

Chapter E 90

ADOPTION OF NATIONAL ELECTRICAL CODE, 1978
AND WISCONSIN AMENDMENTS THERETO

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| E 90.01 | Adoption of code for electrical and communication equipment and wiring | E 90.03 | Omission from NEC-1978 |
| E 90.02 | Consent to incorporate NEC-1978 by reference | E 90.04 | Changes or additions to NEC-1978 |

E 90.01 Adoption of code for electrical and communication equipment and wiring. The National Electrical Code-1978 (NEC-1978), also American National Standards Institute CI-1978 (ANSI CI-1978), 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-1978 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, December, 1978, No. 276, eff. 1-1-79.

E 90.02 Consent to incorporate NEC-1978 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-1978, 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, December, 1978, No. 276, eff. 1-1-79.

E 90.03 Omission from NEC-1978. The following sections of the NEC-1978 are not incorporated as part of the Wisconsin State Electrical Code, Volume 2.

Section 90-1	Section 725-2 (b) Exception
90-2	760-4 (d) Exception
90-4	800-3 (d) Exception
518-3 Exception No. 1	820-15 Exception
600-4	

History: Cr. Register, December, 1978, No. 276, eff. 1-1-79.

E 90.04 Changes or additions to NEC-1978. Following are the changes or additions to the NEC-1978. [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-1978. 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-1978 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

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the NEC-1978 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.

ARTICLE 210—BRANCH CIRCUITS

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

Exception: Where a branch circuit supplies only fixed permanently connected load consisting of 2 or more appliance or lighting unit outlets, Table 210-24 shall not apply.

E 210.25 (NEC 210-25.) Receptacle Outlets Required. (Change)

(b) *Dwelling unit.* In every kitchen, family room, dining room, breakfast room, living room, parlor, library, den, sun room, bedroom, recreation room, or similar rooms, receptacle outlets shall be installed so that no point along the floor line in any wall space is more than 6 feet, measured horizontally, from an outlet in that space, including any wall space 2 feet or more in width. Receptacle outlets shall, insofar as practicable, be spaced equal distances apart. Receptacle outlets in floors shall not be counted as part of the required number of receptacle outlets unless located within 12 inches of the wall.

1. In kitchen and dining areas, a receptacle outlet shall be installed at each counter space wider than 12 inches. Counter top spaces separated by range tops, refrigerators, or sinks shall be considered as separate counter top spaces. Receptacles rendered inaccessible by appliances fastened in place or appliances occupying dedicated space shall not be considered as these required outlets.

2. At least one wall receptacle outlet shall be installed in the bathroom adjacent to the basin location. See 210-8 (a).

3. For a one- or 2-family dwelling, at least one receptacle outlet shall be installed outdoors.

4. For a one- or 2-family dwelling, at least one receptacle outlet, in addition to any provided for laundry equipment, shall be installed in each basement and in each attached garage.

a. Outlets in other sections of the dwelling unit for special appliances, such as laundry equipment, shall be placed within 6 feet of the intended location of the appliance.

b. At least one receptacle outlet shall be installed for the laundry.

5. The receptacle outlets required by this section shall be in addition to any receptacle that is part of any lighting fixture or appliance, located within cabinets or cupboards, or located over 5-½ feet above the floor.

6. *Exceptions:* a. Permanently installed electric baseboard heaters equipped with factory installed receptacle outlets, or outlets provided as a separate assembly by the manufacturer, shall be permitted as the required outlet or outlets for the wall space utilized by such permanently installed heaters. Such receptacle outlets shall not be connected to the heater circuits.

b. Receptacles concealed by stationary appliances shall not be considered as the required outlets.

c. The distance along a floor line occupied by a door opened fully against that space need not be included in establishing the horizontal measurement.

d. Receptacle requirements for bar-type counters and for fixed room dividers no more than 8 feet in length shall be permitted to be provided by a receptacle outlet in the wall at the nearest point where the counter or room divider attaches to the wall.

Note: To qualify as a "fixed room divider" the divider cannot be more than 8 feet in length nor more than 4 feet in height and may be attached to a wall at one end only.

7. As used in this section, a "wall space" shall be considered a wall unbroken along the floor line by doorways, fixed glass panels 8 feet or less in width, fireplaces, and similar openings. Each wall space 2 or more feet wide shall be treated individually and separately from other wall spaces within the room. A wall space shall be permitted to include 2 or more walls of a room (around corners) where unbroken at the floor line. Alcoves less than 4 feet in width, entering rooms, shall not be considered wall space.

