

## Chapter PSC 114

### WISCONSIN STATE ELECTRICAL CODE, VOLUME I

#### Subchapter I — Administration and Enforcement

- PSC 114.01 General information (p. 130)
- PSC 114.02 Purpose and scope (p. 130)
- PSC 114.03 Authority and statutory references (p. 131)

#### Subchapter II — General Requirements

- PSC 114.04 General requirements (p. 131)
- PSC 114.05 Application of rules (p. 132)
- PSC 114.06 Adoption of standard by reference (p. 133)

#### Subchapter III — Omissions, Changes or Additions to NESC-1990

- PSC 114.07 Omissions from NESC-1987 (p. 133)
- PSC 114.08 Changes or additions to NESC-1987 (p. 133)
  - PSC 114.2 Definitions (p. 134)
  - PSC 114.3 References (p. 134)
  - PSC 114-94B2c Driven rods (p. 134)
  - PSC 114-96A3 Multiple grounded systems (p. 134)
  - PSC 114-97C Separation of Grounding Conductors (p. 135)
  - PSC 114-110A Enclosure of equipment (p. 135)
  - PSC 114-127 Classified Locations (p. 135)
  - PSC 114-202 Application of Rules (p. 135)
  - PSC 114-210 Referenced sections (p. 136)
  - PSC 114-219 Marking of poles and structures carrying high voltage supply lines (p. 136)
  - Table PSC 114-232-1 Vertical clearance of wires, conductors and cables above ground, rails, or water surfaces (p. 137)
  - Table PSC 114-232-3 Reference heights (p. 143)
  - Table PSC 114-233-1 Vertical clearance between wires, conductors and cables carried on different supporting structures (p. 143)
  - PSC 114-234A4 Transmission lines over dwelling occupancies (p. 147)
  - PSC 114-234-1 Clearance of wires, conductors, and cables, and unguarded rigid live parts adjacent but not attached to buildings and other installations except bridges (p. 147)
  - PSC 114-234C3c Supply conductors attached to buildings or other installations (p. 151)

- PSC 114-234C6 Near stored materials (p. 151)
- PSC 114-234C7 Near fuel storage tanks (p. 151)
- PSC 114-234C8 Near wells (p. 151)
- PSC 114-234C9 Antennas (p. 152)
- PSC 114-234E1 Clearance of wires, conductors, or cables installed over or near swimming areas (p. 152)
- PSC 114-234I Clearance of wires conductors, or cables to rail cars (p. 153)
- PSC 114-239D Mechanical protection near ground (p. 153)
- PSC 114-239G8 Requirements for vertical supply conductors passing through communication space on jointly used line structures (p. 153)
- PSC 114-242G Grades of construction for conductors (p. 153)
- PSC 114-250D Longitudinal capability (p. 153)
- PSC 114-261A Supporting structure (p. 153)
- Table PSC 114-261-4 Overload capacity factors for guys, guy anchors, foundations, and settings (p. 153)
- PSC 114-310 Referenced sections (p. 154)
- PSC 114-311C Installation and maintenance - markers (p. 154)
- PSC 114-317 Outdoor location of oil-insulated padmounted transformers near buildings (p. 154)
- PSC 114-320B7 Clearances from other underground installations - gas lines (p. 156)
- PSC 114-352E Clearances from other underground installations - gas lines (p. 156)
- PSC 114-353D2c Depth of burial (p. 156)
- PSC 114-354E4 Random separation - protection (p. 157)
- PSC 114-360A Risers - general (p. 157)
- PSC 114-381H Warning signs (p. 157)
- PSC 114-402 Referenced sections (p. 157)
- PSC 114-444A3 De-energizing equipment or lines to protect employees, application of rules (p. 157)

Note: Chapter PSC 114 as it existed on April 30, 1991 was repealed and a new chapter PSC 114 was created effective May 1, 1991.

#### Subchapter I — Administration and Enforcement

**PSC 114.01 General information. (1) ADMINISTRATIVE AUTHORITIES.** The Wisconsin State Electrical Code is issued and administered by the public service commission and the department of industry, labor and human relations as part of the Wisconsin Administrative Code. The public service commission has primary responsibility for issuance and ad-

ministration of Volume 1 as found in this chapter. The department of industry, labor and human relations has similar responsibility for issuance and administration of Volume 2 which is found in ch. ILHR 16, Wis. Adm. Code.

(2) **AVAILABILITY OF STATE ELECTRICAL CODE.** The public service commission has adopted the 1990 edition of the National Electrical Safety Code (NESC-1990) with certain deletions, changes and additions which are found in Volume 1, Wisconsin State Electrical Code. Copies of the NESC may be purchased from the Institute of Electrical and Electronics Engineers, Inc., IEEE Service Center, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331 (telephone 1-800-678-IEEE) or the American National Standards Institute, 1430 Broadway, New York, NY 10018 (telephone 212/642-4900). Copies of Volume 1, Wisconsin State Electrical Code, may be ordered from the Wisconsin Department of Administration, Document Sales, 202 S. Thornton Avenue, Madison, WI 53702, telephone 608/266-3358.

**Note:** The department of industry, labor and human relations has similarly adopted the National Electrical Code (NEC) with certain deletions, changes and additions which are found in Volume 2, Wisconsin State Electrical Code. Copies of Volume 2, Wisconsin State Electrical Code, may be ordered from the Wisconsin Department of Administration, Document Sales, 202 S. Thornton Avenue, Madison, WI 53702. See chapter ILHR 16, Wis. Adm. Code, for current availability information for the NEC.

**History:** Cr. Register, April, 1991, No. 424, eff. 5-1-91.

**PSC 114.02 Purpose and scope** (1) **PURPOSE.** The purpose of this chapter is the practical safeguarding of persons during the installation, operation or maintenance of electric supply and communication lines and their associated equipment. They contain minimum provisions considered necessary for the safety of employees and the public. They are not intended as a design specification or an instruction manual.

(2) **SCOPE.** (a) This chapter covers supply and communications lines, equipment, and associated work practices employed by an electric supply, communication, railway, or similar utility in the exercise of its function as a utility. In addition, this chapter prohibits the location of buildings, structures, and equipment; materials storage and change of grade, by any person in violation of the clearance requirements of this chapter. This chapter has also been adopted by the department of industry, labor and human relations as part of Volume 2, Wisconsin State Electrical Code, for application to installations over 600 volts of parties other than utilities.

(b) This chapter does not cover installations in mines, ships, railway rolling equipment, aircraft or automotive equipment, or utilization wiring except as covered in Parts 1 and 3, NESC-1990.

**History:** Cr. Register, April, 1991, No. 424, eff. 5-1-91.

**PSC 114.03 Authority and statutory references** (1) **STATUTORY AUTHORITY.** Volume 1, Wisconsin State Electrical Code, constitutes a general order of the public service commission authorized by 196.74 and 227.11, Stats.

(2) **STATUTORY ENFORCEMENT.** (a) Compliance with the requirements of Volume 1, Wisconsin State Electrical Code, is required before a utility may provide electric service even though some portions of the code may not be directly enforceable by state agencies. See s. 101.865, Stats. The authority for the enforcement of Volume 1, Wisconsin State Electrical Code, is the Wisconsin Department of Administration, Document Sales, 202 S. Thornton Avenue, Madison, WI 53702, telephone 608/266-3358. **Register, April, 1991, No. 424**

Code, is vested in the public service commission with respect to the installation and operation of circuits or equipment by public utilities and railroads in the exercise of their functions as utilities and railroads.

