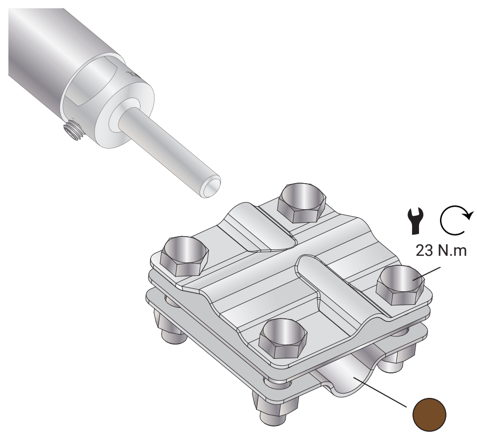
| Part: MPSC404SSA | Part: MPSC404SS |
|---|---|
|   |   |
| Connects to:<br>8 mm, 10 mm diameter Solid conductor<br>35 mm² - 50 mm² Stranded conductor<br>40 mm x 4 mm (max) Tape conductor | Connects to:<br>5/8” to ¾” nominal Earth electrode<br>(actual diameter 14.2 – 19.0 mm) |

Figure 54–Connectors for use with the lower termination

# 4. Installation Details

## 4.6 CONDUCTOR FUNCTION AND TERMINATIONS REQUIRED

There are three types of conductor functions, and the terminations required for each are shown in the following figure.

The mast conductors are used in the majority of uses discussed in this document. The arrangement used for protection of specific items is discussed in section 2.5.4. As the conductors need to be terminated before each mast is lifted into position, it is important that sufficient length is allowed for.

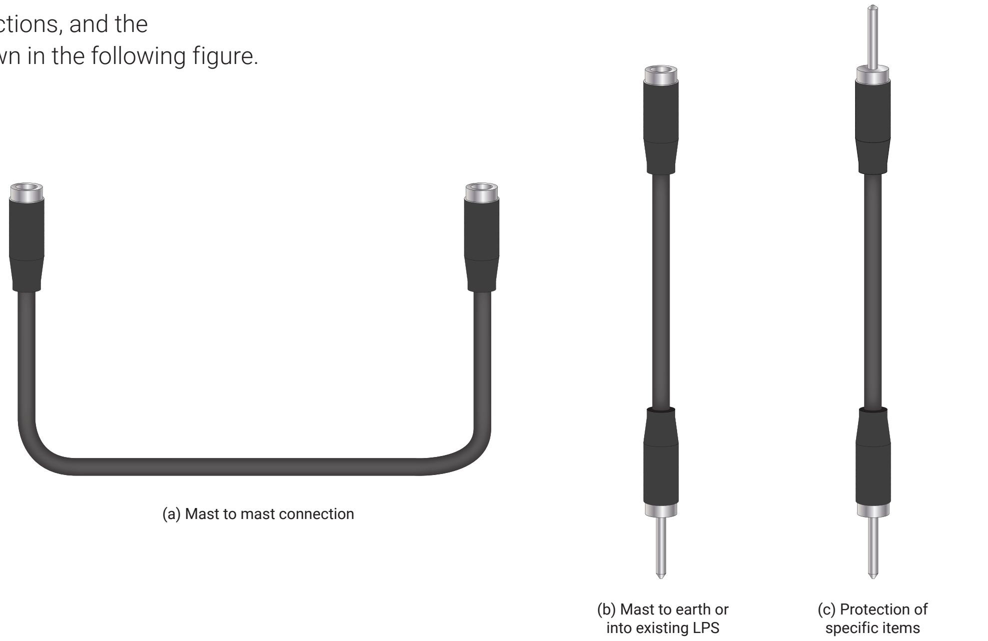



Figure 55–Conductor function and terminations required

## 4.7 CLEARANCE ZONES

To avoid direct flashovers through air and tracking failures, it is necessary to keep earthed objects (structural elements, mechanical supports, piping, aerial conductors, etc) away from the upper insulated portion of the mast. The figure below shows the zone that must be kept clear of these earthed items. It extends from the lightning rod, down to the coupling unit of the mast, at a radius given by the calculated separation distance at that point. To be conservative, the radius R can be made to be the equivalent separation distance of the ISOnV conductor (50 cm for ISONV50, or 70 cm for ISONV70).

