

Chapter E 90

ADOPTION OF NATIONAL ELECTRICAL CODE, 1975
AND WISCONSIN AMENDMENTS THERETO

- E 90.01 Adoption of code for electrical and communication equipment and wiring
- E 90.02 Consent to incorporate NEC-1975 by reference
- E 90.03 Omissions from NEC-1975
- E 90.04 Changes or additions to NEC-1975

E 90.01 Adoption of code for electrical and communication equipment and wiring. The National Electrical Code-1975 (NEC-1975), also American National Standards Institute C1-1975 (ANSI C1-1975), Article 90, chapters 1 through 9 inclusive, and index, subject to omissions shown in section E 90.03, and changes and additions shown in section E 90.04, is hereby incorporated by reference into the Wisconsin Administrative Code, Electrical, Volume 2. Interim amendments of the NEC-1975 will have no effect in the state of Wisconsin until such time as this section is correspondingly revised to reflect these changes.

History: Cr. Register, November, 1975, No. 239, eff. 12-1-75.

E 90.02 Consent to incorporate NEC-1975 by reference. Pursuant to section 227.025, Wis. Stats., the attorney general and the revisor of statutes have consented to the incorporation by reference of the standards, except for sections E 90.03 and E 90.04, contained in the NEC-1975, which can be obtained from the National Fire Protection Association, 470 Atlantic Avenue, Boston, Massachusetts 02110. Copies of the aforementioned standard code are on file in the offices of the department of industry, labor and human relations, the secretary of state and the revisor of statutes.

History: Cr. Register, November, 1975, No. 239, eff. 12-1-75.

E 90.03 Omissions from NEC-1975. The following sections of the NEC-1975 are not incorporated as part of the Wisconsin State Electrical Code, volume 2:

Section 90-1	Section 600-4
90-2	
210-8(b)	
518-3 Exception No. 1	

History: Cr. Register, November, 1975, No. 239, eff. 12-1-75.

E 90.04 Changes or additions to NEC-1975. Following are the changes or additions to the NEC-1975. (The following changes or additions have been prefixed by the letter E to denote that such changes or additions are rules of this state and not those of NEC-1975. Following the E designation is the referenced NEC section or subsection. Example: E 110.03 (NEC 110-3). The word "Change" following the section number and heading means that the corresponding wording of the NEC-1975 has been changed and that the new wording is substituted at the appropriate location. The word "Addition" following the section number and heading means that a

new requirement is incorporated in the NEC-1975 and that the new requirement is inserted at the appropriate location.)

ARTICLE 100—DEFINITIONS

Administrative Authority (Addition): The Department of Industry, Labor and Human Relations.

Special Permission (Change): The written consent of the Department of Industry, Labor and Human Relations.

ARTICLE 110—GENERAL

E 110.03 (NEC 110-3.) Installation and Use. (Change)

(b) Except as otherwise permitted in this code, all electrical equipment shall be installed or used in the exact manner and for the exact purpose indicated by the manufacturer's instructions, markings or labels.

E 110.22 (NEC 110-22.) Identification of Disconnecting Means. (Change)

Each disconnecting means required by this code for motors and appliances, and each service, feeder or branch circuit at the point where it originates, shall be legibly marked to indicate its purpose. The marking shall be of sufficient durability to withstand the environment involved.

ARTICLE 210—BRANCH CIRCUITS

E 210.05 (NEC 210-5.) Color Code for Branch Circuits. (Addition)

(b) Exception No. 3: For public highway traffic control, communications, metering, railway and railroad signal installations.

E 210.23 (NEC 210-23.) Permissible Loads. (Addition)

Exception: Where a branch circuit supplies only fixed permanently connected load consisting of two or more appliance or lighting unit outlets, Table 210-24 shall not apply.

ARTICLE 220—BRANCH CIRCUIT AND FEEDER CALCULATIONS

E 220.03 (NEC 220-3.) Branch Circuits Required. (Addition)

(e) **Fixed Appliances.** Fixed appliances exceeding $\frac{1}{8}$ hp or 300 watts rating shall not be connected to general purpose branch circuits in dwelling type occupancies. Where an air conditioner sleeve is provided in a building wall, an outlet within 4 feet of the sleeve location shall be provided. If a circuit is not run to the outlet, a raceway shall be provided. When the air conditioner is installed in the sleeve, it shall be supplied by a separate circuit. A receptacle outlet installed for an air conditioner shall not be counted as one of the receptacles required by section NEC 210-25 (b).