**Note:** While the public service commission does not have jurisdiction for enforcement of Volume 1, Wisconsin State Electrical Code, over parties other than public utilities and railroads, electric utilities are prohibited under s. 101.865, Stats., from extending electric service to premises which are not in compliance with the Wisconsin State Electrical Code, which includes both Volumes 1 and 2.

(b) The requirements in the code are enforceable in the same manner as other orders of the public service commission.

**Note:** See ss. 102.57, 102.58, 195.07, 196.41, 196.64, 196.66, 196.74, and ch. 227, Stats.

(3) **OTHER REQUIREMENTS.** (a) Nothing in this chapter shall be construed to deprive a municipality of jurisdiction over utilities, places of employment or public buildings, except that no local requirements shall be less stringent than the requirements in this chapter. See s. 196.58, Stats.

(b) A utility may file with the public service commission requirements covering subject matter which is a part of this code, but such requirements must be acceptable and not less stringent than the requirements of this chapter. See s. 196.19, Stats.

**Note:** There are state statutes that refer directly to certain electrical construction. Some of these are: ss. 66.047, 86.16, 101.865, 134.40, 134.41, 182.017, 182.0175, 182.018, 196.171, 196.58, 196.67, and 196.72, Stats.

(4) **COMPLAINTS.** If a complaint is filed with the public service commission by any interested party to the effect that public safety requires changes in construction or methods of operation, the public service commission shall investigate and make recommendations. See s. 196.74, Stats., for procedure if changes in utility facilities are necessary.

**History:** Cr. Register, April, 1991, No. 424, eff. 5-1-91.

## Subchapter II — General Requirements

**PSC 114.04 General requirements.** (1) **CHARACTER OF CONSTRUCTION, MAINTENANCE AND OPERATION.** All electrical power and communication equipment and lines shall be of such construction, and so installed, operated and maintained as to minimize the life and fire hazard.

(2) **CONSTRUCTION, INSPECTION AND REPAIRS.** (a) All construction and equipment shall be cleaned when necessary and inspected at such intervals as experience has shown to be necessary. Any equipment or construction known to be defective so as to endanger life or property shall be promptly repaired, permanently disconnected, or isolated until repairs can be made. Construction, repairs, additions and changes to electrical equipment and conductors shall be made by qualified persons only.

(b) Facilities installed or used in the generation, transmission, distribution and utilization of electricity shall be designed for such installation and use.

**History:** Cr. Register, April, 1991, No. 424, eff. 5-1-91.

**PSC 114.05 Application of rules.** (1) **NEW INSTALLATIONS AND EXTENSIONS.** (a) This chapter shall apply in full to all new installations, reconstructions, alterations and extensions, except when any rule is shown to be impractical for special reasons or where the advantage of uniformity

Register, April, 1991, No. 424

with existing construction is greater than the advantage of construction in compliance with the rules, providing the existing construction is reasonably safe;

(b) By bringing existing installations into conformity with these rules as far as may be directed by the public service commission and within the time determined by said agency; or

(c) Where the requirement is waived by the public service commission under sub. (3).

(2) EXISTING INSTALLATIONS. (a) Where an existing installation meets, or is altered to meet these rules, such installation is considered to be in compliance with this edition and is not required to comply with any previous edition.

(b) Existing installations, including maintenance replacements, which comply with prior editions of the code, need not be modified to comply with these rules except as may be required for safety reasons by the administrative authority.

(c) Where conductors or equipment are added, altered, or replaced on an existing structure, the structure or the facilities on the structure need not be modified or replaced if the resulting installation will be in compliance with either the rules in effect a) at the time of the original installation, or b) at the time of an addition, alteration, or replacement, or c) currently in accordance with par. (a).

(3) WAIVING RULES. The rules are intended to apply to all installations, except as modified or waived by the public service commission. They are intended to be so modified or waived in particular cases whenever any rules are shown for any reason to be impractical or if equivalent safety is secured in other ways.

(4) TEMPORARY INSTALLATIONS. Modifying or waiving certain of the rules will sometimes be necessary in case of temporary installations or installations which are shortly to be dismantled or reconstructed. Such temporary construction may be used for a reasonable length of time without fully complying with this code, provided it is under competent supervision while it or adjoining equipment is energized, or if it is protected by suitable barriers or warning signs when accessible to any person; but all such construction shall be made reasonably safe.

(5) TESTING. Rooms which are used exclusively for routine or special electrical test work, and therefore are under the supervision of a qualified person, need comply with this code only insofar as is practical for the character of the testing done.

(6) EMERGENCY. In case of emergency the person responsible for the installation may decide to modify or waive any requirement of this chapter, subject to review by the public service commission, even should an application be pending before the public service commission for a requested emergency related modification or waiver.

(7) INTENT. Rules in this chapter which are to be regarded as mandatory are characterized by the use of the word shall. Where a rule is of an advisory nature, to be followed insofar as practical, it is indicated by the use of the word should. Other practices which are considered desirable are stated as RECOMMENDATIONS. NOTES, other than footnotes

to tables, are for information purposes only and are not to be considered as mandatory or as part of the code requirements.

History: Cr. Register, April, 1991, No. 424, eff. 5-1-91.

**PSC 114.06 Adoption of standard by reference.** (1) **ADOPTION OF STANDARD.** The National Electrical Safety Code-1990 edition (also American National Standards Institute C2-1990 edition) subject to omissions, changes and additions as otherwise shown in this chapter, is hereby incorporated by reference into the Wisconsin State Electrical Code, Volume 1. Interim amendments to the NESC-1990 will not be effective in this state until such time as this chapter is revised to reflect such changes.

(2) **CONSENT TO INCORPORATE NESC-1990 BY REFERENCE.** Pursuant to s. 227.21, Stats., the attorney general and the revisor of statutes have consented to the incorporation by reference of these standards contained in the NESC-1990, except for the omissions as shown in s. PSC 114.07 and the changes and additions as shown later in this chapter. Copies of the NESC-1990 are on file in the offices of the public service commission, the secretary of state, and the revisor of statutes.

History: Cr. Register, April, 1991, No. 424, eff. 5-1-91.

### **Subchapter III — Omissions, Changes or Additions to NESC-1990**

**PSC 114.07 Omissions from NESC-1990.** (1) **OMISSIONS.** The following portion of the NESC-1990 is not incorporated as part of the Wisconsin State Electrical Code, Volume 1:

(a) Rules 010-016 of Section 1 - Introduction to the National Electrical Safety Code, pp. 45-48.

History: Cr. Register, April, 1991, No. 424, eff. 5-1-91.

**PSC 114.08 Changes, additions to NESC-1990.** Changes or additions to the NESC-1990 are specified in this subchapter and are rules of the public service commission and not requirements of the NESC-1990.

Note: Each change or addition has been prefixed by PSC 114. Following the PSC designation is the referenced NESC section or subsection and the page on which it is found in the NESC. Example: PSC 114-96A3 [NESC 96A3, p. 84]. The word "Change" following the section number and heading means that the corresponding wording of the NESC-1990 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 NESC-1990 and that the new requirement is inserted at the appropriate location.