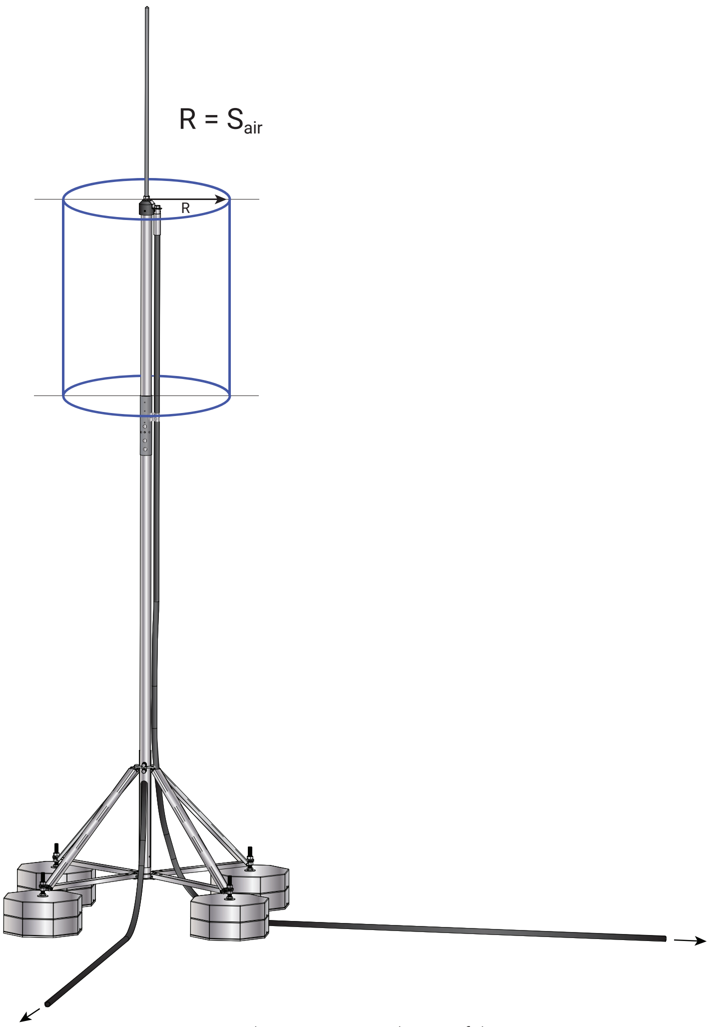



Figure 56–Clearance zone at the top of the mast

# 4. Installation Details

At the bottom end of the ISOnV conductor a similar situation can occur. Where the lower termination connects directly to the earth termination network, a clearance zone is not required. However, if the lower termination connects into a non-isolated LP system on a non-conductive building (e.g. masonry building, see section 2.5.3 'Building is non-conductive') then a clearance zone is required.

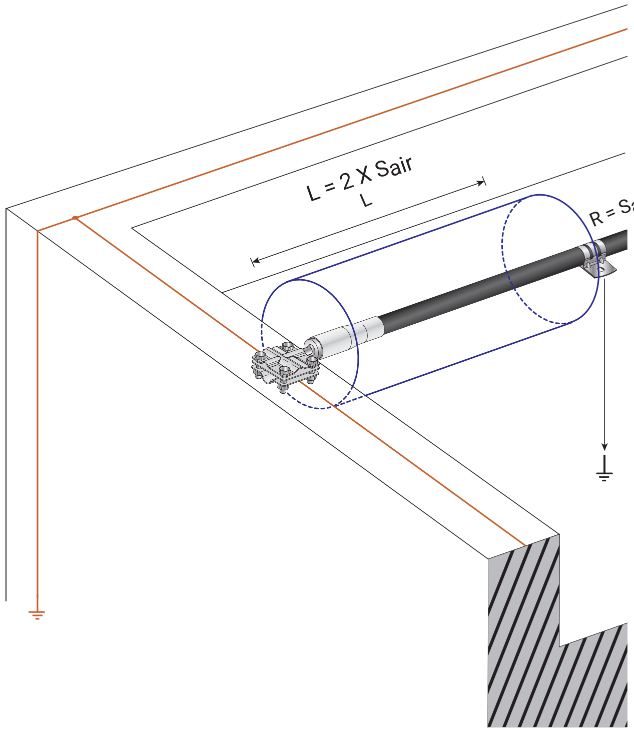



Figure 57–Clearance zone at lower termination (non-conductive building)

The separation distance is calculated at the point where the lower termination connects to the non-insulated conductors (using, for example, a MPSC404SS connector). The length of the clearance zone from that point is L = 2 x $S_{air}$ , and the radius of the clearance zone is R = $S_{air}$ . Any support required for the cable in this zone must be non-conducting, and at least length R.

In addition, an Equipotential Bonding Sheath Clamp should be fitted to the conductor immediately past the clearance zone, and connected to the equipotential bonding system of the building, using a 6 $mm^2$ bonding conductor as shown in Figure 43. Note that this Equipotential Bonding Sheath Clamp is not required where the lower termination connects directly to the earth termination network.

Where a particular electrical item in a non-isolated LPS is located within the separation distance of the LP conductor running past it, it would normally be required to be bonded to the LP conductor. Where this is not desirable (the item might be a surveillance camera, for example), and the LP conductor cannot be repositioned, it is possible to use a length of ISOnV conductor in the vicinity of the item. The following figure shows this arrangement. The ISOnV conductor needs to extend beyond the item on each side, and equipotential bonding clamps are fitted that connect to the equipotential bonding system of the building as shown. The item can be as close to the ISOnV conductor as needed between these earthed two clamps.

