

## Chapter E 503

## CLASS III INSTALLATIONS; HAZARDOUS LOCATIONS

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**E 503.01 General.** The general rules of this code shall apply to the installation of electrical wiring and apparatus in locations classified as class III under section E 500.06 except as modified by this chapter.

(1) Equipment installed in class III locations shall be able to function at full rating without developing surface temperatures high enough to cause excessive dehydration or gradual carbonization of accumulated fibers or flyings. Organic material which is carbonized or is excessively dry is highly susceptible to spontaneous ignition. In general, maximum surface temperatures under actual operating conditions shall not exceed 165° C. (329° F.) for equipment which is not subject to overloading, and 120° C. (248° F.) for equipment such as motors, power transformers, etc., which may be overloaded.

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

**E 503.02 Transformers and capacitors, class III, divisions 1 and 2.** Transformers and capacitors shall conform to subsection E 502.02 (2).

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

**E 503.03 Wiring methods.** Wiring methods shall conform to the following:

(1) **CLASS III, DIVISION 1.** In class III, division 1 locations, rigid metal conduit or type MI cable shall be the wiring method employed.

(a) **Boxes and fittings.** Fittings and boxes in which taps, joints or terminal connections are made shall 1. be provided with telescoping or close fitting covers, or other effective means to prevent the escape of sparks or burning material, and 2. shall have no openings (such as holes for attachment screws) through which, after installation, sparks or burning material might escape, or through which adjacent combustible material might be ignited.

(b) *Flexible connections.* Where flexible connections are necessary the provisions of subsection E 502.04 (1) (b) shall apply.

(2) **CLASS III, DIVISION 2.** In class III, division 2 locations, the wiring method shall conform to subsection E 503.03 (1), except that in sections, compartments or areas used solely for storage and containing no machinery, open wiring on insulators may be employed when installed to conform to chapter E 320, but only on condition that protection as required by section E 320.12 be provided where conductors are not run in roof spaces, and well out of reach of sources of physical damage.

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

**E 503.04 Switches, circuit-breakers, motor controllers and fuses, class III, divisions 1 and 2.** Switches, circuit-breakers, motor controllers and fuses, including pushbuttons, relays and similar devices, shall be provided with tight metal enclosures designed to minimize entrance of fibers and flyings, and which shall (1) be equipped with telescoping or close fitting covers, or with other effective means to prevent escape of sparks or burning material, and (2) have no openings (such as holes for attachment screws) through which, after installation, sparks or burning material might escape, or through which exterior accumulations of fibers or flyings or adjacent combustible material might be ignited.

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

**E 503.05 Control transformers and resistors, class III, divisions 1 and 2.** Transformers, impedance coils and resistors used as or in conjunction with control equipment for motors, generators and appliances, shall conform to section E 502.07 (2), with the exception that, in class III, division 1 locations, when these devices are in the same enclosure with switching devices of such control equipment, and are used only for starting or short time duty, the enclosure shall conform to the requirements of section E 503.04.

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

**E 503.06 Motors and generators.** Motors and generators shall conform to the following:

(1) **CLASS III, DIVISION 1.** In class III, division 1 locations, motors, generators, and other rotating electrical machinery shall be totally-enclosed not ventilated, totally-enclosed pipe ventilated, or totally-enclosed fan-cooled, except that in locations where, in the judgment of the administrative authority, only moderate accumulations of lint and flyings will be likely to collect on, in, or in the vicinity of a rotating electrical machine, and where such machine is readily accessible for routine cleaning and maintenance, self-cleaning textile motors of the squirrel-cage type, standard open type machines without sliding contacts, centrifugal or other types of switching mechanism (including motor overload devices), or standard open type machines having such contacts, switching mechanisms or resistance devices enclosed within tight metal housings without ventilating or other openings, may be installed.

(2) **CLASS III, DIVISION 2.** In class III, division 2 locations, motors, generators, and other rotating electrical machinery shall be totally-enclosed not ventilated, totally-enclosed pipe ventilated, or totally-

enclosed fan-cooled, except that in locations where, in the judgment of the administrative authority, only moderate accumulations of lint and flyings will be likely to collect on, in, or in the vicinity of a rotating electrical machine, and where such machine is readily accessible for routine cleaning and maintenance, self-cleaning textile motors of the squirrel-cage type, standard open type machines without sliding contacts, centrifugal or other types of switching mechanism (including motor overload devices), or standard open type machines having such contacts, switching mechanisms or resistance devices enclosed within tight metal housings without ventilating or other openings, may be installed.

(3) **PARTIALLY ENCLOSED TYPE, CLASS III, DIVISIONS 1 AND 2.** Motors, generators or other rotating electrical machinery of the partially enclosed or splash-proof type shall not be installed in class III locations.