History: Cr. Register, April, 1991, No. 424, eff. 5-1-91.

## **SECTION 2. DEFINITIONS OF SPECIAL TERMS**

### **PSC 114.2 Definitions**

**Administrative Authority** [NESC, p. 50] (Change). The authority for the enforcement of this code is vested in the public service commission with respect to the installation and operation of circuits or equipment by public utilities and railroads in the exercise of their functions as utilities and railroads.

**Commission** [NESC, p. 51] (Addition). Public service commission of Wisconsin.

## SECTION 3. REFERENCES

PSC 114.3 References [NESC, p. 65] (Change). Change reference [32] to read as follows:

ANSI/NFPA 70-1990, National Electrical Code.

SECTION 9. GROUNDING METHODS FOR ELECTRIC  
SUPPLY AND COMMUNICATION FACILITIES

PSC 114-94B2c [NESC 94B2c, p. 78] Driven Rods. (Addition) Add a new Exception 3 as follows:

Exception 3: When contained within vaults, or manholes, the driven depth may be reduced to not less than 7.5 ft. (2.3m) provided that the upper end is within 4 inches of a wall.

PSC 114-96A3 [NESC 96A3, p. 84] Multiple Grounded Systems.

(Change) Change A3 to read:

The neutral, which shall be of sufficient size and ampacity for the duty involved, shall be connected to a made or existing electrode at each transformer location and at a sufficient number of additional points with made or existing electrodes to total not less than nine grounds in each mile (1.6 km) of line, including those grounds at transformer locations but not including grounds at individual services.

Exception 1: In underground multiple-grounded systems where an insulating jacket or nonmetallic conduit is used over direct-buried concentric neutral supply cable, this requirement shall be permitted to be reduced to four grounds in each mile. This exception for use of supply cable with an insulating jacket or nonmetallic conduit shall not be permitted for random lay construction. See Part 3, Rule 354, "Random Separation — Additional Requirements."

Exception 2: Where underwater crossings are encountered, the requirements of made electrodes do not apply for the underwater portion if the neutral is of sufficient size and capacity for the duty involved and the requirements of Rule 92B2 are met.

Note: Multiple grounding systems extending over a substantial distance are more dependent on the multiplicity of grounding electrodes than on the resistance to ground of any individual electrode. Therefore, no specific values are imposed for the resistance of individual electrodes.

PSC 114-97C [NESC 97C, p. 85] Separation of Grounding Conductors (Change). Change paragraph C. to read:

C. Primary and secondary circuits utilizing a single conductor as a common neutral shall have at least nine ground connections on such conductor in each mile (1.6 km) of line, including those grounds at transformer locations but not including ground connections at customers' service equipment.

## PART 1. RULES FOR THE INSTALLATION AND MAINTENANCE OF ELECTRICAL SUPPLY STATIONS AND EQUIPMENT

### SECTION 11. PROTECTIVE ARRANGEMENTS IN ELECTRICAL SUPPLY STATIONS

PSC 114-110A [NESC 110A, p. 88] Enclosure of Equipment. (Addition) Add to third paragraph:

In the case of chain-link, mesh or other open-type fences through which sticks or other objects can be inserted to make contact with live parts or parts that may become alive, the horizontal clearance between such parts and the fence shall be not less than that listed in column 3, Horizontal clearance of unguarded parts, of Table 124-1, Clearance from Live Parts.

### SECTION 12. INSTALLATION AND MAINTENANCE OF EQUIPMENT

PSC 114-127 [NESC 127, pp. 107-124] Classified Locations (Change and Omission)

Revise the following subsections of Rule 127, by changing the citations of Reference No. [32] from "ANSI/NFPA 70-1987" to "ANSI/NFPA 70-1990."

127	line 2	page 107
127A.3.	line 5	page 108
127A.5	line 10	page 109
127A.6	line 11	page 109
127E.2.	line 2	page 112
127E.3.	line 6	page 112
127F.1.	line 10	page 113
127F.2.	line 5	page 113
127H.1.	line 4	page 114
127H.2.	line 5	page 114
127K.3.	line 3	page 115
127L.3.	line 3	page 115

Delete subsections NESC 127A1, A2, A5, and A6.

## PART 2. SAFETY RULES FOR THE INSTALLATION AND MAINTENANCE OF OVERHEAD ELECTRIC SUPPLY AND COMMUNICATION LINES

### SECTION 20. PURPOSE, SCOPE AND APPLICATION OF RULES

PSC 114-202 [NESC 202, p. 138] Application of Rules (Change) Change the first sentence to read:

The general requirements for application of these rules are contained in Rule PSC 114.05.

### SECTION 21. GENERAL REQUIREMENTS

PSC 114-210 [NESC 210, p. 138] Referenced Sections (Change) Change rule 210 to read:

210. Referenced Sections

The Introduction (Section 1) as amended by PSC 114.01 - PSC 114.07, Definitions (Section 2) as amended by Section 2 of Chapter PSC 114, List of Referenced Documents (Section 3) as amended by Section 3 of Chapter PSC 114 and Grounding Methods (Section 9) as amended by Section 9 of Chapter PSC 114 shall apply to the requirements of Part 2.

PSC 114-219 [follows NESC 218, p. 144] Marking of Poles and Structures Carrying High Voltage Supply Lines (Addition). Add the following section:

**PSC 114-219 MARKING OF POLES AND STRUCTURES CARRYING HIGH VOLTAGE SUPPLY LINES.**

(1) Every corporation, company or person constructing, operating or maintaining an electric transmission line with a voltage of 2,000 or more between conductors and the ground shall place warning signs from 4 to 8 feet (1.2 to 2.45 m) above the ground upon all poles or other structures supporting the line:

- (a) within 100 feet (30.48 m) of school grounds;
- (b) within 100 feet (30.48 m) of any place where the line crosses a public highway;
- (c) within any city or village.

(2) The following shall constitute standards for warning signs on overhead electrical supply line poles and structures:

(a) "Danger — High Voltage" warning signs which meet the requirements as to format of subsections 1926.200(a) and (b) of Part 1926-Safety and Health Regulations for Construction-1979 (OSHA) as found in the Code of Federal Regulations, subject to the following conditions:

1. The overall dimensions of these signs shall not be less than 10 inches by 7 inches (25.4 cm by 17.78 cm) except that in those situations where use of a sign this size is not practical, two or more signs not smaller than 7 inches by 5 inches (17.78 cm by 12.7 cm) may be substituted.

2. Letters of the words "High Voltage" shall be in red, black, orange, or reflective letters on the contrasting white background and at least 2 inches (5.08 cm) in height. Exception: For those specific signs having dimensions of 10 inches (25.4 cm) horizontal by 7 inches (17.78 cm) vertical, the height of letters shall not be less than 1 1/4 inches (3.175 cm).

3. Warning signs installed as replacements or installed as new facilities shall comply with the standards as prescribed in PSC 114-217(2).

**Note:** This rule amends and expands the application of the warning sign requirements of s. 196.67, Stats. See s. 196.67.

**SECTION 23. CLEARANCES**

**Note:** The specification of clearances in Rules 232, 233, and 234 of the 1990 Edition of the NESC adopted herein have been revised in both concept and content to reflect the new Uniform System of Clearances approach which is described in Appendix A of NESC-1990. Because the approach and the application of the rules have been revised, it must be understood that clearance values cannot be directly compared between the 1990 Edition and prior Editions of the NESC or the Wisconsin State Electrical Code. See Appendix A, NESC-1990.