# 4. Installation Details

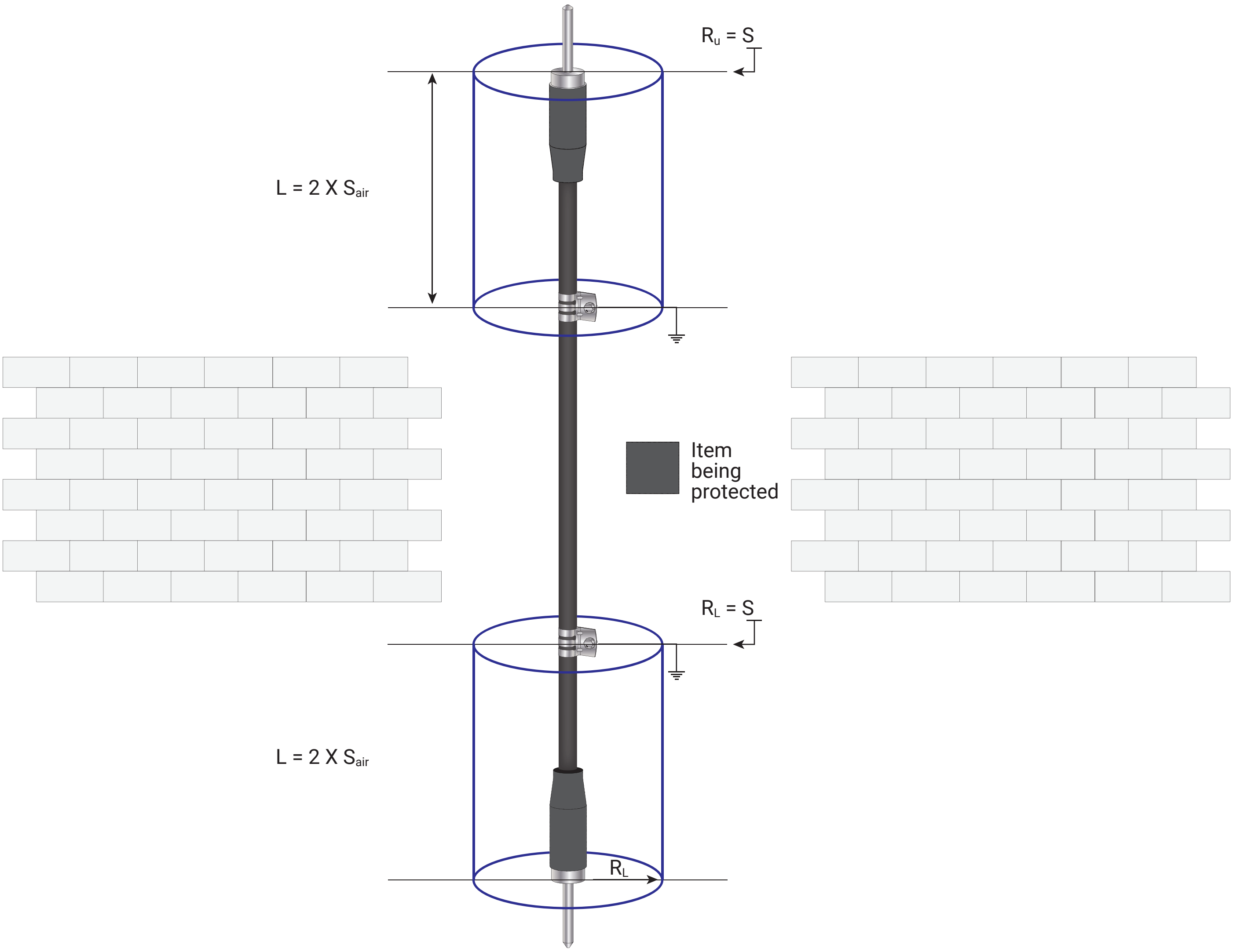



Figure 58–Clearance zones when protecting a particular item of equipment

A clearance zone needs to be maintained between the earthed clamps and the terminations on the ISOnV conductor. The radius and length of this clearance zone depends on the calculated separation distance at the terminations. If the lower termination connects directly into the earthing termination system, a clearance zone is not required. This example is simplistic in that it is usually easier to relocate either the LP conductor or the item, but it illustrates the principles, and can be applied in more complex scenarios where this technique might be the most effective solution.

## 4.8 LIGHTNING EVENT COUNTER

If desired, a Lightning Event Counter (LEC) can be installed. It is a device for registering and recording the number of strikes intercepted. The LEC should be mounted in a secure area that is not prone to contact by moving items, theft or vandalism. However, it should be mounted in a location that allows safe access to inspect the display. Refer to instructions supplied with the LEC.

The LEC is fixed to the ISOnV downconductor, and does not require additional fixing to the structure. Additional downconductor fixings should be installed directly above and below the LEC counter.

Note that to be most effective, the LEC is usually only installed in systems that involve a single downconductor from each air terminal, and is usually installed near the bottom end of the conductor.

# 5. Ordering Guide

The first flowchart below shows the parts needed for each mast being considered. The second flowchart shows the terminations, conductor, fasteners, and connectors needed, and assumes ISONV50 conductor is being used. If ISONV70 is being used change the “50” in the part numbers involved to “70”. Note that in some designs, both ISONV50 and ISONV70 will be used on the same mast.

