Chapter E 517

FLAMMABLE ANESTHETICS

E 517.01 Definitions. (1) Flammable anesthetics are gases or vapors such as cyclopropane, divinyl ether, ethyl chloride, ethyl ether, and ethylene, which may form flammable or explosive mixtures with air, oxygen, or nitrous oxide.

(2) For the purpose of this chapter, anesthetizing locations are areas in hospitals in which flammable anesthetics are or may be administered to patients. Such locations will include operating rooms, delivery rooms and anesthesia rooms, and will also include any corridors, utility rooms or other areas which are or may be used for administering flammable anesthetics to patients. Recovery rooms are not classed as anesthetizing locations unless used for administering flammable anesthetics.

Note: For further information regarding safeguards for hospital operating rooms, see the NFPA Code for the Use of Flammable Anesthetics (No. 56).

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

E 517.02 Hazardous areas. (1) Any room or space in which flammable anesthetics or volatile flammable disinfecting agents are stored shall be considered to be a class I, division 1 location throughout.

(2) In an anesthetizing location as defined in section E 517.01, the entire area shall be considered to be a class I, division 1 location which shall extend upward to a level 5 feet above the floor.

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

E 517.03 Wiring and equipment within hazardous areas. (1) In hazardous areas as defined in section E 517.02, all fixed wiring and equipment, and all portable equipment, including lamps and other utilization equipment, operating at more than 8 volts between conductors, shall conform to the requirements of sections E 501.01 to E 501.15 inclusive and of subsections E 501.16 (1) and (2) for class I, division 1 locations, and all such equipment shall be specifically approved for the hazardous atmospheres involved.

(2) Where a masonry wall or floor constitutes a boundary of a hazardous area, any portion of a raceway embedded in such masonry shall be considered to be within the boundary itself, but any portion of a raceway located in a hollow space in such wall or floor shall be considered to be within the hazardous area.

(3) Where a box fitting or enclosure is partially but not entirely within a hazardous area, the hazardous area shall be considered to be extended to include the entire box, fitting or enclosure.

(4) Flexible cords which are or may be used in hazardous areas for connection to portable utilization equipment, including lamps operating at more than 8 volts between conductors shall be of a type approved for extra hard usage, shall be of ample length, and shall include an additional conductor for grounding. A storage device for the flexible cord shall be provided, and shall not subject the cord to bending at a radius of less than 3 inches.

(5) Receptacles and attachment plugs shall be of the type with provision for connection of the grounding conductor, and where located within a hazardous area, shall be approved for class 1 location. Single phase, 125 volt receptacles and attachment plugs shall be of the type recognized for use in anesthetizing locations.

Note: See Section 2438 of NFPA Code for the Use of Flammable Anesthetics (No. 56).

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

E 517.04 Wiring and equipment above hazardous areas. (1) Wiring above a hazardous area as defined in subsection E 517.02 (2) shall be installed in metal raceways or shall be type MI cable or type ALS cable.

(2) Equipment which may produce arcs, sparks or particles of hot metal, such as lamps and lampholders for fixed lighting less than 8 feet above the floor, cutouts, switches, receptacles, generators, motors, or other equipment having make and break or sliding contacts, shall be of totally-enclosed type or shall be provided with suitable guards or screens to prevent escape of sparks or hot metal particles.

(3) Surgical and other lighting fixtures shall conform to subsection E 501.09 (2), except that surface temperature limitations set forth in subsection E 501.09 (2) (b) shall not apply, and except that integral or pendant switches which are located above and cannot be lowered into the hazardous area need not be explosion-proof.

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

E 517.05 Sealing. Approved seals shall be provided in conformance with section E 501.05, and subsection E 501.05 (1) (c) shall apply to horizontal as well as to vertical boundaries of the defined hazardous areas.

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

E 517.06 Circuits in anesthetizing locations. (1) Except as provided in subsection E 517.06 (5), each circuit within or partially within an anesthetizing location as defined in subsection E 517.01 (2) shall be controlled by a switch having a disconnecting pole in each circuit conductor, and shall be supplied from an ungrounded distribution system which shall be isolated from any distribution system supplying areas other than anesthetizing locations. Such isolation may be obtained by means of one or more transformers having no electrical connection between primary and secondary windings, by means of motor generator sets, or by means of suitably isolated batteries.

(2) Circuits supplying primaries of isolating transformers shall operate at not more than 300 volts between conductors, and shall be provided with proper overcurrent protection. Secondary voltage of such transformers shall not exceed 300 volts between conductors, and all circuits supplied from such secondaries shall be ungrounded and

shall have an approved overcurrent device of proper rating in each conductor. Circuits supplied from batteries or from generators, or motor-generator sets shall be ungrounded, and shall be protected against overcurrent in the same manner as transformer secondary circuits.

