

MAIN CATALOG

Pulsar lightning protection systems

External lightning protection



**With over 80 years experience
in the industry, ABB are
recognised as a leader in
offering lightning protection
solutions to meet the needs
of our customers**

Pulsar lightning protection systems

External lightning protection

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Our expertise

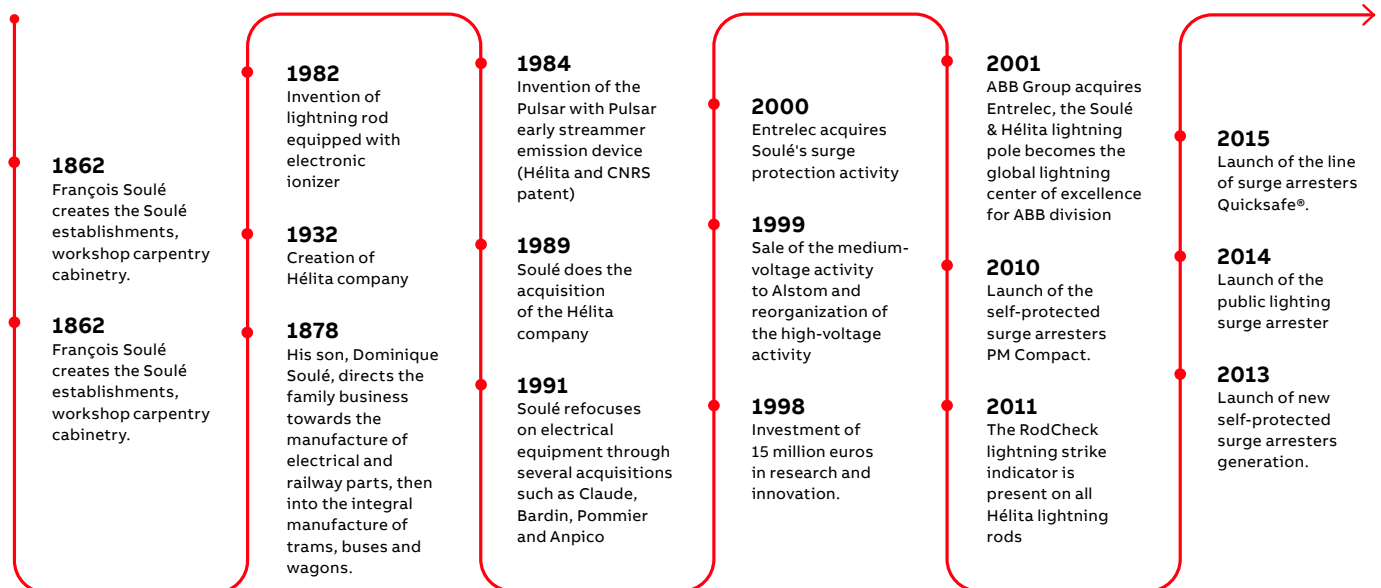
Control of high amplitude and short duration currents



Why protect against lightning?

Lightning strikes more than 32 million times around the world each year. It can directly hit the roof of a building, a nearby element or a overhead powerline causing fire and transient overvoltages. These lightning surges will then propagate through the building through cables and damage sensitive equipment such as the alarm or heating system, computers and telephone and ADSL lines. Thus, anticipating risks by protecting your building and its electrical equipment is the best way to limit material and financial losses.

More than 80 years of experience in lightning protection



Testing and research

Goals

The ABB Lightning Division has been investing for many years in research into means of protection against lightning, in order to constantly improve the performance of its products.



Tests under laboratory conditions

Since 2003, our factory in Bagnères de Bigorre (France) has had a high-tech laboratory enabling us to test our surge arresters in waveforms of 10/350 μ s and 8/20 μ s as well as our range of lightning rods with currents of lightning up to 100 kA.

We also test our lightning rods in a dedicated high voltage laboratory close to our factory and offering normative tests thanks to a generator that can reach 3 MV



In situ tests at the Pic du Midi

An experimental site dedicated to the study of direct lightning strikes on a lightning rod was selected and installed at the top of the "Pic du Midi" in the French Pyrenees for its high lightning density (30 days of thunderstorms per year). The in situ research carried out today by ABB in France and abroad has three objectives:

- Improve protection models
- Develop our products to improve their efficiency
- Validate the sizing of equipment in real lightning strike conditions.

The "Pic du Midi", renowned for its astronomical observatory, offers a unique scientific environment for observing

lightning. Object of the experiment:

- Measure the flow of lightning currents captured by lightning rods towards low voltage surge arresters via an appropriate earth network
- Test the resistance of equipment to lightning strikes and extreme climatological constraints.



Laboratory test history

As regards the efficiency tests on our lightning rod products, which is the essential test to check the good operation of an ESE lightning rod, we certainly have the most experience in this domain.

The first tests were conducted in the laboratory EDF (Electricité de France) Renardières France (77) in the 1980s. Then we certified efficiency tests by the LCIE (Central Laboratory for Electrical Industries) who drafted a certificate in April 1996.

We were also the first ESEAT manufacturer to perform tests with a current of 100 kA in the laboratory of the University of LImenau in Germany in April 1999.

And efficiency tests (measuring the time gain) using arc of 7 meters lengths in the laboratory of IREC in Canada in October 2000. Then by using arcs of 17 meters lengths in the WHVRI laboratory in China, lab that is open air, in December 2001.

These efficiencies tests showed us that tests at 1 meter, 3 meters to 7 meters or 17 meters have perfectly consistent results with a scale factor and it is unnecessary to use arcs very long for these tests.

Based on these experiences, many tests have been made using small arcs 1 to 3 meters in the SEDIVER laboratory of Bazet (France) in 2003, 2010, 2012, and since we use the laboratory SIAME of the University of Pau (France). We, in the same period, in China also proceeded to tests for the Asian market.

All these certificates are available on demand.

Pulsar Designer Software

Our software Pulsar Designer is able to design a complete lightning protection system with all installations details, listing of material, protections areas layout, tests certificates within a complete technical document that is available for the client in pdf format.

Lightning mechanism and location

Storms

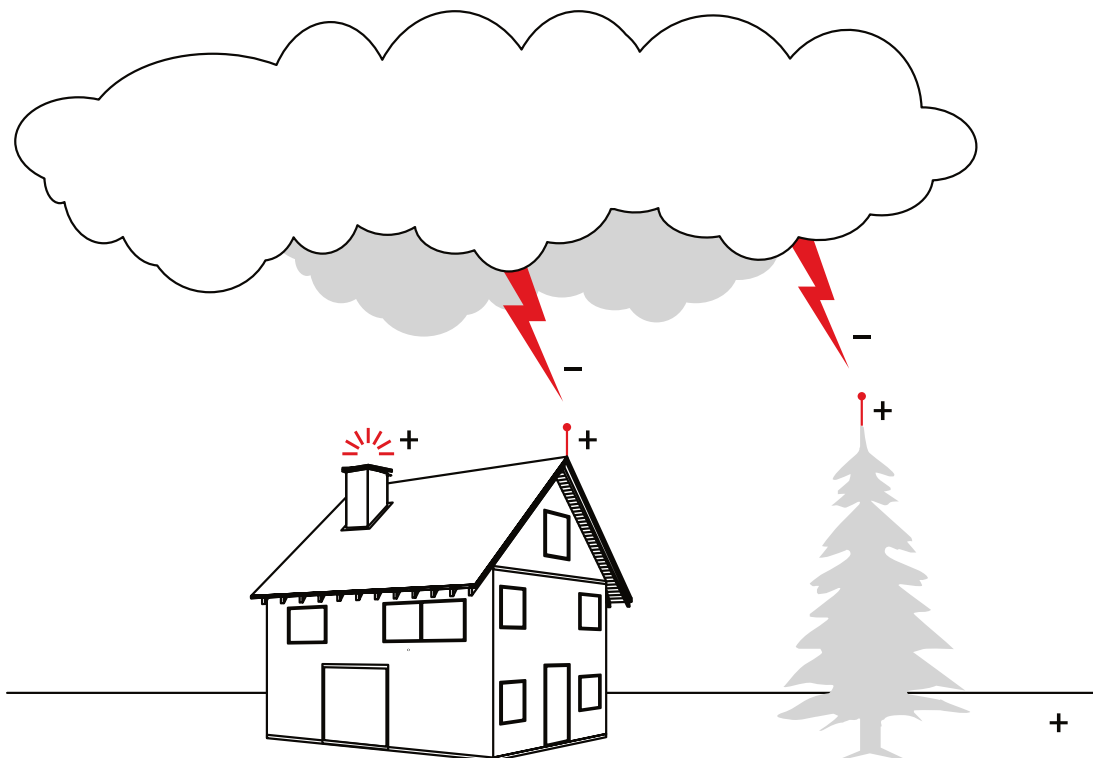
The presence of unstable, moist and warm air weights gives rise to the formation of cumulonimbus storm clouds. This type of cloud is very extensive, both horizontally (about 10 km in diameter) and vertically (up to 15 km). Its highly characteristic shape is often compared with the profile of an anvil of which it displays the upper and lower horizontal planes. The existence of extreme temperature gradients in a cumulonimbus (the temperature can drop to -65°C at the top) generates very rapid ascending air currents, and results in the electrical energisation of the water particles. In a typical storm cloud, the upper part, consisting of ice crystals, is normally positively charged, whilst the lower part, consisting of water droplets, is negatively charged. Consequently, the lower part of the cloud causes the development of electrically opposite charges (i.e. positive over the part of the ground nearby). Thus the cumulonimbus formation constitutes a sort of huge plate /ground capacitor whose median distance can often reach 1 to 2 km. The atmospheric electrical field on the ground, about 600 V/m in fine weather is reversed and can reach an absolute value of 15 to 20 kV/m when a ground discharge is imminent (the lightning stroke). Before and during the appearance of the lightning stroke, discharges can be seen both within the cloud and between clouds.

Lightning

According to the direction in which the electrical discharge develops (downward or upward), and the polarity of the charges it develops (negative or positive), four classes of cloud-to-ground lightning stroke can be distinguished. In practice, lightning strokes of the descending and negative type are by far the most frequent: it is estimated that on plains and in our temperate zones, they account for 96 % of all cloud / ground discharges.

Mechanism of a lightning stroke

It is impossible to discern the individual phases of the lightning stroke by simple visual observation. This can only be done with high-speed cameras. Most lightning bolts exhibit the following phenomena: a leader leaves a point in the cloud and travels about 50 m at a very high speed of around 50 000 km/s. A second leader then leaves the same point, follows the previous path at comparable speed, goes beyond the final point of the first leader by an approximately identical distance, then disappears in turn. The process is repeated until the tip of the last leader reaches a point a few dozen metres, or even just a few metres above ground level. The ascending jets then converge, producing a return stroke from the ground towards the cloud (the upward streamer) during which the electric current circulates: The convergence of these two phenomena produces the main discharge, which may be followed by a series of secondary discharges, passing unbroken along the channel ionised by the main discharge. In an average negative lightning stroke, the maximum current is around 35 000 A.



Lightning protection risk analysis

Risk analysis

All lightning protection standards recommend carrying out a lightning risk analysis before dimensioning the protection, which is calculated in three parts:

- Lightning risk assessment
- Choice of the lightning protection level
- Definition of the lightning protection installation.

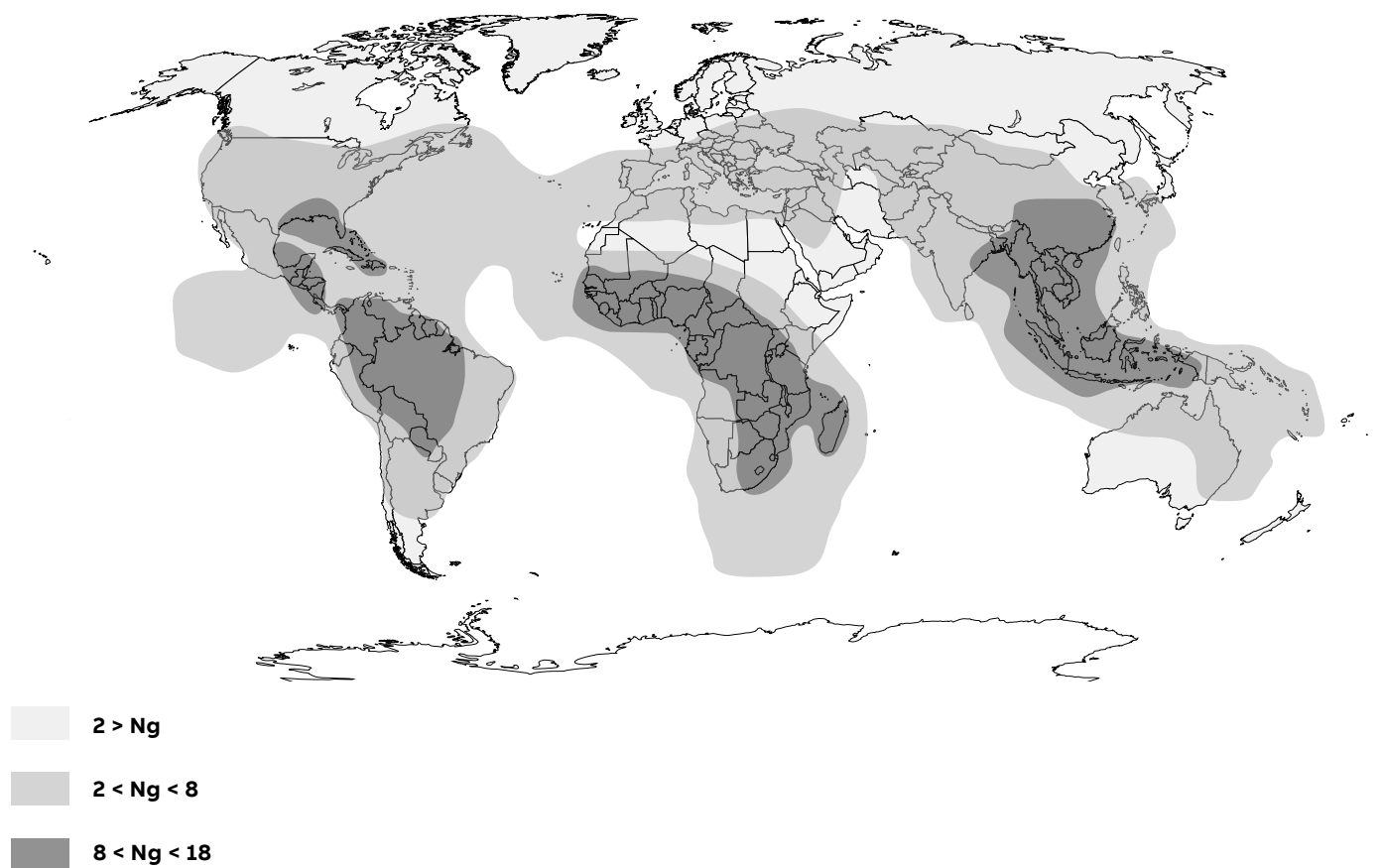
We have developed a software based on the calculations of standard NF EN 62305-2 or NF C 17-102 (appendix A) in order to offer a simple and precise solution for analyzing the risks of an installation to be protected. (Furse strike risk software).

Definition of the lightning protection installation

It is recommended that technical and architectural constraints be taken into account when determining the location of the various components of the protection device. To simplify the preliminary studies, we provide a questionnaire in which can be entered the information required, allowing our technical department to do the calculation.

This questionnaire is available at the end of this catalogue.

Lightning flash density map (flashes per km² per year)



Lightning protection technologies

The effects of lightning

The effects of lightning are those of a high-strength impulse current that propagates initially in a gaseous environment (the atmosphere), and then in a solid, more or less conductive medium (the ground):

- visual effects (flash): caused by the Townsend avalanche mechanism
- acoustic effects: caused by the propagation of a shock wave (rise in pressure) originating in the discharge path; this effect is perceptible up to a range of around 10 km
- thermal effect: heat generated by the Joule effect in the ionised channel
- electrodynamic effects: these are the mechanical forces applied to the conductors placed in a magnetic field created by the high voltage circulation. They may result in deformations
- electrochemical effects: these relatively minor effects are conveyed in the form of electrolytic decomposition through the application of Faraday's law
- induction effects: in a variable electromagnetic field, every conductor harnesses induced current
- effects on a living being (human or animal): the passage of a transient current of a certain r.m.s value is sufficient to incur risks of electrocution by heart attack or respiratory failure, together with the risk of burns.

Lightning causes two major types of accidents:

- accidents caused by a direct stroke when the lightning strikes a building or a specific zone. This can cause considerable damage, usually by fire. Protection against this danger is provided by lightning air terminal systems
- accidents caused indirectly, as when the lightning strikes or causes power surges in power cables or transmission links. Hence the need to protect with SPD the equipment at risk against the surge voltage and indirect currents generated.

Protection against direct lightning stroke

To protect a structure against lightning strokes, a preferred impact point is selected to protect the surrounding structure and conduct the flow of the electric current towards the ground, with minimal impedance on the path followed by the lightning. Four types of protection systems meet these requirements.

Protection systems	Standard
Early streamer emission air terminal	France NFC 17-102 (september 2011 edition)
Single rods air terminals	NF IEC EN 62305-3
Meshed cages	NF IEC EN 62305-3
Stretched wires	NF IEC EN 62305-3

Lightning protection technologies

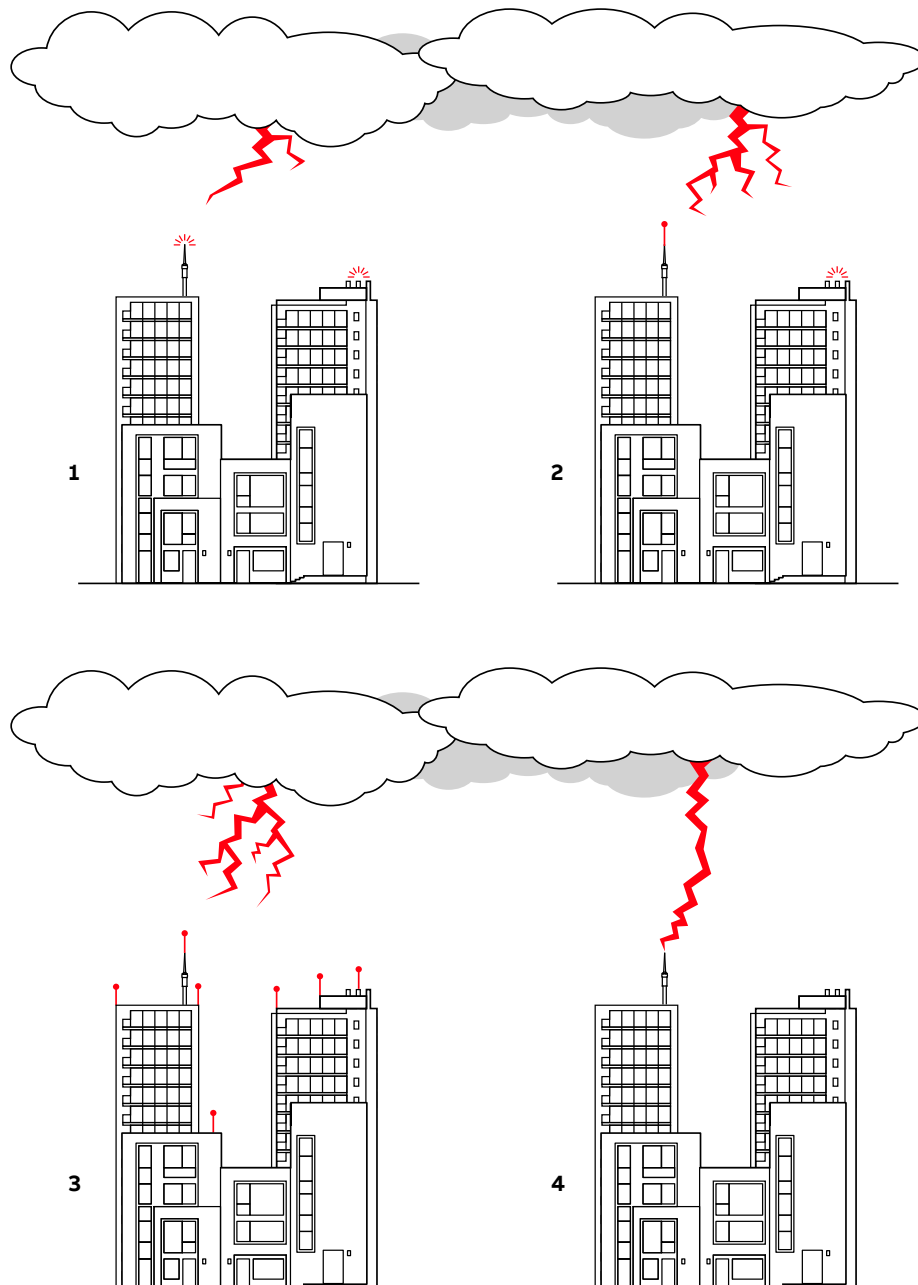
Lightning protection system with early streamer emission air terminal (ESEAT)

These state-of-the-art technologies have been designed on the basis of a series of patents registered jointly by HELITA and the French National Scientific Research Centre (CNRS). The Pulsar is equipped with an electronic device which is high pulse voltage of known and controlled frequency and amplitude enabling the early formation of the upward leader which is then continuously propagated towards the downward leader. This is why this product is called Pulsar that means Optimized Pulse Rod.

This anticipation in the upward leader formation is essential with regard to the last scientific knowledge on the lightning attachment that acknowledge the fact that this one results from an upward leader competition. Today the upward leader competition is internationally recognized thanks to high speed cameras pictures of this phenomenon of attachment and to its digital simulation.

The Pulsar draws its energy from the ambient electrical field during the storm. After capturing the lightning stroke, the Pulsar directs it towards the down conductors to the ground where it is dissipated.

Lightning attachment process on an ESEAT



Lightning protection technologies

The early streamer emission (ESE) concept

During a storm, when the propagation field conditions are favorable, the Pulsar first generates an upward leader. This leader from the Pulsar tip propagates towards the downward leader from the cloud.

The triggering time ΔT (μs) is defined as the mean gain at the sparkover instant (continuous propagation of the upward leader) obtained with an ESE air terminal compared with a single rod air terminal exposed to the same conditions. ΔT is measured in the high-voltage laboratory, all tests are defined in appendix C of the French standard NF C 17-102.