Note: The purpose of this requirement is to minimize the use of cords across doorways, fireplaces, and similar openings.

ARTICLE 220—BRANCH CIRCUIT AND FEEDER CALCULATIONS

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

(e) Fixed Appliances. 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.

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.

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 sets of service drop or service lateral conductors shall be permitted to 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. (Change)

Note: For clearance of service drop conductors, see Wis. Adm. Code, Electrical, Volume 1.

E 230.32 LENGTH OF SERVICE LATERAL ENTERING A BUILDING. (Addition)

Service conductors shall not extend into a building in a raceway or cable longer than 8 feet unless over-current protection is provided at the outer end.

Exception No. 1: A service lateral shall be permitted to exceed 8 feet provided that the service enters an outside wall of a substation or service equipment room.

Exception No. 2: Service entrance busway.

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

(b) Ungrounded Conductors.

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

(2) 150-ampere, 3-wire or 4-wire for a 2-family or multi-family dwelling. Each dwelling 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 2-family dwelling 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 drop 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) General.

Exception No. 1: Individual dwelling units shall have a single main disconnecting means for each metered service.

Exception No. 2: Not more than 6 switches or 6 circuit breakers shall be permitted for additions to existing services installed prior to February 1, 1968.

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

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

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

(c) One-Family Dwelling.

(1) For one-family dwellings 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.

(2) For 2-family or multi-family dwellings, the service equipment shall have a rating of not less than 150 amperes, 3-wire or 4-wire. Service or feeder equipment for each dwelling 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 2-family dwelling 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 cranes and hoists as provided in section NEC 610.42.

ARTICLE 300—WIRING METHODS

E 300.22 (NEC 300-22.) Wiring in Ducts, Plenums, and Other Air Handling Spaces. (Addition)

(e) *Exception:* Conductors of Article 725 Class 2 and Class 3 circuit conductors, Article 760 nonrequired fire protective signaling system conductors, Article 800 communication circuit conductors, and Article 820 community antenna television coaxial cables having inherent fire-resistant and low-smoke producing characteristics approved for the purpose shall be permitted for ducts, hollow spaces used as ducts, and plenums other than those described in section 300-22 (a).

ARTICLE 310—CONDUCTORS FOR GENERAL WIRING

Notes to 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 dwelling unit.

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 3-phase, 4-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 TRANSFORMER VAULTS

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.

ARTICLE 514—GASOLINE DISPENSING AND SERVICE STATIONS

E 514.03 (NEC 514-3.) Wiring and Equipment Within Hazardous Locations. (Addition)

Exception No. 2: For existing installations, self-service station communication circuits extending between service station and gasoline dispensing units shall be permitted to be installed in existing raceways with power conductors, providing the conductors are insulated for the maximum voltage of any conductor in the raceway and approved for use under such conditions.

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 feet horizontally from aboveground flammable liquid storage tanks. When the voltage is 300 or below, a horizontal clearance of not less than 10 feet 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.

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 STANDBY EMERGENCY POWER. (Addition)

(a) Standby emergency power of a type recognized by subsection 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.

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 shall be permitted to 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.
3. Metal-clad cable shall be permitted to be used where it can be fished in hollow spaces of walls or partitions in existing apartments or rooming houses not over 3 stories in height.

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.

TABLE E 700.07
OCCUPANCIES REQUIRING STANDBY EMERGENCY POWER

Column A Occupancy	Column B No. Persons Accommodated	Column C Calculated Capacity or Area
1. Apartment buildings	100	50 bedrooms
2. Arenas	200	800 square feet. (Use seated space only.)
3. Art galleries	200	20,000 square feet
4. 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
5. Assembly halls with stage	200	1,400 square feet
6. Auditoriums	200	1,400 square feet
7. Banks	400	30,000 square feet
8. 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.
9. Centers for developmentally disabled	20	20 inmate beds
10. Children's homes	20	20 beds
11. Community-based residential facilities	20	20 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.)
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	20	20 patient beds
19. Hotels	200	200 rooms
20. Jails	20	20 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	20	20 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 700.17 (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 shall be permitted to 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 and NEC Article 700. Where section E 700.07 requires standby emergency power, required fire alarm systems shall be supplied from an approved standby emergency source.

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.

History: Cr. Register, December, 1978, No. 276, eff. 1-1-79.