**START**

**Air terminal – Choose ONE (1)**

- LPAAT0500
- LPAAT1000
- LPAAT1500
- LPAAT2000
- LPSAT1000
- LPSAT2000

**Upper mast assembly – Choose ONE (1)**

- ISOMASTASSY

Using Mast Stand

**Lower mast – Choose ONE (1)**

- ISONVMASTA11
- ISONVMASTA24
- ISONVMASTA37

**Mast stand – Choose ONE (1)**

- ISONVSTAND10
- ISONVSTAND15
- ISONVSTAND25

Flat Roof

**Concrete block sets – Choose ONE (1) item – Quantity FOUR (4)**

- ISONVBLOCKSET1
- ISONVBLOCKSET2
- ISONVBLOCKSET3
- ISONVBLOCKSET4
- ISONVBLOCKSET5

Sloping Roof

**Concrete block sets – Choose ONE (1) item – Quantity FOUR (4)**

- ISONVBLOCKSET1K
- ISONVBLOCKSET2K
- ISONVBLOCKSET3K
- ISONVBLOCKSET4K
- ISONVBLOCKSET5K

**Extension rod – Quantity FOUR (4)**

- ISONVROD200EXT
- ISONVROD240EXT
- ISONVROD270EXT
- ISONVROD300EXT

Using Mast Brackets

**Lower mast – Choose ONE (1)**

- ISONVMAST11
- ISONVMAST24
- ISONVMAST37

**Mast brackets – Choose ONE (1) item – Quantity TWO or THREE (2 or 3)**

- ISONVBKT15
- ISONVBKT80
- ISONVBKT200
- ISONVBKTXL
- ISONVBKTR40
- ISONVBKTR50
- ISONVBKTR70
- ISONVBKT + ISONVSTRAPC + ISONVSTRAP
- ISONVBKT50X50