Table PSC 114-232-1 [NESC, Table 232-1, pp. 162-165: feet; pp. 166-169: metric] Vertical Clearance of Wires, Conductors and Cables Above Ground, Rails, or Water Surfaces (Changes, Deletions, Additions)



Table PSC 114-232-1 which follows includes the following changes, deletions and additions in NESC Table 232-1:

Footnote 2 has been changed.

Footnote 16 has been changed.

Footnote 17 has been changed.

Footnote 25 has been added.

The reference to Footnote 25 has been added to the headings of the third, fourth, and fifth columns as shown.

The number entry of "14.0" (FT) in the first column of row 5 should be changed to read "9.5" (FT). (Errata correction to NESC-90.)

FT

Table PSC 114-232-1

## VERTICAL CLEARANCE OF WIRES, CONDUCTORS, AND CABLES ABOVE GROUND, ROADWAY, RAIL or WATER SURFACES

(Voltages are phase-to-ground for effectively grounded circuits and those other circuits where all ground faults are cleared by promptly de-energizing the faulted section, both initially and following subsequent breaker operations. See the definition section for voltages of other systems.)

Nature of surface underneath wires, conductors, or cables	Where wires, conductors, or cables cross over or overhang					Trolley and electrified railroad contact conductors and associated span or messenger wires ①	
	① Insulated communication conductors and cables; messengers; surge protection wires; grounded pay-off conductors Rule 230C1 (ft)	Non-insulated communication conductors; supply cables of 0 to 750 V meeting Rules 230C2 or 230C3 (ft) ②	Supply cables over 750 V meeting Rules 230C2 or 230C3; open supply conductors, 0 to 750 V (ft) ③	Open supply conductors, over 750 V to 22kV (ft) ④	0 to 750V to ground (ft)	over 750V to 22kV to ground (ft)	
Where wires, conductors, or cables cross over or overhang							
1. Track rails of railroads (except electrified railroads using overhead trolley conductors) ② ③ ④	23.5	24.0	24.5	26.5	22.0 ④	22.0 ④	
2. Roads, streets, alleys; nonresidential driveways, parking lots, and other areas subject to truck traffic ②	15.5 ③	16.0 ③	16.5	18.5	18.0 ⑤	20.0 ⑤	
3. Residential driveways	15.5 ③ ④	16.0 ③ ④	16.5 ④	18.5	18.0 ⑤	20.0 ⑤	
4. Other land traversed by vehicles, such as cultivated, grazing, forest, orchard, etc.	15.5	16.0	16.5	18.5	—	—	
5. Spaces or ways subject to pedestrians or restricted traffic only ③	9.5	12.0 ⑥	12.5 ⑥	14.5	16.0	18.0	
6. Water areas not suitable for sailboating or where sailboating is prohibited ③	14.0	14.5	15.0	17.0	—	—	
7. Water areas suitable for sailboating including lakes, ponds, reservoirs, tidal waters, rivers, streams, and canals with any unobstructed surface area of: ① ③ ⑥							
(a) Less than 20 acres	17.5	18.0	18.5	20.5	—	—	
(b) 20 to 200 acres	25.5	26.0	26.5	28.5	—	—	
(c) Over 200 to 2000 acres	31.5	32.0	32.5	34.5	—	—	
(d) Over 2000 acres	37.5	38.0	38.5	40.5	—	—	
8. Public or private land and water areas posted for rigging or launching sailboats	Clearance above ground shall be 5 ft, greater than in 7 above, for the type of water areas served by the launching site						
Where wires, conductors, or cables run along and within the limits of highways or other road rights-of-way but do not overhang the roadway							
9. Roads, streets, or alleys	15.5 ③ ④	16.0 ③	16.5	18.5	18.0 ⑤	20.0 ⑤	
10. Roads in rural districts where it is unlikely that vehicles will be crossing under the line	13.5 ③ ④	14.0 ③	14.5 ④	16.5	18.0 ⑤	20.0 ⑤	

## Footnotes for Table PSC 114-232-1

① Where subways, tunnels, or bridges require it, less clearances above ground or rails than required by Table 232-1 may be used locally. The trolley and electrified railroad contact conductor should be graded very gradually from the regular construction down to the reduced elevation.

② For wire, conductors, or cables crossing over mine, logging, and similar railways which handle only cars lower than standard freight cars, the clearance may be reduced by an amount equal to the difference in height between the highest loaded car handled and 20 ft., but the clearances shall not be reduced below that required for street crossings.

③ This footnote not used in this edition.

④ In communities where 21 ft. has been established, this clearance may be continued if carefully maintained. The elevation of the contact conductor should be the same in the crossing and next adjacent spans. (See Rule 225D2 for conditions which must be met where uniform height above rail is impractical.)

⑤ In communities where 16 ft. has been established for trolley and electrified railroad contact conductors 0 to 750 V to ground, or 18 ft. for trolley and electrified railroad contact conductors exceeding 750 V, or where local conditions make it impractical to obtain the clearance given in the table, these reduced clearances may be used if carefully maintained.

⑥ This footnote not used in this edition.

⑦ Where the height of attachment to a building or other installation does not permit service drops to meet these values, the clearances may be reduced to the following:

	(feet)
(a) Insulated supply service drops limited to 300 V to ground	12.5
(b) Insulated drip loops of supply service drops limited to 300 V to ground	10.5
(c) Supply service drops limited to 150 V to ground and meeting Rules 230C1 or 230C3	12.0
(d) Drip loops only of service drops limited to 150 V to ground and meeting Rules 230C1 or 230C3	10.0
(e) Insulated communication service drops	11.5

⑧ Where the height of attachment to a building or other installation does not permit service drops to meet these values, the clearance may be reduced to the following:

	(feet)
(a) Insulated supply service drops limited to 300 V to ground	10.5
(b) Insulated drip loops of supply service drops limited to 300 V to ground	10.5
(c) Supply service drops limited to 150 V to ground and meeting Rules 230C1 or 230C3	10.0
(d) Drip loops only of supply service drops limited to 150 V to ground and meeting Rules 230C1 or 230C3	10.0

⑨ Spaces and ways subject to pedestrians or restricted traffic only are those areas where equestrians, vehicles or other mobile units, exceeding 8 ft in height, are prohibited by regulation or permanent terrain configurations or are otherwise not normally encountered or not reasonably anticipated.

⑩ Where a supply or communication line along a road is located relative to fences, ditches, embankments, etc., so that the ground under the line would not be expected to be traveled by pedestrians, this clearance may be reduced to the following values:

	(feet)
(a) Insulated communication conductor and communication cables	9.5
(b) Conductors of other communication circuits	9.5
(c) Supply cables of any voltage meeting Rule 230C1 and supply cables limited to 150 V to ground meeting Rules 230C2 or 230C3	9.5
(d) Insulated supply conductors limited to 300 V to ground	12.5
(e) Guys	9.5

⑪ No clearance from ground is required for anchor guys not crossing tracks, rails, streets, driveways, roads, or pathways.

⑫ This clearance may be reduced to 13 ft. for communication conductors and guys.

