

## COMMUNICATION SYSTEMS

### Chapter E 800

#### COMMUNICATION CIRCUITS

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#### A. GENERAL

**E 800.01 Scope.** The provisions of this chapter shall apply to telephone, telegraph (except radio), district messenger, fire and burglar alarms and similar central station systems and to telephone systems not connected to a central station system but using similar type of equipment, methods of installation and maintenance.

*Note 1.* Such protective measures as are essential to safeguard these systems under the various conditions to which they are subjected are outlined in these rules.

*Note 2.* For detailed service requirements for fire alarm, sprinkler supervisory or watchman systems, see the Standards of the National Fire Protection Association. The NFPA standards on fire alarm and supervisory systems are published by the NFPA in the National Fire Codes, Vol. V and in separate pamphlet form by the NFPA Nos. 71, 72 and 73.

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

#### B. PROTECTION

**E 800.02 Protective devices.** A protector approved for the purpose shall be provided on each circuit, aerial or underground, so located within the block containing the building served as to be liable to accidental contact with light or power conductors operating at a potential exceeding 300 volts, and on each circuit run partly or entirely in aerial wire or cable not confined within a block. Underground circuits buried without separation from power conductors in accordance with subsection E 129.05 (2) of Volume 1 shall be provided with protectors.

*Note:* The word "block" as used in this chapter shall be construed to mean a square or portion of a city, town, or village enclosed by streets and including the alleys so enclosed but not any street.

(1) **LOCATION.** The protector shall be located in or on the building as near as practicable to the point where the conductors enter. In the case of an underground entrance the protector may be located at the junction of the underground and the aerial wires.

(2) **HAZARDOUS LOCATIONS.** The protector shall not be located in any hazardous location as defined in chapter E 500, nor in the vicinity of easily ignitable material.

(3) **PROTECTOR REQUIREMENTS.** The protector shall be mounted on a noncombustible, nonabsorptive insulating base and shall consist of an arrester between each line conductor and the ground, and a fuse in

each line conductor, the fuses protecting the arrester except as specified in subsection E 800.02 (4). The protector terminals shall be plainly marked to indicate line, instrument and ground.

(4) OMISSION OF FUSES. A protector without fuses may be used under any of the following conditions:

(a) Where circuits enter a building through metal-sheathed cable, provided the metal sheath of the cable is effectively grounded and the conductors in the cable shall safely fuse at currents less than the current-carrying capacity of the protector, the associated insulated conductors, and the protector grounding conductor.

(b) Where insulated conductors in accordance with subsections E 800.11 (3) (a) and (b) are used to extend circuits to a building from a metal-sheathed cable or from a nonmetallic-sheathed cable having a metal grounding shield between the sheath and the conductor assembly provided the metal sheath or shield is effectively grounded and the conductors in the cable or cable stub shall safely fuse at currents less than the current-carrying capacity of the protector, the associated insulated conductors, and the protector grounding conductor.

(c) Where insulated conductors, in accordance with subsection E 800.11 (3) (a) and (b) are used to extend circuits to a building from other than grounded metal-sheathed cable, provided: 1. the protector is approved for this purpose and 2. the protector grounding conductor is connected to a water pipe electrode or the grounding conductor or grounding electrode of a multi-grounded neutral power system and 3. the connections of the insulated conductors to the exposed plant or the conductors of the exposed plant shall safely fuse at currents less than the current-carrying capacity of the protector, the associated insulated conductors, and the protector grounding conductor.

(d) Where insulated conductors in accordance with subsections E 800.11 (3) (a) and (b) are used to extend circuits aerially to a building from an unexposed buried or underground circuit.

*Note:* Effectively grounded means permanently connected to earth through a ground connection of sufficiently low impedance and having sufficient current-carrying capacity to prevent the building up of voltages which may result in undue hazard to connected equipment or to persons.