**COMPLETE**

Figure 59–Ordering flowchart – Air terminal, mast, and supports

# 5. Ordering Guide

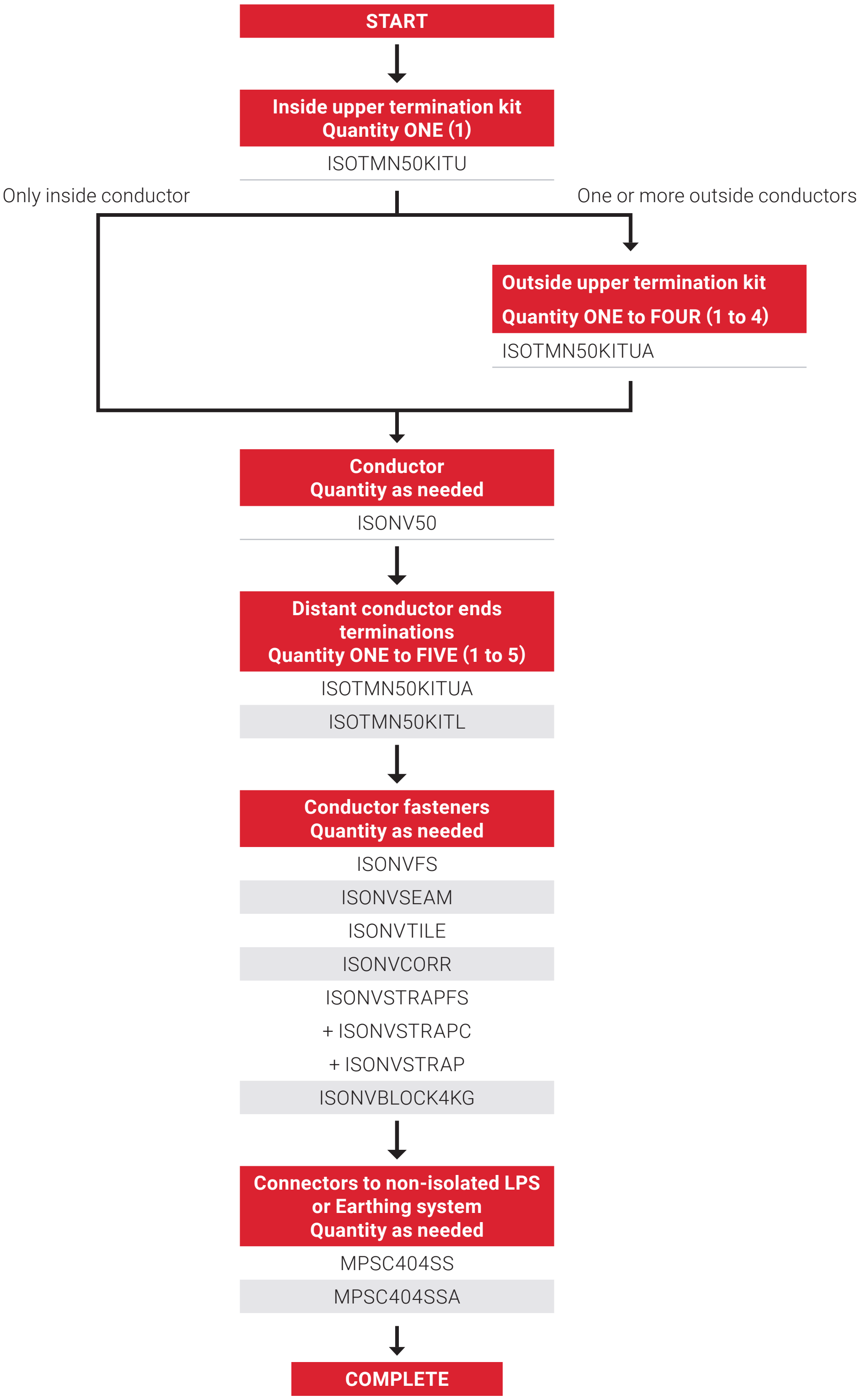



Figure 60–Ordering flowchart–Terminations, conductor, fasteners, and connectors

The flowcharts above are a starting point. Take care not to double up on conductors and terminations that go between masts. In addition, typically a stripping tool with the correct bushing to suit the conductor being used will be required.

As an example Bill of Material resulting from these flow charts, consider a freestanding mast on a corner of a building where one conductor runs down to the earthing system, and two others head to neighboring masts (not shown).

# 5. Ordering Guide

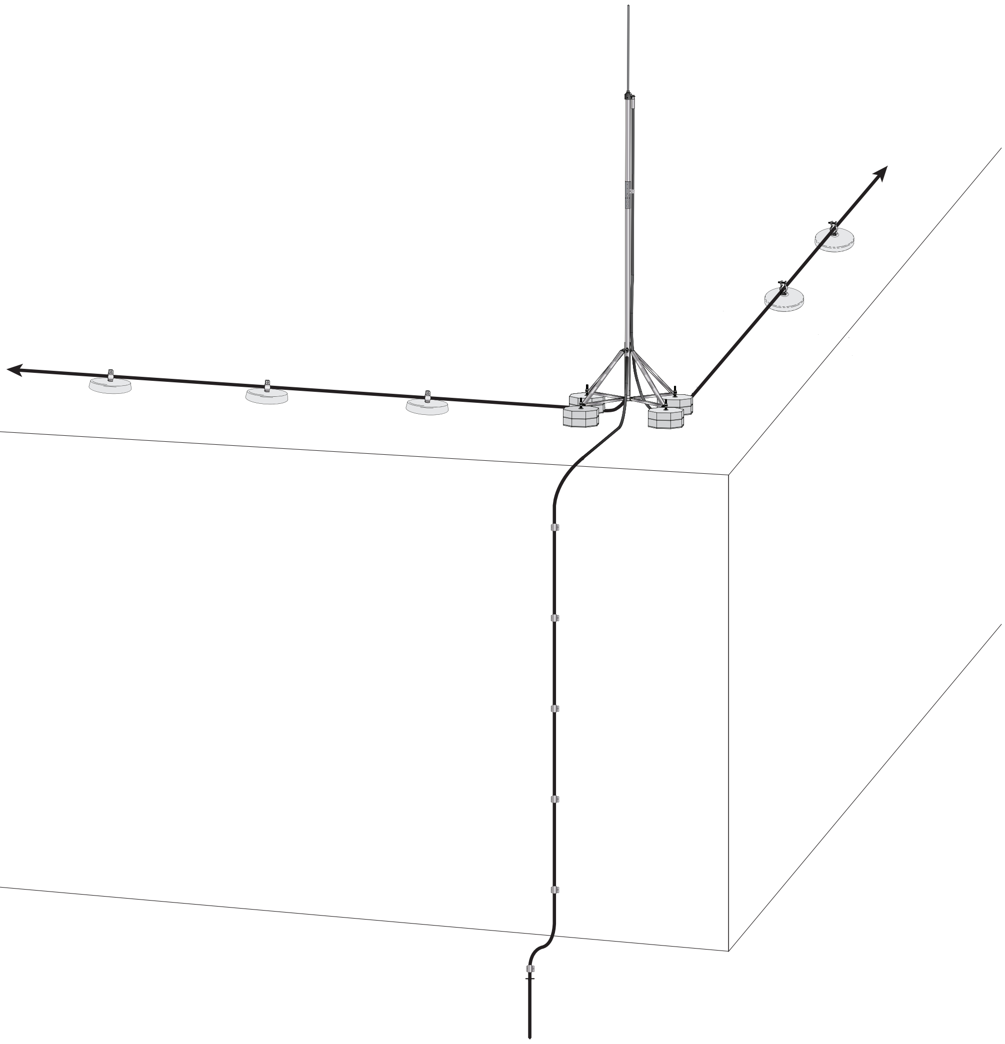


Figure 61–Example freestanding mast

The Bill of Material for the items shown is:

| Part | Description | Quantity | Notes |
|---|---|---|---|
| LPAAT2000 | 2 m Air terminal | 1 | |
| ISOMASTASSY | Upper mast assembly | 1 | |
| ISONVMASTA37 | 3.7m Lower mast | 1 | |
| ISONVSTAND25 | 2.5 m Mast stand | 1 | |
| ISONVBLOCKSET3 | 3 Block set | 4 | |
| ISOTMN50KITU | Inside upper termination kit | 1 | Inside the mast |
| ISOTMN50KITUA | Outside upper termination kit | 2 | Outside the mast |
| ISONV50 | Insulated conductor, SD = 0.5 m | 30 | |
| ISOTMN50KITU | Outside upper termination kit | 2 | Distant ends |
| ISOTMN50KITL | Lower termination kit | 1 | End going to earth rod |
| ISONVFS | Fastener | 5 | |
| ISONVBLOCK4KG | 4 kg Concrete block with fastener | 5 | |
| MPSC404SS | Connector to earth rod | 1 | |

