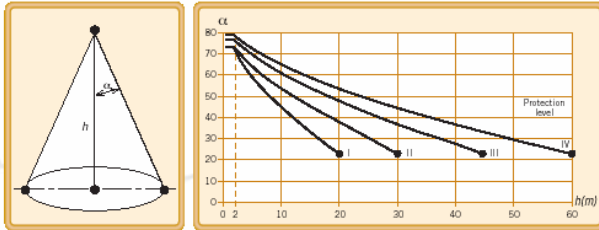


The installation of a lightning protection system using rods and meshed conductors must follow the standards IEC62305 Lightning Protection: The volume protected by the air terminals can be determined using 3 methods:

ANGLE METHOD

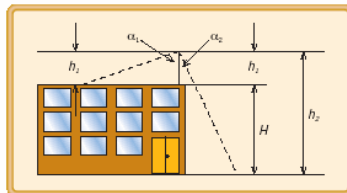
According to this method the protection volume is given by a line which origin is at the air terminal and which angle depends on the height and the protection level according to the following chart and graphic:



PROTECTION LEVEL	R(m)	h(m)			
		20	30	45	60
I	20	25	*	*	*
II	30	35	25	*	*
III	45	45	35	25	*
IV	60	55	45	35	25

*For higher structures regarding this chart, this method cannot be applied.

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



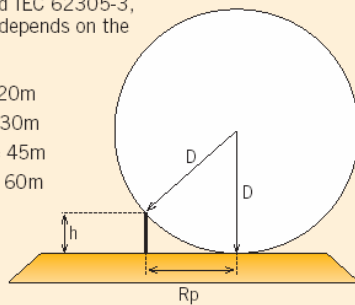
Self-standing rods (table 9) are recommended when the rods have to surpass 8m or higher elements on the roof.

ROLLING SPHERE METHOD

The rolling sphere method is based on an electrogeometrical model when it is assumed that the downward leader that will strike the structure to be protected has the shape of a sphere with a radius D (space where the last step of the downward leader can stay). The points where this sphere can touch the structure should be provided with air terminals.

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

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



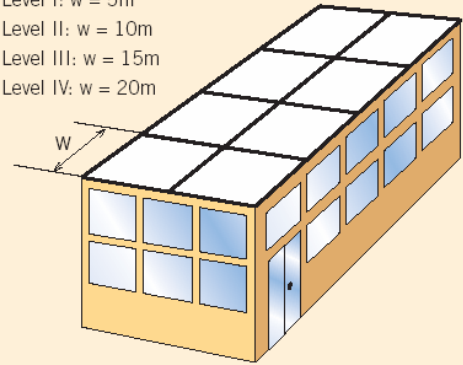
Once these air terminals are installed, the protection radius (Rp) can be defined as shown in the figure and the formula:

$$R_p = \sqrt{2 \cdot D \cdot h - h^2}$$

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 I: w = 5m
- Protection Level II: w = 10m
- Protection Level III: w = 15m
- Protection Level IV: w = 20m



The mesh should protect firstly the cover perimeter, especially edges and overhangs.

For buildings higher than 60m, a mesh with the same size has to cover also the upper 20% of the outer walls.

Down-conductors should follow these requirements:

- To provide several parallel paths for sharing the lightning current.
- The length of the current paths to the earthing should be as short and direct as possible.
- They should be connected to the grounded metallic parts of the structure if the distance between them is shorter than the separation distance as defined in the standards.

The distance between down-conductors depends also on the protection level:

Protection Level	Distance between down-conductors
I	10m
II	10m
III	15m
IV	20m

- The conductors should be fixed to the structure every meter approximately.
- For thermic length compensation of longer conductors, it is recommended to install expansion units each 20 meters.
- A guard tube should be installed for each down-conductor, covering at least 2m over the floor, in order to avoid mechanical damages.
- Every down-conductor must be connected to the earthing. It is recommended to equipotentialize all the down-conductors at ground level and every 20m.
- A disconnecting sleeve should be installed in each down-conductor for measuring earth resistance separated from other conductive elements.
- It is recommended less than 10Ω for earthing resistance.
- Earth conductors should be buried at a depth of at least 0,5m.
- It is not recommended to install aluminium conductors or pieces directly into earth.
- Unions between copper and aluminium conductors or copper and galvanized steel conductors are not recommended to avoid corrosion. It should be used bimetallic or stainless steel clamps.

