

Chapter E 162

MISCELLANEOUS STRUCTURES

E 162.01	Spires, steeples, and flag poles	E 162.02	Water towers, silos, and similar structures
		E 162.03	Grain elevators

E 162.01 Spires, steeples, and flag poles. (1) **GENERAL.** The materials, equipment and ground connections required by the rules of this chapter for the protection of spires, steeples, and flag poles, shall comply with the requirements of chapter E 161.

(2) **AIR TERMINALS.** A single air terminal may be used, which elevates the tip a distance of not less than 10 inches above the uppermost point of the structure.

(3) **DOWN CONDUCTORS.** A single down conductor may be used, which, if the structure is isolated, shall be extended directly to a ground connection. If the structure is an adjunct of a building and near or touching the perimeter, the down conductor shall be extended directly to a ground connection, but shall also be connected to the lightning-conductor system on the building. If it is set well within the perimeter the descending conductor shall be connected to the nearest roof conductor.

(4) **INTERCONNECTION OF METALS.** Bells, clocks, structural iron, and other metallic masses shall be connected to the down conductor. If the length of a metallic body is comparable to the height of the structure, connection shall be made at the upper and lower extremities; otherwise connection may be made at the nearest point.

(5) **GROUNDING OF METALLIC SPIRES AND FLAG POLES.** Spires and flag poles composed entirely of or covered entirely with metal and resting on foundations of non-conducting material with the top so constructed as to receive a stroke of lightning without appreciable damage, need not be provided with air terminals or down conductors, but shall be grounded or connected to the nearest lightning conductor, or both, according as the structure is isolated, set within the perimeter of a building or near it, respectively.

Note: On spires and steeples exceeding 100 feet in height it is advisable to use more massive conductors and fastenings than on ordinary types of buildings in order to resist the extraordinary conditions found on tall structures.

History: Cr. Register, April, 1964, No. 100, eff. 5-1-64.

E 162.02 Water towers, silos, and similar structures. (1) **GENERAL.** The materials, equipment, and ground connections required by the rules of this chapter for the protection of water towers, silos, and similar structures, shall comply with the requirements of chapter E 161.

Note: On structures exceeding 100 feet in height it is advisable to use more massive conductors and fastenings than on ordinary buildings in order to resist the extraordinary conditions found on tall structures, especially with regard to temperature effects and loading which may lead to alternate expansion and contraction.

(2) **AIR TERMINALS.** The number and location of air terminals shall in general comply with the requirements of section E 164.04, except that on silos and other towers having roofs ending in a peak a single air terminal may be regarded as sufficient.

(3) **CONDUCTORS.** Where more than one air terminal is used they shall be connected together by a conductor which forms a closed loop about the structure near the top, or passes over it, as the contour of the roof may require. From this, or from the single air terminal if but one is used, at least 2 down conductors shall be extended directly to ground connections on opposite sides, if the structure is isolated. If it is an adjunct of a building, near or touching the perimeter, one down conductor shall be extended directly to a ground connection while the other may be connected to the lightning conductor system on the building. If it is set well within the perimeter both down conductors may be connected to the lightning-conductor system on the building. If the height of the structure exceeds 100 feet the down conductors should be cross-connected midway between top and bottom.

(4) **INTERCONNECTION OF METALS.** All metallic bodies of considerable size or extent, whether exterior or interior, shall be connected to the down conductors. If their length is comparable to the height of the structure they shall be connected to the down conductors at both ends; otherwise connection may be made at the nearest point.

Note: Metal objects about towers which are comparable in length with the height of the structure, consist usually of stairways, elevator guides, and drain pipes carrying water from the roof.

(5) **GROUNDING OF METAL TOWERS AND WATER TANKS.** Towers and tanks composed entirely of or covered entirely with metal and resting on foundations of non-conducting material, with the uppermost portion so constructed as to receive a stroke of lightning without appreciable damage, shall be grounded by means of 2 earth terminals on opposite sides of the structure.

History: Cr. Register, April, 1964, No. 100, eff. 5-1-64.

E 162.03 Grain elevators. (1) **GENERAL.** The rules contained in chapter E 161, except as modified by subsections E 162.03 (2) and E 162.03 (3), shall apply to grain elevators, and to other structures in which combustible dusts may be produced in quantities sufficient to form explosive or ignitable mixtures with air or in which such dusts may accumulate on ledges or other surfaces in quantities sufficient to sustain smoldering fire.

(2) **CONDUCTORS.** Roof conductors and down conductors shall be of copper or aluminum cable conforming to section E 161.01.

Note: Due to the physical deformation of such structures through cycles of loading and unloading, it is necessary that conductors have sufficient flexibility to guard against breakage.

(3) **INTERCONNECTION OF METALLIC MASSES.** Interconnection of metallic masses shall conform to section E 161.07, except that all interior metallic masses having any dimension greater than 5 feet, and all metallic masses except those of comparatively small size, which are within 6 feet of grounded metallic masses including lightning conductors and metal connected thereto, shall be interconnected with each other and with the lightning conductors. Interconnected networks of interior metallic masses shall have at least one interior ground connection in addition to the lightning conductor grounds.

History: Cr. Register, April, 1964, No. 100, eff. 5-1-64.