Table 5–Example Bill of Material

# 6. ISOnV System Parts

## ISONV INSULATED CONDUCTOR

- Provides protection of equipment against lightning strike flashover by providing an insulated path to ground via an equivalent separation distance

| Part Number | Equivalent Separation Distance | Material |
|---|---|---|
| ISONV50 | 50 cm | Copper, Polyethylene |
| ISONV70 | 70 cm | |

## ISONV CONDUCTOR CLAMP FOR SEAMED METAL ROOF

- Secures conductors to standing seam profiles
- Suits both ISONV50 and ISONV70

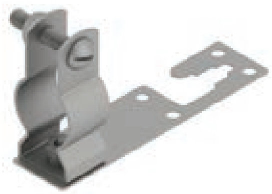
| Part Number | Material |
|---|---|
| ISONVSEAM10 | Stainless Steel 304 (conductor clamp), Galvanized Steel (seam clamp) |

## ISONV CONDUCTOR CLAMP FOR INTERLOCKING ROOF TILE

- Secures ISOnV Insulated Conductor to roof tiles
- Suits both ISONV50 and ISONV70

| Part Number | Material |
|---|---|
| ISONVTILE | Stainless Steel 304 |

## ISONV CONDUCTOR CLAMP FOR CORRUGATED ROOF



- Secures ISOnV Insulated Conductor to corrugated metal roofs

| Part Number | Material |
|---|---|
| ISONVCORR10 | Stainless Steel 304 |

## ISONV CONDUCTOR FASTENER

- Secures lightning protection conductors and prevents displacement

| Part Number | Material |
|---|---|
| ISONVFS | Stainless Steel 304 |

## ISONV CONDUCTOR SUPPORT BLOCK

- Weighted ballast with cable fastener to support ISOnV Insulated Conductor along rooftop
- Suits both ISONV50 and ISONV70

| Part Number | Unit Weight | Material |
|---|---|---|
| ISONVBLOCK4KG | 4 kg | Concrete (block), Stainless Steel 304 (conductor clamp) |

## ISONV CONDUCTOR STRAP BRACKET

- Secures conductors to round objects such as masts, pipes and columns
- Suits both ISONV50 and ISONV70
- Use in conjunction with ISONVSTRAP and ISONVSTRAPC

| Part Number | Material |
|---|---|
| ISONVSTRAPFS | Stainless Steel 304 |

# 6. ISOnV System Parts

## ISONV UPPER TERMINATION KIT, INSIDE MAST

- Kit includes upper termination, heat shrink tubing, hex key wrench, air terminal washers and crimp ring terminal for bonding to mast

| Part Number | Conductor Type | Material |
|---|---|---|
| ISOTMN50KITU | ISONV50 | 316L |
| ISOTMN70KITU | ISONV70 | |

## ISONV UPPER TERMINATION KIT, OUTSIDE MAST

- Kit includes upper termination, heat shrink tubing, hex key wrench, air terminal washers, multi-cable adapter and an equipotential bond

| Part Number | Conductor Type | Material |
|---|---|---|
| ISOTMN50KITUA | ISONV50 | 316L |
| ISOTMN70KITUA | ISONV70 | |

## ISONV LOWER TERMINATION KIT

- Kit includes lower termination, heat shrink tubing, and a hex key wrench

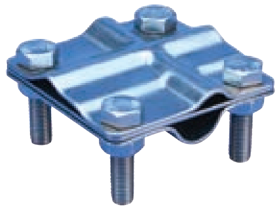
| Part Number | Conductor Type | Material |
|---|---|---|
| ISOTMN50KITL | ISONV50 | 316L |
| ISOTMN70KITL | ISONV70 | |

## ISONV EQUIPOTENTIAL BOND KIT

- Used with ISOnV lower terminations when equipotential bonding is required

| Part Number | Conductor Type | Material |
|---|---|---|
| ISONVEBL50 | ISONV50 | Stainless Steel 304 (Conductor Bond), Tinned Copper (Terminal) |
| ISONVEBL70 | ISONV70 | |

## MULTI-PURPOSE GROUNDING CLAMP, STAINLESS STEEL



- Convenient multi-purpose clamp designed to accommodate round conductors, flat conductors, ground rods and rebar

| Part Number | Earth Rod | Material |
|---|---|---|
| MPSC404SS | 14.2–19.0 mm Diameter, Actual (Ø) | Stainless Steel 304 |

## MULTI-PURPOSE GROUNDING CLAMP, STAINLESS STEEL

- Cross connector for round-to-round, round-to-tape, and tape-to-tape connections

| Part Number | Conductor Size | Material |
|---|---|---|
| MPSC404SSA | 8 mm Solid-10 mm Solid, 35 mm² Stranded-50 mm² Stranded 40 mm x 4 mm max. Tape | Stainless Steel 304 |