Installation Requirements

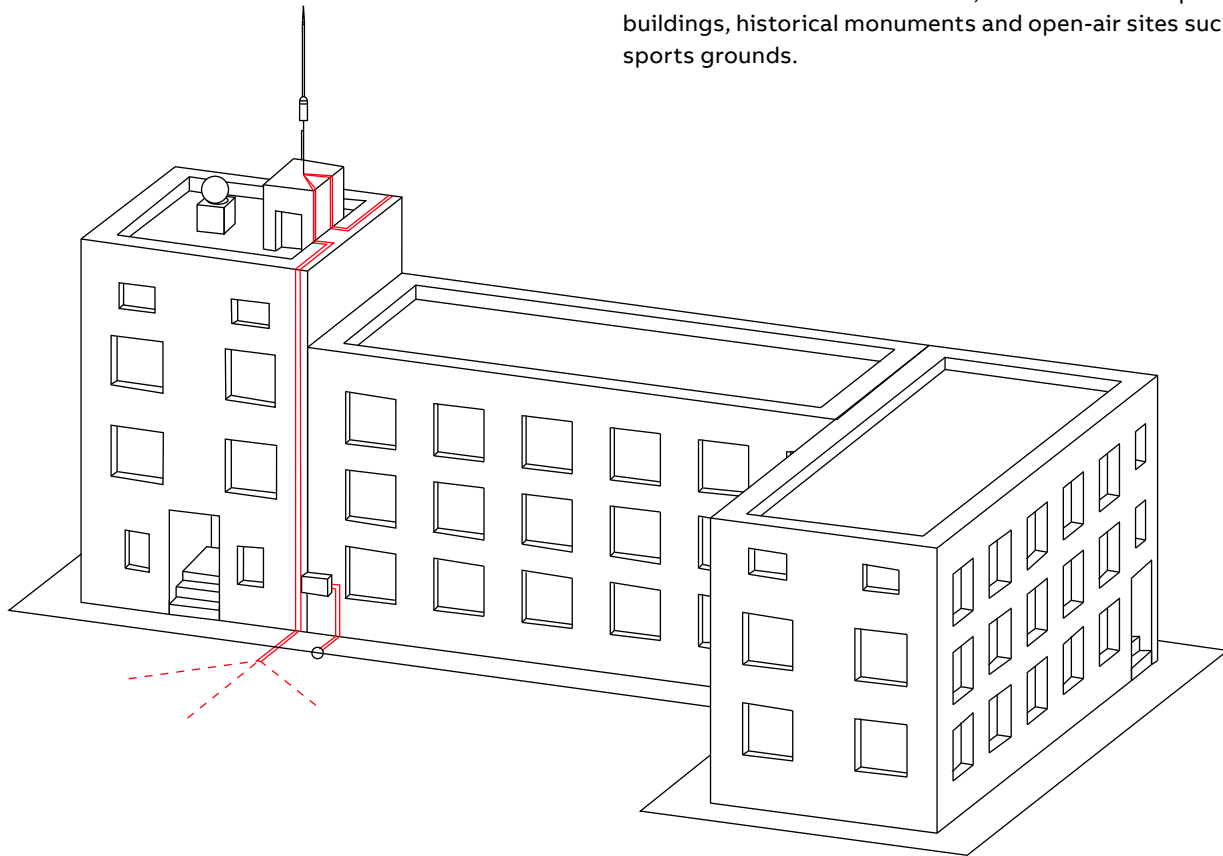
An ESEAT installation includes:

- An early streamer emission lightning conductor and its extension mast.
- Two down conductors, or one conductor per ESEAT if several ESEATs are used, or if the installed ESEAT is isolated
- A cut-off bar or control joint by down conductor allowing verification of the resistance of the earth connection.
- A protective tube protecting the last two meters of each down conductor above the ground.
- An earth connection intended to drain lightning currents at the foot of each down conductor.
- A disconnectable equipotential link between each earth connection and the general earth circuit of the structure.
- Protective measures to avoid injuries due to touch and step voltages, for example with a warning notice.

The triggering time instance gain ΔT is associated with a triggering time distance gain ΔL .

- $\Delta T = \Delta L$, where:
- ΔL (m): gain in lead distance or sparkover distance
- ΔT (μs): gain in sparkover time of the upward leader measured in laboratory conditions.

Pulsar air terminals are especially effective for the protection of classified industrial sites, administrative or public buildings, historical monuments and open-air sites such as sports grounds.



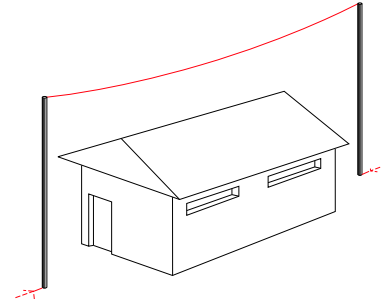
Lightning protection technologies

Stretched wires

This system is composed of one or several conductor wires stretched above the protected installation. The protection area is determined by applying the electro-geometrical model.

- The conductors must be earthed at each end.
- A stretched wire installation requires a thorough preliminary study to consider issues such as mechanical strength, the type of installation, and the insulation distances.

This technology is used to protect ammunition depots and as a general rule in circumstances where the site cannot be protected by using a building structure to support the conductors that convey the lightning currents to the earth.

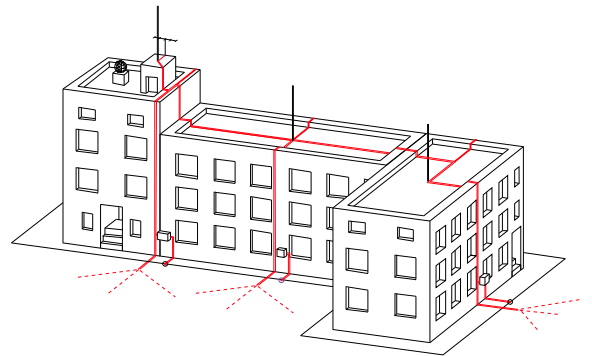


Single rod air terminal

By their dominant geometry, they favor the triggering of ascending sparks and thus impose themselves as the preferential point of impact of lightning strikes which would occur in a very close vicinity of the structure. This type of protection is particularly recommended for radio stations and antenna masts when the ground surface to be protected is small.

A simple rod lightning rod installation includes:

- A lightning rod and its extension mast
- Two down conductors, or one conductor if it is isolated from the building
- A cut-off bar or control joint by down conductor allowing the verification of the resistance of the earth of the conductor
- A protective guard protecting the last two meters of each down conductor above the ground
- A disconnectable equipotential link between each earth connection and the general earth circuit of the structure
- Protective measures to avoid injuries due to contact and step voltages, for example by means of a warning notice.



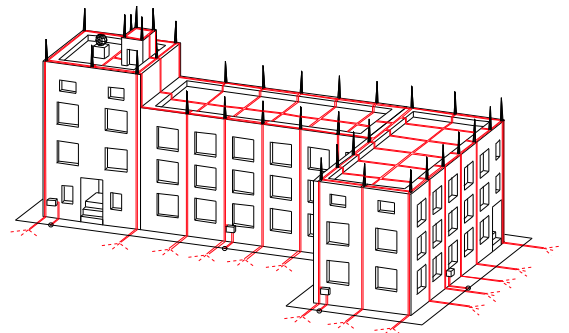
Mesh cage type protections

This principle consists in favoring the distribution and the flow of the lightning current by a set of conductors and earth connections. A meshed cage installation requires a large number of down conductors and therefore constitutes a very effective solution when the equipment located inside the building is sensitive to electromagnetic disturbances.

Indeed, the lightning current is divided by the number of down conductor and the low value of the current circulating in the meshes creates very little disturbance by induction.

A mesh cage type installation includes:

- Atmospheric discharge capture devices consisting of short rods
- Roof conductors, constituting a mesh
- Down conductors and earth connections
- Protective measures to prevent injury from contact and step voltages, e.g. with a warning notice



Lightning capture devices

Lightning air terminals

Early Streamer Emission Air Terminals (ESEAT) or Single Rod Air Terminals (SRAT).

As a general rule, the lightning air terminal should culminate at least two metres above the highest points of the building(s) to be protected.

Its location should therefore be determined relative to building superstructures: chimneys, machine and equipment rooms, flagpoles, pylons or aerials. Ideally, these vulnerable points should be selected for lightning air terminal installation. The lightning air terminal may be raised by an extension mast.

Our stainless steel interlocking extension masts can reach an overall height of 8.50 or 11 m including the lightning air terminal height. They have been specially designed to obviate the need for guying. However, if guying is essential (e.g. when the conductor is fixed with a flat support on the roof waterproofing, or is exposed to particularly strong winds), the guys should be made of $\varnothing 5.6$ fibre glass. When metal cables are used for guying, the lower anchoring points should be interconnected with the down conductor by a conductive material of the same type. We offer a range of fixtures adapted to most requirements.

Installation specifications are detailed in the individual product data sheets.

If several lightning air terminals (ESEAT or SRAT) are used in the outside installation on the same structure, they should be connected by a conductor, except when this has to pass an obstacle of more than 40 cm in height.

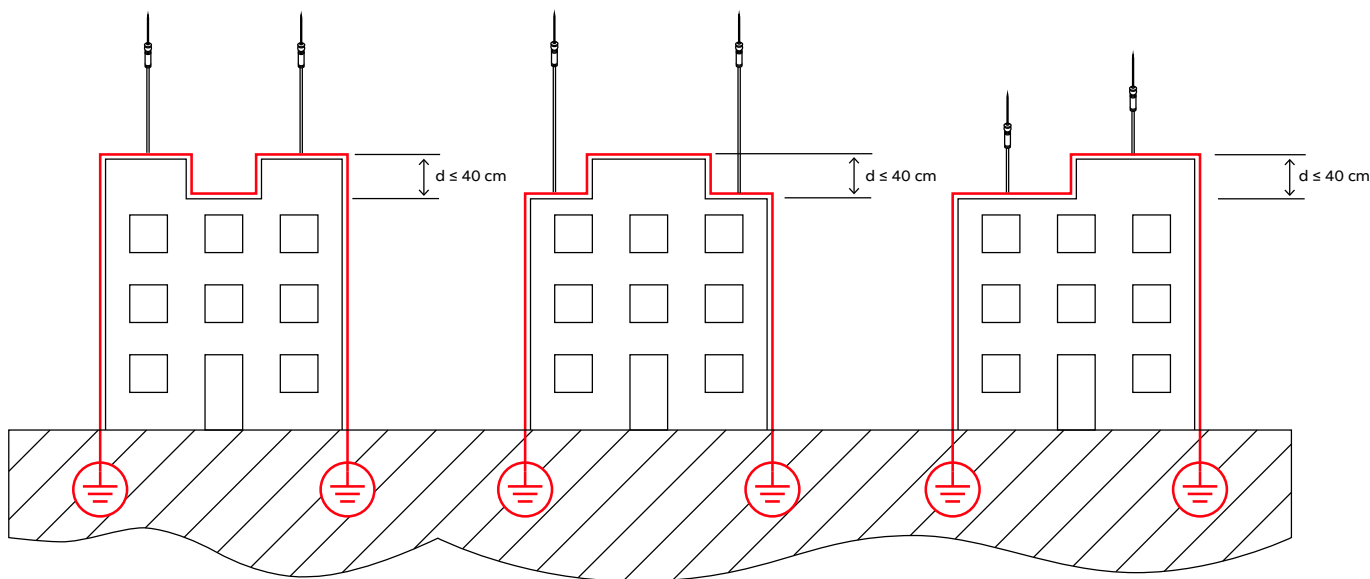
$D \leq 40$ cm: connect ESEATs on roof level

$D \geq 40$ cm: no need to connect ESEATs on roof level

When protecting open-air sites such as sports grounds, golf courses, swimming pools, and camping sites, ESEATs are installed on special supports such as lighting masts, pylons, or any other nearby structures from which the lightning conductor can cover the area to be protected.

Our software Pulsar Designer is able to design a complete lightning protection system with all installations details, listing of material, protections areas layout, tests certificates within a complete technical document that is available for the client in pdf format.

Interconnection rule when several ESEAT on the same roof



Lightning capture devices

Special cases

Antennas

By agreement with the user of the antenna, the device can be mounted on the antenna mast, provided that allowance is made for a number of factors notably:

- the lightning air terminal tip must culminate at least 2 m above the antenna
- the aerial coaxial cable is routed inside the antenna mast
- the common supporting mast will no need guying
- the connection to the down conductor will be made using a clamp fixed to the foot of the mast.

This process, widely used today, offers three advantages:

- technical (it earths the aerial itself)
- visual (there is only one mast)
- cost.

To be noted that an ESEAT electronic generator cannot be used in an atmosphere where the temperature is greater than 120°.

Industrial chimney

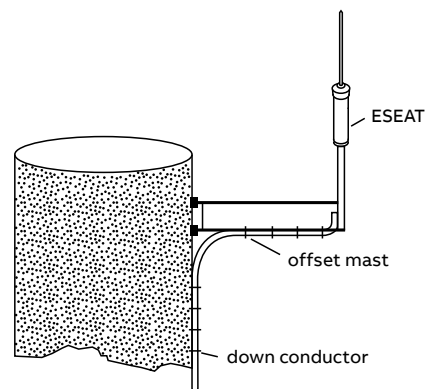
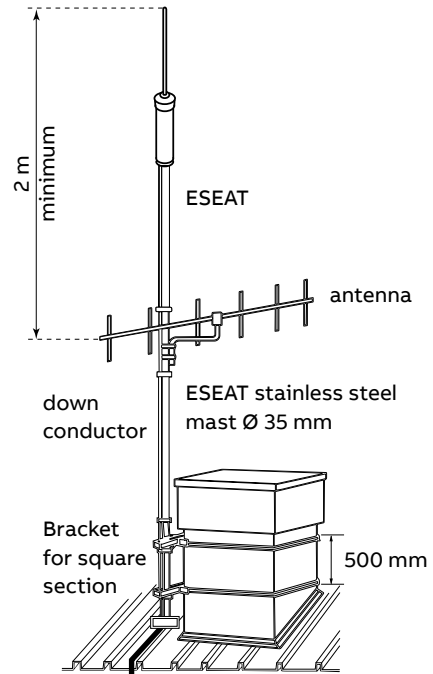
ESE air terminal:

- the lightning air terminal should be mounted on an offset mast (2CTH0HRI3501) as far as possible from smoke and corrosive vapors
- the mast should be fixed to 2 points as shown in the diagram.
- To be noted that an ESEAT electronic generator cannot be used in an atmosphere where the temperature is greater than 120°.

Single rod air terminal:

The lightning air terminals (1 or 2 m) should be mounted on stainless steel supports (2CTH0HPS2630) to enable mounting at a 30° angle. They will be interconnected by a belt conductor positioned 50 cm from the summit of the chimney. When using 1 m air terminal at least two points should be used and placed at intervals of no more than 2 m around the perimeter.

When using strike points of at least 2 m in height, the number of points should be calculated to cover the protection radius.