⑬ Where this construction crosses over or runs along alleys, driveways, or parking lots, this clearance may be reduced to 15 ft.

⑭ This footnote not used in this edition.

⑮ This footnote not used in this edition.

⑩ Adjacent to tunnels and overhead bridges which restrict the height of loaded rail cars to less than 20 ft., these clearances may be reduced by the difference between the highest loaded rail car handled and 20 ft. if mutually agreed to by the parties at interest.

⑪ For controlled impoundments, the surface area and corresponding clearances shall be based upon the design high water level. For other waters, the surface area and clearances shall be based on the normal high water level. The clearance over rivers, streams, and canals shall be based upon the largest surface area of any 1 mi long segment which includes the crossing. The clearance over a canal, river, or stream normally used to provide access for sailboats to a larger body of water shall be the same as that required for the larger body of water.

⑫ Where an overwater obstruction restricts vessel height to less than the applicable reference height given in Table 232-3, the required clearance may be reduced by the difference between the reference height and the overwater obstruction height, except that the reduced clearance shall be not less than that required for the surface area on the line-crossing side of the obstruction.

⑬ Where the US Army Corps of Engineers, or the State, or a surrogate thereof has issued a crossing permit, clearances of that permit shall govern.

⑭ See Rule 234I for the required horizontal and diagonal clearances to rail cars.

⑮ For the purpose of this rule, trucks are defined as any vehicle exceeding 8 ft. in height. Areas not subject to truck traffic are areas where truck traffic is not normally encountered or not reasonably anticipated.

⑯ This footnote not used in this section.

⑰ This footnote not used in this section.

⑱ Communication cables and conductors may have a clearance of 15ft. where poles are back of curbs or other deterrents to vehicular traffic.

⑲ A diagonal clearance the same as the vertical clearance shall be maintained to uneven or sloping terrain within a horizontal distance of  $\frac{1}{4}$  of the vertical clearance, all distances to be measured from the conductors in their wind-displaced position as defined in Rule 234A2.

## VERTICAL CLEARANCE OF WIRES, CONDUCTORS, AND CABLES ABOVE GROUND, ROADWAY, RAIL, OR WATER SURFACES

(Voltages are phase to ground for effectively grounded circuits and those other circuits where all ground faults are cleared by promptly de-energizing the faulted section, both initially and following subsequent breaker operations. See the definition section for voltages of other systems.)

Nature of surface underneath wires, conductors, or cables	① Insulated communication conductors and cables, messengers, surge protection wires; grounded guys; neutral conductors meeting Rule 230E1; supply cables meeting Rule 230C1 (m)	Where wires, conductors, or cables cross over or overhang				Trolley and electrified railroad contact conductors and associated span or messenger wires ①	
		Non-insulated conductors; supply cables of 0 to 750 V meeting Rules 230C2 or 230C3	Supply cables over 750 V meeting Rules 230C2 or 230C3; open supply conductors, 0 to 750 V (m) ②	Open supply conductors, over 750 V to 22kV (m) ③		0 to 750V to ground (m)	over 750V to 22kV to ground (m)
1. Track rails of railroads (except electrified railroads using overhead trolley conductors) ②⑤⑥	7.2	7.3	7.5	8.1		6.7④	6.7④
2. Roads, streets, alleys; nonresidential driveways, parking lots, and other areas subject to truck traffic ②	4.7③	4.9③	5.0	5.6		5.5⑤	6.1⑤
3. Residential driveways	4.7③④	4.9⑦③	5.0⑦	5.6		5.5⑤	6.1⑤
4. Other land traversed by vehicles, such as cultivated, grazing, forest, orchard, etc.	4.7	4.9	5.0	5.6		—	—
5. Spaces or ways accessible to pedestrians or restricted traffic only ③	2.9	3.6③	3.8③	4.4		4.9	5.5
6. Water areas not suitable for sailboating or where sailboating is prohibited ③	4.3	4.4	4.6	5.2		—	—
7. Water areas suitable for sailboating including lakes, ponds, reservoirs, tidal waters, rivers, streams, and canals with an unobstructed surface area of: ⑦⑧⑨							
(a) Less than 8 ha	5.3	5.5	5.6	6.2		—	—
(b) 8 to 80 ha	7.8	7.9	8.1	8.7		—	—
(c) Over 80 to 800 ha	9.6	9.8	9.9	10.5		—	—
(d) Over 800 ha	11.4	11.6	11.7	12.3		—	—
8. Public or private land and water areas posted for rigging or launching sailboats	Clearance above ground shall be 1.5 m greater than in 7 above, for the type of water areas served by the launching site						
Where wires, conductors, or cables run along and within the limits of highways or other road rights-of-way but do not overhang the roadway	4.7③④	4.9③	5.0	5.6		5.5⑤	6.1⑤
9. Roads, streets, or alleys							
10. Roads in rural districts where it is unlikely that vehicles will be crossing under the line	4.1⑩②	4.3⑩	4.4⑩	5.0		5.5⑤	6.1⑤

## Footnotes for Table PSC 114-232-1

① Where subways, tunnels, or bridges require it, less clearances above ground or rails than required by Table 232-1 may be used locally. The trolley and electrified railroad contact conductor should be graded very gradually from the regular construction down to the reduced elevation.

② For wire, conductors, or cables crossing over mine, logging, and similar railways which handle only cars lower than standard freight cars, the clearance may be reduced by an amount equal to the difference in height between the highest loaded car handled and 6.1 m but the clearances shall not be reduced below that required for street crossings.

③ This footnote not used in this edition.

④ In communities where 6.4 m has been established, this clearance may be continued if carefully maintained. The elevation of the contact conductor should be the same in the crossing and next adjacent spans. (See Rule 225D2 for conditions which must be met where uniform height above rail is impractical.)

⑤ In communities where 4.9 m has been established for trolley and electrified railroad contact conductors 0 to 750 V to ground, or 5.5 m for trolley and electrified railroad contact conductors exceeding 750 V, or where local conditions make it impractical to obtain the clearance given in the table, these reduced clearances may be used if carefully maintained.

⑥ This footnote not used in this edition.

⑦ Where the height of attachment to a building or other installation does not permit service drops to meet these values, the clearances may be reduced to the following:

	(meters)
(a) Insulated supply service drops limited to 300 V to ground	3.8
(b) Insulated drip loops of supply service drops limited to 300 V to ground	3.2
(c) Supply service drops limited to 150 V to ground and meeting Rules 230C1 or 230C3	3.6
(d) Drip loops only of service drops limited to 150 V to ground and meeting Rules 230C1 or 230C3	3.0
(e) Insulated communication service drops	3.5

⑧ Where the height of attachment to a building or other installation does not permit service drops to meet these values, the clearances may be reduced to the following:

	(meters)
(a) Insulated supply service drops limited to 300 V to ground	3.2
(b) Insulated drip loops of supply service drops limited to 300 V to ground	3.2
(c) Supply service drops limited to 150 V to ground and meeting Rules 230C1 or 230C3	3.0
(d) Drip loops only of service drops limited to 150 V to ground and meeting Rules 230C1 or 230C3	3.0

⑨ Spaces and ways subject to pedestrians or restricted traffic only are those areas where equestrians, vehicles, or other mobile units, exceeding 2.45 m in height, are prohibited by regulation or permanent terrain configurations or are otherwise not normally encountered or not reasonably anticipated.