## ISONV STRAP CLAMP

- Fastens ISOnV Strap
- Use in conjunction with ISONVSTRAP and either ISONVSTRAPBKT or ISONVSTRAPFS

| Part Number | Material |
|---|---|
| ISONVSTRAPC | Stainless Steel 304 |

## ISONV STRAP

- Provides variable fastening on poles, masts and pipes
- Use in conjunction with ISONVSTRAPC and either ISONVSTRAPBKT or ISONVSTRAPFS

| Part Number | Length | Material |
|---|---|---|
| ISONVSTRAP | 50 m | Stainless Steel 304 |

# 6. ISOnV System Parts

## ISONV STRIPPING TOOL HANDLE

- For use with ISOnV Stripping Tool Bushings to provide precise strip length of ISOnV Insulated Conductor

| Part Number | Material |
|---|---|
| ISONVSTRIPT | Thermoplastic, Steel and Brass |

## ISONV STRIPPING TOOL BUSHING

- For use with ISOnV Stripping Tool Handle to provide precise strip length of ISOnV Insulated Conductor

| Part Number | Conductor Type | Material |
|---|---|---|
| ISONVSTRIP50 | ISONV50 | Thermoplastic, Stainless Steel Blades |
| ISONVSTRIP70 | ISONV70 | |

## ISONV STRIPPING TOOL CARRYING CASE

- Designed to carry ISOnV stripping tool handle, bushing and replacement blades

| Part Number | Material |
|---|---|
| ISONVSTRIPCS | Polyethylene |

## ISONV STRIPPING TOOL REPLACEMENT BLADE

- Replacement blades for ISOnV Stripping Tool Bushing

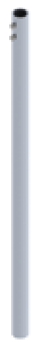
| Part Number | Material |
|---|---|
| ISONVSTRIPBL | Stainless Steel |

## ISONV AIR TERMINAL

- Lightning strike termination points for use with air terminal bases

| Part Number | Height | Material |
|---|---|---|
| LPAAT0500 | 500 mm | Aluminum |
| LPAAT1000 | 1,000 mm | |
| LPAAT1500 | 1,500 mm | |
| LPAAT2000 | 2,000 mm | |
| LPSAT1000 | 1,000 mm | Stainless Steel 304 |
| LPSAT2000 | 2,000 mm | |

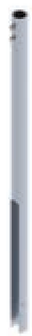
## ISONV LOWER MAST



- For use with ISOnV Upper Mast Assembly in vertical cantilever installations

| Part Number | Material |
|---|---|
| ISONVMAST11 | Aluminum |
| ISONVMAST24 | |
| ISONVMAST37 | |

## ISONV LOWER MAST WITH OUTLET

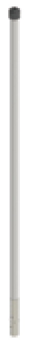


- For use with ISOnV Upper Mast Assembly in mast stand installations

| Part Number | Material |
|---|---|
| ISONVMASTA11 | Aluminum |
| ISONVMASTA24 | |
| ISONVMASTA37 | |

# 6. ISOnV System Parts

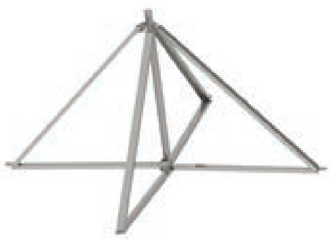
## ISONV UPPER MAST ASSEMBLY



- For use with ISOnV lower masts

| Part Number | Material |
|---|---|
| ISOMASTASSY | Polypropylene (cap), Fiberglass (mast), Stainless Steel 304 (coupler) |

## ISONV MAST STAND



- Used to support ISOnV mast assemblies with an outlet

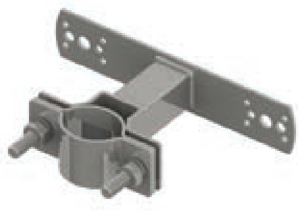
| Part Number | Material |
|---|---|
| ISONVSTAND10 | Stainless Steel 304 |
| ISONVSTAND15 | |
| ISONVSTAND25 | |

## ISONV ADJUSTABLE OFFSET MAST BRACKET

- Telescoping mast support for mounting under roof overhang

| Part Number | Offset Distance | Material |
|---|---|---|
| ISONVBKTXL | 800 – 1,000 mm | Stainless Steel 304 |

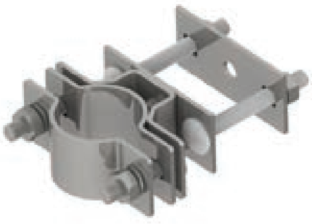
## ISONV FIXED OFFSET MAST BRACKET



- Use for cantilevered mounting ISOnV masts

| Part Number | Offset distance | Material |
|---|---|---|
| ISONVBKT15 | 15 mm | Stainless Steel 304 |
| ISONVBKT80 | 80mm | |
| ISONVBKT200 | 200 mm | |