(f) A branch circuit shall not supply outlets in more than one apartment of a multi-family building, except hotels and motels.

ARTICLE 225—OUTSIDE BRANCH CIRCUITS AND FEEDERS

E 225.04 (NEC 225-4.) Conductor Covering. (Addition)

Approved factory assembled cables, consisting of one or more insulated conductors lashed or twisted with an uninsulated and effectively grounded messenger or neutral, may be used for outdoor overhead branch circuits and feeders. The uninsulated conductor, when used as a neutral, shall not be used as an equipment grounding conductor.

E 225.18 (NEC 225-18.) Clearance From Ground. (Addition)

27 feet—over track rails of railroads.

E 225.18 (NEC 225-18.) Clearance From Ground. (Change)

Note: For clearance of conductors of over 600 volts, see Wis. Adm. Code Volume 1, Electrical, section E 123.03.

E 225.19 (NEC 225-19.) Clearances From Buildings for Conductors Not in Excess of 600 Volts. (Change)

Note: For clearance of conductors of over 600 volts, see Wis. Adm. Code Volume 1, Electrical, section E 123.03.

ARTICLE 230—SERVICES

E 230.02 (NEC 230-2.) Number of Services to a Building or Other Premises Served. (Change)

Exception No. 4: Capacity requirements. Additional services may be installed by special permission, or in accordance with the following table:

Service Rating	Number of Services Permitted
0— 400 amperes.....	1
401— 800 amperes.....	2
801—1200 amperes.....	3

Note 1: Where 2 services are permitted, one must be of at least 400 ampere rating. Where 3 services are permitted, 2 must be of at least 400 ampere rating.

Note 2: For services above 1200 ampere rating and 3 in number, the pattern established by the above table and Note 1 is to be continued.

E 230.24 (NEC 230-24.) Clearance of Service Drops. (Addition)

(b) 27 feet—over track rails of railroads.

(d) Clearance from storage tanks. A horizontal clearance of at least 15 feet shall be maintained between aboveground flammable liquid storage tanks and open conductors operating at more than 300 volts to ground. When the voltage is 300 or below, a horizontal clearance of not less than 10 feet shall be maintained.

Note: This requirement does not apply to LPG tanks with capacity of 1,000 gallons or less.

(e) Clearance from water wells. A horizontal clearance of at least $\frac{3}{4}$ the required vertical clearance of the conductor shall be maintained between open conductors and water wells.

E 230.24 (NEC 230-24.) Clearance of Service Drops. (Change)

Note: For clearance of conductors of over 600 volts, see Wis. Adm. Code, Electrical, Volume 1, section E 123.03. ✓

E 230.32 Length of Service Lateral Entering a Building. (Addition)

The underground service lateral shall not extend into a building in a raceway longer than 3 feet.

Exception: The service lateral shall be permitted to exceed 3 feet provided that the service enters an outside wall of a substation or service equipment room.

E 230.41 (NEC 230-41.) Size and Rating. (Change)

(b) (1) 100-ampere, 3-wire or 4-wire, for a single-family residence requiring more than three 2-wire branch circuits or having an area of more than 500 square feet (external dimensions).

(b) (2) 150-ampere, 3-wire or 4-wire for a multi-occupancy building requiring more than three 2-wire branch circuits. Each unit shall have a minimum of a 50-ampere, 3 wire service or feeder.

(Addition)

Exception No. 4: A 100-ampere, 3-wire or 4-wire service shall be permitted to be installed in an existing two-family residence only where both of the following conditions are complied with:

1. The load computed in accordance with Article 220 does not exceed 80 amperes.
2. Specific written approval is granted by the municipal inspection department having jurisdiction.

E 230.54 (NEC 230-54.) Connection at Service Head. (Addition)

(h) Service head and service drop attachments and communication cables or conductors attached to or carried along the surface of a building shall be so located that no part of the drip loops or service drop conductors within 3 feet of the service head and service drop attachments shall be less than 12 inches from communication cables or conductors.

E 230.70 (NEC 230-70.) General. (Addition)

Disconnecting means shall be provided to disconnect the utility wiring from the premises wiring at any point where utility wiring terminates and premises wiring extends overhead or underground to more than one building or structure.