⑩ Where a supply or communication line along a road is located relative to fences, ditches, embankments, etc., so that the ground under the line would not be expected to be traveled except by pedestrians, this clearance may be reduced to the following values:

	(meters)
(a) Insulated communication conductor and communication cables	2.90
(b) Conductors of other communication circuits	2.90
(c) Supply cables of any voltage meeting Rule 230C1 and supply cables limited to 150 V to ground meeting Rules 230C2 and 230C3	2.90
(d) Insulated supply conductors limited to 300 V to ground	3.8
(e) Guys	2.90

⑪ No clearance from ground is required for anchor guys not crossing tracks, rails, streets, driveways, roads, or pathways.

⑫ This clearance may be reduced to 4.0 m for communication conductors and guys.

⑬ Where this construction crosses over or runs along alleys, driveways, or parking lots, this clearance may be reduced to 4.6 m.

⑭ This footnote not used in this edition.

⑮ This footnote not used in this edition.

⑮ Adjacent to tunnels and overhead bridges which restrict the height of loaded rail cars to less than 6.1 m, these clearances may be reduced by the difference between the highest loaded rail car handled and 6.1 m, if mutually agreed to by the parties at interest.

⑰ For controlled impoundments, the surface area and corresponding clearances shall be based upon the design high water level. For other waters, the surface area and clearances shall be based on the normal high water level. The clearance over rivers, streams, and canals shall be based upon the largest surface area of any 1600 m long segment which includes the crossing. The clearance over a canal, river, or stream normally used to provide access for sailboats to a larger body of water shall be the same as that required for the larger body of water.

⑱ Where an overwater obstruction restricts vessel height to less than the applicable reference height given in Table 232-3, the required clearance may be reduced by the difference between the reference height and the overwater obstruction height, except that the reduced clearance shall be not less than that required for the surface area on the line-crossing side of the obstruction.

⑲ Where the US Army Corps of Engineers, or the State, or a surrogate thereof has issued a crossing permit, clearances of that permit shall govern.

⑳ See Rule 234I for the required horizontal and diagonal clearances to rail cars.

㉑ For the purpose of this rule, trucks are defined as any vehicle exceeding 2.45 m in height. Areas not subject to truck traffic are areas where truck traffic is not normally encountered or not reasonably anticipated.

㉒ This footnote not used in this edition.

㉓ This footnote not used in this edition.

㉔ Communication cables and conductors may have a clearance of 4.6 m where poles are back of curbs or other deterrents to vehicular traffic.

㉕ A diagonal clearance the same as the vertical clearance shall be maintained to uneven or sloping terrain within a horizontal distance of  $\frac{1}{4}$  of the vertical clearance, all distances to be measured from the conductors in their wind-displaced position as defined in Rule 234A2.

Table PSC 114-232-3 [NESC, Table 232-3, p. 174] Reference Heights (Changes).

Change Footnote 3 to read:

<sup>3</sup> For controlled impoundments, the surface area and corresponding clearances shall be based upon the design high water level. For other waters, the surface area and clearances shall be based on the normal high water level. The clearance over rivers, streams, and canals shall be based upon the largest surface area of any one-mile-long (1600 m) segment which includes the crossing. The clearance over a canal, river or stream normally providing access for sailboats to a larger body of water shall be the same as that required for the larger body of water.

Table PSC 114-233-1 [NESC Table 233-1, pp. 184-186 (FT) and pp. 188-190(M)] Vertical Clearance Between Wires, Conductors and Cables Carried on Different Supporting Structures (Change) Change NESC Table 233-1 (FT) as follows:

The value in Item 1, Column 5 is revised from "6" to "4.5".  
The value in Item 4, Column 1 is revised from "6" to "4.5".  
The value in Item 4, Column 2 is revised from "4" to "2.5".  
The value in Item 5, Column 5 is revised from "6" to "4.5".  
The value in Item 6, Column 5 is revised from "4" to "2.5".

Change NESC Table 233-1(m) as follows:

The value in Item 1, Column 5 is revised from "1.80" to "1.35".  
The value in Item 3, Column 4 is revised from "2.0" to "0.60".  
The value in Item 4, Column 1, Entry 1 is revised from "2.40" to "1.35".  
The value in Item 4, Column 1, Entry 2 is revised from "2.40" to "1.80".  
The value in Item 4, Column 2, Entry 1 is revised from "1.20" to "0.75".  
The value in Item 4, Column 3, Entry 2 is revised from "2.40" to "1.80".  
The value in Item 4, Column 4, Entry 2 is revised from "2.40" to "1.80".  
The value in Item 5, Column 5 is revised from "2.40" to "1.35".  
The value in Item 6, Column 5 is revised from "1.20" to "0.75".



Table PSC 114-233-1

FT

**VERTICAL CLEARANCE BETWEEN WIRES, CONDUCTORS, AND CABLES CARRIED ON DIFFERENT SUPPORTING STRUCTURES**

(Voltages are phase to ground for effectively grounded circuits and those other circuits where all ground faults are cleared by promptly de-energizing the faulted section, both initially and following subsequent breaker operations. See the definition section for voltages of other systems.)

Upper level →		Guys, span wires, neutral conductors meeting Rule 230E1, and surge protection wires (ft)	Supply cables meeting Rule 230C1, and supply cables of 0 to 750 V meeting Rule 230C2 or 230C3 (ft)	Open supply conductors 0 to 750 V, supply cables over 750 V meeting Rule 230C2 or 230C3 (ft)	Open supply conductors over 750 V to 22kV (ft)
Lower level ↓	Communication conductors and cables, and messengers (ft)				
1. Communication conductors and cables, and messengers	2②	2	2	4⑧	4.5⑤
2. Supply cables meeting Rule 230C1, and supply cables of 0 to 750V meeting Rules 230C2 or 230C3	2	2	2	2	2
3. Open supply conductors, 0 to 750V; supply cables over 750V meeting Rules 230C2 or 230C3	4⑨	2	4	2	2
4. Open supply conductors 750V to 22kV over 22kV to 50kV	4.5⑤⑨ 6⑨	2.5 4	4⑨ 6⑨	4⑨ 6⑨	2 4⑨
5. Trolley and electrified railroad contact conductors and associated span and messenger wires	4③	4③	4③	4③④	4.5
6. Guys ⑦, span wires, neutral conductors meeting Rule 230E1, and surge protection wires	2②	2①②	2②	2	2.5

- ① This clearance may be reduced where both guys are electrically interconnected.
- ② The clearance of communication conductors and their guy, span, and messenger wires from each other in locations where no other classes of conductors are involved may be reduced by mutual consent of the parties concerned, subject to the approval of the regulatory body having jurisdiction, except for fire-alarm conductors and conductors used in the operation of railroads, or where one set of conductors is for public use and the other used in the operation of supply systems.
- ③ Trolley and electric railroad contact conductors of more than 750V should have at least 6 ft. clearance. This clearance should also be provided over lower voltage trolley and electrified railroad contact conductors unless the crossover conductors are beyond reach of a trolley-contact conductor or are suitably protected against damage from trolley poles leaving the trolley-contact conductor.
- ④ Trolley and electrified railroad feeders are exempt from this clearance requirement for contact conductors if they are of the same nominal voltage and of the same system.
- ⑤ This clearance may be reduced to 4 ft. where supply conductors of 750V to 8.7kV cross a communication line more than 6 ft. horizontally from a communication structure.
- ⑥ This footnote not used in this edition.
- ⑦ These clearances may be reduced by not more than 25% to a guy insulator, provided that full clearance is maintained to its metallic end fittings and the guy wires. The clearance to an insulated section of a guy between two insulators may be reduced by not more than 25% provided that full clearance is maintained to the uninsulated portion of the guy.
- ⑧ This clearance may be reduced to 2 ft. for supply service drops.
- ⑨ In general, this type of crossing is not recommended.