## ISONV SQUARE RAILING MAST BRACKET



- Secures masts to square railing

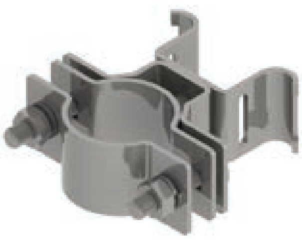
| Part Number | Rail Size | Material |
|---|---|---|
| ISONVBKT50X50 | 50 mm x 50 mm | Stainless Steel 304 |

## ISONV MAST TO PIPE BRACKET

- For mast-to-mast or pipe-to-mast mounting connections

| Part Number | Pipe Outside Diameter | Material |
|---|---|---|
| ISONVBKTR40 | 40 – 50 mm | Stainless Steel 304 |
| ISONVBKTR50 | 50 – 60 mm | |
| ISONVBKTR70 | 70 – 80 mm | |

## ISONV MAST STRAP BRACKET



- Secures masts to round objects such as masts, pipes and columns

| Part Number | Material |
|---|---|
| ISONVSTRAPBKT | Stainless Steel 304 |

# 6. ISOnV System Parts

## THREADED ROD EXTENSION

- Used with concrete block supports for inclined surfaces for level installation of mast stands

| Part Number | Material |
| --- | --- |
| ISONVROD200EXT | Stainless Steel 304 |
| ISONVROD240EXT | |
| ISONVROD270EXT | |
| ISONVROD300EXT | |

## ISONV EARLY STREAMER EMISSION TERMINAL ADAPTOR

- Adaptor to interface Early Streamer Emission Terminal with ISOnV Insulated Conductor

| Part Number | Material |
| --- | --- |
| ISONVESE | Stainless Steel |

## ISONV CONCRETE BLOCK SUPPORT ASSEMBLY

- Used to ballast mast stands on horizontal surfaces

| Part Number | Material |
| --- | --- |
| ISONVBLOCKSET1 | Concrete (Block), Stainless Steel 304 (Threaded Rod) |
| ISONVBLOCKSET2 | |
| ISONVBLOCKSET3 | |
| ISONVBLOCKSET4 | |
| ISONVBLOCKSET5 | |

## ISONV CONCRETE BLOCK SUPPORT ASSEMBLY, INCLINED SURFACE

- Used to ballast mast stands on inclined surfaces
- Use in conjunction with Threaded Rod Extensions.

| Part Number | Material |
| --- | --- |
| ISONVBLOCKSET1K | Concrete (Block), Stainless Steel 304 (Threaded Rod), Aluminum (Knuckle Joint) |
| ISONVBLOCKSET2K | |
| ISONVBLOCKSET3K | |
| ISONVBLOCKSET4K | |
| ISONVBLOCKSET5K | |

## CABLE TIE

- Strap for securing downconductor

| Part Number | Length | Material |
| --- | --- | --- |
| LPTIESS25 | 360 mm | Stainless Steel 316 with Black Polyester/Epoxy Coating |

# 7. Glossary

ISOnV – Is a proprietary system complying with relevant IEC standards, which allows the economic and convenient construction of an Isolated LPS.

Lightning strike – An electrical discharge between cloud and earth. Also called a Lightning flash.

Lightning Protection System (LPS) - In this document it is considered to be the external items consisting of an air termination system, downconductors, and an earth termination system. An LPS is intended to intercept lightning strikes and thereby prevent damage to structures and equipment. A more comprehensive definition for LPS would include internal items such as surge protective devices.

Isolated LPS – An LPS designed in such a way that the lightning current does not flow through any elements of the structure being protected. In an isolated LPS, dangerous sparks between the LPS and the structure are prevented.

Non-isolated LPS – An LPS designed in such a way as to be in electrical contact with the structure and to electrically bond (connect) with conductive structural elements. It is not generally isolated from the building electrical earthing system.

Air termination system – that part of the LPS constructed of metal designed to receive lightning flashes. In a non-isolated LPS, the air termination system may include conductive natural elements of the structure where appropriate and convenient. In an isolated LPS, the air termination system always consists of specially provided and installed air terminals, in order to keep lightning currents out of the structure.

Air terminal – A metallic item designed and installed with the function to receive a lightning strike. Also called a Lightning rod.

Downconductor – That part of the LPS designed to conduct the lightning current from the air termination system to the earth termination system.

Earth termination system – That part of the LPS designed to dissipate the lightning current into the general mass of earth. Usually comprised of some combination of the building foundation, buried bare conductors, and earth rods (ground rods). Also called a Grounding system.

Equipotential bonding system of the building - In this document, the equipotential bonding system is earthed, and is a part of the building earthing arrangement. It is usually constructed using Bonding bars, to which the electrical system earthing conductor is connected, along with communications systems earths, the LPS system, and other earthed items such as metallic structural elements.

Insulated conductor – a conductor with an insulating jacket, designed to carry lightning currents in an isolated LPS, performing as a downconductor.

Dangerous sparking - Electrical discharge due to lightning which causes physical damage in the structure to be protected. Occurs between the LPS and the structure or other metallic parts. Also known as a flashover.

Separation distance – The distance between two conductive parts at which no dangerous sparking or flashover can occur.

# 8. Index

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