Solution overview

Protection against direct effects of lightning



ESEAT



Fixing accessories



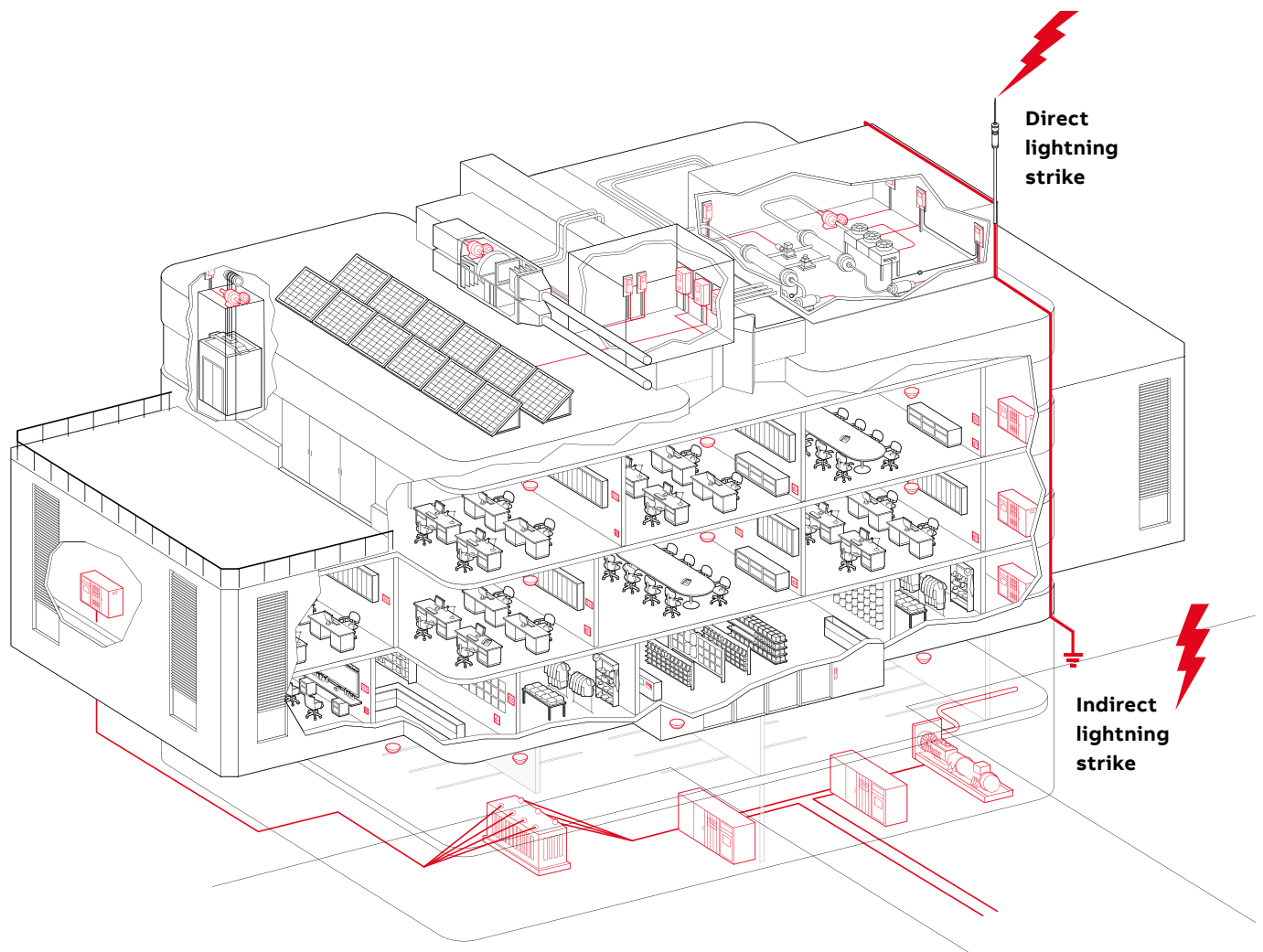
Down conductor



Lightning stroke counter



ESEAT test set



Protection against indirect effects of lightning



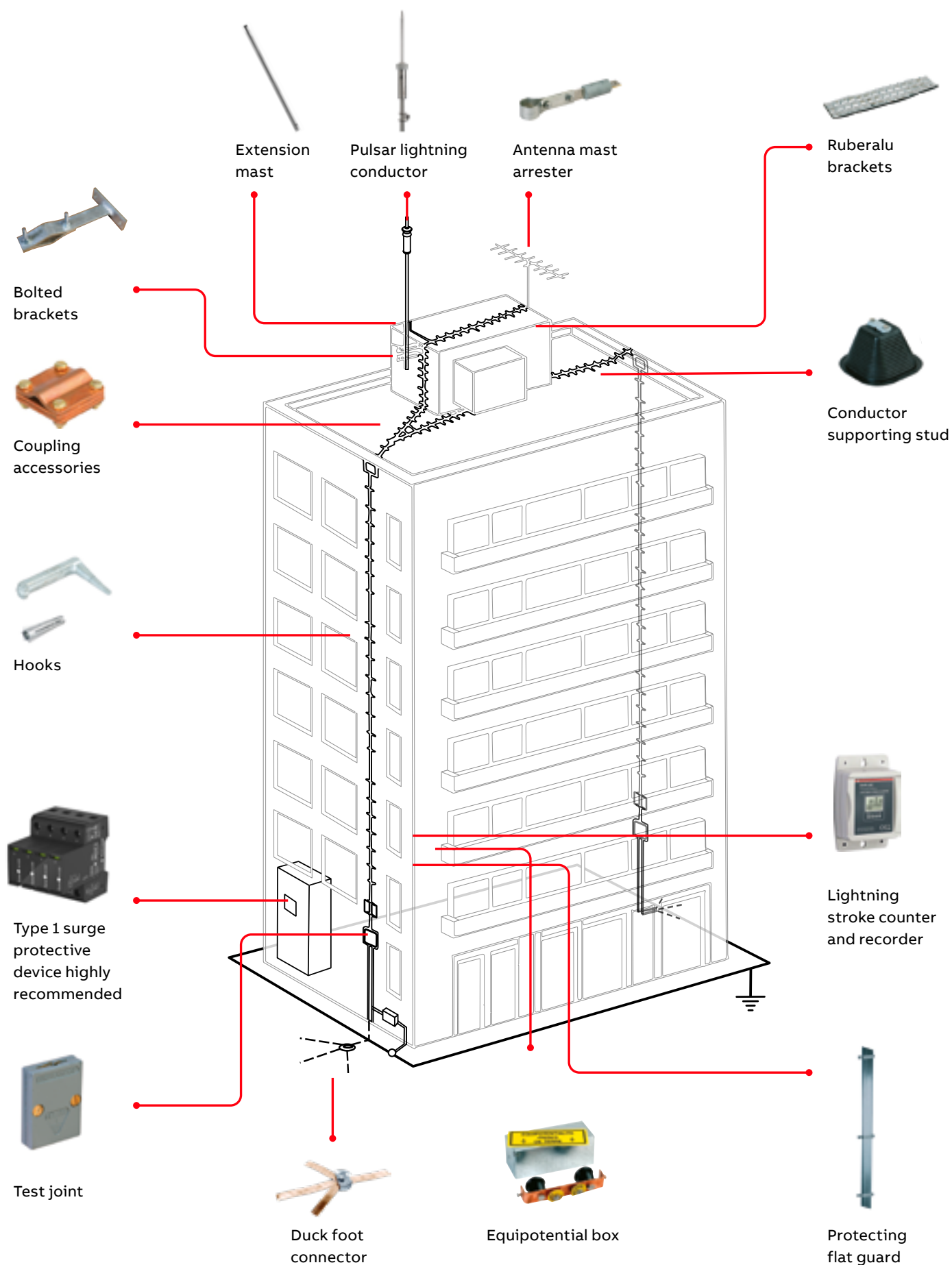
T1+2



T2

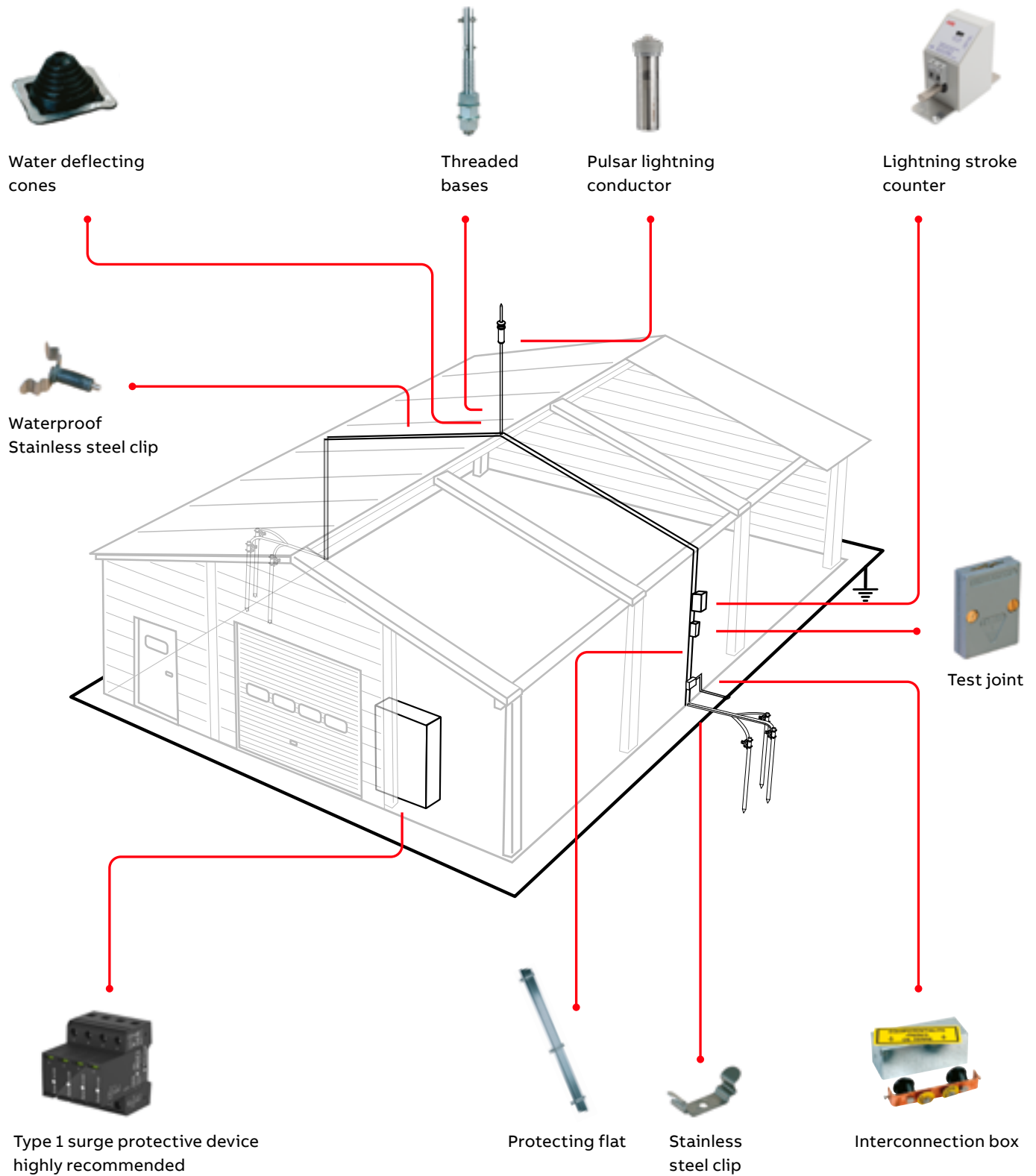
Lightning air terminal range

ESEAT typical installation on masonry building



Lightning air terminal range

ESEAT typical installation on metal cladding



Lightning air terminal range – Early Streamer Emission

Pulsar, the high pulse voltage, initiation advance lightning air terminal

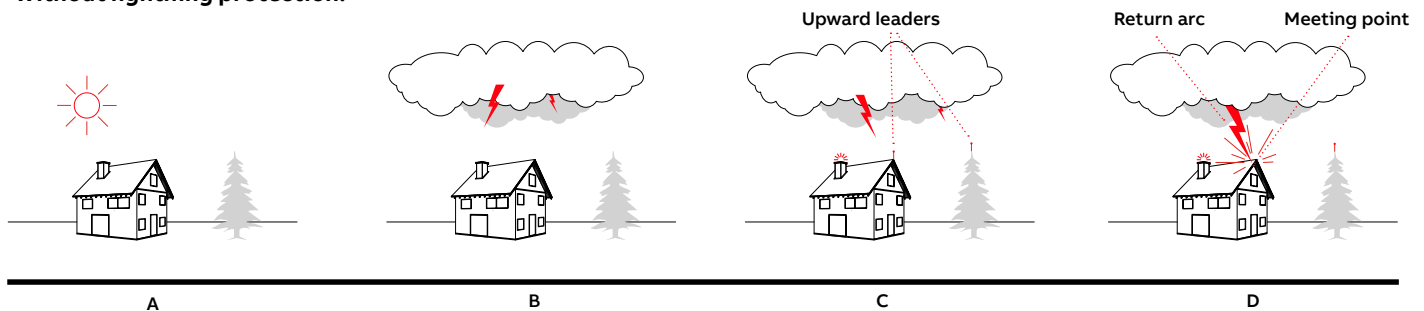
ABB continues to innovate, and has developed a new generation of lightning devices. The new Pulsar range with increased initiation advance performances, represents further progress in terms of protection, operating autonomy and ease of maintenance. These advancements reinforce ABB's position as International leader in direct lightning protection with over 200 000 installations throughout the world.

ABB manufacturing quality

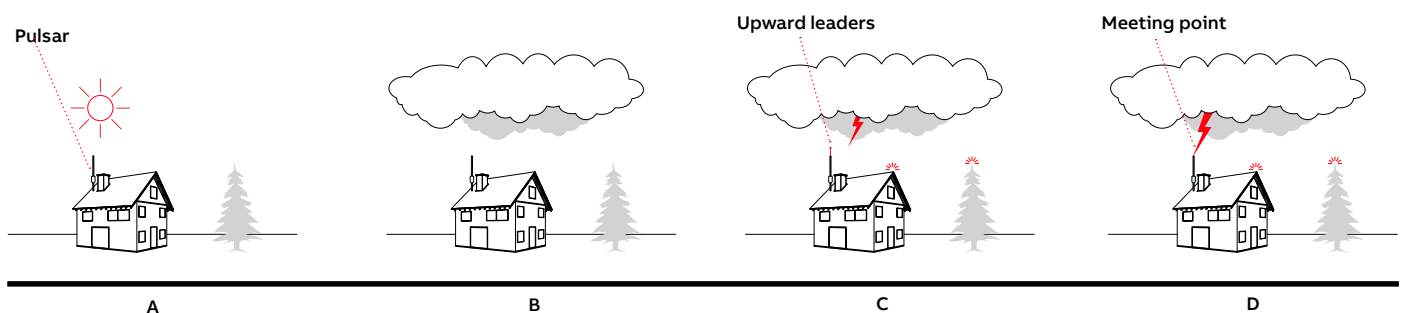
The enviable reputation of the Pulsar has been earned through maintaining a consistently high quality in manufacture. Before leaving the factory, each Pulsar has been tested for installation breakdown at high voltage, and subjected to a current test that ensures its performance when conducting lightning discharges. The high voltage output pulses at the Pulsar are also examined to verify correct amplitude and frequency. The Pulsar is built to withstand the arduous conditions encountered in service, and its ongoing performance can be monitored simply and quickly using the Pulsar test set.



Without lightning protection:



With lightning protection:



The advantage of initiation advance

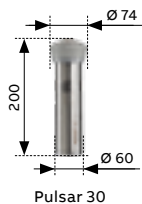
The unique efficiency of the Pulsar lightning air terminal is based on a specific initiation advance, well before the natural formation of an upward leader, the Pulsar generates a leader that rapidly propagates to capture the lightning and direct it to earth. Validated in the laboratory, this gain in time relative to the simple rod provides additional essential protection.

Complete autonomy

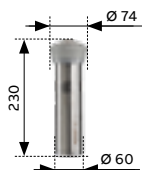
During a storm the ambient electric field may rise to between 10 to 20 kV/m. As soon as the field exceeds a threshold representing the minimum risk of a lightning strike, the Pulsar lightning terminal is activated. It draws its energy from the ambient electric field the energy required to generate high voltage pulses, creating and propagating an upward leader. No other power sources are required, and no radioactive components are used.

Lightning air terminal range

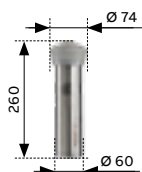
Early Streamer Emission Air Terminal – ESEAT



Pulsar 30



Pulsar 45



Pulsar 60

RodCheck system: visual strike indicator

The aim of the RodCheck system is to give visual information on the intensity of the lightning current caught by the Pulsar even from a long distance.

We need to keep in mind that the lightning rod is a security device that permits to limit risk and therefore contributes to the safety of the people. Indeed a lightning impact may lead to explosion, to fire and consequently be a risk for the people within the structure.

As for any security device, it is important to figure out directly its degree of aging, which is linked to the lightning strike current to which it has been subjected.

On many sites lightning rods are usually equipped with counters that detect the flow of current without necessarily giving information about its intensity.

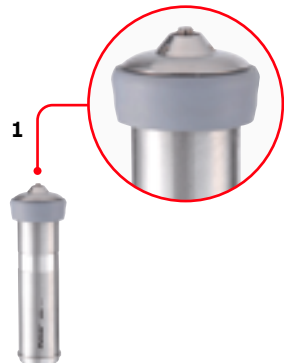
Only a digital counter could give such characteristics, but it would undoubtedly increase the price

of the overall installation.

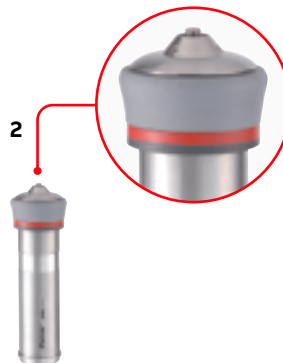
On the other hand, the new edition of the NF C 17-102 also states that from January 2009 it has been compulsory to have two down conductors per ESEAT. Therefore, as the counters are usually placed only on one of the two down conductors, they don't record the entire value of the current. The RodCheck system has been developed so as to solve this specific security issue and it provides an estimate of the intensity of the lightning strike at first glance.

Thanks to the new RodCheck technology, the Pulsar considerably reinforces and improves the security of sites and people and provides the right answer to a perfectly justified question: "Has the lightning rod been deeply hit and is it necessary to check the installation?"

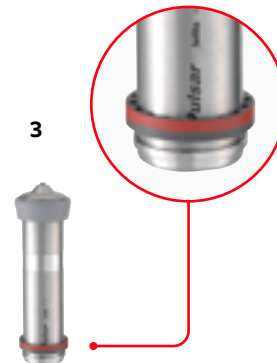
This visual indicator is made of a UV resistant EPDM shell, mounted directly on the Pulsar external spark gap. It is a simple and robust mechanical indicator.



RodCheck has not been hit by a lightning stroke



RodCheck after lightning stroke of few kA



RodCheck after several strokes or one of more than 40 kA

This device allows to ensure the maintenance of the lightning conductor remotely without use active electronic components (batteries, solar cells, radio control transmitters) which are, by definition, with a short life and fragile to overvoltages.

In examples 2 and 3, it is necessary to test the Pulsar to ensure its operation.

During the complete verification of an installation, the visual verification measures of the ESEAT (Red Ring) must be applied:

- If the red ring is visible, the lightning conductor must be electrically checked with the test case and follow the instructions provided in the maintenance manual (if the test is positive, the RodCheck can be put back in place).
- If the red ring is not visible, no action is necessary

Lightning air terminal range

Early Streamer Emission Air Terminal – ESEAT

In order to meet the new requirements of the lightning market in France, the ABB Group has decided to relaunch a test campaign on its range of lightning rods with Pulsar electronic priming device (PDAs). The ABB Group is now one of the only manufacturers to have performed validation testing in a third-party laboratory. The latter make it possible to confirm once again the effectiveness of this lightning rod technology against direct lightning impacts. The Pulsar lightning rods have been tested in accordance with the general tests according to the test procedures and requirements described in Annex C of the NF C 17-102 standard of September 2011. These tests were carried out according to the chronology of the normative flowchart in several laboratories according to their respective competences, including the SIAME laboratory (Pau in France) with regard to the efficacy test. The APAVE organization monitored the progress of all the tests in the various laboratories and can thus attest to full compliance with the standard. These protective devices have therefore undergone general and marking tests, mechanical tests, tests environmental (salt mist and sulphurous atmosphere), electrical impact tests and finally efficiency tests. The entire Pulsar lightning rod range (Pulsar 30 Stainless Steel, Pulsar 45 Stainless Steel, Pulsar 60 Stainless Steel) passed all these tests successfully. These tests are now necessary to meet regulatory requirements but also the quality requirements sought by users of lightning protection devices.

Since 1996, we have generated more than 40 000 sparks using this test procedure in the following high voltage laboratories:

- SIAME Laboratory – PAU UNIVERSITY (France)
- Bazet VHV Laboratory – SEDIVER (France)
- Volta HV Laboratory – MERLIN GERIN (France)
- L.G.E. Les Renardières – ELECTRICITE DE FRANCE
- Bagnères de Bigorre HV Laboratory – LEHTM (France)
- Varennes IREQ Laboratory (Canada)
- Korea Electrotechnology Research Institute – KERI (Korea)
- WHVRI – Wuhan High Voltage Research Institute (China)
- Beijing testing center surge protective devices (China).

The UL certification is an important achievement, particularly in major markets such as the United States and others where customers look to UL listings to validate a company's dedication to extensive testing to back up key product claims. The certification was achieved following a thorough process of evaluation in accordance with the NFC 17-102 standard. Throughout the testing, ABB collaborated closely with UL with tests undertaken at a UL Laboratories facility in New York and ABB's COFRAC certified laboratory in Chassieu, along with work done at the ABB Bagnères and Pau University laboratories. The triggering time ΔT (μs) was measured as the average time gain calculated on 50 discharges at the instant of flashover achieved by the ABB Pulsar ESEAT compared with a single rod air terminal exposed to the same conditions in the laboratory. The UL certification follows more than two decades of rigorous testing that ABB has performed to confirm and improve the ESEAT's efficacy since commercial installations of the system began. These tests are conducted in many high-voltage laboratories able to produce sparks from 2 to 14 meters long and in-situ at our test platform on the Pic du Midi in France. Our testing is further evaluated by third-party companies such as APAVE and UL, in accordance with the test requirements of the NF 17-102 standard, to ensure the high standards of ABB are maintained. The NF 17-102 is the worldwide benchmark for testing the key qualities of early streamer emission lightning protection products.



Procedure for measuring the Early Streamer Emission of an ESE

air terminal according to standard NF C 17-102 appendix C

This test procedure consists in evaluating the triggering time of an Early Streamer Emission (ESEAT) compared with the reference Single Rod Air Terminal (SRAT) in high voltage laboratory conditions. 50 shocks are applied to the single rod air terminal in the first configuration, then to the early streamer emission air terminal in a second configuration.

Simulation of natural conditions

Natural conditions can be simulated in a laboratory by superimposing a permanent field and an impulse field associated with a plate / ground platform area (H). The tested lightning air terminal is placed on the ground, beneath the centre of this platform. In the experiment, the height $H = 6$ m, and the lightning air terminal height $h = 1.5$ m.

Electrical conditions

The permanent field caused by the charge distribution in the cloud is represented by a negative DC voltage of -20 to -25 kV/m (simulating a negative field of around -20 to -25 kV/m) applied to the upper plate. The impulse field caused by the approach of the download leader is simulated with a negative polarity wave applied to the platform. The rise time of the wave T_m is 650 μ s. The wave gradient, at the significant points is around 109 V/m/s.

Geometrical conditions

The volume used for the experiment must be large enough to allow the ascending discharge to develop freely:
distance d between upper platform and tip ≥ 1 m
upper plate diameter $\geq$ distance from upper plate to ground.
The lightning air terminal are tested in sequence in strictly identical geometrical conditions same height, same location, same distance between tip and upper platform.

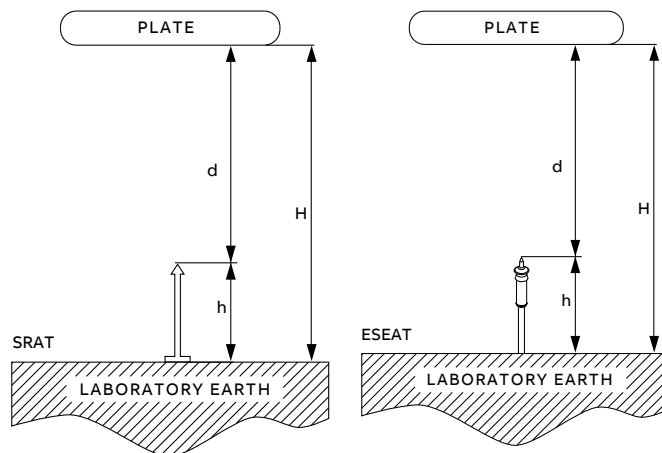
ESE air terminals triggering time calculation

General conditions

- number of shocks: around 50 per configuration (sufficient for an accurate analysis of the leader / leader transition)
- interval between shocks: the same for each configuration equal to 2 min.

Recording

- triggering time (TB): obtained directly by reading the data from the diagnostic equipment. This data is not characteristic, but it does enable a simple reading to establish whether or not a shock can yield a valid result
- light emitted by the leader at the lightning air terminal tip (photomultipliers): this data provides a very accurate detection of the leader continuous propagation instant
- pre-discharge current (coaxial shunt): the resulting curves confirm the previous diagnostic data
- space-time development of the discharge (image converter): the image converter pictures provide a further means of analysing the results.



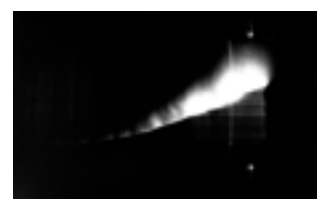
IREQ Laboratory (Canada – 2000)

Other recordings and measurements

- short-circuit current (coaxial shunt)
- time/voltage characteristics for several shocks
- rod to plate distance before and after each configuration
- climatic parameters must be maintain for the 2 configurations :
 - pressure ± 2 %
 - temperature ± 10 %
 - relative humidity ± 20 %.



Triggering picture of a SRAT with a rotative high speed camera.



Triggering picture of an ESEAT with a rotative high speed camera.

Inspection ESEAT maintenance

The current standards NF C 17-102 September 2011 edition recommends regular, periodical inspections of the lightning protection system.

The following schedules are recommended:

Protection level	Visual inspection (year)	Complete inspection (year)	Critical system complete inspection (year)
I and II	1	2	1
III and IV	2	4	1

Note: Critical systems shall be defined by laws or end users.

A lightning protection system should also be inspected whenever the protection structure is modified, repaired or when the structure has been struck by lightning. Lightning strikes can be recorded by a lightning strike counter installed on one of the down conductors.

ESEAT maintenance kit, a unique solution

With its experience of ESEAT development and special testing processes, ABB offers a simple and complete solution: a telescopic 8 m pole supplied with a portable test case to enable simple in situ inspections.

The device can be used without dismantling the ESEAT.

The following aspects of an ESE System installation should be inspected (see NF C 17-102 September 2011 edition paragraph 8)

A visual inspection should be performed to make sure that:

- no damage related to lightning has been noted
- integrity of ESE System has not been modified
- no extension or modification of the protected structure needs the installation of additional lightning protection measures
- the electrical continuity of visible conductors is correct
- all component fasteners and mechanical protectors are in good condition
- no parts have been weakened by corrosion
- the separation distance is respected and there are enough equipotential bondings and their condition is correct
- SPD end of life indicator is correct
- maintenance operations results are checked and recorded

Complete verification includes visual verification and the following measurements to check:

- the electrical continuity of hidden conductors
- the earth termination system resistance values (any variation with regards to initial values > 50 % should be analysed)
- properly working of ESEAT according to manufacturer procedure.



The findings of each scheduled inspection should be recorded in a detailed report stating the required corrective measures.

Any faults identified in a scheduled inspection should be corrected as soon as possible in order to maintain optimal lightning protection.

Initial verification should be performed once the ESE system installation is completed in order to make sure that it complies with the NF C 17-102 standard requirements.

Lightning protection technical study

Pulsar Designer software



Pulsar Designer

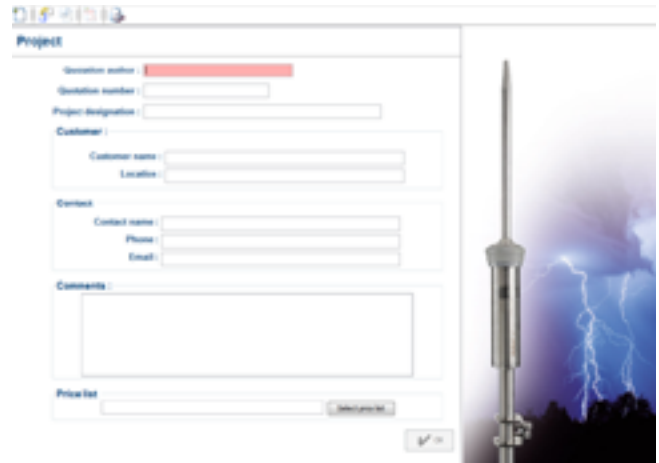


ABB is happy to provide you with a complete new software in the field of lightning protection. With a very simple approach you can create your technical study in one click!

Scan the QR code below to install the application (26 Mb). A shortcut will be automatically added to your desktop to launch the application directly.

Requires operating system or later version: Windows (XP, Vista, Seven) or Apple (OSX) and Java

You can either draw, import file (pictures...) and from that point get a complete bill of material (air terminals, down conductors, fixing accessories and earthing system), the positioning of the lightning protection system on the structure.