(3) Transformers, motor-generator sets, batteries and battery chargers, together with their overcurrent devices shall be installed in non-hazardous locations, and shall conform to the requirements of this code for such locations.

(4) In addition to the usual control and protective devices, the ungrounded system shall be provided with an approved ground contact indicator so arranged that a green signal lamp conspicuously visible to persons in the anesthetizing location remains lighted while the system is isolated from ground. An adjacent red signal lamp and an audible warning signal shall be energized when any conductor of the system becomes grounded through a resistance or a capacitive reactance of any value up to at least 60,000 ohms. The current through the ground indicator to the ground shall not exceed 2 milliamperes. The indicator and associated signals shall not be installed within a hazardous area.

Note: For maintenance tests of the ground indicator, see Section 3422 of the NFPA Code for the Use of Flammable Anesthetics (No. 56).

(5) Branch circuits supplying only fixed lighting fixtures above the hazardous location other than surgical lighting fixtures or supplying only approved permanently installed X-ray equipment which complies with Section 2434 of the NFPA Code for the Use of Flammable Anesthetics (No. 56) may be supplied by a conventional grounded system, provided: (a) wiring for grounded and ungrounded circuits does not occupy the same raceways; (b) the lighting fixtures and the X-ray equipment (except the enclosed X-ray tube and the metal-enclosed high voltage leads to the tube) are located at least 8 feet above the floor or outside the anesthetizing location; and (c) switches for the grounded circuits are located outside of the anesthetizing location.

Note: Remote control stations for remote control switches may be installed in the anesthetizing location if the remote control circuit is energized from the ungrounded distribution system.

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

E 517.07 Low voltage equipment and instruments. (1) Electrical apparatus and equipment used within a hazardous area, and which has exposed current-carrying elements or which is frequently in contact with the bodies of persons, shall be designed to operate at 8 volts or less unless it is entirely surrounded by a metallic casing or sheath. Power supply shall be ungrounded, and shall be electrically isolated from all circuits of higher voltage.

(2) Where a low voltage unit receives current from an individual transformer located within a hazardous area, the flexible cord shall conform to subsection E 517.03 (4), the core and case of the transformer shall be effectively grounded, and the transformer shall be approved for class I locations.

(3) Where low voltage units within a hazardous area are supplied with current from a common source, such as a transformer, motor-generator set, or storage battery, such common source shall be in-

stalled in a non-hazardous location. Where located or used within a hazardous area, receptacles and attachment plugs shall be approved for class I locations. Plugs shall be so designed that they cannot be inserted into receptacles for higher voltage. Flexible cords shall be of adequate length and current-carrying capacity, and shall be approved for extra hard usage. An extra conductor for grounding is not required.

(4) Low voltage equipment and wiring (including flexible cords) shall be protected from dangerous overcurrents by suitable overcurrent devices or by inherent current limiting characteristics of the source of supply. Overcurrent devices shall not be installed in a hazardous area.

(5) Resistance or impedance devices may be used to control low voltage units but shall not be used to limit maximum input voltage. Where a low voltage unit includes a switch or other make and break or sliding contact, or where it includes a resistor or resistance device which may under any operating condition reach a surface temperature exceeding 80% of the lowest ignition temperature in degrees Centigrade (as determined by approved test procedure) of the gases or vapors that may be present, the unit shall be of a type approved for class I locations.

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

E 517.08 Other equipment. (1) Suction, pressure, or insufflation equipment involving electrical elements, and located or used within a hazardous area shall be approved for class I locations.

(2) X-ray equipment installed or operated in an anesthetizing location as defined in subsection E 517.01 (2) shall be provided with approved means for preventing accumulation of electrostatic charges. All control devices, switches, relays, meters, and transformers shall be totally enclosed, and where installed or operated within a hazardous area, shall be approved for class I locations. High voltage wiring shall be effectively insulated from ground and adequately guarded against accidental contact.

(3) Equipment for generating high frequency currents or voltages used in electrocautery, diathermy, television, etc., where installed or used in an anesthetizing location, shall conform to sections E 517.03 and E 517.04.

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

E 517.09 Grounding. In any hazardous area, all metallic raceways, and all non-current-carrying metallic portions of fixed or portable equipment (except equipment operating at not more than 8 volts between conductors) shall be grounded as provided in subsections E 501.16 (1) and (2).

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