



> GUIDE FOR DESIGN AND INSTALLATION USING RODS AND MESHED CONDUCTORS

Lightning protection using rods and meshed conductors is intended to share and dissipate the lightning current through a network of down-conductors and earth terminations.

The elements of a lightning protection system using rods and meshed conductors are as follows:

> EXTERNAL LIGHTNING PROTECTION SYSTEM

- Simple rods and/or meshed conductors
- Down-conductors
- Earth Termination System

> INTERNAL LIGHTNING PROTECTION SYSTEM

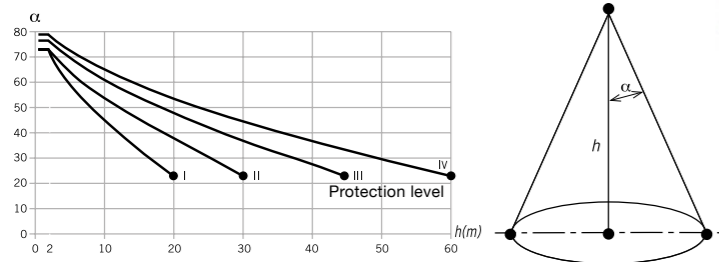
- A suitable surge protection installation.
- Other measures minimizing the destructive effects of lightning (equipotential bonding, screening etc.).

The installation of a lightning protection system using rods and meshed conductors must follow the standards IEC62305 on Lightning Protection:

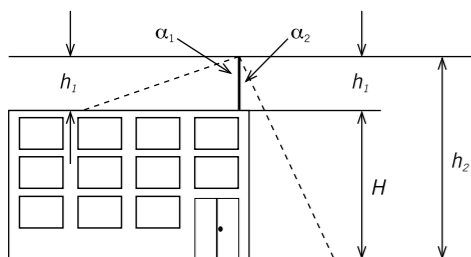
The volume protected by the air terminals can be determined using 3 methods:

> ANGLE METHOD

According to this method, the protection volume is given by a line starting at the air terminal, the angle of which depends on the height and the protection level, according to the following graph:



Franklin rods should be placed on the higher and most vulnerable places (corners, overhangs, etc.), as shown in the figure:

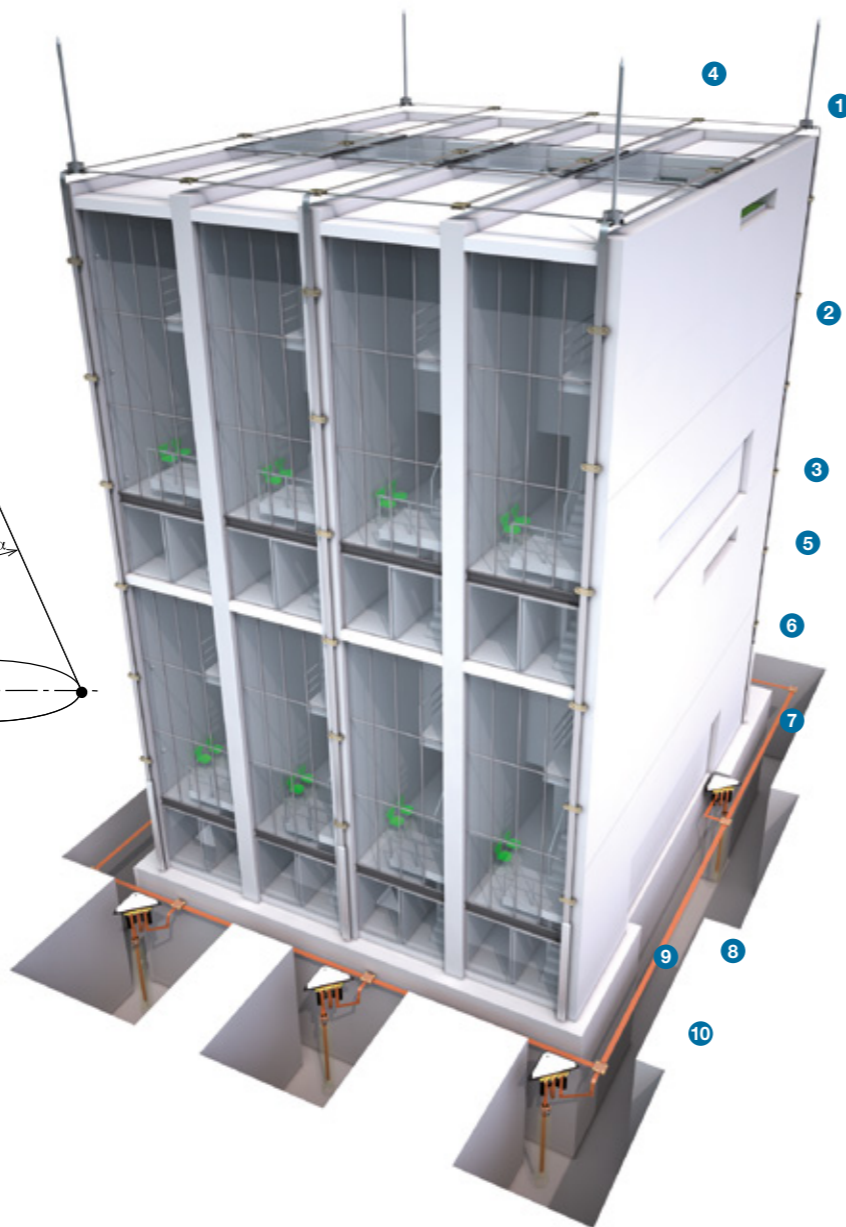
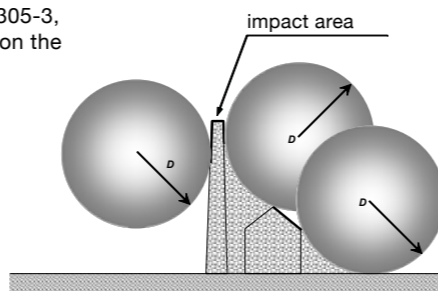