Table PSC 114-233-1

M

## VERTICAL CLEARANCE BETWEEN WIRES, CONDUCTORS, AND CABLES CARRIED ON DIFFERENT SUPPORTING STRUCTURES

(Voltages are phase to ground for effectively grounded circuits and those other circuits where all ground faults are cleared by promptly de-energizing the faulted section, both initially and following subsequent breaker operations. See the definition section for voltages of other systems.)

Upper level →	Communication conductors and cables, and messengers (m)	Guys, span wires, neutral conductors meeting Rule 230E1, and surge protection wires (m)	Supply cables meeting Rule 230C1, and supply cables of 0 to 750 V meeting Rule 230C2 or 230C3 (m)	Open supply conductors 0 to 750 V, supply cables over 750 V meeting Rule 230C2 or 230C3 (m)	Open supply conductors over 750 V to 22kV (m)
Lower level ↓					
1. Communication conductors and cables, and mes- sengers	0.60②	0.60	0.60	1.20⑧	1.35⑤
2. Supply cables meeting Rule 230C1, and supply cables of 0 to 750V meeting Rules 230C2 or 230C3	0.60	0.60	0.60	0.60	0.60
3. Open supply con- ductors, 0 to 750V; supply cables over 750V meeting Rules 230C2 of 230C3	1.20⑨	0.60	1.20	0.60	0.60
4. Open supply con- ductors 750V to 22kV over 22kV to 50kV	1.35⑤⑨ 1.80⑨	0.75 1.20	1.20⑨ 1.80⑨	1.20⑨ 1.80⑨	0.60 1.80⑨
5. Trolley and elec- trified railroad contact conductors and associated span and messen- ger wires	1.20③	1.20③	1.20③	1.20③④	1.35
6. Guys ⑦, span wires, neutral con- ductors meeting Rule 230E1, and surge protection wires	0.60②	0.60①②	0.60②	0.60	0.75

- ① This clearance may be reduced where both guys are electrically interconnected.
- ② The clearance of communication conductors and their guy, span, and messenger wires from each other in locations where no other classes of conductors are involved may be reduced by mutual consent of the parties concerned, subject to the approval of the regulatory body having jurisdiction, except for fire-alarm conductors and conductors used in the operation of railroads, or where one set of conductors is for public use and the other used in the operation of supply systems.
- ③ Trolley and electric railroad contact conductors of more than 750V should have at least 1.80 m clearance. This clearance should also be provided over lower voltage trolley and electrified railroad contact conductors unless the crossover conductors are beyond reach of a trolley-contact conductor or are suitably protected against damage from trolley poles leaving the trolley-contact conductor.
- ④ Trolley and electrified railroad feeders are exempt from this clearance requirement for contact conductors if they are of the same nominal voltage and of the same system.
- ⑤ This clearance may be reduced to 1.20 m where supply conductors of 750V to 8.7kV cross a communication line more than 1.80 m horizontally from from a communication structure.
- ⑥ This footnote not used in this edition.
- ⑦ These clearances may be reduced by not more than 25% to a guy insulator, provided that full clearance is maintained to its metallic end fittings and the guy wires. The clearance to an insulated section of a guy between two insulators may be reduced by not more than 25% provided that full clearance is maintained to the uninsulated portion of the guy.
- ⑧ This clearance may be reduced to 0.60 m for supply service drops.
- ⑨ In general, this type of crossing is not recommended.

PSC 114-234A4 [follows NESC 234A3, p. 194] Transmission Lines Over Dwelling Occupancies (Addition). Add the following paragraph:

#### 4. Transmission Lines Over Dwelling Occupancies

Supply lines designed to operate at voltages in excess of 35 kV shall not be constructed over dwellings or mobile homes intended for residential occupancy and dwellings or mobile homes intended for residential occupancy shall not be located under such lines. This provision is also intended to cover the line conductors in their wind-displaced position as defined in Rule 234A2.

Note 1: The term "dwelling" as used herein is the same as defined in Volume 2, Wisconsin State Electrical Code (NEC/NFPA 70-1990), i.e., "Dwelling Unit: One or more rooms for the use of one or more persons as a housekeeping unit with space for eating, living, and sleeping, and permanent provisions for cooking and sanitation."

Note 2: Electric utilities are prohibited by s. 101.865, Stats., from extending electric service to premises which are not in compliance with the Wisconsin State Electrical Code.

Table PSC 114-234-1 [NESC Table 234-1, pp. 208-209; feet; pp. 210-211; metric] Clearance of Wires, Conductors, and Cables, and Unguarded Rigid Live Parts Adjacent But Not Attached to Buildings and Other Installations Except Bridges (Changes and Additions).

Table PSC 114-234-1 which follows contains the following change and addition:

The clearance values for Item 1.b.(1), in columns 1 and 2 have been changed. Footnote 12 has been added.

Table PSC 114-234-1

FT

**CLEARANCE OF WIRES, CONDUCTORS, CABLES, AND UNGUARDED RIGID LIVE PARTS ADJACENT BUT NOT ATTACHED TO BUILDINGS AND OTHER INSTALLATIONS EXCEPT BRIDGES**

(Voltages are phase to ground for effectively grounded circuits and those other circuits where all ground faults are cleared by promptly de-energizing the faulted section, both initially and following subsequent breaker operations. See the definition section for voltages of other systems.)

Clearance of	Insulated communication conductors and cables; messengers; surge protection wires; grounded guys; neutral conductors meeting Rule 230C1 (ft)	Unguarded rigid live parts, 0 to 750V; non-insulated communication conductors; supply cables of 0 to 750V meeting Rules 230C2 or 230C3 (ft)	Supply cables over 750V meeting Rules 230C2 or 230C3; open supply conductors, 0 to 750V (ft)	Open supply conductors, over 750V to 22kV (ft)	Unguarded rigid live parts, over 750V to 22kV (ft)
1. Buildings					
a. Horizontal					
(1) To walls, projections and guarded windows	4.5 <sup>⑦</sup>	5.0	5.5 <sup>①②⑨</sup>	7.5 <sup>①②⑩⑪</sup>	7.0
(2) To unguarded windows <sup>⑧</sup>	4.5	5.0	5.5 <sup>①②⑨</sup>	7.5 <sup>⑩⑪</sup>	7.0
(3) To balconies and areas accessible to pedestrians <sup>③</sup>	4.5	5.0	5.5 <sup>⑨</sup>	7.5 <sup>⑩⑪</sup>	7.0
b. Vertical					
(1) Over or under roofs or projections not accessible to pedestrians <sup>③</sup>	8.0 <sup>⑫</sup>	8.0 <sup>⑫</sup>	10.5	12.5	12.0
(2) Over or under balconies and roofs accessible to pedestrians <sup>③</sup>	10.5	11.0	11.5	13.5	13.0
(3) Over roofs accessible to vehicles but not subject to truck traffic <sup>⑥</sup>	10.5	11.0	11.5	13.5	13.0
(4) Over roofs accessible to truck traffic <sup>⑥</sup>	15.5	16.0	16.5	18.5	18.0
2. Signs, chimneys, billboards, radio and television antennas, tanks, and other installations not classified as buildings or bridges					
a. Horizontal <sup>④</sup>	3.0	3.5	5.5 <sup>①②⑨</sup>	7.5 <sup>①②⑩⑪</sup>	7.0
b. Vertical over or under <sup>④</sup>	3.0	3.5	6.0 <sup>①</sup>	8.0	7.5

① Where building, sign, chimney, antenna, tank, or other installation does not require maintenance such as painting, washing, changing or sign letters, or other operations which would require persons to work or pass between supply conductors and structure, the clearance may be reduced by 2 ft.

