SPECIAL CONDITIONS

Chapter E 700

EMERGENCY SYSTEMS

A. GENERAL

E 700.01 Scope. The provisions of this chapter apply to the installation, operation and maintenance of circuits, systems and equipment intended to supply illumination and power in the event of failure of the normal supply or in the event of accident to elements of a system supplying power and illumination essential for safety to life and property where such systems or circuits are legally required by municipal, state, federal or other codes, or by any governmental agency having jurisdiction.

Note 1. Emergency systems are generally installed in places of assembly where artificial illumination is required, such as buildings subject to occupancy by large numbers of persons, hotels, theaters, sports arenas, hospitals and similar institutions. Emergency systems may provide power for such functions as essential refrigeration, operation of mechanical breathing apparatus, ventilation when essential to maintain life, illumination and power for hospital operating rooms, fire pumps, fire alarm systems, industrial processes where current interruption would produce serious hazards, public address systems and similar functions.

Note 2. See Wis. Adm. Code sections Ind 54.06 (2), Ind 55.11 (1), sections Ind 56.08, Ind 51.15 and Ind 57.11 for specification of locations where emergency lighting is considered essential to life safety.

Note 3. The methods of supplying exit and emergency illumination in existing buildings will be determined in each individual case.

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

E 700.02 Other requirements. All requirements of the Wisconsin state electrical code shall apply to emergency systems, except as modified by this chapter.

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

E 700.03 Equipment approval, tests and maintenance. (1) All equipment shall be approved for use on emergency systems.

(2) The authority having jurisdiction shall conduct or witness a test on the complete system upon installation and periodically afterward.

(3) Systems shall be tested periodically on a schedule acceptable to the authority having jurisdiction to assure their maintenance in proper operating condition.

(4) Where battery systems or unit equipments are involved, including batteries used for starting or ignition in auxiliary engines, the authority having jurisdiction shall require periodic maintenance.

(5) A written record shall be kept of such tests and maintenance.

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

E 700.04 Capacity. Emergency systems shall have adequate capacity and rating for the emergency operation of all equipment connected to the system.

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

B. SOURCES OF POWER

E 700.05 Systems. (1) Current supply shall be such that in event of failure of the normal supply to or within the building or group of buildings concerned, emergency lighting, or emergency power, or both emergency lighting and power will be immediately available. The supply system for emergency purposes may comprise one or more of the types of system covered in sections E 700.07 to E 700.10. The normal building supply, as referred to in section E 700.07 (1) and section E. 700.08 may be obtained from the normal building service, a building feeder or branch circuit. Unit equipments in accordance with section E 700.22 shall satisfy the applicable requirements of this chapter.

(2) Emergency auxiliary service supply from a storage battery, generator, etc., when used to replace a part or all of normal service, shall be provided with a double throw switch or throw over switches mechanically interlocked to prevent energy from flowing into the normal source of supply.

(3) Consideration must be given to the type of service to be rendered, whether of short time duration, as for exit lights of a theater, or of long duration as for supplying emergency power and lighting due to a long period of current failure from trouble either inside or outside the building, as in the case of a hospital.

(4) The emergency service switch shall be identified.

Note: Assignment of degree of reliability of the recognized emergency supply system depends upon the careful evaluation of the variables at each particular installation.

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

E 700.06 Standby emergency power. Standby emergency power of a type recognized by sections E 700.07, E 700.08 or E 700.22 shall be provided as a source of supply for emergency lighting or power in occupancies where people are housed, assembled, confined or congregated as follows:

Number of Persons	Typical Occupancies
1. Over 30	Hospitals, homes for the aged, nursing homes, children's homes, asylums, natatoriums and similar buildings.
2. Over 200	Theater, assembly halls, dining rooms, libraries, stores, hotels, motels and similar buildings.
3. Over 400	Apartment buildings, dormitories, office buildings, convents, factories and similar buildings.

Note: The figures in the following table shall be used to determine the capacity of buildings or parts of buildings, when determining if standby emergency power is required. The square foot figures noted below are based on net area which would include internal room and corridor areas. The area occupied by toilets, stairwells, elevator shafts, janitor's closets, boiler and equipment rooms, and similar areas need not be included in calculating the minimum area. Areas within rooms occupied by furniture, machinery or display counters must be included. The area occupied by a bar or serving counter such as is found in a tavern, restaurant, or drug store and the area behind them where employees work need not be included.