E 230.71 (NEC 230-71.) Maximum Number of Disconnects. (Addition)

(a) Exception: Single-family residences or individual residential occupancies of multi-occupancy buildings shall have a single main disconnecting means for each metered service.

E 230.72 (NEC 230-72.) Grouping of Disconnects. (Addition)

(d) Exception: Individual residential occupancies shall have a single main disconnecting means for each metered service.

E 230.79 (NEC 230-79.) Rating of Disconnect. (Change)

(c) For single-family residences requiring more than three 2-wire branch circuits or having an area of more than 500 square feet (external dimensions), the service equipment shall have a rating of not less than 100 amperes, 3-wire or 4-wire. For multi-occupancy buildings requiring more than three 2-wire branch circuits, the service equipment shall have a rating of not less than 150 amperes, 3-wire or 4-wire. Service or feeder equipment for each unit of multi-occupancy buildings shall have a rating of not less than 50 amperes.

Exception: Service equipment having a rating of not less than 100 amperes, 3-wire or 4-wire shall be permitted to be installed in an existing two-family residence only where both of the following conditions are complied with:

1. The load computed in accordance with Article 220 does not exceed 80 amperes.
2. Specific written approval is granted by the municipal inspection department having jurisdiction.

ARTICLE 240—OVERCURRENT PROTECTION**E 240.24 (NEC 240-24.) Location in or on Premises. (Addition)**

- (a) 1. Exception No. 4: For signs as provided in section E 600.06.
2. Exception No. 5: For cranes and hoists as provided in section NEC 610-42.

ARTICLE 250—GROUNDING**E 250.92 (NEC 250-92.) Installation. (Addition)**

(a) Except where fished in hollow spaces of finished buildings, No. 6 or larger grounding conductors shall be fastened at intervals not exceeding 4 ½ feet and within 12 inches of every cabinet, box or fitting.

ARTICLE 310—CONDUCTORS FOR GENERAL WIRING

Tables 310-16 through 310-19

Note 8. (Addition)

Exception No. 4: The derating factors shown above shall not apply to branch circuits supplying an individual residential occupancy.

ARTICLE 334—METAL-CLAD CABLE**E 334.04 (NEC 334-4.) Construction. (Addition)**

(a) One or more grounding conductors shall be incorporated under the metallic covering. The total cross section of the grounding

conductor shall be approximately equal to one-half the cross section of one phase conductor.

E 334.12 (NEC 334-12.) Exposed Work. (Addition)

Running boards shall not be less than 2 inches wide.

ARTICLE 336—NON-METALLIC SHEATHED CABLE

E 336.13 (NEC 336-13.) Running Boards. (Addition)

Running boards shall not be less than 2 inches wide.

ARTICLE 384—SWITCHBOARDS AND PANELBOARDS

E 384.03 (NEC 384-3.) Support and Arrangement of Busbars and Conductors. (Change)

(f) The B phase shall be that phase having the higher voltage to ground on three-phase, four-wire delta systems.

ARTICLE 400—FLEXIBLE CORDS AND CABLES

E 400.08 (NEC 400-8.) Uses not Permitted. (Addition)

(6) Above false ceilings.

ARTICLE 450—TRANSFORMERS AND VAULTS

E 450.08 (NEC 450-8.) Ventilation. (Addition)

Vaults containing oil-filled equipment shall be vented to the outside.

E 450.26 Oil-insulated Transformers Installed on Roofs. (Addition)

Oil-insulated transformers installed on the roof of a building shall comply with the following conditions:

(a) The structure of the building shall be of sufficient strength to carry the weight of the transformers, their enclosures, the equipment used in connection therewith, plus the superimposed live load. There shall be a path from the edge of the roof to the transformer location of sufficient strength to support the transformer.

Note: See Wis. Adm. Code chapters Ind 50-64, Building and Heating, Ventilating and Air Conditioning—chapter Ind 53 for structural requirements.

(b) Where the roof construction has a 2-hour fire-resistive rating or greater, the transformers shall be installed in a fenced enclosure, vault or other enclosure where the live parts are guarded against accidental contact. Where a fence is used, it shall be of a type that cannot be readily climbed and shall not be less than 6 feet in height excluding any barbed wire. A locked gate shall be provided. Where the transformers are installed in other than a vault, a curb or basin shall be provided. The curb shall be high enough to contain the oil from the largest of the transformers, but in no case less than 6 inches high. A drain shall be provided to carry any oil away from the building.