The solution is given in a complete pdf file that includes :

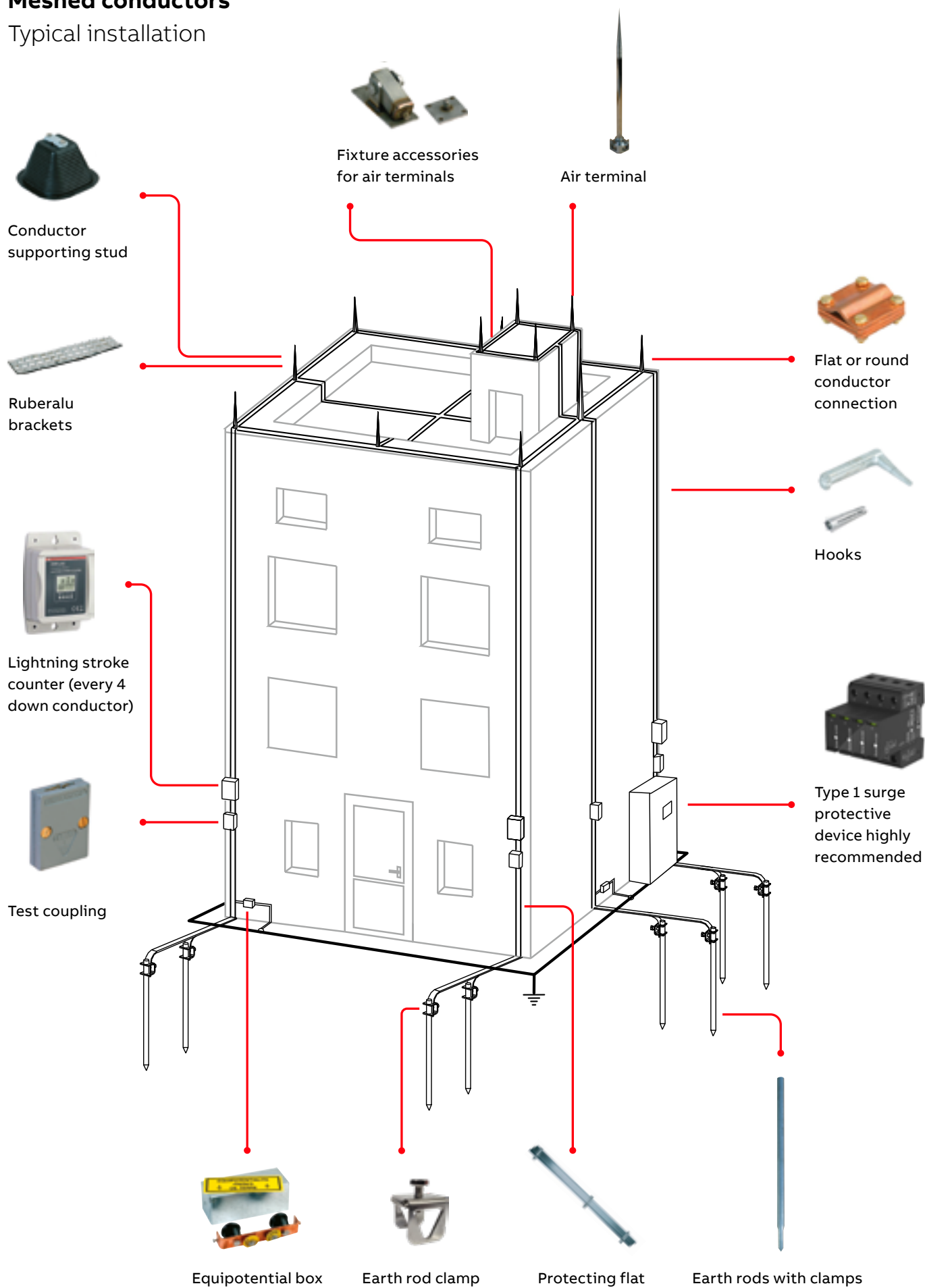
- protected areas
- lightning air terminals positioning
- complete bill of material
- detailed bill of material per building
- catalogue pages for each component
- test certificates

This software is so far available in English, French, Spanish, Russian and Lithuanian version.

You may download Pulsar designer at the following address:
https://www.lowvoltage-tools.abb.com/download/pulsar/Pulsar_installer.exe

Meshed conductors

Typical installation



Down conductors

Overview

Down conductors should preferably be made with tin-plated red copper strips, 30 mm wide and 2 mm thick.

Lightning is a high frequency current that flows along the periphery of the conductors. For a like cross-section, a flat conductor has a greater periphery.

An exception to the above rule is buildings with aluminium cladding on which a copper down conductor might generate an electrolytic coupling phenomenon.

Here a 30 x 3 mm aluminium strip should be used or bimetal connection.

In some cases where it is impossible to fix the copper strip, a round Ø 8 mm tin-plated copper conductor can be used. In the case where there is a need of mechanical movement of the down conductor use a 30 x 3 mm flexible tin-platted copper braid.

Path

The path should be planned to take account of the location of the earth termination. The path should be as straight and short as possible avoiding any sharp bends or upturns. Curvature radii should be no less than 20 cm. To divert the down conductor laterally, 30 x 2 mm tin-plated red copper pre-formed bends should be used.

The down conductor path should be chosen to avoid intersection and to be routed along electrical ducts. Shielding the electrical ducts 1 m on each side can be done when it is impossible to avoid crossing them. However when cross-overs cannot be avoided, the conduit should be protected inside metal sheeting extending by 1 m on either side of the crossover. This metal sheeting should be connected to the down conductor.

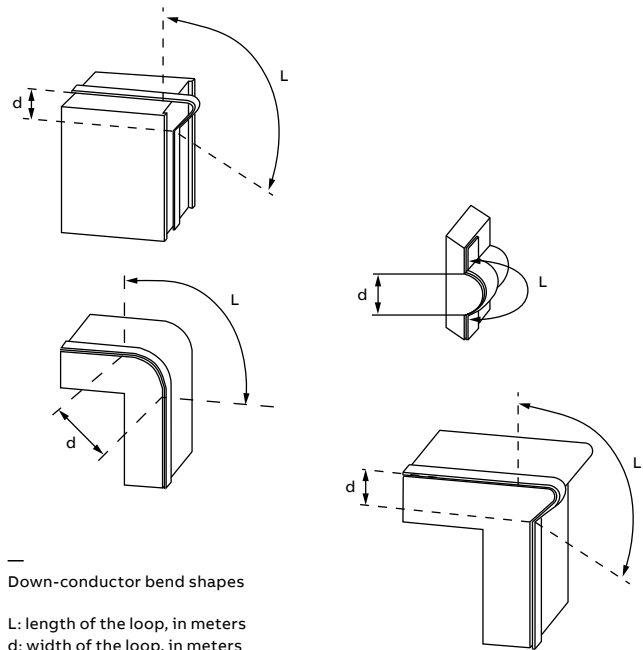
However, in exceptional cases where an outside down conductor cannot be installed, the conductor may run down through a service duct, provided that this is used for no other purpose (and subject to agreement with the safety services and inspection organizations).

When a building is fitted with a metallic external cladding or stone facing or in glass, or in the case of a fixed covering part of the facade, the down conductor can be installed on the concrete facade or on the main structure, under the cladding. In this case, the conductive parts of the cladding must be connected to the down conductor at the top and at the bottom.

The down conductor, if not a copper one, shall be located at more than 10 cm behind inflammable material of the outside cladding if its cross section area is lower than 100 mm². For cross section area of 100 mm² or greater, there is no need to keep a distance between the down conductor and the inflammable material.

A specific calculation of the temperature increase may be performed to validate a different rule.

The same requirements apply also to all inflammable material even on the roof (e.g. thatched roof).



The risk of any dielectric breakdown is avoided if the condition $d > L/20$ is fulfilled.

Indoor routing

When a down conductor cannot be installed outside the structure, it can be fitted inside on a part or on the full height of the structure. In this case, the down conductor must be placed inside a dedicated non flammable and insulating duct.

The separation distance shall be calculated also for indoor down conductors in order to be able to determine the necessary insulation level of the dedicated duct.

The building operator has to be aware of the resulting difficulties to check and maintain the down conductors, and of the resulting risks of over voltages inside the building. Access of people to the specific cable channel should be avoided in stormy periods or measures of protection as per outdoor down conductors should be fulfilled (see Annex D NF C 17-102 Vers September 2011) including equipotential bondings of floors with the down conductor.

Down conductors

Parapet walls

When the face of the parapet wall is less than or equal to 40 cm, an upward section in the down conductor is allowed with a maximum slope of no more than 45°. For parapet walls with an upward section of more than 40 cm, space should be allowed or a hole drilled to accommodate a 50 mm minimum diameter sheath and thereby avoid bypassing. If this is not possible, supports of the same height as the parapet wall should be installed to avoid an upturn.

Connection

The lightning air terminal is connected to the down conductor by a connecting clamp that must be tightly secured on to the mast. The strip will be secured along the extension masts by stainless steel clamps. The conductors can be connected together by coupling strips.

Fasteners

Whatever the supporting medium the down conductor must be secured by at least 3 fasteners per linear meter. Insulators are used to distance the conductors and prevent contact with easily flammable material (thatch or wood, for example).

The fastener must be appropriate for the structure material and installed so as not to impair watertightness and allow the conductor thermal extension.

Test joint

Each down conductor must be fitted with a test joint or connection link to enable measurement of the resistance of the lightning earth system alone and the electrical continuity of the down conductor.

The test coupling is usually placed about 2 m above ground level to make it accessible for inspection purposes only. To be compliant with standards, the test joint should be identified by the words "lightning air terminal" and the "earth" symbol.

On metal pylons, framework or cladding, the test joint should be placed on the ground in inspection earth pit about 1 m from the foot of the metal wall to avoid distorting the resistance measurement of the earth connection by inevitably measuring the electrical resistance on the other metallic networks in the building.

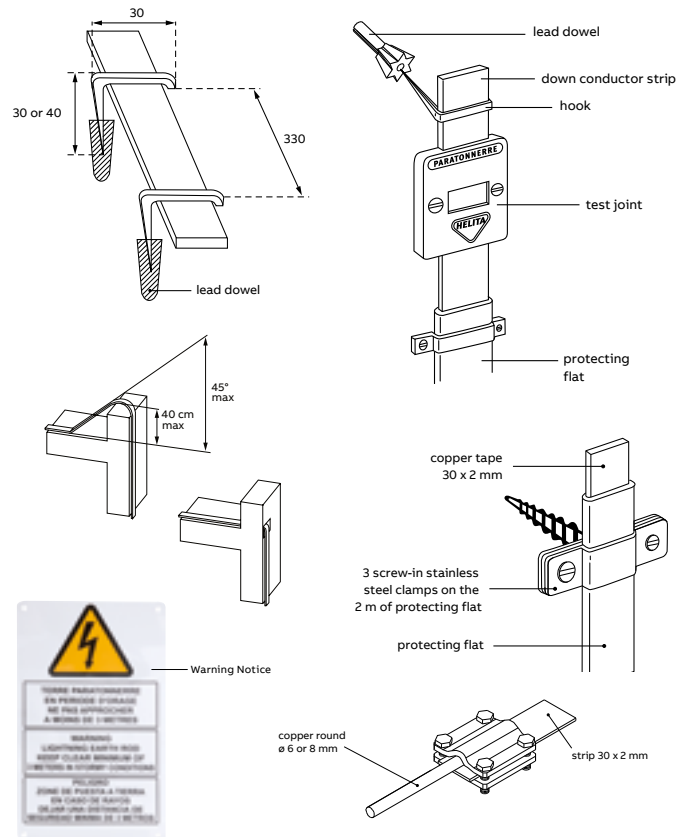
Protecting flat

Between the test joint and the ground, the strip is protected by a 2 m galvanized or stainless steel sheet metal flat fixed by 3 clamps supplied with the guard.

The protecting guard can be bent to follow the profile guard of the building.

Warning Notice: Protection measures against step and touch voltages

In certain conditions, the vicinity of the down-conductors of an ESE System, outside the structure, may be hazardous to life even if the ESE System has been designed and con-



structed according to the above-mentioned requirements. The hazard is reduced to a tolerable level if one of the following conditions is fulfilled:

The probability of persons approaching, or the duration of their presence outside the structure and close to the down-conductors, is very low. The natural down-conductor system consists of typically more than ten columns of the extensive metal framework of the structure or of several pillars of interconnected steel of the structure, with the electrical continuity assured;

The contact resistance of the surface layer of the soil, within 3 m of the down-conductor, is not less than 100 kΩ.

NOTE: A layer of insulating material, e.g. asphalt, of 5 cm thickness (or a layer of gravel 15 cm thick) generally reduces the hazard to a tolerable level. If none of these conditions is fulfilled, protection measures shall be adopted against injury to living beings due to touch voltages as follows:

- insulation of the exposed down-conductor is provided giving a 100 kV, 1.2/50 μs impulse withstand voltage, e.g. at least 3 mm cross-linked polyethylene
- physical restrictions and/or warning notices to minimize the probability of down-conductors being touched.

We propose in our catalogue Warning Notice (2CTH0PSH2009) to prevent touch voltage.

Down conductors

Lightning stroke counter

When the regulations require the installation of a lightning stroke counter, or to know when to make a complete verification of the installation after a lightning stroke. One per ESEAT or SRAT should be fitted. Regarding mesh cage installation one every 4 down conductor should be installed. The test joint around 2 m above the ground. The counter is connected in serial on the down conductor.

Lightning stroke counter and recorder is used to store date and time of the impact as well as lightning current values.



Meshed conductors

On roof

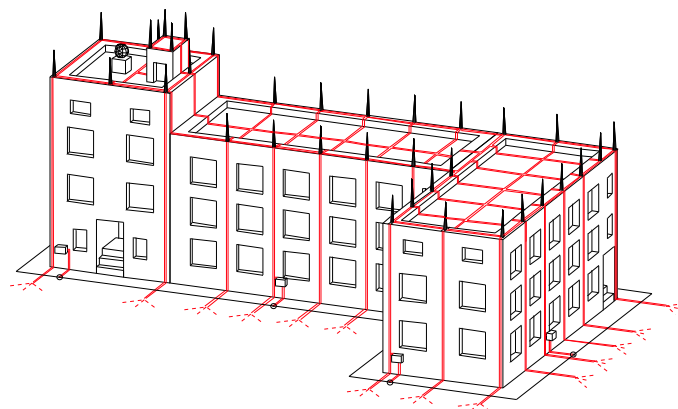
Is carried on the roof meshes with conductors of which the width depends on the level of protection and those ones must not be greater than 20 m as follows:

It is primarily a closed polygon whose perimeter is adjacent the periphery of the roof, this polygon is then complete by transverse conductors to satisfy the condition on the maximum width of the meshes. If there is a ridge, the conductor must follow it.

Air terminals are placed vertically at the highest and most vulnerable points on the buildings (roof ridges, salient points, edges, corners, etc.).

They are arranged at regular intervals around the periphery of the roof as follows:

- the distance between two 30 cm air terminals should not exceed 15 m
- the distance between two 50 cm air terminals should not exceed 20 m
- strike air terminals not located on the outer polygon are connected to the polygon as follows:
- either by a conductor excluding any upturn if the air terminals is less than 5 m from the polygon
- or by two conductors in opposite directions forming a transversal section if the air terminals is located more than 5 m from the polygon.



On wall

The down conductors are placed on the corners and salient features of the building in a layout that should be as symmetrical and regular as possible.

The average distance between two adjacent down conductors depends on the required protection level.

Level protection (NF IEC EN 62305-1)	Distance between 2 down conductors (NF IEC EN 62305-3)	Roof mesh size (NF IEC EN 62305-3)
I	10 m	5 x 5
II	10 m	10 x 10
III	15 m	15 x 15
IV	20 m	20 x 20

Equipotential bonding

Overview

When lightning current flows through a conductor, differences in potential appear between the conductor and nearby metallic networks (steel framework, pipes, etc.) inside or outside the building. Dangerous sparks may be produced between the two ends of the resulting open loop. There are two ways to avoid this problem:

- Establish an interconnection providing an equipotential bond between the conductor and the metallic networks
- Allow a separation distance between the conductor and the metallic networks.

The separation distance is the distance beyond which no dangerous sparks can be produced between the down conductor carrying the lightning current and nearby metallic networks.

Because it is often difficult to guarantee that the lightning protection system is sufficiently isolated during installation or will remain so in the event of structural changes, on-site work, etc., equipotential bonding is often preferred. There are, however, some cases in which equipotential bonding is not used (e.g. when there are flammable or explosive piping networks). In this case, the down conductors are routed beyond the separation distance "s".

Separation distance calculation

$$S \text{ (m)} = k_i \cdot k_c \cdot L \text{ km}$$

where:

"kc" is a coefficient determined by the number of down conductors per ESEAT:

- $k_c = 1$ for one down conductor,
- $k_c = 0.75$ for two down conductors,
- $k_c = 0.6$ for three conductors,
- $k_c = 0.41$ for four or more conductors.

"ki" is determined by the required protection level:

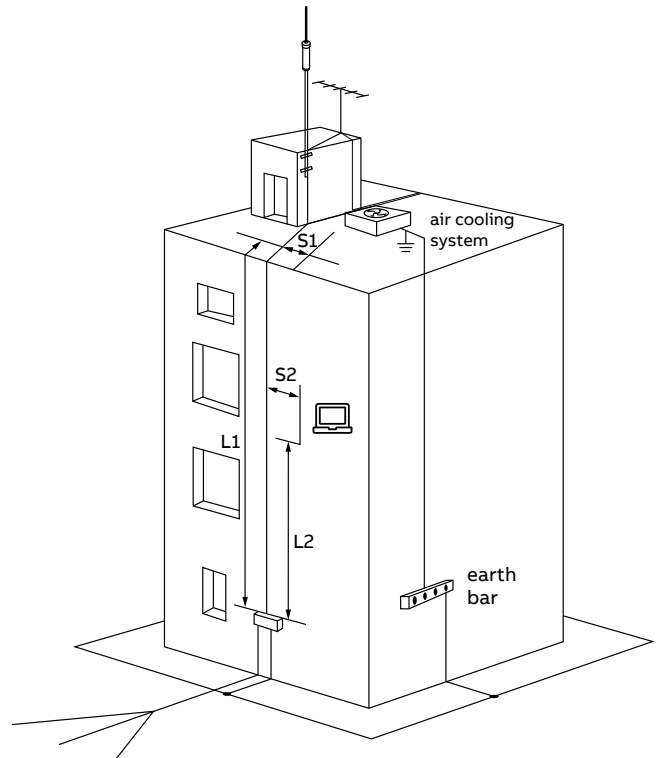
$k_i = 0.08$ for protection level 1 (high protection), for very exposed or strategic buildings

- $k_i = 0.06$ for protection level 2 (reinforced protection, exposed building)
- $k_i = 0.04$ for protection level 3 & 4 (standard protection)

"km" is related to the material situated between the two loop ends:

- $k_m = 1$ for air
- $k_m = 0.5$ for a solid material other than metal

"L" is the length between the point at which proximity is measured and the point at which the metallic network is earthed or the nearest equipotential bonding point.



Example

An ESEAT with two down conductors protects a 20 m high building with protection level I.

Question 1: Should an air conditioning extractor located on the roof be interconnected if 3 m away from the down conductor? Length $L_1 = 25$ m.

Answer 1: $S_1 = 0.08 \times 0.75 \times 25 / 1 = 1.5 \text{ m}$

Since the distance (3 m) between the conductor and the air-conditioning system is greater than the separation distance (1.5 meters), there is no need to interconnect this extractor.

Question 2: Should the computer located in the building 3 m away from the down conductor be interconnected with the conductor, where $L_2 = 10$ m?

Answer 2: $S_2 = 0.08 \times 0.75 \times 10 / 0.5 = 1.2 \text{ m}$

Since the distance between the computer and the down conductor (3 m) is greater than the separation distance (1.2 m), there is no need to interconnect this computer.

A tool is available that can be used to quickly calculate the separation distances.

Equipotential bonding

Equipotential bonding of external metallic networks

The equipotential bonding of external metallic networks is an integral part of the outdoor lightning protection installation just like the down conductors and their earths. All conductive metallic networks located at a distance of less than (separation distance) from a conductor should be connected to the conductor by a conductive material with a like cross-section.

The aerial masts and small posts supporting electrical power lines should be connected to the conductor via a mast arrester. Earthing systems embedded in walls should be connected to the conductor if terminal connections have been provided.

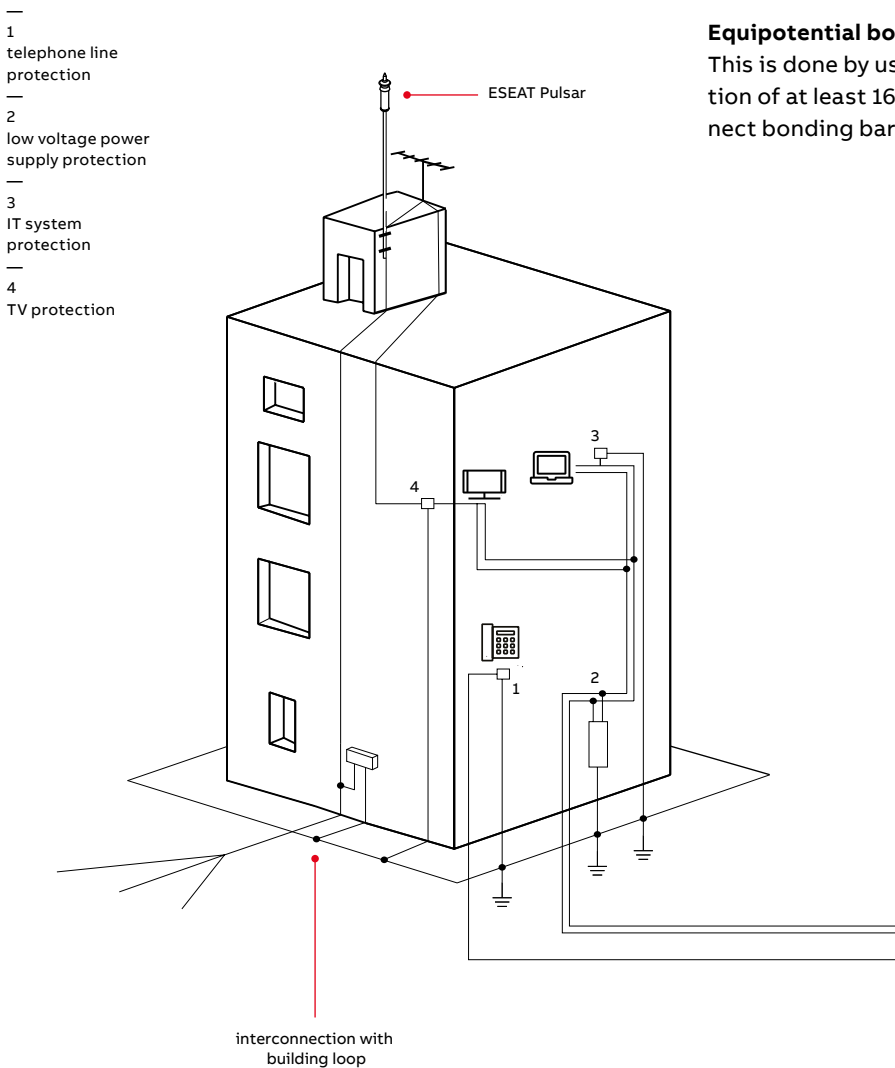
Equipotential bonding of internal metallic networks

The equipotential bonding of internal metallic networks is an integral part of the indoor lightning protection installation. All conductive metallic networks in the structure (steel frameworks, ducts, sheathing, electrical raceways or telecommunication cable trays, etc.) should be connected to the conductor. This is done by using a conductive material with a cross-section of at least 6 mm^2 for copper or 16 mm^2 for steel to connect to equipotential bonding bars installed inside the structure and connected in turn to the closest point of the earthing circuit.