Number of Persons	Occupancy	Minimum Total Area or Capacity
1. Over 30	a. Hospitals, homes for the aged, children's homes, asylums, jails and similar occupancies.	30 patient or inmate beds.
	b. Natatoriums.	450 square feet.
2. Over 200	a. Assembly halls with stage, lecture halls, school auditoriums.	1,400 square feet.
	b. Theaters and theater lobbies.	1,400 square feet. (Theater and lobby must be combined in determining total area.)
	c. Arenas and field houses.	800 square feet. (Use seated space only.)
	d. Gymnasiums and lodge halls.	1,200 square feet for seated space. 3,000 square feet for unseated space. (For combined areas use 6 square feet per person for seated space and 15 square feet per person for unseated space.)
	e. Exhibition buildings, museums and art galleries.	20,000 square feet.
	f. Libraries.	4,000 square feet for reading rooms. 20,000 square feet for balance. (For combined areas use 20 square feet per person for reading rooms and 100 square feet per person for the balance.)
	g. Church dining rooms and fellowship halls, dance halls, banquet halls, dining rooms, restaurants, taverns, night clubs, school multipurpose rooms and similar occupancies.	2,000 square feet.
	h. Stores.	6,000 square feet for first floor or basement. 12,000 square feet for second floor and above. (For combined areas use 30 square feet per person for first floor and basement and 60 square feet per person for second floor and above.)

Number of Persons	Occupancy	Minimum Total Area or Capacity
	i. Skating rinks.	3,000 square feet.
	j. Hotels, motels and rooming houses.	200 rooms.
	k. Bowling alleys.	200 persons based on 5 persons per alley plus number of spectator seats and area for bar and dining areas in accordance with above item g.
3. Over 400	a. Apartment buildings.	200 apartments.
	b. Dormitories, including those in detention schools and convents.	400 beds.
	c. Office buildings, banks and factories.	30,000 square feet.
	d. Warehouses.	120,000 square feet.

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

E 700.07 Storage battery. (1) A normal building supply and a storage battery of suitable rating and capacity to supply and maintain at not less than 91% of system voltage of the total load of the circuits supplying emergency lighting and emergency power for a period of at least ½ hour. An automatic battery charging means shall be provided.

(2) Batteries whether of the acid or alkali type shall be designed and constructed to meet the requirements of emergency service. When of the lead-acid type, this shall include low gravity acid (1.20 to 1.22 SP-GR), relatively thick and rugged plates and separators, and a transparent jar.

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

E 700.08 Generator set. A normal building supply and a generator set driven by some form of prime mover and of sufficient capacity and proper rating to supply circuits carrying emergency lighting or lighting and power, with suitable means for automatically starting the prime mover on failure of the normal building supply. For hospitals, the transition time from instant of failure of the normal power source to the emergency generator source shall not exceed 10 seconds.

Note: See section E 700.03.

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

E 700.09 Separate service. Two services, each in accordance with Wis. Adm. Code chapter E 230, widely separated electrically and physically to minimize the possibility of simultaneous interruption of supply.

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

E 700.10 Connection ahead of service disconnecting means. Connections on the line side of the main service if sufficiently separated from main service to prevent simultaneous interruption of supply through an occurrence within the building or group of buildings served. Feeder conductors entering a separate building may be considered service conductors as far as emergency supply is concerned.

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

E 700.11 Auxiliary source. The requirements of sections E 700.04 and E 700.05 shall also apply to installations where the entire electrical load on a service or sub-service is arranged to be supplied from a second source. Current supply from a standby power plant shall satisfy the requirements of availability in section E 700.05.

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

E 700.12 Derangement signals. Audible and visual signal devices shall be provided where practicable for the following purposes:

(1) To give warning of derangement of the emergency or auxiliary source.

(2) To indicate that the battery or generator set is carrying load.

(3) To indicate when battery charger is properly functioning.

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

C. EMERGENCY CIRCUITS FOR LIGHTING AND POWER

E 700.13 Loads on emergency branch circuits and feeders. No appliances and no lamps, other than those specified as required for emergency use shall be supplied by emergency lighting branch circuits and feeders.

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

E 700.14 Emergency illumination. Emergency illumination shall include all required exit lights and all other lights specified as necessary to provide sufficient illumination. When standby emergency power is required by section E 700.06, the required exit lights and general emergency lights shall be supplied from the standby source.

Note: Emergency lighting systems should be so designed and installed that the failure of any individual lighting element, such as the burning out of a light bulb, cannot leave any space in total darkness.

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

E 700.15 Circuits for emergency lighting. Branch circuits intended to supply emergency lighting shall be so installed as to provide service immediately when the normal supply for lighting is interrupted. Such installations shall provide either one of the following:

(1) An emergency lighting supply, independent of the general lighting system with provisions for automatically transferring, by means of devices approved for the purpose, the emergency lights upon the event of failure of the general lighting system supply.

(2) Two or more separate and complete systems with independent power supply, each system providing sufficient current for emergency lighting purposes. Unless both systems are used for regular lighting purposes and are both kept lighted, means shall be provided for automatically energizing either system upon failure of the other. Either or both systems may be part of the general lighting system of the protected occupancy if circuits supplying lights for emergency illumination are installed in accordance with other rules of this chapter.

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

E 700.16 Circuits for emergency power. For branch circuits which supply equipment classed as emergency, there shall be an emergency supply source to which the load will be transferred automatically and immediately upon the failure of the normal supply.