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

**E 800.03 Installation of conductors.** Conductors from the protector to the equipment or, where no protector is required, conductors attached to the outside of, or inside the building shall comply with the following:

(1) SEPARATION FROM OTHER CONDUCTORS. Conductors shall be separated from conductors of electric light and power circuits as follows:

(a) *Open conductors.* Conductors shall be separated at least 2 inches from any light or power conductors not in metallic raceways or metal-sheathed cable unless permanently separated from the conductors of the other system by a continuous and firmly fixed non-conductor, additional to the insulation on the wire, such as porcelain tubes or flexible tubing.

(b) *In raceways and boxes.* Communication conductors shall not be placed in any raceway, compartment, outlet box, junction box or similar fitting with conductors for light and power circuits or class 1

signal and control circuits unless the conductors of the different systems are separated by a partition; provided that this shall not apply to conductors in outlet boxes, junction boxes or similar fittings or compartments where such conductors are introduced solely for power supply to communication equipment or for connection to remote-control equipment.

(c) *In shafts.* Conductors may be run in the same shaft with conductors for light and power provided the conductors of the two systems are separated at least 2 inches, or where the conductors of either system are encased in noncombustible tubing.

(2) **VERTICAL RUNS.** Conductors bunched together in a vertical run in a shaft shall have a fire-resistant covering capable of preventing the carrying of fire from floor to floor, except where conductors are encased in noncombustible tubing or are located in a fireproof shaft having fire stops at each floor.

*Note:* The conductors referred to in this rule would ordinarily be insulated but the kind of insulation is not specified as reliance is placed on the protective device to stop all dangerous voltages and currents.

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

## C. OUTSIDE CONDUCTORS

**E 800.11 Overhead conductors.** Overhead conductors entering buildings shall comply with the following:

(1) **ON POLES.** Where communication conductors and light or power conductors are supported by the same pole, the following conditions shall be met:

(a) *Relative location.* The conductors should preferably be located below the light or power conductors.

(b) *Attachment to crossarms.* Conductors shall not be attached to a crossarm which carries light or power conductors.

(c) *Climbing space.* The climbing space through signal conductors shall comply with the requirements of section E 730.14. ✓

(2) **ON ROOFS.** Conductors passing over buildings shall be kept at least 8 feet above any roof having a pitch of 3 inches or less per foot except small auxiliary buildings such as garages and the like.

(3) **CIRCUITS REQUIRING PROTECTORS.** Circuits which require protectors (see section E 800.02) ✓ shall comply with the following:

(a) *Insulation, single or paired conductors.* Each conductor, from the last outdoor support to the protector, shall have 1/32-inch rubber insulation, except that when such conductors are entirely within a block the insulation on the conductor may be less than 1/32-inch, but not less than 1/40-inch in thickness. In addition, the conductor, either individually or over the pair, shall be covered with a substantial fibrous covering or equivalent protection. Conductors approved for the purpose having rubber insulation of a thickness less than specified above, or having other kinds of insulation may be used.

(b) *Insulation, cables.* Conductors within a cable of the metal-sheathed type, or within a cable having a rubber sheath of at least 1/32-inch thickness and covered with a substantial fibrous covering, may have paper or other suitable insulation. Where the metal or rub-

ber sheath is omitted, each conductor shall be insulated as required in subsection E 800.11 (3) (a), and the bunched conductors shall be covered with a substantial fibrous covering or equivalent covering.

(c) *On buildings.* Open conductors shall be separated at least 4 inches from light or power conductors not in conduit or cable, unless permanently separated from conductors of the other system by a continuous and firmly fixed non-conductor additional to the insulation on the wires, such as porcelain tubes or flexible tubing. Open conductors exposed to accidental contact with light and power conductors operating at over 300 volts, and attached to buildings, shall be separated from woodwork by being supported on glass, porcelain or other insulating material approved for the purpose except that such separation is not required where fuses are omitted, as provided for in subsection E 800.02 (4), or where conductors approved for the purpose are used to extend circuits to a building from a cable having a grounded metal sheath.