(c) Where the roof construction has less than a 2-hour fire-resistive rating, the transformers shall be enclosed in a vault complying with NEC Article 450, Part C—Provisions for Transformer Vaults.

Note: See Wis. Adm. Code Chapters Ind 50-64, Building and Heating, Ventilating and Air Conditioning—Chapter Ind 51 for fire-resistive standards.

E 450.41 (NEC 450-41.) Location. (Change)

Vaults containing oil-insulated transformers shall be located where they can be ventilated to the outside air without using flues or ducts.

Exception: Where special permission is granted by the administrative authority.

E 450.42 (NEC 450-42.) Walls, Roof and Floor. (Change)

The walls and roofs of vaults shall be constructed of reinforced concrete, brick, load-bearing tile, concrete block, or other fire-resistive construction which has adequate structural strength for the conditions, and a minimum fire-resistive rating of 3 hours. The floors of vaults in contact with the earth shall be of concrete not less than 4" thick, but when the vault is constructed with a vacant space or other stories below it, the floor shall have adequate structural strength for the dead and/or superimposed live loads imposed thereon and a minimum fire-resistive rating of 3 hours.

Note: See Wis. Adm. Code chapters Ind 50-64, Building and Heating, Ventilating and Air Conditioning—chapter Ind 51 for fire-resistive standards and chapter Ind 53 for structural requirements.

ARTICLE 515—BULK STORAGE PLANTS

E 515.02 (NEC 515-2.) Hazardous Locations. (Addition)

(d) (5) Open conductors operating at more than 300 volts to ground shall be kept at least 15' horizontally from aboveground flammable liquid storage tanks. When the voltage is 300 or below, a horizontal clearance of not less than 10' shall be maintained.

ARTICLE 600—ELECTRIC SIGNS AND OUTLINE LIGHTING

E 600.02 (NEC 600-2.) Disconnect Required. (Addition)

The switch or breaker required by this section may control one or more signs or outline lighting installations.

E 600.06 (NEC 600-6.) Load of Branch Circuit. (Addition)

(c) Branch circuit overcurrent devices, if on or within the body of the sign, shall be mounted in a separate accessible compartment.

ARTICLE 620—ELEVATORS, DUMBWAITERS, ESCALATORS AND MOVING WALKS

See Wis. Adm. Code chapter Ind 4, Elevator Code.

ARTICLE 700—EMERGENCY SYSTEMS

E 700.06 (NEC 700-6.) Systems. (Addition)

Exception: The supply systems for emergency purposes permitted by this section shall be limited in accordance with section E 700.07.

The "One service in accordance with Article 230" referred to in subsections NEC 700-6(a) and (b) shall be permitted to consist of the normal building service, a building feeder or branch circuit.

(Change)

(e) Emergency circuit wiring shall be in approved raceways.

E 700.07 (NEC 700-7.) Standby Emergency Power. (Addition)

(a) Standby emergency power of a type recognized by subsections NEC 700-6(a), (b) or (e) shall be provided as a source of supply for required exit lights, emergency lighting or power in occupancies where people are housed, assembled, confined or congregated with a capacity or area equal to or greater than either column B or C of Table E 700.07.

(b) The capacity of assembly hall type occupancies shall be based upon the entire area within each assembly hall occupancy separation as provided in the Wisconsin state building code, chapter Ind 55. This area may include one or more rooms or floors.

**TABLE E 700.07
OCCUPANCIES REQUIRING STANDBY EMERGENCY
POWER**

Column A	Column B	Column C
Occupancy	No. Persons Accommodated	Calculated Capacity or Area
1. Apartment buildings	200	200 bedrooms
2. Apartment buildings (housing for elderly or homes for the aged)	30	30 bedrooms
3. Arenas	200	800 square feet. (Use seated space only.)
4. Art galleries	200	20,000 square feet
5. Assembly halls such as church dining rooms and fellowship halls, dance halls, banquet halls, dining rooms, restaurants, taverns, night clubs, school multipurpose rooms and similar occupancies	200	2,000 square feet
6. Assembly halls with stage	200	1,400 square feet
7. Asylums	30	30 inmate beds
8. Auditoriums	200	1,400 square feet
9. Banks	400	30,000 square feet
10. Bowling alleys	200	200 persons based on 5 persons per alley plus number of spectator seats and 10 square feet per person for bar and dining areas.
11. Children's homes	30	30 beds
12. Convents	200	200 beds
13. Dormitories including those used in detention schools	200	200 beds
14. Exhibition buildings	200	20,000 square feet
15. Factories	400	30,000 square feet
16. Field houses	200	800 square feet. (Use seated space only.)