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

**E 503.07 Ventilating piping, class III, divisions 1 and 2.** Vent pipes for motors, generators or other rotating electrical machinery, or for enclosures for electrical apparatus or equipment, shall be of metal not lighter than No. 24 MS (USS Revised) gauge, or of equally substantial noncombustible material, and shall (1) lead directly to a source of clean air outside of buildings, (2) be screened at the outer ends to prevent the entrance of small animals or birds, (3) be protected against physical damage and against rusting or other corrosive influences, and (4) vent pipes and their connections shall be sufficiently tight to prevent the entrance of appreciable quantities of fibers or flyings into the ventilated equipment or enclosure, and to prevent the escape of sparks, flame or burning material which might ignite accumulations of fibers or flyings or combustible material in the vicinity. For metal pipes, lock seams and riveted or welded joints may be used, and tight fitting slip joints may be used where some flexibility is necessary as at connections to motors.

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

**E 503.08 Utilization equipment, fixed and portable, class III, divisions 1 and 2.** Utilization equipment shall conform to the following:

(1) **HEATERS.** Electrically heated utilization equipment shall be approved for class III locations.

(2) **MOTORS.** Motors of motor-driven utilization equipment shall conform to subsection E 503.06 (2). Utilization equipment which may be readily moved from one location to another should conform to requirements for the most hazardous location.

(3) **SWITCHES, CIRCUIT-BREAKERS, MOTOR CONTROLLERS AND FUSES.** Switches, circuit-breakers, motor controllers and fuses shall conform to section E 503.04.

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

**E 503.09 Lighting fixtures, class III, divisions 1 and 2.** Lamps shall be installed in fixtures which shall conform to the following:

(1) **FIXED LIGHTING.** Lighting fixtures for fixed lighting shall provide enclosures for lamps and lampholders which shall be designed to minimize entrance of fibers and flyings, and to prevent the escape of sparks, burning material or hot metal. Each fixture shall be clearly

marked to indicate the maximum wattage of lamp which may be used without exceeding a maximum exposed surface temperature of 165°C. (329°F.) under normal conditions of use.

(2) **PHYSICAL DAMAGE.** A fixture which may be exposed to physical damage shall be protected by a suitable guard.

(3) **PENDENT FIXTURES.** Pendent fixtures shall be suspended by stems of threaded rigid conduit or threaded metal tubing of equivalent thickness. For stems longer than 12 inches, permanent and effective bracing against lateral displacement shall be provided at a level not more than 12 inches above the lower end of the stem, or flexibility in the form of a fitting or a flexible connector approved for the purpose shall be provided not more than 12 inches from the point of attachment to the supporting box or fitting.

(4) **SUPPORTS.** Boxes, box assemblies or fittings used for the support of lighting fixtures shall be of a type approved for the purpose.

(5) **PORTABLE LAMPS.** Portable lamps shall be equipped with handles and protected with substantial guards, and lampholders shall be of unswitched type with no exposed metal parts and without provision for receiving attachment plugs. In all other respects, portable lamps shall conform to subsection E 503.09 (1).

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

**E 503.10 Flexible cords, class III, divisions 1 and 2.** Flexible cords shall conform to section E 502.12.

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

**E 503.11 Receptacles and attachment plugs, class III, divisions 1 and 2.** Receptacles and attachment plugs shall conform to subsection E 502.13 (2).

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

**E 503.12 Signal, alarm, remote-control and local loud-speaker intercommunication systems, class III, divisions 1 and 2.** Signal, alarm, remote-control and local loud-speaker intercommunication systems shall conform to subsection E 502.14 (1).

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

**E 503.13 Electric cranes and hoists, and similar equipment, class III, divisions 1 and 2.** Where installed for operation over combustible fibers or accumulations of flyings, traveling cranes and hoists for material handling, traveling cleaners for textile machinery, and similar equipment shall conform to the following:

(1) Power supply to contact conductors shall be isolated from all other systems and shall be ungrounded, and shall be equipped with an acceptable recording ground detector which will give an alarm and will automatically de-energize the contact conductors in case of a fault to ground, or with an acceptable ground fault indicator which will give a visual and audible alarm, and maintain the alarm as long as power is supplied to the system and the ground fault remains.

(2) Contact conductors shall be so located or guarded as to be inaccessible to other than authorized persons, and shall be protected against accidental contact with foreign objects.

(3) Current collectors shall be arranged or guarded to confine normal sparking and to prevent escape of sparks or hot particles. To reduce sparking, 2 or more separate surfaces of contact shall be provided for each contact conductor. Reliable means shall be provided to keep contact conductors and current collectors free of accumulations of lint or flyings.

(4) Control equipment shall conform to sections E 503.04 and E 503.05.

*Note:* It is recommended that where the distance of travel permits, current to the crane be supplied through flexible cord approved for extra hard usage and equipped with approved type of reel or takeup device.

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

**E 503.14 Electric trucks.** Electric trucks shall be used, maintained and operated in an approved manner.

*Note:* See NFPA standard No. 505.

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

**E 503.15 Storage-battery charging equipment, class III, divisions 1 and 2.** Storage-battery charging equipment shall be located in separate rooms built or lined with substantial noncombustible materials so constructed as to adequately exclude flyings or lint, and shall be well ventilated.

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

**E 503.16 Live parts, class III, divisions 1 and 2.** There shall be no exposed live parts except as provided in section E 503.13.

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

**E 503.17 Grounding, class III, divisions 1 and 2.** Wiring and equipment shall be grounded in conformity with section E 502.16.

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