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

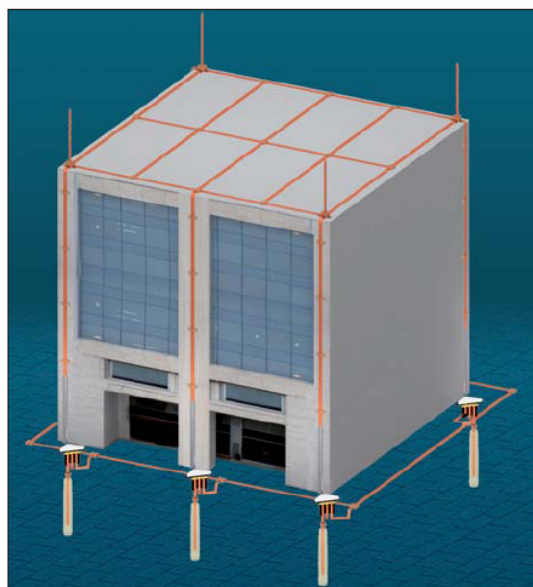
The elements of a lightning protection system using rods and meshed conductors are the following:

External Lightning Protection System

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

Internal Lightning Protection System

- A correct surge protection installation (see Overvoltage Protection catalogue)
- Other measures minimizing the destructive lightning effects (equipotential bonding, screening, etc.)



Recommended materials for a lightning protection installation using rods and meshed conductors:

This table gives the proper material for making a copper, aluminium, galvanized steel or stainless steel mesh. In the column "Table", the number of the table in the catalogue where the recommended material is described.

Denomination	Reference Cu	Table	Reference Al	Table	Reference Galv S	Table	Reference SS	Table
Air rod	AT-005A	5	AT-008A	5	AT-038A	8	AT-032A	8
Self-supporting air rod					AT-104A	9	AT-104A	9
Air rod base	AT-115B	16	AT-116B	16	AT-030B	25	AT-030B	25
Flat washer					AT-095B	25	AT-095B	25
Roof conductor holder	AT-207E	49	AT-207E	49	AT-042E	64	AT-042E	64
Clamp	AT-033F	85	AT-039F	85	AT-125F	91	AT-122F	91
Conductor	AT-011D	147	AT-057D	150	AT-060D	157	AT-128D	157
Clip	AT-114E	43	AT-121E	43	AT-128E	53	AT-128E	53
Clip for guard tube					AT-132E	53		
Tile support	AT-094E	71	AT-094E	71	AT-090E	67	AT-090E	67
Gutter clamp					AT-040F	72	AT-040F	72
Downpipe support	AT-177E	83	AT-025J	84	AT-186E	77	AT-186E	77
Clamp	AT-033F	85	AT-039F	85	AT-125F	91	AT-122F	91
Test clamp	AT-080F	94	AT-094F	100				
Spark gap for aerial mast	AT-060F	101	AT-060F	101	AT-060F	101	AT-060F	101
Guard tube	AT-060G	103	AT-060G	103	AT-057G	103	AT-053G	103
Joint protection					AT-010J	125		
Conductor	AT-011D	147	AT-057D	150	AT-060D	157	AT-128D	157
Earth electrode	AT-041H	117	AT-041H	117	AT-049H	120	AT-080H	119
Coupling					AT-038K	120		
Ground enhancing product	AT-010L	124	AT-010L	124	AT-010L	124	AT-010L	124
Earth pit	AT-010H	126	AT-010H	126	AT-010H	126	AT-010H	126
Bonding bar	AT-020H	127	AT-020H	127	AT-020H	127	AT-021J	127
Earth clamp	AT-080J	137	AT-080J	137	AT-131J	146	AT-133J	146
Conductor	AT-011D	147	AT-011D	147	AT-061D	157	AT-129D	157

Interception systems

Down-conductors

Earthing

NOTE: The pages and tables indicated here are the one from our EXTERNAL PROTECTION catalogue. Download it on our Website: www.at3w.com