Unscreened telecommunication or electrical conductors should be bonded to the lightning protection system via surge arresters.

Equipotential bonding of earths

This is done by using a conductive material with a cross-section of at least 16 mm^2 for copper or 50 mm^2 for steel to connect bonding bar to earth termination system.



Earth termination systems

Overview

Each down conductor in a lightning protection system must be connected to an earth termination system which fulfils four conditions:

- **The earth termination resistance value**

International standards stipulate an earth termination resistance value of less than 10 ohms. This value should be measured on the earth connection isolated from any other conductive component. If the resistance value of 10 ohms cannot be achieved, the earth termination is nonetheless considered compliant if it is made up of at least 160 m (protection level 1) or 100 m (protection level 2, 3 & 4) of conductors or electrodes, each section measuring no more than 20 m.

- **Current carrying capacity**

This is an often overlooked but essential aspect of lightning conduction. To minimise the earthing system impedance value, a parallel configuration of three electrodes is strongly recommended instead of just one excessively long electrode.

- **Equipotential bonding**

Standards require the equipotential bonding of lightning earth termination systems with the existing earthing systems. This must be done using 16 mm² (copper) or 50 mm² (steel) minimum cross section conductor.

- **Distance from buried utilities**

Earth termination should be at least 2 m (if soil resistivity is over 500 ohms/m 5 m) distant from any buried metal pipe or electrical conduit, not connected to the main equipotential bonding of the structure.

Inspection earth pit

The connection parts of an earth termination system (duck's foot connector, earth rod, test joint) can be accessed in an inspection earth pit.

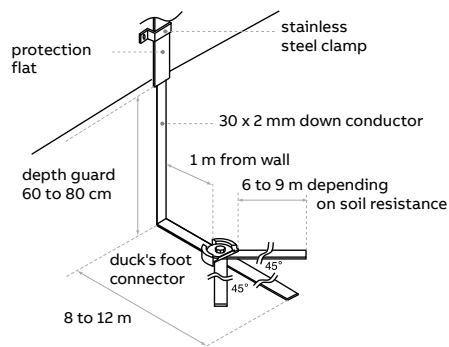
Lightning air terminals

- **Ducks foot connector**

The minimum earth termination system is made up of 25 m of 30 x 2 mm tin-plated copper strip, split into 3 strands buried in 3 trenches at a depth of 60 to 80 cm dug in a fan shape like a duck's foot: one end of the longest strand is connected to the test joint, the two other strands being linked to a special connection known as a duck foot's connector.

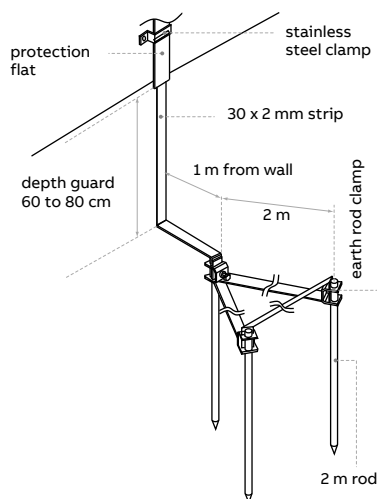
- **Earth rods**

When the site topography does not lend itself to the installation of a duck's foot as described above, an earth termination system can be developed using at least 3 copper earth rods each with a minimum length of 2 m, buried vertically in the ground; the rods should be spaced at intervals of about 2 m and at a mandatory distance of 1 m to 1.5 m from the foundations.



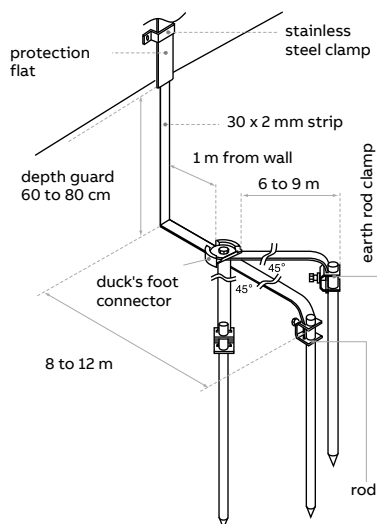
Duck's foot earth termination system

It is recommended to cover the earth termination system with a red or orange warning plastic mesh.



Rod triangle earth termination system

It is recommended to cover the earth termination system with a red or orange warning plastic mesh.



Duck's foot earth termination system with earth rods

It is recommended to cover the earth termination system with a red or orange warning plastic mesh.

Earth termination systems

Combined

If the soil type is not altogether suitable for a duck's foot connector, a combination of duck's foot and earth rods will significantly enhance protection (better earth resistance). In this case, the end of each duck foot connector strand is connected to an earth rod.

Meshed conductors

Duck's foot connector

The earth connection is made up of 3 conductors each 3 m minimum in length, buried horizontally at a depth of 60 to 80 cm. One of the strips is connected to one end of the test joint; the other two splay out at an angle of 45° on either side of this central strand and are coupled to it with a special connector known as a duck's foot connector. The resistance value must be less than 10 ohms. If the resistance value of 10 ohms cannot be achieved, the earth termination is nonetheless considered compliant if it is made up of at least 160 m of electrode in level 1, 100 m in level 2 and 10 m in level 3 & 4.

Earth rods

The earth connection is made up of 2 spiked vertical rods at least 2 m in length, connected to each other and to the down conductor, and at least 2 m from each other. The rods should be 1 m to 1.5 m from the foundations. The earth termination systems in a building should be connected together with a conductor with the same cross-section and of the same type as the down conductors. Where there is an existing entrenched earth protection loop in the foundations for the building's 2 m flat electrical installations, there is no need to create a new loop: the earth terminations can simply 0.6 m be interconnected by a tin-plated 30 x 2 mm copper strip. The resistance value must be less than 10 ohms. If the resistance value of 10 ohms cannot be achieved, the earth termination is nonetheless considered compliant if it is made up of at least 160 m (80 m if vertical rods) of electrode in level 1, 100 m (50 m if vertical rods) in level 2 and 10 m (5 m if vertical rods) in level 3 & 4.

Earthing system equipotential bonding

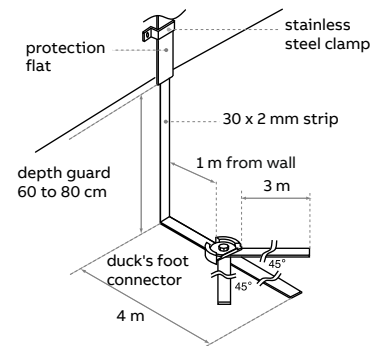
When the protected building or area has an existing earth termination system for the electrical installations, the lightning earth termination systems should be connected to it.

This interconnection should be made to the earthing circuit at the closest point to the down conductor.

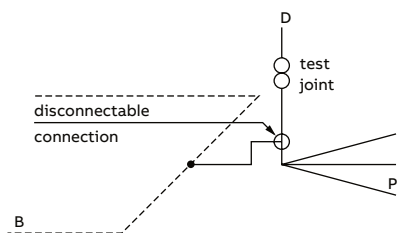
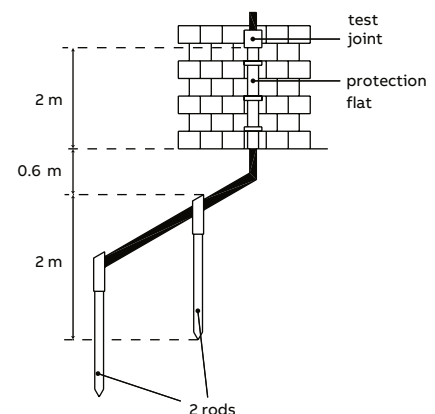
When this is impossible in an existing building, the interconnection should be made to the earth plate. In this case, the interconnecting conductor should be constructed such that no currents are induced in nearby equipment cables.

In all cases, the interconnection should include a device that can be disconnected to enable measurements of the resistance of the lightning earth termination system.

This device can be made up of either an interconnection box for equipotential bonding fixed to the main wall of the building, or an equipotential bonding bar located in an inspection earth pit.



Duck's foot system for a meshed cage
It is recommended to cover the earth termination system with a red or orange warning plastic mesh.



D: down conductor of a lightning air terminal
B: entrenched building loop
P: lightning conductor ear th termination system

Product guide

Early Streamer Emission Air Terminal – ESEAT



Typical applications

Industrial sites, buildings, warehouses, where a large protection area is needed.

Pulsar

Description	ΔT	Type	Order code	EAN code	Pkg qty	Weight kg
Pulsar 30	30	B752135	2CTH030002R0000	3660308521354	1	3,3
Pulsar 45	45	B752136	2CTH030003R0000	3660308521361	1	3,6
Pulsar 60	60	B752137	2CTH030004R0000	3660308521378	1	3,7

Stainless steel 304 L

Mast to be ordered separately.

Maximum operating temperature: 120 °C.

Masts

Description	Height m	Type	Order code	EAN code	Pkg qty	Weight (1 pce) kg
1.3m SS ESEAT MAST D.30mm	1.3	B752165	2CTH070001R0000	3660308521651	1	1.92
2.3m SS ESEAT MAST D.30mm	2.3	B752166	2CTH070002R0000	3660308521668	1	3.16
3 m SS ESEAT MAST DIAM.35mm	3.0	B752175	2CTH070011R0000	3660308521750	1	4.69

To be noted that the mast 2CTH070011R0000 needs to be ordered with its screw and fixing kit KFP0035 made of a connecting clamp especially designed for Ø 35 mm mast.

Kit for mast 2CTH070011R0000

Description	Type	Order code	EAN code	Pkg qty	Weight (1 pce) kg
SCREW KIT FOR THREADED SS MAST D.35mm	B752178	2CTH050027R0000	3660308521781	1	0.14

Pulsar radius of protection

Level of protection	I (D = 20 m)			II (D = 30 m)			III (D = 45 m)			IV (D = 60 m)		
Type	Pulsar 30	Pulsar 45	Pulsar 60	Pulsar 30	Pulsar 45	Pulsar 60	Pulsar 30	Pulsar 45	Pulsar 60	Pulsar 30	Pulsar 45	Pulsar 60
h (m)	Radius of protection Rp (m)											
2	19	25	31	22	28	35	25	32	39	28	36	43
3	29	38	47	33	42	52	38	48	58	43	54	64
4	38	51	63	44	57	69	51	64	78	57	72	85
5	48	63	79	55	71	86	63	81	97	71	89	107
6	48	63	79	55	71	87	64	81	97	72	90	107
8	49	64	79	56	72	87	65	82	98	73	91	108
10	49	64	79	57	72	88	66	83	99	75	92	109
15	50	65	80	58	73	89	69	85	101	78	95	111
20	50	65	80	59	74	89	71	86	102	81	97	113
45	43	60	76	58	73	89	75	90	105	89	104	119
50	40	58	74	57	72	88	75	90	105	89	105	120
55	36	55	72	55	71	86	74	89	105	90	105	120
60	30	51	69	52	69	85	73	89	104	90	105	120

Note: the optimized radius of protection is reached when placing the ESE lightning conductor at 5 m above the highest point of the structure to protect. A minimum of 2 m is a must.

Calculating protected areas

The radius of protection R_p of an Pulsar is given by French standard NF C 17-102 (September 2011 edition).

It depends on the ESEAT efficiency ΔT of the Pulsar measured in the high voltage laboratory, on the levels of protection I, II, III or IV calculated according to the lightning risk assessment guides or standards (NF C 17-102 annex A or IEC 62305-2, guides UTE C 17-100-2 or UTE C 17-108) and on the height h of the lightning air terminal over the area to be protected (minimum height = 2 m).

The protection radius is calculated according to Annex C in French standard NF C 17-102. For Pulsar 60, limiting the value of ΔT used in the protection radius calculations to 60 μs (limited 60 μs in accordance with the paragraph 5.2.2 of the NF C 17-102 standard).

$R_p(h)$: Protection radius at a given height (h) for $h \geq 5$ m

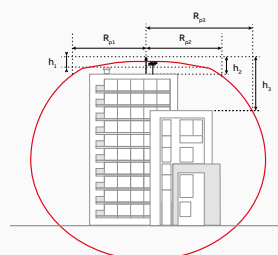
$$R_p(h) = \sqrt{2rh - h^2 + \Delta(2r + \Delta)}$$

For $h < 5$ m, refer to the table above

h : Height of the Pulsar tip above the surface(s) to be protected

$r(m)$: Standardized striking distance

$\Delta(m)$ = 106 $\cdot \Delta T$ (Pulsar efficiency)



Product guide

Single Rod Air Terminal – SRAT

Applications typiques

Small structure, pylons, chimney.

Description

The rods are made of a typical solid stainless steel tip ($L = 0.20$ m), a stainless steel mast of 1 or 2 m length, to be ordered separately. In accordance with standard IEC 62305-3 (paragraph 5.2.2), the protection radii are as follows:

Radius of protection R_p (m)

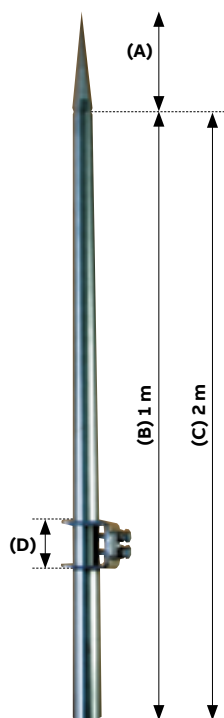
H m	Level of protection			
	I (D = 20 m)	II (D = 30 m)	III (D = 45 m)	IV (D = 60 m)
2	5	6	9	11
4	8	10	12	15
6	10	12	15	20
8	10	13	17	21
10	10	14	17	22
20	10	15	21	29

H: height of conductor tip above protected surface(s).

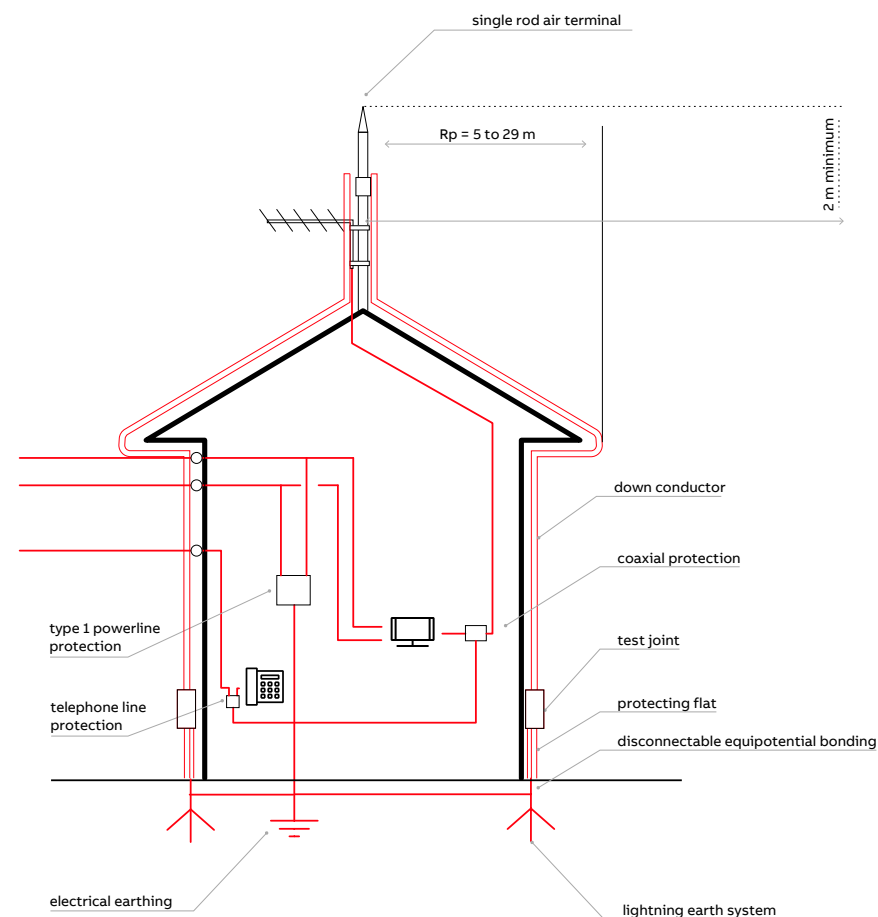
R_p : radius of protection in horizontal plane located at a vertical distance h from the conductor tip.

Single rod air terminal

Description	Length m	Type	Order code	EAN code	Pkg qty	Weight (1 pce) kg
SS TIP (A) & CONNECTION CLAMP (D)	0.2	B752182	2CTH010004R0000	3660308521828	2.500	1.00
1M SS AIR TERMINATION MAST (Ø 30mm) (B)	1	B752131	2CTH010001R0000	3660308521316	2.000	1.47
2M SS AIR TERMINATION MAST (Ø 30mm) (C)	2	B752132	2CTH010002R0000	3660308521323	3.500	2.57



Protection of individual houses



Product guide

Accessories



Air terminal

Meshed cage air terminals are designed for easy, rapid installation on a wide range of structures.

They are made up of:

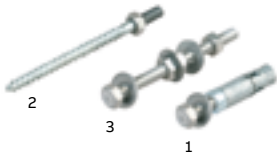
- a cylindrical (Ø 18 mm) bright nickel-plated copper cylinder tapered at the top and with a threaded lower section
- a bright tapped nickel-plated brass base M 10 for the connection and intersection of flat or round conductors. They are adaptable to all fixtures shown below.

Description	Length	Type	Order code	EAN code	Pkg qty	Weight (1 pce)
m	m					kg
AIR TERMINAL 0.5M	0.50	H0HPC5000	2CTH0HPC5000	3660308522603		1.43

Fixture accessories for air terminals

Vertical mounting

- Material: tin-plated or galvanized steel.



Description	Length	Hole Ø	Type	Order code	EAN code	Pkg qty	Weight (1 pce)
	mm	mm					kg
1 – Expansion bolt	50 x 50		H0SSH5001	2CTHSSH5001	–		0.120
2 – SCREW-IN FIXING FOR CAGE ROD	120 x 50		H0CSTH5002	2CTHCSTH5002	3660308524423		0.06
3 – S/Steel threaded base	250 x 120		H0EFH5003	2CTH0EFH5003	3660308522184		0.100

Supporting plates

- Material: stainless steel
- Fixing: 2x Ø 10 mm bolt holes (centerline distance 93 mm).



Description	Length x width	Type	Order code	EAN code	Pkg qty	Weight (1 pce)
	mm					kg
1 – ROD FIXING 50x50MM	50 x 50	H0PSH5002	2CTH0PSH5002	3660308522795		0.08
1 – ROD FIXING 120x50mm	120 x 50	H0PSH5004	2CTH0SOH5004	3660308522801		0.20
2 – SUPPORTING SWIVELLING PLATE	120 x 50	H0SOH5006	2CTH0SOH5006	3660308522863		0.47
3 – ROOF RIDGE PLATE	250 x 120	H0PFH5000	2CTH0PFH5000	3660308522733		0.39

Adaptor sleeve

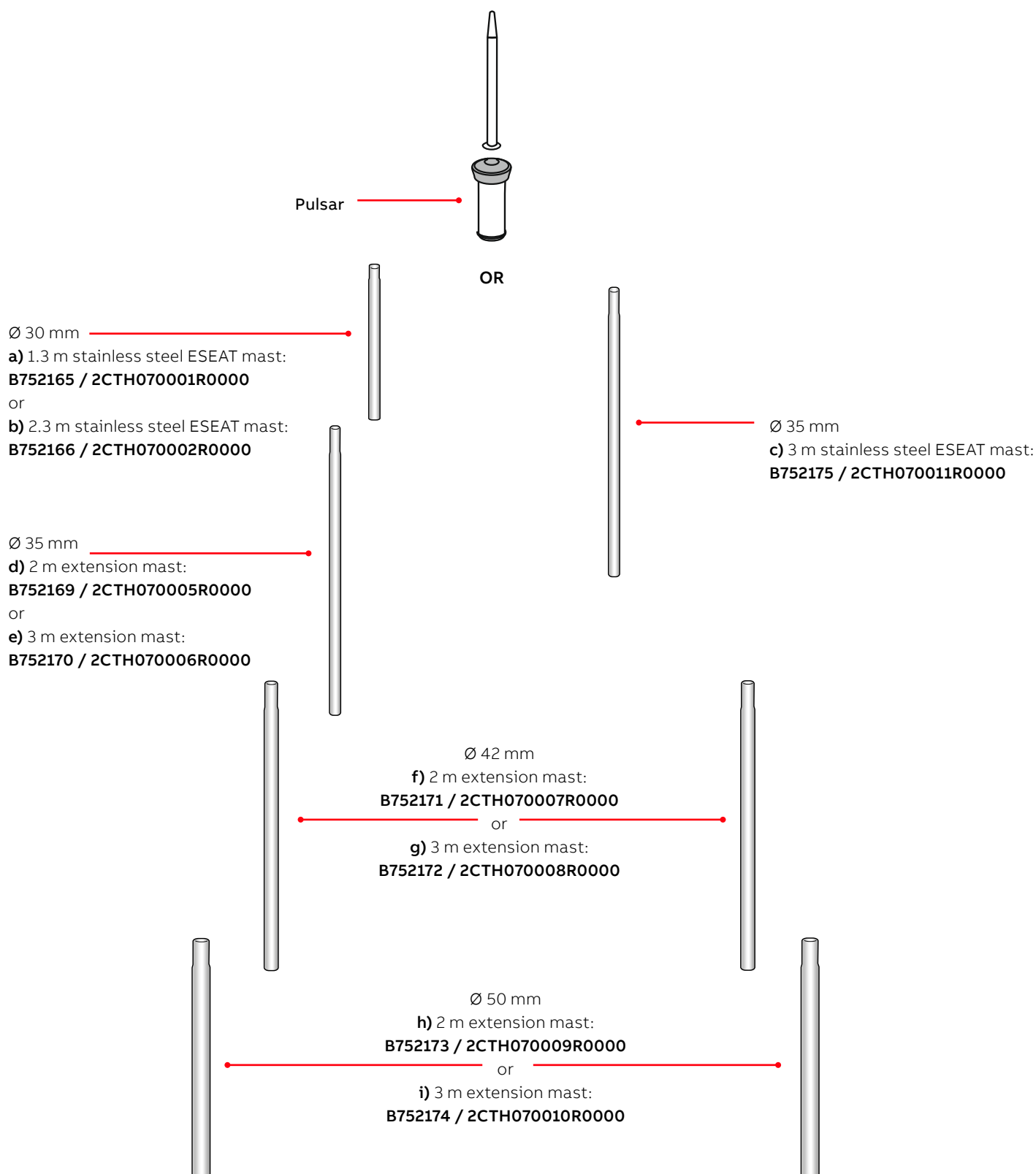
- Use: to fix air terminals to existing supports (max. Ø 50 mm)
- Material: stainless steel.



