

## Chapter E 164

## SMOKESTACKS AND CHIMNEYS

E 164.01	Metal smokestacks	E 164.03	Reinforced-concrete stacks
E 164.02	Brick, hollow-tile, and concrete stacks	E 164.04	Vents emitting explosive dusts, vapors or gases

**E 164.01 Metal smokestacks.** (1) Metal smokestacks need no protection against lightning other than that afforded by their construction, except that they shall be properly grounded. If the construction of the foundation is not such as to provide ample electrical connection with the earth, ground connections shall be provided similar to those required for stacks made of materials other than metal as provided in section E 164.02 (7).

(2) Metal guy wires and cables shall be grounded at their lower ends.

*Note:* Metal guy wires or cables attached to steel anchor rods set in earth may be considered as sufficiently well grounded. Only those set in concrete or attached to buildings or non-conducting supports need attention.

*History:* Cr. Register, January, 1968, No. 145, eff. 2-1-68.

**E 164.02 Brick, hollow-tile, and concrete stacks.** Where stacks of brick, hollow tile, concrete, or other material liable to damage by lightning are to be protected the following rules shall apply.

(1) **CONDUCTORS.** (a) Conductors shall be of copper of the grade required for commercial electrical work, generally designated as having 98% conductivity when annealed.

(b) The weight of the conductor shall be not less than 6 ounces per linear foot.

(c) The size of any wire in a cable shall be not less than No. 15 AWG (0.057 inch).

(d) The thickness of any tube wall shall be not less than No. 15 AWG (0.057 inch).

(e) The thickness of any web or ribbon shall be not less than No. 12 AWG (0.080 inch).

(2) **FASTENERS.** (a) Fasteners shall be of copper or copper alloy substantially as resistant to corrosion as the conductor itself, and must be strongly constructed. Each fastener must have a sufficiently tight grip to support its corresponding length of conductor.

(b) Fasteners shall be spaced close enough to give ample support to the conductor, generally not over 4 feet apart.

(3) **AIR TERMINALS.** (a) Air terminals shall be strongly constructed of the same grade of material as the conductor, or may be made of stainless steel, monel metal, or other equally corrosion-resistant metal; and shall be uniformly distributed about the rim of the stack at intervals not exceeding 8 feet.

(b) The height above the rim shall be not less than 30 inches.

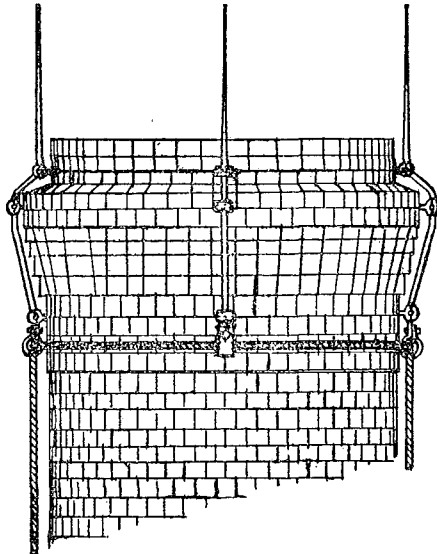
(c) They shall be secured to the top of the stack by means of expansion bolts or fan shank fasteners of substantial construction. The air terminals shall be electrically connected together by means of a metal ring or band which forms a closed loop about 2 feet below the top of the chimney. If there is a metal crown the air terminals should be connected thereto.

(4) DOWN CONDUCTORS. (a) At least 2 down conductors shall be provided on opposite sides of the stack, leading from the ring or crown at the top to the ground.

(b) On stacks exceeding 160 feet in height the down conductors shall be cross-connected approximately midway between top and bottom. Where a metal ladder is continuous from the rim to the ground, and the vertical members have a combined cross-section not less than twice that specified in section E 161.01 (2) (c), such members may be utilized as down conductors.

(5) LEAD COVERING. In order to prevent corrosion by gases, copper air terminals, conductors, and fasteners within 25 feet of the top of the stack shall have a continuous covering of lead at least 1/16 inch thick.

(6) JOINTS. Joints in conductors must be as few as practicable and of such construction as to show by laboratory tests a strength in tension of at least 50% of that of the conductor.



Typical Arrangement at Top of Stack

(7) GROUND CONNECTIONS. (a) Ground connections may be made in the manner prescribed for buildings. (See section E 161.08).

(b) If there is a water pipe nearby connection shall be made to it by means of a substantial clamp.

(8) PROTECTION AGAINST MECHANICAL INJURY. (a) Down conductors near the ground shall be protected against mechanical injury by means of wood molding or other non-magnetic material.

(b) If metal tubing is used for protective purposes the down conductor shall be electrically connected to it at its upper end.

(9) METAL LININGS. Where stacks have a metal lining extending part way up the lining shall be connected to the rod at its upper end and grounded at the bottom.

**History:** Cr. Register, January, 1968, No. 145, eff. 2-1-68.

**E 164.03 Reinforced-concrete stacks.** (1) REINFORCING METAL. Stacks consisting partly or entirely of reinforced concrete shall comply with the requirements of section E 164.02, and in addition the reinforcing metal shall be electrically connected together and shall be electrically connected to the down conductors at the top and bottom of the concrete.

*Note:* In existing stacks whose reinforcement may not be electrically continuous, it is recommended that additional connections be made at points where the reinforcing rods are accessible.

(2) JOINTS. Joints between iron or steel and copper, within 25 feet of the chimney top shall be protected against corrosion by being coated with lead or imbedded in the concrete.

**History:** Cr. Register, January, 1968, No. 145, eff. 2-1-68.

**E 164.04 Vents emitting explosive dusts, vapors or gases.** (1) Air terminals on capped or hooded vents emitting explosive dusts, vapors or gases should extend not less than 5 feet above the opening.

(2) When explosive dusts, gases or vapors are emitted under forced draft from open stacks, the air terminals should extend not less than 15 feet above the vent opening.

**History:** Cr. Register, January, 1968, No. 145, eff. 2-1-68.