> ROLLING SPHERE METHOD

This method is based on an electrogeometric model that assumes that the last step of the downward leader can propagate in any direction. The model represents this with a sphere (of different radius depending on the required protection level) whose centre is the end of the lightning downward leader. This sphere is rolled along the external surface of the structure to be protected, so that the points in contact with the sphere are susceptible to get a lightning strike.

According to the Standard IEC 62305-3, the rolling sphere radius depends on the protection level:

- Protection level I: D = 20 m
- Protection level II D = 30 m
- Protection level III D = 45 m
- Protection level IV D = 60 m

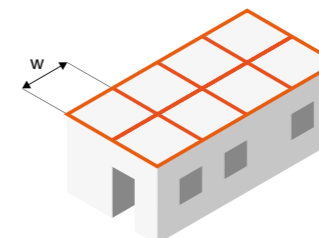


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> MESH METHOD

According to this method, conductors forming a mesh should be placed on the structure. The separation depends on the protection level:

Protection level	w	Distance between down-conductors
I	5 m	10 m
II	10 m	10 m
III	15 m	15 m
IV	20 m	20 m



INTERCEPTION

- The mesh should be applied to the edges, overhangs and roof area perimeter, following the described methods. For buildings higher than 60 m, a level IV mesh should also cover the upper 20% of the outer walls.

DOWN-CONDUCTORS

- Down-conductors should provide several parallel paths to distribute the lightning current. The length of the current paths to the earthing system should be as short and direct as possible. To minimize the risk of dangerous sparks, down-conductors should be connected to the grounded metal parts of the structure if the distance between them is shorter than the safety separation distance as defined in the regulations.
- The conductors should be fixed to the structure once every metre.
- For longer conductors, it is recommended to install expansion joints every 20 m.
- A guard tube should be installed for each down-conductor, covering at least 2 m from the floor, in order to avoid mechanical damages.
- Each down-conductor must be connected to the earthing system. Equipotential bonding is recommended for all the down-conductors at ground level every 20 m.

EARTHING

- The recommended configuration for the earthing system is a ring bonding all down-conductors. A disconnecting sleeve should be installed in each down-conductor for measuring earth resistance separated from other conductive elements.
- It is recommended that the earthing resistance is less than 10 Ω.
- Earth conductors should be buried at a depth of at least 50 cm.
- Aluminium conductors or fittings must not be used directly with the earth. Direct connections between copper and aluminium conductors or copper and galvanized steel conductors are not recommended in order to avoid corrosion. Bimetal or stainless steel clamps should be used for these connections.

> RECOMMENDED MATERIALS

DENOMINATION	REF.	TABLE
Franklin air rod	AT-008A	5
Franklin air rod base	AT-116B	17
Self-supporting Franklin air rod	AT-104A	10
Expansion unit	AT-012G	108
Roof conductor holder	AT-041E	66
Clamp	AT-039F	88
Conductor	AT-057D	123

DENOMINATION	REF.	TABLE
Clip	AT-240E	46
Rainwater pipe bond	AT-025J	87
Clamp	AT-039F	88
Bimetallic connector	AT-094F	103
Guard tube	AT-060G	107
Joint protection	AT-060G	107
Conductor	AT-057D	123

DENOMINATION	REF.	TABLE
Earth electrode	AT-041H	135
Clamp	AT-020F	90
Ground enhancing product	AT-010L	145
Earth pit	AT-010H	144
Bonding bar	AT-020H	148
Earth clamp	AT-090H	158
Conductor	AT-011D	120