Description	Max. tightening length L	Type	Order code	EAN code	Pkg qty	Weight (1 pce)
	mm					kg
MAST SLEEVE ADAPTOR FOR CAGE ROD	100	H0HMA5010	2CTH0HMA5010	3660308522566	1	0.59

Lightning air terminal range

Extension masts – installation



Important: All these extension need to be ordered with their screw and fixing kits
 2CTH050026R0000 / B752177 or 2CTH050028R0000 / B752178 (see next page)

Product guide

Masts and extension masts



Extension masts

Description

All the extension masts have to be ordered with their screw kits.

Description	Type	Order code	EAN code	Pkg qty	Weight (1 pce) kg
Extension masts					
2M SS MAST DIAM.35mm	B752169	2CTH070005R0000	3660308521699	1	3.40
3M SS MAST DIAM.35mm	B752170	2CTH070006R0000	3660308521705	1	4.58
2M SS MAST DIAM.42mm	B752171	2CTH070007R0000	3660308521712	1	5.79
3M SS MAST DIAM.42mm	B752172	2CTH070008R0000	3660308521729	1	8.65
2M SS MAST DIAM.50mm	B752173	2CTH070009R0000	3660308521736	1	6.54
3M SS MAST DIAM.50mm	B752174	2CTH070010R0000	3660308521743	1	9.93
Screw and fixing kit					
SCREW KIT FOR SS MAST DIAM.35/42mm (1)	B752177	2CTH050026R0000	3660308521774	1	0.27
SCREW KIT FOR SS MAST DIAM.50mm (2)	B752179	2CTH050028R0000	3660308521798	1	0.38

(1) 5 collars, 4 nuts and bolts.

(2) 6 collars, 2 nuts and bolts.

Selection guide

Mast configuration without guying kit for a wind.

Ordering detail

Nominal height	ESEAT mast type	Extension mast type
Wind speeds below 140 km/h and more than 6 km away from the sea		
(a + d) 3.60 m	a) B752165	d) B752169
(b + d) 4.50 m	b) B752166	d) B752169
(b + e) 5.50 m	b) B752166	e) B752170
(b + d + f) 6.25 m	b) B752166	d) B752169 + f) B752171
Wind speeds up to 170 km/h or close to the coast		
(a + d) 3.60 m	a) B752165	d) B752169
(b + d) 4.50 m	b) B752166	d) B752169
(c + f) 5.00 m	c) B752175	f) B752171
(c + f + h) 6.75 m	c) B752175	f) B752171 + h) B752173
(c + f + i) 7.75 m	c) B752175	f) B752171 + i) B752174

Product guide

Roof masts fixing accessories

ROOF FIXING ACCESSORIES

Ballasted tripods

– Use : to fix a mast (height 5m) on a flat roof (max. gradient 5%)

– Material : galvanized steel.



Description	Type	Order code	EAN code	Weight (1 pce) kg
BALLASTED TRIPOD 5M MAST FIT: 149KM/H	HCTLB5002	2CTHCTLB5002	3660308524430	128.00
BALLASTED TRIPOD 5M MAST FIT: 170KM/H	HCTLB5004	2CTHCTLB5004	3660308524447	264.00
BALLASTED TRIPOD 5M MAST FIT: 186KM/H	HCTLB5005	2CTHCTLB5005	3660308528438	373.00

For speeds greater than 186km/h, use a guying kit.

Supporting plates / tripods

– Use: to fix lightning conductors or elevation masts to flat roofs

– Material: galvanized steel

– Bolt hole diameters: 12mm.



Description	Height mm	Dimensions of the base	Center distance	Type	Order code	EAN code	Weight (1 pce) kg
1 – SUPPORTING PLATE FOR D.30/35MM	330	200 x 200	160 x 160	H0HPP4523	2CTH0HPP4523	3660308522610	4.00
2 – TRIPOD FOR 30 TO 50MM MAST	800	420 de côté	390	HCTSH4525	2CTHCTSH4525	3660308524454	8.00

H0HPP4523 : to be used with a guying kit.

HCTSH4525 : maximum height is 5 meters without guying kit. For mast from Ø 30 mm to 50 mm.

Carriage bolt holdfasts

– Use: to fix a single conductor rod (with no extension mast) in timber frameworks or bedding in masonry

– Material: galvanized steel

– Delivered complete with hardware.



Description	Useful thread mm	Useful length after fixing m	Ø drilling mm	Type	Order code	EAN code	Weight (1 pce) kg
SCREWDRIVER SUPPORT FOR ESEAT MAST	150	0.1	18	H0HST2044	2CTH0HST2044	3660308522689	1.32
SCREWDRIVER LONG SUPP. FOR 35mm MAST	150	1	18	H0HST2698	2CTH0HST2698	3660308522696	6.00

Maximum height in wind zone 3 is 5 meters (without guying kit).

Important : not to omit the use of water deflecting cone to secure watertightness of the installation.

Threaded bases

– Use: to fix a conductor to a metal framework. The conductor may be raised by a diameter 35mm extension mast.

– Material: galvanized steel

– Delivered complete with hardware



Description	Maximum complete length mm	Ø thread mm	Type	Order code	EAN code	Weight (1 pce) kg
THREADED BASE FOR AIR TERMINAL	115	30	B752251	2CTH050033R0000	3660308522511	2.30
THREADED BASE FOR 35mm MAST	150	36	B752252	2CTH050034R0000	3660308522528	4.50

Maximum height in wind zone 3 is 3m (without guying kit).

Maximum height in wind zone 3 is 5m (without guying kit) for the reference 2CTH050034R0000

Important: not to omit the use of water deflecting cone to secure watertightness of the installation.

Water deflecting cones

– Use : to ensure the watertightness in between the roof and the mast when fixing is used under roofing. Cut according to mast diameter.



Description	Ø opening mm	Height mm	Type	Order code	EAN code	Weight (1 pce) kg
WATER DEFLECTING CONE (MAST 6-50mm)	6 to 50	55	HCCRE2700	2CTHCCRE2700	3660308523211	0.07

Adaptor sleeve

– Use: to fix an Pulsar lightning conductor to an existing support with max. Ø 54mm



Description	Maximum length mm	Ø thread mm	Type	Order code	EAN code	Weight (1 pce) kg
3 – ESEAT MAST SLEEVE ADAPTOR	180	30	HCHMA5030	2CTHCHMA5030	3660308523570	0.63
4 – SIMPLE ROD MAST SLEEVE ADAPTOR	180	Tube 30	H0HMA5115	2CTH0HMA5115	3660308522573	1.64

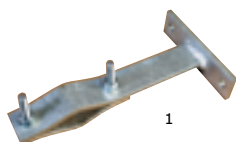
Product guide

Lateral fixations

WALL FIXING ACCESSORIES

Bolted brackets

- Use : bolted fixing for an offset mast on a vertical wall (M10)
- Bolt hole diameter : Ø 11 mm
- Mast Ø 30 to 50 mm
- Delivered individually
- 2 brackets minimum are necessary for fixing lightning rods



1

Description	Offset mm	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
1 – LONG BOLTED BRACKET (290mm)	290	B752155	2CTH050016R0000	3660308521552	1	1.50
SHORT BOLTED BRACKET (125mm)	125	B752154	2CTH050015R0000	3660308521545	1	1.20

Lorsque le paratonnerre est installé sur un ensemble de mâts atteignant 5 à 6 mètres, il est nécessaire d'utiliser 3 pattes de fixation

Offset bracket vertical

- Use: fixing of a mast offset from a vertical section
- Mast Ø 30 to 50 mm
- Delivered individually
- 2 brackets minimum are necessary for fixing lightning rods



2

2 – OFFSET BRACKET VERT. SUPP. LG.190mm	240	B752157	2CTH050018R0000	3660308521576	1	1.90
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When the lightning rod is installed on a set of poles reaching 5 to 6 meters, it is necessary to use 3 fixing brackets

PYLONS, LADDERS, GUARDRAIL OR FENCES FIXING ACCESSORIES

Clamps for horizontal or vertical support

- Use: fixing of a mast offset from a vertical wall or a horizontal section by means of Ø 10 mm bolts.
- Mast Ø 30 to 50 mm
- Delivered individually
- 2 collars minimum are necessary for fixing lightning rods



3

Description	Utilisation	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
3 – CLAMPS FOR HORIZONTAL SUPPORT	Horizontal support	B752152	2CTH050013R0000	3660308521521	1	1.27
4 – CLAMP FOR VERTICAL SUPPORT	Vertical support	B752153	2CTH050014R0000	3660308521538	1	1.30

4

When the lightning rod is installed on a set of poles reaching 5 to 6 meters, it is necessary to use 3 fixing collars

Wall anchors

- Use: fixing a mast embedded in a masonry wall
- Offset distance: 150 mm max.
- Embedded distance to be sealed: 150 mm min.



5

Description	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
5 – WALL ANCHOR	B752156	2CTH050017R0000	3660308521569	1	1.90

Screw in brackets

- Use: fixing a mast along a horizontal or a vertical concrete wall by using mechanical plug Ø 10 mm .

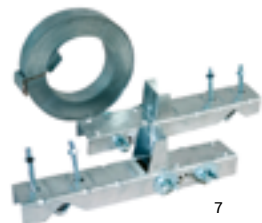


6

Description	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
6 – BRACKET FOR MECHANICAL PLUG	B752158	2CTH050019R0000	3660308521583	1	0.76

Product guide

Fixings



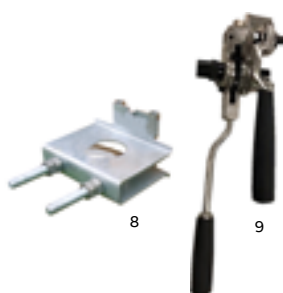
7

STEEL HOOPS

Masonry chimney (rectangular/square section)

- Use: fixing of a mast on a chimney, a concrete mast, etc. (rectangular/square section).
- Mast Ø 30 to 50 mm
- Delivered individually
- 2 steel hoops minimum are necessary for fixing lightning rods

Description	Clamping diameter mm	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
7 – BRACKET FOR SQUARE SECTION	Max 35 mm	B752159	2CTH050020R0000	3660308521590	1	0.91
GALV. STEEL FLAT ROLL 25m 40×0.8mm	–	HCHFC4002	2CTHCHFC4002	3660308523440	25	4.55



8



9

Metal cylindrical chimney

- Use: fixing of a mast on a chimney, round section
- Mast Ø 30 to 50 mm
- Delivered individually
- 2 Brackets minimum are necessary for fixing lightning rods

8 – BRACKET FOR CYLINDRICAL SECTION	250	B752160	2CTH050021R0000	3660308521606	1	1.13
SS TAPE 20×0.7mm(50m)	–	HCHFP2650	2CTHCHFP2650	3660308523471	50	5.69
SS CLIP FOR 20mm FLAT SS TAPE (PER 6)	–	H0HCP2651	2CTH0HCP2651	3660308524485	6	0.06
9 – PETITJEAN BAND STRAPPING PLIER		HCPINCE01	2CTHCPINCE01	3660308524287	1	1.53

Product guide

Conductors and coupling accessories



CONDUCTORS

Flat conductors (sold per meter)

Description	Section mm	Material	Type	Order code	EAN code	Pkg qty	Weight (1 pce) kg
COPPER TAPE STRIP 30×2mm (25m roll)	60	Tinned copper	B752186	2CTH040001R0000	3660308521866	25	13.40
COPPER TAPE STRIP 30×2mm (50m roll)	60	Tinned copper	B752187	2CTH040002R0000	3660308521873	50	27.00
COPPER TAPE 30×2mm	60	Tinned copper	B752312	2CTH040003R0000	3660308523129	1	1.86
RED COPPER 30×2mm (50m roll)	60	Red copper	B752311	2CTH040004R0000	3660308524669	50	27.00
TINNED COPPER FLEXIBLE BRAID 30×3.5mm	60	Tinned copper	HCCTC2714	2CTHCCTC2714	3660308523259	1	0.49
ALUMINIUM STRIP 30×3mm (50m roll)	90	Aluminium	HCCPA2715	2CTHCCPA2715	3660308523105	50	12.00
GALV. STEEL STRIP 30×3.5mm (29m ROLL)	105	Galvanized steel	HCCPG3035	2CTHCCPG3035	3660308523143	29	23.00



Round conductors (2)

Description	Section mm ²	Material	Type	Order code	EAN code	Pkg qty	Weight (1 pce) kg
ROUND COPPER TAPE D.8mm (50m roll)	50	tin-plated copper	B752319	2CTH040005R0000	3660308524676	50	22.00
RED ROUND COPPER D.8mm (50m roll)	50	red copper	B752320	2CTH040006R0000	3660308524683	50	22.00

Product guide

Conductors and coupling accessories



Shunts

- Electrolytically tin-plated flat flexible copper braid with welded eyelet at each end

Description	Section mm ²	Length m	Type	Order code	EAN code	Pkg qty	Weight (1 pce) kg
COPPER BRAID 30×3.5mm LENGTH 0.3m	50	0.3	H0STP5030	2CTH0STP5030	3660308522870	1	0.18
COPPER BRAID 30×3.5mm LENGTH 0.5m	50	0.5	H0STP5050	2CTH0STP5050	3660308522887	1	0.29
COPPER BRAID 30×3.5mm LENGTH 1m	50	1	H0STP5100	2CTH0STP5100	3660308522900	1	0.52

Bended conductor

- Made of tinned copper
- Bend radius in accordance with lightning rod standards of 20 cm
- We recommend for bended conductor connection to use 2 flat/flat connectors



Description	Type	Order code	EAN code	Pkg qty	Weight (1 pce) kg
BENDED 30×2mm CONDUCTOR	H0CCP2716	2CTH0CCP2716	3660308522122	1	0.23

COUPLING ACCESSORIES

COUPLING STRIPS

- Use: for coupling or crossing two conductors without riveting
- The "standard" models accommodate 30 mm wide strips and rounds with Ø 6 and 8 mm
- The "multiple" model also enables crossings of round conductors
- The special strip model only accommodates flat strips.



Description	Type	Order code	EAN code	Pkg qty	Weight (1 pce) kg
1 – GALV. STEEL FLAT AND ROUND COUPLING	HCBRP2680	2CTHCBRP2680	3660308523082	1	0.23
2 – COPPER CONDUCT. COUPLING (FLAT-ROUND)	H0BRC2780	2CTH0BRC2780	3660308522047	1	0.22
3 – COPPER MULT. COND. COUPLING FLAT-ROUND	H0BRX3780	2CTH0BRX3780	3660308522115	1	0.32
4 – COPPER FLAT CONDUCTORS COUPLING	H0BRH2779	2CTH0BRH2779	3660308522092	1	0.22
5 – SS FLAT CONDUCTORS COUPLING	H0BRI2779	2CTH0BRI2779	3660308522108	1	0.18

Connector for round conductors



Description	Diameter mm	Type	Order code	EAN code	Pkg qty	Weight (1 pce) kg
LUG WITH OFFSET BASE FOR 8MM CONDUCTOR	8	HCPRC8000	2CTHCPRC8000	3660308524300	1	0.05
8 - CONCENTRIC CLAMPING SLEEVE	8	HCPRM8000	2CTHCPRM8000	3660308524324	1	0.05
CONCENTRIC CLAMPING SLEEVE	8	HCPR8000	2CTHCPR8000	3660308524328	q	0.06
9 - CROSS WITH 8MM CONCENTRIC CLAMPING	8	HCPRX8000	2CTHCPRX8000	3660308522054	1	0.065

Product guide

Conductor fasteners

ROOF FIXING ACCESSORIES

Conductor supporting studs

- Material: black synthetic exterior filled with cement (except 2CTHCHPV2771 to be filled up by your means)
- Eliminates the need to drill through waterproofing to attach the conductor
- Can be glued with neoprene glue
- Height: 8 cm



Description	Utilisation	Type	Order code	EAN Code	Pkg pce	Weight (1 pce) kg
1 – HOLLOW COND. CONCRETE BLOCK	Conductor Ø 8 mm Conductor 30 x 2 mm	HCHPV2771	2CTHCHPV2771	3660308524072	1	0.10
2 – COND. CONCRETE BLOCK FIXING WITH CLIP	Conductor Ø 8 mm Conductor 30 x 2 mm	HCHPB2772	2CTHCHPB2772	3660308523945	1	1.00
COND. CONCRETE BLOCK SCREWED FIXING	Conductor Ø 8 mm Conductor 30 x 2 mm	HCHPB2773	2CTHCHPB2773	3660308523952	1	1.00

Ruberalu brackets for flat roof with waterproofing

- Material: bituminised aluminium
- These brackets are attached by hot-melt gluing.



Description	Dimensions mm	Type	Order code	EAN Code	Pkg qty	Weight (1 pce) kg
RUBBER ALU BRACKET	150 x 40	H0HBR2717	2CTH0HBR2717	3660308522375	1	0.02

Zinc bracket to be welded

- Tinned copper
- For 30 mm wide tape
- To be welded on the roof and tape must be fixed with copper rivets



Description	Type	Order code	EAN Code	Pkg pce	Weight (1 pce) kg
ZINC BRACKET TO BE WELDED	H0HBZ2702	2CTH0HBZ2702	3660308522382	1	0.01

Clipped tile fasteners

- Material: tin-plated copper strip saddle 25 x 1 mm
- Stainless steel clips: used for fixing 30 x 2 mm strips to all types of slated or unbedded roofing tiles (3)
- PVC clips: used for round conductors, exists in red copper colour or grey (4).



For flat conductors

3 – TILE FASTENER CLIPS FOR FLAT 30x2mm	H0HAA2673	2CTH0HAA2673	3660308522238	1	0.41
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For round conductors

4 – TILE FASTENER COPPER PVC CLIP D.8mm	H0HAR2746	2CTH0HAR2746	3660308522290	1	0.05
TILE FASTENER GREY PVC D.8MM	H0HAR2745	2CTH0HAR2745	3660308522283	1	0.05

Tile fastener

- Tinned copper
- For 30 mm wide tape
- A weld point between the tape and the clip is preferable to prevent slipping of the clip



5 – TILE FASTENER LG.30cm	Leg length 0.30 m	H0HAA2672	2CTH0HAA2672	3660308522221	1	0.06
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Product guide

Conductor fasteners

WALL FIXING ACCESSORIES FOR FLAT CONDUCTORS

Masonry wall hooks

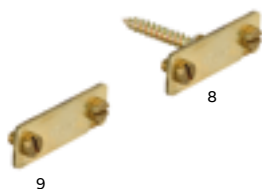
- Fixing: on masonry by hookds into lead dowels
- For flat strip.



Description	Material	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
6 – 30mm MASONRY HOOKS	Hooks 30 mm	B752185	2CTH050032Z0000	3660308521859	20	0.44
7 – LEAD DOWEL FOR 30mm MASONRY HOOK	Dowel	B752183	2CTH050030Z0000	3660308521835	20	0.10

Screw fastener

- For 30 mm wide strip: supplied with wood screw
- Material: brass.

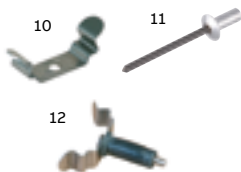


Description	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
8 – BRASS FIX. FLAT 30x2mm WITH SCREW	HCL2641	2CTH0HCL2641	3660308522436	1	0.02
9 – BRASS FIX. FLAT 30x2mm WITHOUT SCREW	HCL2642	2CTH0HCL2642	3660308522443	1	0.015

Metal cladding walls

Stainless steel clips

- Material: stainless steel
- For fixing a flat strip conductor
- Fixed with pop rivets or screws (Ø 4 mm) not supplied.



10 – SS CLIPS FOR 30x2mm TAPE	B752184	2CTH050031Z0000	3660308521842	20	0.77
11 – ALUMINIUM POP RIVETS D.4mm (x 100)	B752150	2CTH050011Z0000	3660308521507	100	0.16
12 – WATERPROOF SS CLIP FOR METAL CLADDING	H0HCB4240	2CTH0HCB4240	3660308522399	1	0.01

Product guide

Conductor fasteners

Waterproof fixing on cladding

- Fixing : on cladding and roofs of galvanised or thermo-lacquered steel plate (ref. 2CTH0FDT0045)
- Fixing : on tiles or fibrocement (ref. 2CTH0FDT0046)
- Fixed entirely from outside and guaranteeing perfect watertightness. May be equipped with a bakelite insulator
- Drill hole : Ø 10 mm



Description	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
1 – WATERTIGHT FIXING FOR METAL CLADDING	H0FDT0045	2CTH0FDT0045	3660308522191	1	0.03
WATERTIGHT FIXING TILE/FIBER CEMENT	H0FDT0046	2CTH0FDT0046	3660308522207	1	0.03
2 – PVC COND. FIXING M8 FIXTURE	HCHAP3001	2CTHCHAP3001	3660308523310	1	0.02

Insulating supports

- Fixing: strip on timber framework or thatch
- Material: bakelite
- Supplied complete with wood screws
- 2CTH0HIS6000 for flat conductors, 2CTH0HAR... for round conductors.



Description	Insulator height H mm	Colour	Thread Ø mm	Type	Order code	EAN code	Pkg (qty)	Weight (1 pce) kg
3 – INSUL. SUPPORT FLAT 30x2mm ON WOOD	35	black	6	H0HIS6000	2CTH0HIS6000	3660308522542	20	1.41
4 – INSULATED FIXING GREY PVC FOR D.8mm	36.4	grey	8	H0HAR2645	2CTH0HAR2645	3660308526236	20	0.06
INSULATED FIXING COPPER PVC FOR D.8mm	36.4	copper	8	H0HAR2646	2CTH0HAR2646	3660308522276	20	0.06

WALL FIXING ACCESSORIES FOR ROUND CONDUCTORS PVC FIXTURES

- Fixing: on 30mm wide strip with isolation from supporting material
- Color: grey or copper.



Description	Utilisation	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
5 – GREY PVC ROUND FIXING M8 FIXTURE	Masonry	HCHAR2445	2CTHCHAR2445	3660308523341	1	0.01
6 – COPPER PVC ROUND FIXING M8 FIXTURE	Masonry	HCHAR2446	2CTHCHAR2446	3660308523358	1	0.01
7 – GREY PVC CLIP FOR D.8mm WITH PLUG	Masonry	H0HAR2845	2CTH0HAR2845	3660308522313	1	0.01
8 – COPPER PVC CLIP FOR D.8mm WITH PLUG	Masonry	H0HAR2846	2CTH0HAR2846	3660308522320	1	0.01
– WATERTIGHT GREY PVC FIXING FOR D.8mm	Metallic	H0HAR2545	2CTH0HAR2545	3660308522252	1	0.02
9 – SS FIXING FOR 8MM ROUND	Masonry	HCHAR2945	2CTHCHAR2945	3660308523365	1	0.02
10 – WATERTIGHT SS FIXING FOR D.8mm	Metallic	H0HAR2945	2CTH0HAR2945	3660308522337	1	0.03

Product guide

Conductor fasteners



CONDUCTOR FASTENERS

Masonry fixture

- For round conductor : supplied with wood screw
- Material: copper.