(d) *Entering buildings.* Where a protector is installed inside the building, the conductors shall enter the building either through a noncombustible, nonabsorptive insulating bushing, or through a metal raceway. The insulating bushing may be omitted where the entering conductors 1. are in metal-sheathed cable, 2. pass through masonry, 3. are approved for the purpose and fuses are omitted as provided for in subsection E 800.02 (4) or 4. are approved for the purpose and are used to extend circuits to a building from a cable having a grounded metal sheath. Raceways or bushings shall slope upward from the outside or, where this cannot be done, drip loops shall be formed in the conductors immediately before they enter the building. Raceways shall be equipped with an approved service head. More than one conductor may enter through a single raceway or bushing. Conduits or other metallic raceways located ahead of the protector shall be grounded.

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

**E 800.12 Lightning conductors.** Where practicable, a separation of at least 6 feet shall be maintained between open conductors of communication systems on buildings and lightning conductors.

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

## D. UNDERGROUND CIRCUITS

**E 800.21 Underground circuits.** Underground conductors of communication circuits entering buildings shall comply with the following:

(1) **WITH ELECTRIC LIGHT OR POWER CONDUCTORS.** See chapter E 129 of volume 1 of the Wisconsin State Electrical Code.

(2) **UNDERGROUND BLOCK DISTRIBUTION.** Where the entire street circuit is run underground and the circuit within the block is so placed as to be free from liability of accidental contact with electric light or power circuits of over 300 volts, the insulation requirements of subsections E 800.11(3) (a) and E 800.11(3) (d) shall not apply, the conductors need not be placed on insulating supports and no bushings shall be required where the conductors enter the building.

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

## E. GROUNDING

**E 800.31 Grounding.** Equipment shall be grounded as follows:

(1) **CABLE SHEATH.** The metal sheath of aerial cables entering buildings which are liable to contact with electric light or power conductors shall be grounded or shall be interrupted close to the entrance to the building by an insulating joint or equivalent device.

(2) **PROTECTOR GROUND.** The protector ground shall comply with the following:

(a) *Insulation.* The grounding conductor shall have a 1/32-inch rubber insulation and shall be covered by a substantial fibrous covering. Conductors approved for the purpose having less than 1/32-inch rubber insulation or having other kinds of insulation may be used.

(b) *Size.* The grounding conductor shall not be smaller than No. 18 copper.

(c) *Run in straight line.* The grounding conductor shall be run in as straight a line as practicable to the grounding electrode.

(d) *Physical damage.* Where necessary, the grounding conductor shall be guarded from physical damage.

(e) *Electrode.* The grounding conductor shall preferably be connected to a water pipe electrode. Where a water pipe is not readily available and the grounded conductor of the power service is connected to the water pipe at the building, the protector grounding conductor may be connected to the power service conduit, service equipment enclosures, or grounding conductor of the power service. In the absence of a water pipe, connection may be made to a continuous and extensive underground gas piping system, to an effectively grounded metallic structure, or to a ground rod or pipe driven into permanently damp earth. Steam or hot water pipes, or lightning rod conductors shall not be employed as electrodes for protectors. A driven rod or pipe used for grounding power circuits shall not be used for grounding communication circuits unless the driven rod or pipe is connected to the grounded conductor of a multi-grounded neutral power system. The requirements for separate made electrodes for power and lighting system grounds, those for communication systems, and those for a lightning rod installation shall not prohibit the bonding together of all such made electrodes. (See section E 250.086).

(f) *Electrode connection.* The grounding conductor shall be attached to a pipe electrode by means of a bolted clamp to which the conductor is soldered or otherwise connected in an effective manner. Where a gas pipe electrode is used, connection shall be made between the gas meter and the street main. In every case the connection to the grounding electrode shall be made as close to the earth as practicable.

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