

15.3.3 Horizontal conductor(s) for flat roofs.

Figure 6b) shows a simple horizontal air termination consisting of a roof conductor around the periphery of a rectangular building. The resulting zone of protection is shown in plan and elevation.

Figure 10 shows a typical arrangement for a structure with a large area of flat roof where the use of a system of horizontal roof conductors is strongly recommended (see 15.2). The network of the air termination on a flat roof is recommended to be in the form of a grid to reduce the effect of flashover caused by large induction loops.

15.3.4 Large structures

For buildings formed by tall block(s) with abutting lower block(s), such as that shown in Figure 15, protection should comprise air terminations, down conductors and earth terminations. The protection for the lower block(s) should be designed as though the tall block(s) and its lightning protection does not exist. The earth termination network and the bonding should be common (see Figure 7, 16.9, 16.10, clause 17 and A.1, A.2 and A.5).

Figure 11 shows the type of building formed by a large rectangular block having a flat roof at different levels. The block is protected by a horizontal air termination consisting of roof conductors along the outer edges of the roof and also along the inner edges of any parts of the roof that are higher than adjacent parts, unless they fall in the zone of protection of a higher conductor, e.g. the light well. Additional roof conductors may be necessary for large roof areas (see note 1 to Figure 11). All elements of the lightning protection system should be joined together as recommended in clause 12 (see Figure 15 and Figure 31).

NOTE In Figure 15, the horizontal conductors at the base of the tower are used to connect the roof mesh to the down conductors present in the steelwork of the tower. They are within the zone of protection; otherwise such conductors would not be necessary.

Figure 12 shows examples of common profiles for roofs covering large areas. Horizontal air terminations are shown which consist of ridge conductors bonded at both ends by conductors following the roof profiles. If the roof is longer than 20 m, additional transverse conductors are positioned every 20 m or part thereof.

For structures over 20 m high and of complex geometry, the rolling sphere method (see A.5 and Figure A.1) will determine the required locations for air terminations (unless they are inherently provided by structural steelwork or reinforcing).

15.3.5 Tiled roofs

On non-conducting roofs, the conductor may be placed either under or, preferably, over the tiles. Although mounting the conductor under the tiles has the advantages of simplicity and a reduced risk of corrosion, it is preferable, where adequate fixing methods are available, to install it along the top of the tiles (i.e. externally). This reduces the risk of damage to the tiles should the conductor receive a direct strike and also simplifies inspection.

Conductors placed below the tiles should preferably be provided with short vertical finials or strike plates which protrude above roof level and are spaced not more than 10 m apart. Churches and similar non-conducting structures should be treated as special cases; the presence of the tower or spire should be disregarded when designing the protection for the lower parts of the structure (see Figure 31).

15.3.6 Simple structures with explosive hazards

Figure 18 shows the type of installation primarily intended for simple structures with explosive hazards. It consists of two vertical conductors connected by a horizontal catenary wire. The zone of protection is shown in plan and elevation and reflects the effect of the sag in the catenary wire (see 22.2.1).

16 Down conductors

16.1 General

The function of a down conductor is to provide a low impedance path from the air termination to the earth electrode so that the lightning current can be safely conducted to earth.

This code of practice covers the use of down conductors of various types including the use of strip, rod, reinforcing bars and structural steel stanchions, etc. Any good conductor which forms part of the building structure can be included, appropriately jointed to the air and earth terminations. In general, the greater the number of down conductors used, the lower the risk of side-flashing and other undesirable phenomena. Likewise, large conductors reduce the risk of side-flashing, especially if insulated. However, the performance of the "shielded" coaxial down lead system is not significantly different in any respect from conductors of similar overall dimensions and insulation. Use of such shielded conductors does not allow a reduction in the number of down conductors recommended by this code of practice.

In practice, depending upon the form of the building, it is often necessary to have multiple down conductors in parallel, some or all of which may be part of the building structure itself. For example, a steel framed or reinforced concrete structure might need no added down conductors as the framework itself provides an efficient natural network of many paths to earth; conversely a structure made entirely from non-conducting materials would need down conductors deployed according to the size and form of the structure.

In brief, the down conductor system should, where practicable, be directly routed from the air termination to the earth termination network and be symmetrically placed around the outside walls of the structure starting from the corners. In all cases, consideration should be given to side-flashing. (See also 16.5.)

Design recommendations are given in 16.2 to 16.11.