Description	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
COPPER FIXING (MASONRY) D. 8mm	HCSCP3000	2CTHCSCP3000	3660308524409	1	0.05

PYLON OR LADDER FIXING ACCESSORIES FOR ROUND OR FLAT CONDUCTOR

Stainless steel collar

- Use: to clamp conductors on tube supports
- Material: stainless steel



Description	Clamping diameter mm	Type	Order code	EAN code	Pkg	Weight (1 pce) kg
SS COLLAR FOR 25-100mm DIAM.	25 – 100	B752841	2CTH050040R0000	5415022518832	1	0.03

Tinned steel gutter brackets

- Use: To inter connect gutters where they are in contact with conductors
- Material: Tin plated steel
- For round conductors Ø 8 mm and flat max width 30 mm



Description	Clamping diameter mm	Type	Order code	EAN code	Pkg	Weight (1 pce) kg
TINNED STEEL GUTTER BRACKET	25 – 100	HCHPG2679	2CTHCHPG2679	3660308523983	1	0.20

Angle brackets

- Use: fixing flat or round conductors along a metal sectional part
- Material: Zinc-coated steel.



Description	Tightening capacity mm	Type	Order code	EAN code	Pkg	Weight (1 pce) kg
PRESS TYPE FIXING FOR METALLIC PROFIL	12 max.	H0HPC2773	2CTH0HPC2773	3660308522597	1	2.70

Product guide

Equipotential bonding and lightning stroke counter

Antenna mast or metallic part bonding spark gap

Isolating spark gaps can be extended to the earthing of metallic masses (2CTH050038R0000), such as pylons, motor frames, roofing equipment, etc.

The reference 2CTH050038R0000 and 2CTH050037R0000 earthing spark gap have the same electrical characteristics.

Characteristics :

- Weight (kg): 0.522
- Dimensions (mm): 292 x 64 x 60 mm
- Rated impulse spark over voltage: < 1500 V
- Lightning current capability: 50 kA: 10-350 μ s (class N)
- Standard: IEC 62 561-3
- ISG classification: N
- Rated DC voltage: > 600 V
- Power frequency withstand voltage: 255 V
- Insulation resistance: > $10^8 \Omega$



1



2

Description	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
1 – ANTENNA MAST ARRESTER	H05003700	2CTH050037R0000	3660308526212	1	0.50
2 – ISOLATING SPARK GAP	B752679	2CTH050038R0000	3660308526793	1	0.37

Cut-off and equipotential terminal

- Cut-off strip for earthing network
- Permissible current: 50 A
- Fixing: by wall plug and screw tab
- Supplied with 2 thimbles for cables from 28 to 75 mm.



3

Description	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
3 – CUT OFF TERMINAL	HCBCH2709	2CTHCBCH2709	3660308523068	1	0.34

Lightning stroke counter

- This counter, which is connected in series to a lightning down conductor, records lightning current
- This counter (4) uses the current induced in a secondary circuit to activate an electromechanical counter. It has been tested in High Voltage laboratories and in situ.



4

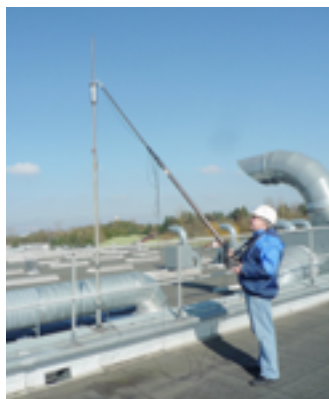


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Description	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
4 – MECHANICAL LIGHTNING COUNTER	H0CCF2004	2CTH0CCF2004	3660308521279	1	0.52
5 – MEMORY LIGHTNING COUNTER	OVR LSC	7TCA085410R0053	5415022509144	1	0.48

Product guide

Pulsar test kit and digital earth test set



6

Pulsar test kit

Pulsar lightning air terminal testing kit

- The testing kit needs a contact with the Pulsar tip in one hand, and the bottom of the pole or the down conductor in the other hand
- It tests the Pulsar electronics by activating the high-voltage internal circuit of the Pulsar.

Description	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
6 – ESEAT POLE TEST KIT *	B752471	2CTH080004R0000	3660308524713	1	3.39
7 – ESEAT TEST SET	B752130	2CTH080001R0000	3660308521309	1	1.20

* 2.75 m not deployed.



7

Digital earth test set

- Battery-powered and watertight the 2CTHCACA6460 is a device that is easy to use and has been designed for operation in the field
- On all installations requiring the qualification of electrical or lightning earth termination system, using traditional earth rod methods, the 2CTHCACA6460 measures the earth resistance and resistivity of the soil.

Description	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
8 – DIGITAL EARTH – RESISTIVITY TEST SET	ACA6460	2CTHCACA6460	3660308523044	1.300	1.3
9 – ACCESS. HOUSING FOR TEST SET ACA 6460 4 LEADS AND 4 RODS	ACA2025	2CTHCACA2025	3660308523006	6.000	6



8



9

Product guide

Earth coupling accessories

Test joint

- Enables the disconnection of the conductors for insulation and earthing measurements
- Material: die-cast brass
- No need to drill the conductors
- Accommodate Ø 6 and 8 mm round conductors and 30 x 2 or 30 x 3 mm flat conductors
- Guarantee perfect conductivity, low impedance
- Fixed by brackets with wood or metal screws, etc.
- In accordance with NF C 17-102 standard.



1

Description	Dimensions mm	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
1 – TEST JOINT	70 x 50 x 20	H0JCH2708	2CTH0JCH2708	3660308522719	1	0.35

Note: Down conductors have to overlap on the whole height of the test joint.

Protecting flats and tubes

- 2 m galvanized steel flats or tubes to protect the down conductors against mechanical impact
- Generally placed between the test joint and the ground
- Delivered complete with 3 clamps (bracket, wood screw).



2

Description	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
2 PROTECT. TUBE FOR STRIP INCL. FIX	TPH2705	2CTH0TPH2705	3660308522917	2	1.20
PROTECT. FLAT FOR ROUND INCL. FIXING	TPH2768	2CTH0TPH2768	3660308522924	2	1.81
SS PROTECT. FLAT FOR STRIP INCL. FIX	TPI2705	2CTH0TPI2705	3660308522931	2	1.00

Inspection earth pit

- Used to house the test joint at ground level, the earth rod connections or earth interconnections
- The 2CTH0RVH3073 and 2CTH0RVH3074 models are equipped with a copper bar enabling the interconnection of 3 conductors or 2 conductors and a test joint.



5

7

3

6

4

Description	Dimensions mm	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
3 – CAST IRON INSPECTION EARTH PIT	Ø ext. 190	RVH3071	2CTH0RVH3071	3660308522825	1	2.40
4 – POLYESTER POLYMER EARTH PIT	300 x 300 x 212	B7527172	2CTH130001R0000	3660308527172	1	1.90
4 – PE POLYMER EARTH PIT WITH EARTH BAR	300 x 300 x 212	B752718	2CTH130002R0000	3660308527189	1	2.40
5 – GREY PVC EARTH PIT WITH EARTH BAR	300 x 300	RVH3074	2CTH0RVH3074	3660308522856	1	3.49
6 – CAST IRON INSPECTION EARTH PIT	350 x 250	RVH3072	2CTH0RVH3072	3660308522832	1	9.00
7 – CAST IRON INSPECTION EARTH PIT	350 x 250	RVH3073	2CTH0RVH3073	3660308522849	1	9.50

Product guide

Earth coupling accessories

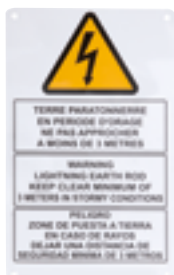


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Interconnection box for equipotential bonding

- These boxes are fixed to the bottom of the down conductor and enable easy, accessible interconnection and disconnection of the lightning earth termination system and the building's earth loop
- They are made of a galvanized steel cover over a copper bar mounted on two insulators enabling the connection of 2 conductors
- Delivered complete with wood screw brackets and earth identification labels.

Description	Dimensions mm	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
7 – INTERCONNECTION BOX	150 x 66 x 65	BLH2707	2CTH0BLH2707	3660308522009	1	0.56



8

Warning notice

Description	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
8 – WARNING NOTICE	H0PSH2009	2CTH0PSH2009	3660308522757	1	0.05
9 – TRIANGLE SIGN : "TERRE PARATONNERRE"	H0PSH2708	2CTH0PSH2708	3660308522764	1	0.01
ROUND LABEL "TERRE BATIMENT" (x10)	B752163	2CTH050024Z0000	3660308521637	10	0.01
ROUND LABEL "TERRE PARATONNERRE" (x10)	B752164	2CTH050025Z0000	3660308521644	10	0.01
10 – TRIANGLE SIGN : "TERRE PARAFoudre"	H0PSH2709	2CTH0PSH2709	3660308522771	1	0.01



9



10



11

Earth self

Earth self to be interposed on the connection of two earth electrodes between them. Limits surges transmission.

Description	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
11 – EARTH SELF 30 microH 25mm ²	HCHSA3073	2CTHCHSA3073	3660308524119	1	2.70

Product guide

Earthing system

Overview

Each down conductor in a lightning protection system must be connected to an earth termination system designed to carry away the lightning current. The earth termination system must fulfil three indispensable conditions:

- The earth termination resistance value
French and other international standards, as well as the technical requirements of a number of authorities stipulate an earth termination resistance value of less than 10 ohms. This value should be measured on the earth connection isolated from any other conductive component. If the resistance value of 10 ohms cannot be achieved, the earth termination is nonetheless considered compliant if it is made up of at least 100 m of conductors or electrodes, each section measuring no more than 20 m (for level of protection 2, 3 and 4) and 160 m (8 x 20 m) for level 1.
- Equipotential bonding
Standards require the equipotential bonding of lightning earth termination system with the existing earthing systems.
- Inspection earth pit
The connection parts between lightning earth system and electrical system test joint can be accessed by an inspection pit.

GENERAL EARTH SYSTEM

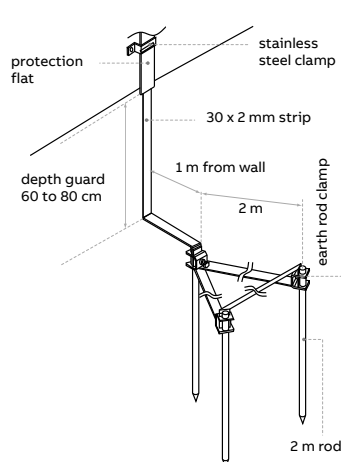
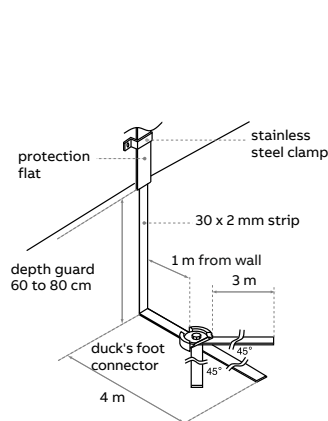
Duck's foot earth termination system

The minimum earth termination system is made up of 25 m of 30 x 2 mm tin-plated copper strip, split into 3 strands buried in 3 trenches at a depth of 60 to 80 cm dug in a fan shape like a duck's foot: one end of the longest strand is connected to the test joint, the two other strands being linked to a special connection known as a duck's foot connector.

Standard list of material

Description	Type	Order code	EAN code	Nb pcs or m
DUCK FOOT CONNECTOR	RPO2840	2CTH0RPO2840	3660308522818	1 pc
COPPER TAPE 30x2mm	B752186	2CTH040001R0000	3660308523129	25 m

Note: The earth termination is covered by a red or orange warning grid.



Rod triangle earth termination system

When the site topography does not lend itself to the installation of a duck's foot as described above, an earth termination system can be developed using at least 3 copper earth rods each with a minimum length of 2 m, buried vertically in the ground: the rods should be spaced at intervals of about 2 m and at a mandatory distance of 1 m to 1.5 m from the foundations.

Standard list of material

Description	Type	Order code	EAN code	Nb pcs or m
DUCK FOOT CONNECTOR	RPO2840	2CTH0RPO2840	3660308522818	1 pc
COPPER TAPE 30x2mm	B752312	2CTH040003R0000	3660308523129	10 m
GALVINIZED STEEL ROD D. 20mm L. 1M	HCPVB2010	2CTHCPVB2010	3660308524379	6 qty
DRIVING STUD 20mm	HOBMA0020	2CTH0BMA0020	3660308522030	1 pc
EARTH ROD CLAMP FOR FLAT 30x2mm	HOCRH4020	2CTH0CRH4020	3660308522160	3 qty

Note: The earth termination is covered by a red or orange warning grid.

Duck's foot earth termination system with earth rods

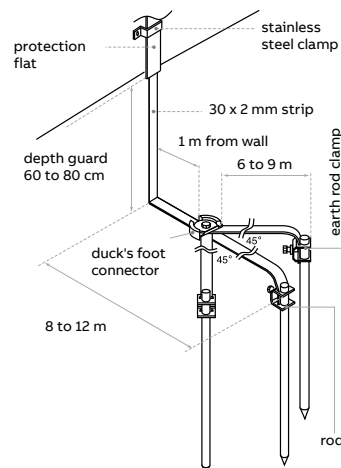
If the soil type is not altogether suitable for a duck's foot connector, a combination of duck's foot and earth rods will significantly enhance protection. In this case, the end of each duck's foot connector strand is connected to an earth rod.

Standard list of material

Description	Type	Order code	EAN code	Nb pcs or m
DUCK FOOT CONNECTOR	RPO2840	2CTH0RPO2840	3660308522818	1 pc
COPPER TAPE 30x2mm	B752186	2CTH040001R0000	3660308523129	25 m
COPPER BOND D.19mm L.2M	HPCPS1920	2CTHCPCS1920	3660308524249	3 pc
DRIVING STUD 20mm	HOBMA0020	2CTH0BMA0020	3660308522030	1 pc
EARTH ROD CLAMP FOR FLAT 30x2mm	HOCRH4020	2CTH0CRH4020	3660308522160	3 qty

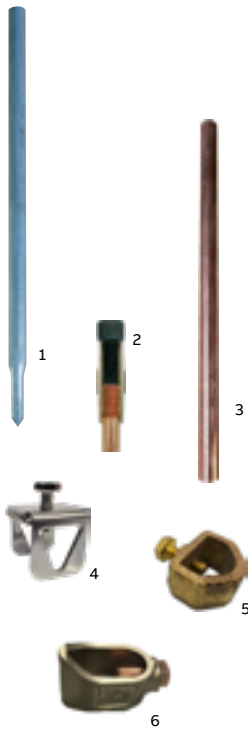
Note: The earth termination is covered by a red or orange warning grid.

These here before configurations cannot guarantee an earth resistance of 10 Ω in case of bad soil resistivity. The values obtained by these configurations depends of the soil resistivity.



Product guide

Earthing system



Earth rods

– The use of a reusable treated steel snap tool is compulsory to protect the rod head when driving in.

Description	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
1 – GALVINIZED STEEL ROD D. 20mm L. 1m	HCPVB2010	2CTHCPVB2010	3660308524379	1	3.00
COPPER BOND ROD DIAM.15mm L.1m	HPCPA1510	2CTHCPCA1510	3660308524171	1	1.51
COPPER BOND ROD DIAM.15mm L.1.5m	HPCPA1515	2CTHCPCA1515	3660308524188	1	1.90
THREADED COPPER BOND D.15mm L.2m	HPCPS1520	2CTHCPCS1520	3660308524225	1	2.67
5 – EARTH ROD CLAMP D.15/20mm TAPE 30 x 2mm	HOCRH3020	2CTHOCRH3020	3660308522153	1	0.20
TAPER COUPLING DIAM.15mm	HCHMC0015	2CTHCHMC0015	3660308523594	1	0.15
THREADED COUPLING DIAM.15mm	HCHMF0015	2CTHCHMF0015	3660308523617	1	0.11
2 – DRIVING HEAD DIAM.15mm	HCHTF0015	2CTHCHTF0015	3660308524126	1	0.11
3 – COPPER BOND D.19mm L.2m	HPCPS1920	2CTHCPCS1920	3660308524249	1	3.60
COPPER BOND ROD DIAM.15mm L.1.5m	HPCPA1915	2CTHCPCA1915	3660308524201	1	2.77
COPPER BOND D.19mm L.1m	HPCPS1910	2CTHCPCS1910	3660308524232	1	1.80
COPPER BOND ROD DIAM.19mm L.1m	HPCPA1910	2CTHCPCA1910	3660308524195	1	1.90
DRIVING STUD 20mm	HOBMA0020	2CTHOBMA0020	3660308522030	1	0.29
4 – EARTH ROD CLAMP FOR 2 TAPES 30 x 2mm	HOCRH4020	2CTHOCRH4020	3660308522160	1	0.15
EARTH ROD CLAMP 15mm	HCCRA0015	2CTHCCRA0015	3660308523167	1	0.06
6 – EARTH ROD CLAMP 20mm ROUND DIAM.8mm	HCCRA0020	2CTHCCRA0020	3660308523174	1	0.08
TAPER COUPLING DIAM.19mm	HCHMC0019	2CTHCHMC0019	3660308523600	1	0.16
THREADED COUPLING DIAM.19mm	HCHMF0019	2CTHCHMF0019	3660308523624	1	0.16
DRIVING HEAD DIAM.19mm	HCHTF0019	2CTHCHTF0019	3660308524133	1	0.13

(1) 2CTHCPVB2010 : hot-dip galvanized high strength steel tube
 (2) 2CTHCPCS1920 : high corrosion resistance thanks to a thickness of 250 µ electrolytically deposited copper
 (3) 2CTHOBMA0020 : driving stud – one for 3 per sink
 (4) The earth rod clamp HOCRH4020 allows horizontal or vertical connection of 30 x 2 mm tape
 The earth rod clamp allows vertical connection of 30 x 2 mm.
 2CTHCPCA1510, 2CTHCPCA1515 and 2CTHCPCS1520 are threaded.

Duck foot connectors

- Zinc-plated, die-cast brass parts enabling the connection of three or four strands of tin-plated copper 30 x 2 mm conductor strip
- Variable strand angles
- Perfect electrical conductivity and strong tightening.



Description	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
DUCK FOOT CONNECTOR	RPO2840	2CTHORPO2840	3660308522818	1	0.65

Earth grids

– Earth grids are made of solid red copper with a mesh size of 115 x 40 mm.

Description	Épaisseur mm	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
EARTH GRID 0.66x0.92M (4)	3	GMD6692	2CTHCGMD6692	3660308523303	1	3.80
EARTH GRID 1x2M (5)	3	GMD1020	2CTHCGMD1020	3660308523297	1	5.50

(4) Equivalent to 18 m of Ø 8 mm round conductor.
 (5) Equivalent to 54 m of Ø 8 mm round conductor.

Earthing enhancing compounds

Features and benefits:

- Permanent earth value (earth resistance will remain constant during the life of the installation without maintenance requirement)
- Chemically inert and completely non-corrosive
- Quick drying properties allows for quick and easy installation.

Description	Type	Order code	EAN code	Pkg pce	Weight (1 pce) kg
EARTHING ENHANCING COMPOUNDS 25kg	CM040	7TCA083870R1819	5415022506259	1	25.00



Product guide

Pylons



Self-supporting pylons

- Material: hot galvanized steel
- These pylons are made of a welded steel lattice with a triangular cross-section. Each element is 3 m in length, except the ground anchoring section (about 1 m)
- Delivered complete with stainless steel hardware and Ø 35 mm mast head (to receive Pulsar mast)
- The concrete anchorage blocks should be made with concrete in a proportion of 350 kg/m³ and calculated for a good ground.

	Type	Order code	Type	Order code	Type	Order code	Type	Order code
Height (1) m	Self carrying pylons							
	Zone I 136 km/h		Zone II 149 km/h		Zone III 167 km/h		Zone IV 183 km/h	
3	-	-	-	-	-	-	HCHPA0403	2CTHCHPA0403
4	-	-	-	-	HCHPA0304	2CTHCHPA0304	-	-
6	HCHPA0106	2CTHCHPA0106	HCHPA0206	2CTHCHPA0206	-	-	-	-
9	HCHPA0109	2CTHCHPA0109	HCHPA0209	2CTHCHPA0209	HCHPA0309	2CTHCHPA0309	HCHPA0409	2CTHCHPA0409
12	HCHPA0112	2CTHCHPA0112	HCHPA0212	2CTHCHPA0212	HCHPA0312	2CTHCHPA0312	HCHPA0412	2CTHCHPA0412
15	HCHPA0115	2CTHCHPA0115	HCHPA0215	2CTHCHPA0215	HCHPA0315	2CTHCHPA0315	HCHPA0415	2CTHCHPA0415
18	HCHPA0118	2CTHCHPA0118	HCHPA0218	2CTHCHPA0218	HCHPA0318	2CTHCHPA0318	HCHPA0418	2CTHCHPA0418
21	HCHPA0121	2CTHCHPA0121	-	-	HCHPA0321	2CTHCHPA0321	-	-
24	HCHPA0124	2CTHCHPA0124	-	-	-	-	-	-

(1) Other sizes on request – Technical specifications available – For wind zone V (210 km/h) please consult us.



Guyed pylons

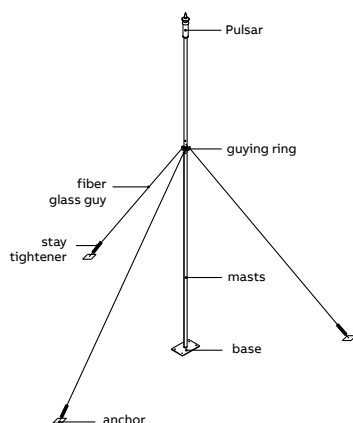
- Material: hot galvanized steel
- These pylons are made of a welded steel lattice with a triangular cross-section (centerline distance 175 mm) supplied in lengths of 3 or 6 m
- Use: lightning air terminal supports for flat roofs
- Fibre glass guying (1 set per section)
- Delivered complete with base and neoprene tile, Ø 35 mm mast head, fibre glass and accessories (anchoring clips and stay tighteners) for guying, with bolted anchoring.

Height (2) m	Guyed Zones I et II
6	2CTHCHPH0600
9	2CTHCHPH0900
12	2CTHCHPH1200
15	2CTHCHPH1500
18	2CTHCHPH1800
21	2CTHCHPH2100
24	2CTHCHPH2400

(2) Other sizes on request – Technical specifications available – For wind zone V (210 km/h) please consult us.