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17. Gymnasiums	200	200 persons based on 6 square feet per person for seated space and 15 square feet per person for unseated space.
18. Hospitals	30	30 patient beds
19. Hotels	200	200 rooms
20. Jails	30	30 inmate beds
21. Lecture halls	200	1,400 square feet
22. Libraries	200	200 persons based on 20 square feet per person for reading rooms and 100 square feet per person for balance.
23. Lodge halls	200	200 persons based on 6 square feet per person for seated space and 15 square feet per person for unseated space.
24. Motels	200	100 rooms
25. Museums	200	20,000 square feet
26. Nursing homes	30	30 patient beds
27. Office buildings	400	30,000 square feet
28. Rooming houses	200	200 rooms
29. Skating rinks	200	3,000 square feet
30. Stores	200	200 persons based on 30 square feet per person for first floor and 60 square feet per person for second floor and above.
31. Swimming pools (indoor)	30	450 square feet
32. Theaters and theater lobbies	200	1,400 square feet. (Theater and lobby must be combined in determining total area.)
33. Warehouses	400	120,000 square feet

Note: The square foot figures noted in Column C 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 capacity. 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 drugstore, and the area behind them where employes work need not be included.

E 700.14 (NEC 700-14.) Emergency Illumination. (Change)

Emergency illumination shall include all required exit lights and emergency lighting required by the Illumination Code, chapter Ind 19, Part G. When standby emergency power is required by section E 700.07, the required exit lights and emergency lighting shall be supplied from the standby source.

(a) Exception: Required exit lights in occupancies not requiring standby emergency power under E 700.07 may be supplied from a separate switch or circuit breaker in a branch circuit or feeder panelboard, or the load side of the service disconnect, under the following conditions:

1. The exit lights are supplied from separate circuits not supplying other lights or equipment.
2. The exit-light wiring shall comply with sections E 700.17 and NEC 700-17 from the point where it leaves the separate switch or breaker, branch circuit or feeder panelboard.

Emergency lighting systems shall 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.

E 700.17 (NEC 700-17.) Independent Wiring. (Addition)

Emergency circuit wiring shall be in approved raceways.

ARTICLE 760—FIRE PROTECTIVE SIGNALING SYSTEMS

E 760.08 Required Fire Alarm Systems. (Addition)

(a) Fire alarm systems required by Wis. Adm. Code chapters Ind 50-64, Building and Heating, Ventilating and Air Conditioning shall comply with Article 760 except as modified by this section.

(b) All electrical wiring in connection with required fire alarm systems including accessory devices such as detectors shall be installed in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, flexible metal conduit or surface metal raceway.

Exception No. 1: Metal-clad cable may be used where it can be fished in hollow spaces of walls or partitions in existing apartment or rooming houses not over 3 stories in height.

Exception No. 2: Any wiring method recognized by Article 760 shall be permitted in buildings used for other purposes prior to occupancy as a day care center, as provided in Wis. Adm. Code section Ind 60.36 (1) (a) Exception—Child Day Care Facilities.

(c) Required fire alarm systems are considered emergency wiring and shall comply with sections E 700.17 and NEC 700-17.

(d) Required fire alarm systems shall be supplied from an emergency source recognized by chapter E 700. Where section E 700.07 requires standby emergency power, required fire alarm systems shall be supplied from an approved standby emergency source.

E 760.30 (NEC 760-30.) Conductors and Cables. (Addition)

(f) Conductors with other types and thicknesses of insulation shall be permitted if approved for the purpose.

ARTICLE 800—COMMUNICATION CIRCUITS

E 800.02 (NEC 800-2.) Protective Devices. (Addition)

Underground circuits buried without separation from power conductors shall be provided with protectors.

E 800.21 (NEC 800-21.) Underground Circuits Entering Buildings. (Change)

(a) With electric light or power conductors. See Wis. Adm. Code, Volume 1, Electrical, chapter E 129.