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

E 700.17 Independent wiring. Emergency circuit wiring shall be in approved raceways, kept entirely independent of all other wiring and equipment and shall not enter the same raceway, box or cabinet with other wiring.

(1) EXCEPTION No. 1. In transfer switches.

(2) EXCEPTION No. 2. In exit or emergency lighting fixtures supplied from 2 sources.

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

D. CONTROL

E 700.18 Switch requirements. (1) The switch or switches installed in emergency lighting circuits shall be so arranged that only authorized persons will have control of emergency lighting except:

(a) *Exception No. 1.* Where 2 or more single throw switches are connected in parallel to control a single circuit, at least one of these switches shall be accessible only to authorized persons.

(b) *Exception No. 2.* Additional switches which act only to put emergency lights into operation but not disconnect them are permissible.

(2) Switches connected in series or 3 and 4-way switches shall not be used. The emergency service switch shall be identified.

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

E 700.19 Switch location. (1) All manual switches for controlling emergency circuits shall be in locations convenient to authorized persons responsible for their actuation. In places of assembly such as theaters a switch for controlling emergency lighting systems shall be located in the lobby or at a place conveniently accessible thereto.

(2) In no case shall a control switch for emergency lighting in a theater or motion picture theater be placed in a motion picture projection booth or on a stage, except that where multiple switches are provided, one such switch may be installed in such location when so arranged that it can energize, but not disconnect the circuit.

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

E 700.20 Other switches. (1) EXTERIOR LIGHTS. Those lights on the exterior of the building which are not required for illumination when there is sufficient daylight may be controlled by an automatic light-actuated device approved for the purpose.

(2) HOSPITAL CORRIDORS. Switching arrangements to transfer corridor lighting in patient areas of hospitals from overhead fixtures to fixtures designed to provide night lighting may be permitted, provided the switching system is so designed that switches can only select between two sets of fixtures and cannot extinguish both sets at the same time.

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

E. OVERCURRENT PROTECTION

E 700.21 Accessibility. The branch-circuit overcurrent devices in emergency circuits shall be accessible to authorized persons only.

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

F. UNIT EQUIPMENTS

E 700.22 Unit equipments. (1) In lieu of other methods specified elsewhere in this chapter, individual unit equipments for emergency illumination shall consist of (a) a storage battery, (b) battery charging means, (c) one or more lamps, and (d) a relaying device arranged to energize the lamps automatically upon failure of the normal supply to the building. The batteries shall be of suitable rating and capacity to supply and maintain at not less than 91% of rated lamp voltage the total lamp load associated with the unit for a period of at least ½ hour. Storage batteries whether of the acid or alkali type shall be designed and constructed to meet the requirements of emergency service. When of the lead-acid type the storage battery shall have a transparent jar.

(2) Unit equipments shall be permanently fixed in place (i.e. not portable) and shall have all wiring to each unit installed in accordance with the requirements of any of the wiring methods in chapter E 300. They shall not be connected by flexible cord. The supply circuit between the unit equipment and the service, feeders, or the branch circuit wiring shall be installed as required by section E 700.17. Emergency illumination fixtures which obtain power from a unit equipment and are not part of the unit equipment shall be wired to the unit equipment as required by section E 700.17 and by one of the wiring methods of chapter E 300.

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

E 700.23 Fire alarm wiring. (1) The energy for operation of fire alarm systems shall be taken from sources suited to the design of the system. Batteries shall not be used.

(2) A 3-wire 120–240 volt or 120–208 volt (3-phase, 4-wire) service shall be provided for required electrical fire alarm systems. The system shall be supervised with the operating current secured from one ungrounded conductor and the neutral or grounded conductor and the current for operating trouble signal or signals secured from the other ungrounded conductor and the neutral or grounded conductor.

(3) Electrical wiring in connection with fire alarm systems shall be installed in rigid metal conduit, flexible metal conduit, electrical metallic tubing or surface metal raceway. Fire alarm systems are considered emergency wiring and shall comply with section E 700.17. Metal-clad cable may be used where it can be fished in hollow spaces of walls or partitions in apartments or rooming houses not over 3 stories in height. Where the wiring is subject to excessive moisture or severe mechanical injury, rigid metal conduit shall be used. The smallest size conductor to be used in any fire alarm system in a building over 3 stories in height shall be No. 14 AWG or No. 16 AWG for buildings not over 3 stories in height. The wires shall be provided with insulation suitable for use on circuits not exceeding 600 volts. Fire alarm systems shall be connected to the line side of the main service switch or to the emergency feeder through 2 single pole breakers or switches used for no other purpose and arranged so they can be locked in the "on" position, and under the supervision of a qualified person. The breaker and switches shall be identified by a red color. Two pole breakers shall not be used.

Note: See Wis. Adm. Code section Ind 51.24 for general requirements covering fire alarm systems.

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