Chapter E 172

PROTECTION OF SPECIFIC CLASSES OF STRUCTURES

E 172.01 Aboveground steel tanks containing flammable liquids at atmospheric pressures. The contents of steel tanks with steel roofs of riveted, bolted, or welded construction, with or without supporting members, used for the storage of flammable liquids, are considered to be reasonably well protected against lightning if the tanks conform to the following specifications:

(1) All joints between steel plates to be riveted, bolted, or welded.

(2) All pipes entering the tank to be metallically connected to the tank at the point of entrance.

(3) All vapor or gas openings to be closed or flameproofed, as described in section E 171.06 when the stored stock is a class I or class II flammable liquid.

(4) The metal tank and roof to have adequate thickness so that holes will not be burned through by lightning strokes (3/16 inch roof sheets on tanks when built have proved adequate).

(5) The roof to be continuously welded to the shell, or bolted, or riveted and caulked, to provide a gastight seam and electrical continuity.

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

E 172.02 Additional protection. In cases where additional protection is deemed to be justified, the following procedures are recommended:

(1) The internal structural supporting members shall be bolted, riveted, welded or otherwise metallically bonded to the tank roof at not more than 10-foot intervals. (Figure E.)

(a) Any bonding conductor between the expandable roof and the rigid supporting structure should be made as short as possible for electrical reasons, but should be sufficiently long to prevent snapping off due to mechanical motion of the roof. The conductor should be flexible and of a size not less than No. 1 AWG. The metal of the conductor should be corrosive resistant for the liquids and vapors existing in the tank.

(2) Provide an overhead ground-wire system or mast protection to prevent contact of direct strokes with the roof (see section E 171.03).

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

E 172.03 Floating roof tanks. (1) GENERAL. Floating roof tanks with hanger mechanisms, located within a vapor space have occasionally ignited at the seal during lightning storms even though there was no evidence of being struck. This may result from sparks that could occur in the pinned joints of the hanger mechanisms when bound charges on the roof are suddenly released by a nearby lightning stroke and return to earth through the hanger mechanism and tank shell.

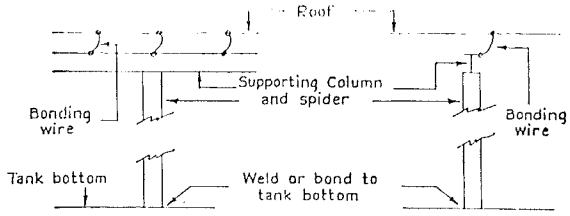

Figure E.

(2) PROTECTION. (a) Experience indicates that floating roof tanks without vapor spaces have not been subject to ignition, and protective measures need not be considered.

(b) In areas where lightning protection is deemed to be justified, floating roof tanks with hangers located within a vapor space may be protected as follows:

1. Bond the roof to the shoes of the seal at intervals not greater than 10 feet on the circumference of the tank, and

2. Break up the conductive paths through the hanger linkage by means of insulated joints or install short jumper bonds around each pinned joint of the hanger mechanism.

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

E 172.04 Steel tanks with non-metallic roofs. (1) Steel tanks with wooden or other non-metallic roofs are not considered to be self-protecting, even if the roof is essentially gastight and sheathed with thin metal and with all gas openings closed or flameproofed.

(2) Such tanks should be provided with air terminals of sufficient height and number to receive all strokes and keep them away from the roof. The air terminals should be thoroughly bonded to each other, to the metallic sheathing, if any, and to the tank. Isolated metal parts should be avoided or else bonded to the tank. In lieu of air terminals, any of the following may be used, conducting masts, suitably spaced around the tank; or overhead ground wires; or a combination of masts and overhead ground wires.

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

E 172.05 Grounding tanks. (1) Tanks should be well grounded to conduct away the current of direct strokes and avoid building up potential that may cause sparks to ground.

(2) Steel tanks that are in intimate contact with the ground, or aboveground steel tanks connected to extensive metallic piping, are sufficiently well grounded inherently.

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

E 172.06 Pressure storage of flammable liquids or gases. Aboveground storage tanks containing flammable liquids or liquefied petroleum gas under pressure do not require lightning protection.

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

E 172.07 Earthen containers. Earthen containers, lined or unlined, with or without roofs, may be protected by air terminals, separate masts, overhead ground wires, or a combination of these.

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