Product guide

Guying kit and Obsta



Guying kit for lightning rod with mast

Complete kit with:

- 25 m of fibre glass cable to be ordered separately, 6 anchoring clips, 3 stay tighteners, 3 ring fasteners, 1 3-directional clamp and 1 base (2CTHCHPP4523).

Description	Type	Order code	EAN code	Weight (1 pce) kg
GUYING KIT	B752161	2CTH050022R0000	3660308521613	8.80
FIBER GLASS CABLE 5.6mm(25m ROLL)	B752162	2CTH050023Z0000	3660308521620	1.90



OBSTA obstruction lights

The OBSTA HISTI is an obstruction light for hazard to low-flying aircraft for airport, building, broadcast transmitting towers, chimneys, bridges and transmission lines.

This lamp based on cold neon discharge principle offers high reliability, robustness in hostile environments (EMC, climatic...), proven long life (more than 25 000 hours) on all kinds of obstacle like transmission lines, TV towers and exposure in electromagnetic fields and high temperature.

One unique model will adjust itself to the main supply voltages, continuously from 100 V to 240 Vrms, 50/60 Hz.

AERIAL LIGHT OBSTA HI STI 100VA 240V	HCHC00071	2CTHCHC00071	3660308527509	3.04
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OBSTA low intensity LED

The NAVILITE is based on LED technology in compliance with ICAO low intensity type recently applied.

These lights are devoted to the night marking of all kinds of obstacles with a DC power supply.

AERIAL LIGHT OBSTA LED 48V DC	HCHC00900	2CTHCHC00900	3660308528421	10.4
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For another voltage, please contact us.

IEC and standards Qualifoudre compliance



IEC EN 62561-1

2CTH0CRH4020	EARTH ROD CLAMP FOR FLAT 30×2mm
2CTH0JCH2708	TEST JOINT
2CTH0BRX3780	COPPER MULT. COND.COUPLING FLAT-ROUND
2CTH0BRH2779	COPPER FLAT CONDUCTORS COUPLING
2CTH0BRC2780	COPPER CONDUCT. COUPLING (FLAT-ROUND)
2CTH0RPO2840	DUCK FOOT CONNECTOR
2CTH0BRI2779	SS FLAT CONDUCTORS COUPLING
2CTHC CRA0015	EARTH ROD CLAMP 15mm
2CTH0HPC2770	Pulsar COLLAR
2CTHCPRM8000	CONCENTRIC CLAMPING SLEEVE D. 8mm
2CTH0BLH2707	INTERCONNECTION BOX
2CTHCPRC8000	LUG WITH OFFSET BASE FOR 8mm COND.
2CTHCBCH2709	CUT OFF TERMINAL
2CTHCPT8000	CONCENTRIC CLAMPING TEE SLEEVE 8mm
2CTHC CRA0020	EARTH ROD CLAMP 20mm

IEC EN 62561-2

2CTH0CCP2716	BENDED 30×2mm CONDUCTOR
2CTHCCTC2714	TINNED COPPER FLEXIBLE BRAID 30×3.5mm
2CTH0STP5030	COPPER BRAID 30×3.5mm LENGTH 0.3M
2CTHCGMD6692	EARTH GRID 0.66×0.92M
2CTH040003R0000	COPPER TAPE 30×2mm
2CTH040005R0000	ROUND COPPER TAPE D.8mm PER 50 M
2CTH070011R0000	3 M SS ESEAT MAST DIAM.35mm
2CTH070001R0000	1.3M SS ESEAT MAST D.30mm
2CTH010002R0000	2M SS AIR TERMINATION MAST (Ø 30mm)
2CTH010001R0000	1M SS AIR TERMINATION MAST (Ø 30mm)
2CTHCPVB2010	GALVINIZED STEEL ROD D. 20mm L. 1M
2CTH0STP5050	COPPER BRAID 30×3.5mm LENGTH 0.5M
2CTHCGMD1020	EARTH GRID 1×2M
2CTH040001R0000	COPPER TAPE STRIP 30×2mm (25M)
2CTH040002R0000	COPPER TAPE STRIP 30×2mm (50M)
2CTH040004R0000	RED COPPER 30×2mm PER 50 M
2CTH040006R0000	RED ROUND COPPER D.8mm PER 50 M
2CTHCPCG3035	GALV. STEEL STRIP 30×3.5mm (29M ROLL)
2CTHCPCA1515	COPPER BOND ROD DIAM.15mm L.1.5M
2CTHCPCA1915	COPPER BOND ROD DIAM.15mm L.1.5M
2CTHCPCS1910	COPPER BOND D.19mm L.1M
2CTHCPCS1520	THREADED COPPER BOND D.15mm L.2M
2CTHCPCA1510	COPPER BOND ROD DIAM.15mm L.1M
2CTHCPCS1520	THREADED COPPER BOND D.15mm L.2M
2CTHCPCA1510	COPPER BOND ROD DIAM.15mm L.1M

IEC EN 62561-4

2CTH050032Z0000	30mm MASONRY HOOK
2CTH050031Z0000	SS CLIPS FOR 30×2mm TAPE
2CTH0HAA2673	TILE FASTENER CLIPS FOR FLAT 30×2mm
2CTHCSCP3000	COPPER FIXING (MASONRY) D. 8mm
2CTH0HAR2845	GREY PVC CLIP FOR D.8mm WITH PLUG
2CTH0HCB4240	WATERPROOF SS CLIP FOR METAL CLADDING
2CTH0HCL2642	BRASS FIX. FLAT 30×2mm WITHOUT SCREW
2CTH0TPH2705	2 PROTECT. TUBE FOR STRIP INCL. FIX
2CTH0HAA2672	TILE FASTENER LG.30CM
2CTH0HPC2773	PRESS TYPE FIXING FOR METALLIC PROFIL
2CTH0HIS6000	INSUL. SUPPORT FLAT 30×2mm ON WOOD
2CTHCHAR2445	GREY PVC ROUND FIXING M8 FIXTURE
2CTH0HAR2746	TILE FASTENER COPPER PVC CLIP D.8mm
2CTH0TPI2705	SS PROTECT. FLAT FOR STRIP INCL. FIX.
2CTHCHPG2679	TINNED STEEL GUTTER BRACKET
2CTH0TPH2768	PROTECT. FLAT FOR ROUND INCL. FIXING
2CTHCHPB2772	COND. CONCRETE BLOCK FIXING WITH CLIP
2CTHCHPB2773	COND. CONCRETE BLOCK SCREWED FIXING
2CTHCHPV2771	HOLLOW COND. CONCRETE BLOCK
2CTHCHAP3001	PVC COND. FIXING M8 FIXTURE

IEC EN 62561-5

2CTH130001R0000	POLYESTER POLYMER EARTH PIT
2CTH130002R0000	PE POLYMER EARTH PIT WITH EARTH BAR

IEC EN 62561-6

2CTH0CCF2004	MECHANICAL LIGHTNING COUNTER
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IEC EN 62561-7

7TCA083870R1819	EARTHING ENHANCING COMPOUNDS 25KG
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ABB Pulsar lightning rods

Pulsar Technology, the 5 reasons to choose it!

Extremely robust and reliable Early Streamer Emission Air Terminal

1 Robustness

All parts of the Pulsar lightning rod are made of stainless steel type 304L.

Those that must withstand to the lightning current are parts machined from massive stainless steel blocks.

2 Reliability

- 3 electronic insulation tests in waves combined 8 / 20-1.2 / 50 to 25 kV are made on each circuit before its assembly in the Pulsar
- Electronic based on high quality passive components: non-polarized capacitors, autotransformer, gas spark gap
- 3 electronic functioning tests carried out with the test case during manufacture (last test before packing)
- 100% reliable: periodic test ensured by a simple mechanical indicator.

3 Performance

Unmatched by our efficiency tests carried out on the Pulsar Technology since 1987 in a lot of laboratories on arcs of 14 m (China), 7 m (Canada), and more generally 3 m (France) and also current withstand test in waveform 10/350 at 100 kA from 1999.

Pulsar are certified to comply with the standard NF C17-102 Version 2011 by ITE Spain (01/2021) and by UL (02/2017).

4 Longevity

Components with increased service life: protection from climatic variations thanks to molding the electronics in a Urethane resin with two components, which eliminates any possibility oxidation thereof. Our experience of more than 30 years on Pulsar's electronics guarantee our know-how.

5 10 year warranty: **New!**

A simple registration on our website allows activate a 10-year warranty extension.

Technical characteristics

- Lightning rod with Early streamer emission device – ESEAT
- Equipped with the RodCheck system, which allows remotely check the good working condition Pulsar's electronic
- 3 products with respective efficiency of 30, 45 and 60 μ s
- Manual re-installation of the rodcheck system
- 304 L Stainless steel body
- Rodcheck mobile indicator ring in polyamide – resistant to high temperatures

How does the impact indicator work?

The signaling of a lightning impact is materialized by the appearance of a red ring visible at a long distance.

This indication makes it essential the verification of the Pulsar's electronics using a ESEAT test set.

If this check indicates that the electronics are in perfect working state, the RodCheck ring must be replaced (manually) to allow the next inspection ESEAT maintenance. Protection is provided again by this lightning rod for a period of 10 years or until the next impact.

If there has been no lightning strike, a check of the Pulsar's electronics using the ESEAT test set is recommended every 10 years.

Why an Pulsar equipped with a Rodcheck system is more reliable than a remotely testable lightning rod?

- Remotely testable lightning rods require a stockage of energy (battery, solar panels).
These components have short lifespans and do not withstand climatic variations.
- The photovoltaic panels present on the remotely testable lightning rods are soiled by acid rains, bird droppings, moss, dust... and the simple rain cannot clean them.
This leads to a lower yield of the photovoltaic cells and therefore no longer ensures the recharging of the battery correctly.
- Standard NF C 17-102 Version 2011 does not provide a remote test of these test systems, which casts doubt on their operation after a lightning impact.

With Pulsar lightning rods, the test is visual and **100% reliable**



RodCheck has not been hit by a lightning stroke



RodCheck after lightning stroke of few kA



RodCheck after several strokes or one of more than 40 kA



Information for lightning protection study

Contact information

Name:

Address:

Postal code: City: Country:

Phone: Email:

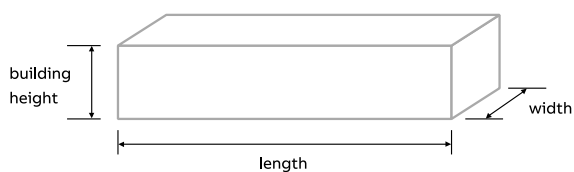
Name of the site to be protected:

Address:

City: Country:

Building typology (use, type of products, stocked or manufactured...):

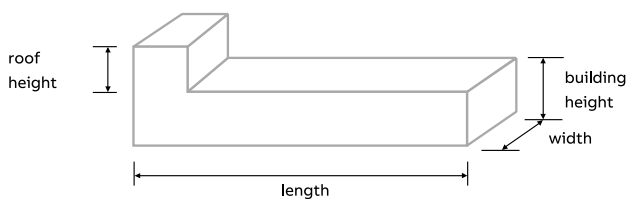
☐ completed building ☐ building under construction



Building height:

Length:

Width:

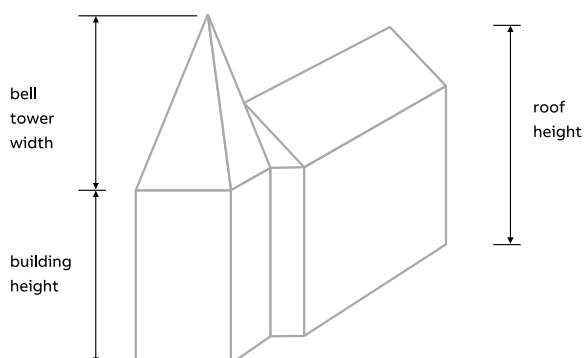


Roof height:

Building height:

Length:

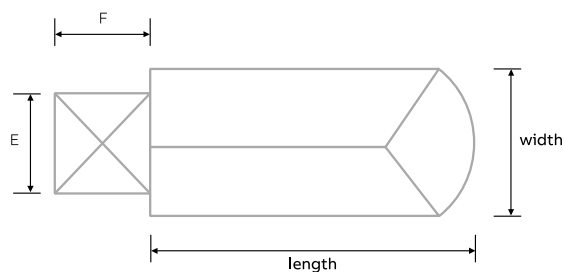
Width:



Bell tower width:

Building height:

Roof height:



Length:

Width:

E: F:

Information for lightning protection study

Construction

Structure	Roof	Facade	Nature of the soil around
☐ metallic	☐ concrete	☐ wood	☐ asphalt
☐ wood	☐ slate, tiles	☐ metallic cladding	☐ concrete
☐ concrete	☐ zinc	☐ stone	☐ soil
☐ other	☐ everit	☐ bricks	☐ other
	☐ aluminium	☐ other	
	☐ other		

Particular elements

Does there exist?

☐ antennas on the roof	☐ some metallic elements	☐ electrical ground	☐ a gas riser
how many:	how many:	☐ by belting	☐ on a facade: electrical cables
height:	type:	☐ by rods	
		electrical ground value: Ω	

Risk assessment (NF C 17-102 Annexe B)

Position relative to the surroundings (choose one):

- ☐ building located in a space where there are structure or trees of same height or higher
- ☐ building surrounded by a structure smaller
- ☐ isolated building with no other structure within a distance of 3H
- ☐ isolated building on a hilltop or headland

Roof

- ☐ metallic
- ☐ current
- ☐ flammable

Structure

- ☐ metallic
- ☐ current
- ☐ flammable

Content of structure

Please choose one option:

- ☐ worthless and non-flammable
- ☐ common value or normally flammable
- ☐ high value or particularly flammable
- ☐ exceptional value, irreplaceable or highly flammable, explosive

Occupation of structure

Please choose one option:

- ☐ unoccupied
- ☐ normally occupied
- ☐ difficult evacuation or risk of panic

Consequences of a lightning

Please choose one option:

- | | | |
|--|---|--|
| ☐ no need of continuity of service and no impact on environment | ☐ need of continuity of service and no impact on environment | ☐ consequences on environment |
|--|---|--|

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2CTH050019R0000	B752158	35	2CTH0PSH2708	HOPSH2708	45	2CTHCHSA3073	HCHSA3073	45
2CTH050020R0000	B752159	36	2CTH0PSH2709	HOPSH2709	45	2CTHCHTF0015	HCHTF0015	47
2CTH050021R0000	B752160	36	2CTH0PSH5002	HOPSH5002	31	2CTHCHTF0019	HCHTF0019	47
2CTH050022R0000	B752161	49	2CTH0RPO2840	HORPO2840	47	2CTHCPCA1510	HPCPA1510	47
2CTH050023Z0000	B752162	49	2CTH0RVH3071	HORVH3071	44	2CTHCPCA1515	HPCPA1515	47
2CTH050024Z0000	B752163	45	2CTH0RVH3072	HORVH3072	44	2CTHCPCA1910	HPCPA1910	47
2CTH050025Z0000	B752164	45	2CTH0RVH3073	HORVH3073	44	2CTHCPCA1915	HPCPA1915	47
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2CTH050027R0000	B752178	29	2CTH0SOH5006	HOSOH5006	31	2CTHCPCS1910	HPCPS1910	47
2CTH050028R0000	B752179	33	2CTH0STP5030	HOSTP5030	37	2CTHCPCS1920	HPCPS1920	47
2CTH050030Z0000	B752183	39	2CTH0STP5050	HOSTP5050	37	2CTHCPINCE01	HCPINCE01	36
2CTH050031Z0000	B752184	39	2CTH0STP5100	HOSTP5100	37	2CTHCPVB2010	HCPVB2010	47
2CTH050032Z0000	B752185	39	2CTH0TPH2705	HOTPH2705	44	2CTHCS3000	HCS3000	41
2CTH050033R0000	B752251	34	2CTH0TPH2768	HOTPH2768	44	2CTHCSSH5001	HCSSH5001	31
2CTH050034R0000	B752252	34	2CTH130001R0000	B7527172	44	2CTHCSTH5002	H CSTH5002	31
2CTH050037R0000	H05003700	42	2CTH130002R0000	B752718	44	2CTHCTLB5002	HCTLB5002	34
2CTH050038R0000	B752679	42	2CTHCACA2025	HCACA2025	43	2CTHCTLB5004	HCTLB5004	34
2CTH050040R0000	B752841	41	2CTHCACA6460	HCACA6460	43	2CTHCTLB5005	HCTLB5005	34
2CTH070001R0000	B752165	29	2CTHCBCH2709	HCBCH2709	42	2CTHCTSH4525	HCTSH4525	34
2CTH070002R0000	B752166	29	2CTHCBRP2680	HCBRP2680	37	7TCA083870R1819	CM040	47
2CTH070005R0000	B752169	33	2CTHCCPA2715	HCCPA2715	37	7TCA085410R0053	OVRLSC	42
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2CTH070010R0000	B752174	33	2CTHCCCTC2714	HCCTC2714	37			
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2CTH080001R0000	B752130	43	2CTHCGMD6692	HCGMD6692	47			
2CTH080004R0000	B752471	43	2CTHCHAP3001	HCHAP3001	40			
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2CTH0BMA0020	H0BMA0020	47	2CTHCHAR2446	HCHAR2446	40			
2CTH0BRC2780	H0BRC2780	37	2CTHCHAR2945	HCHAR2945	40			
2CTH0BRC2781	H0BRI2779	37	2CTHCHCO0071	HCHCO0071	49			
2CTH0BRH2779	H0BRH2779	37	2CTHCHCO0900	HCHCO0900	49			
2CTH0BRI2779	H0BRI2779	37	2CTHCHFC4002	HCHFC4002	36			
2CTH0BRX3780	H0BRX3780	37	2CTHCHFP2650	HCHFP2650	36			
2CTH0CCF2004	H0CCF2004	42	2CTHCHMA5030	HCHMA5030	34			
2CTH0CCP2716	H0CCP2716	37	2CTHCHMC0015	HCHMC0015	47			
2CTH0CRH3020	H0CRH3020	47	2CTHCHMC0019	HCHMC0019	47			
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B752156	2CTH050017R0000	35	H0HMA5010	2CTH0HMA5010	31	HCHPA0321	2CTHCHPA0321	48
B752157	2CTH050018R0000	35	H0HMA5115	2CTH0HMA5115	34	HCHPA0403	2CTHCHPA0403	48
B752158	2CTH050019R0000	35	H0HPC2773	2CTH0HPC2773	41	HCHPA0409	2CTHCHPA0409	48
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B752163	2CTH050024Z0000	45	H0JCH2708	2CTH0JCH2708	44	HCHPB2773	2CTHCHPB2773	38
B752164	2CTH050025Z0000	45	H0PFH5000	2CTH0PFH5000	31	HCHPG2679	2CTHCHPG2679	41
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B752166	2CTH070002R0000	29	H0PSH2708	2CTH0PSH2708	45	HCHSA3073	2CTHCHSA3073	45
B752169	2CTH070005R0000	33	H0PSH2709	2CTH0PSH2709	45	HCHTF0015	2CTHCHTF0015	47
B752170	2CTH070006R0000	33	H0PSH5002	2CTH0PSH5002	31	HCHTF0019	2CTHCHTF0019	47
B752171	2CTH070007R0000	33	H0PSH5004	2CTH0PSH5004	31	HCPCA1510	2CTHCPCA1510	47
B752172	2CTH070008R0000	33	H0PTS3000	2CTH0PTS3000	30	HCPCA1515	2CTHCPCA1515	47
B752173	2CTH070009R0000	33	H0RPO2840	2CTH0RPO2840	47	HCPCA1910	2CTHCPCA1910	47
B752174	2CTH070010R0000	33	H0RVH3071	2CTH0RVH3071	44	HCPCA1915	2CTHCPCA1915	47
B752175	2CTH070011R0000	29	H0RVH3072	2CTH0RVH3072	44	HCPCS1520	2CTHCPCS1520	47
B752177	2CTH050026R0000	33	H0RVH3073	2CTH0RVH3073	44	HCPCS1910	2CTHCPCS1910	47
B752178	2CTH050027R0000	29	H0RVH3074	2CTH0RVH3074	44	HCPCS1920	2CTHCPCS1920	47
B752179	2CTH050028R0000	33	H0SOH5006	2CTH0SOH5006	31	HCPINCE01	2CTHCPINCE01	36
B752182	2CTH010004R0000	30	H0STP5030	2CTH0STP5030	37	HCPVB2010	2CTHCPVB2010	47
B752183	2CTH050030Z0000	39	H0STP5050	2CTH0STP5050	37	HCSCP3000	2CTHCCSCP3000	41
B752184	2CTH050031Z0000	39	H0STP5100	2CTH0STP5100	37	HCSSH5001	2CTHCCSSH5001	31
B752185	2CTH050032Z0000	39	H0TPH2705	2CTH0TPH2705	44	HCSTH5002	2CTHCCSTH5002	31
B752186	2CTH040001R0000	37	H0TPH2768	2CTH0TPH2768	44	HCTLB5002	2CTHCTLB5002	34
B752187	2CTH040002R0000	37	HCACA2025	2CTHHCACA2025	43	HCTLB5004	2CTHCTLB5004	34
B752251	2CTH050033R0000	34	HCACA6460	2CTHHCACA6460	43	HCTLB5005	2CTHCTLB5005	34
B752252	2CTH050034R0000	34	HCBCH2709	2CTHCBCH2709	42	HCTSH4525	2CTHCTSH4525	34
B752311	2CTH040004R0000	37	HCBRP2680	2CTHCBRP2680	37	IMH3000	2CTB899800R7000	29
B752312	2CTH040003R0000	37	HCCPA2715	2CTHCCPA2715	37	IMH4500	2CTB899800R7500	29
B752319	2CTH040005R0000	37	HCCPG3035	2CTHCCPG3035	37	IMH6000	2CTB899800R7100	29
B752320	2CTH040006R0000	37	HCCRA0015	2CTHCCRA0015	47	OVRLSC	7TCA085410R0053	42
B752471	2CTH080004R0000	43	HCCRA0020	2CTHCCRA0020	47			
B752679	2CTH050038R0000	42	HCCRE2700	2CTHCCRE2700	34			
B752712	2CTH130001R0000	44	HCCTC2714	2CTHCCCTC2714	37			
B752718	2CTH130002R0000	44	HCGMD1020	2CTHCGMD1020	47			
B752841	2CTH050040R0000	41	HCGMD6692	2CTHCGMD6692	47			
CM040	7TCA083870R1819	47	HCHAP3001	2CTHCHAP3001	40			
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H0HAA2673	2CTH0HAA2673	38	HCHPA0115	2CTHCHPA0115	48			
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H0HAR2646	2CTH0HAR2646	40	HCHPA0124	2CTHCHPA0124	48			
H0HAR2746	2CTH0HAR2746	38	HCHPA0206	2CTHCHPA0206	48			
H0HAR2845	2CTH0HAR2845	40	HCHPA0209	2CTHCHPA0209	48			

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