② Where available space will not permit this value, the clearance may be reduced by 2ft. provided the conductors, including splices and taps, have covering which provides sufficient dielectric to prevent a short circuit in case of momentary contact between the conductors and a grounded surface.

③ A roof, balcony, or area is considered accessible to pedestrians if the means of access is through a doorway, ramp, window, stairway, or permanently mounted ladder. A permanently mounted ladder is not considered a means of access if its bottom rung is 8 ft. or more from the ground or other permanently installed accessible surface.

④ The required clearances shall be to the closest approach of motorized signs or moving portions of installations covered by Rule 234C.

⑤ This footnote not used in this edition.

⑥ For the purpose of this rule, trucks are defined as any vehicle exceeding 8 ft. in height.

⑦ This clearance may be reduced to 3 in. for the grounded portions of guys.

⑧ Windows not designed to open may have the clearances permitted for walls and projections.

⑨ This clearance shall be not less than 3.5 ft. with the conductor or cable displaced by wind; see Rule 234C1b.

⑩ This clearance shall be not less than 4.5 ft. with the conductor displaced by wind; see Rule 234C1b.

⑪ Where available space will not permit this value, the clearance may be reduced to 7.0 ft. for conductors limited to 8.7kV to ground.

⑫ This clearance may be reduced to 3 ft. for supply conductors limited to 300V to ground and communications conductors and cables if the roof has a slope of not less than 1 to 3.

Table PSC 114-234-1

M

**CLEARANCE OF WIRES, CONDUCTORS, CABLES, AND UNGUARDED RIGID LIVE PARTS  
ADJACENT BUT NOT ATTACHED TO BUILDINGS AND OTHER INSTALLATIONS EXCEPT  
BRIDGES**

(Voltages are phase to ground for effectively grounded circuits and those other circuits where all ground faults are cleared by promptly de-energizing the faulted section, both initially and following subsequent breaker operations. See the definition section for voltages of other systems.)

Clearance of	Insulated communication conductors and cables; messengers; surge protection wires; grounded guys; neutral conductors meeting Rule 230E1; supply cables meeting Rule 230C1 (m)	Unguarded rigid live parts, 0 to 750V; non-insulated communication supply cables of 0 to 750V meeting Rules 230C2 or 230C3 (m)	Supply cables over 750V meeting Rules 230C2 or 230C3; open supply conductors, 0 to 750V (m)	Open supply conductors, over 750V to 22kV (m)	Unguarded rigid live parts, over 750V to 22kV (m)
1. Buildings					
a. Horizontal					
(1) To walls, projections and guarded windows	1.40 <sup>⑦</sup>	1.50	1.70 <sup>①②⑨</sup>	2.30 <sup>①②⑩⑪</sup>	2.00
(2) To unguarded windows <sup>③</sup>	1.40	1.50	1.70 <sup>①②⑨</sup>	2.30 <sup>⑩⑪</sup>	2.00
(3) To balconies and areas accessible to pedestrians <sup>③</sup>	1.40	1.50	1.70 <sup>⑨</sup>	2.30 <sup>⑩⑪</sup>	2.00
b. Vertical					
(1) Over or under roofs or projections not accessible to pedestrians <sup>③</sup>	2.45 <sup>⑫</sup>	2.45 <sup>⑫</sup>	3.2	3.8	3.6
(2) Over or under balconies and roofs accessible to pedestrians <sup>③</sup>	3.2	3.4	3.5	4.1	4.0
(3) Over roofs accessible to vehicles but not subject to truck traffic <sup>⑥</sup>	3.2	3.4	3.5	4.1	4.0
(4) Over roofs accessible to truck traffic <sup>⑥</sup>	4.7	4.9	5.0	5.6	5.5
2. Signs, chimineys, billboards, radio and television antennas, tanks, and other installations not classified as buildings or bridges					
a. Horizontal <sup>④</sup>	0.90	1.07	1.70 <sup>①②⑨</sup>	2.30 <sup>①②⑩⑪</sup>	2.00
b. Vertical over or under <sup>④</sup>	0.90	1.07	1.80 <sup>①</sup>	2.45	2.30



① Where building, sign, chimney, antenna, tank, or other installation does not require maintenance such as painting, washing, changing or sign letters, or other operations which would require persons to work or pass between supply conductors and structure, the clearance may be reduced by 0.60 m.

② Where available space will not permit this value, the clearance may be reduced by 0.60 m provided the conductors, including splices and taps, have covering which provides sufficient dielectric to prevent a short circuit in case of momentary contact between the conductors and a grounded surface.

③ A roof, balcony, or area is considered accessible to pedestrians if the means of access is through a doorway, ramp, window, stairway, or permanently mounted ladder. A permanently mounted ladder is not considered a means of access if its bottom rung is 2.45 m or more from the ground or other permanently installed accessible surface.

④ The required clearances shall be to the closest approach of motorized signs or moving portions of installations covered by Rule 234C.

⑤ This footnote not used in this edition.

⑥ For the purpose of this rule, trucks are defined as any vehicle exceeding 2.45 m in height.

⑦ This clearance may be reduced to 75 mm for the grounded portions of guys.

⑧ Windows not designed to open may have the clearances permitted for walls and projections.

⑨ This clearance shall be not less than 1.07 m with the conductor or cable displaced by wind; see Rule 234C1b.

⑩ This clearance shall be not less than 1.40 m with the conductor displaced by wind; see Rule 234C1b.

⑪ Where available space will not permit this value, the clearance may be reduced to 2.0 m for conductors limited to 8.7kV to ground.

⑫ This clearance may be reduced to 0.90 m for supply conductors limited to 300V to ground and communications conductors and cables if the roof has a slope of not less than 1 to 3.

PSC 114-234C3c [NESC 234C3c, p. 196] Supply Conductors Attached to Buildings or Other Installations. (Change). Change Exception 1 to read as follows:

Exception 1: Where the voltage between conductors does not exceed 300 volts and the roof has a slope of not less than 1 to 3, the clearance may be reduced to 3 feet (0.90 m).

PSC 114-234C6 [follows NESC 234C5, p. 197] Near Stored Materials (Addition). Add the following paragraph:

#### 6. Near Stored Materials

Lines may not be run over designated material storage areas where material is regularly stored and handled by cranes, dump trucks, elevators or other types of high machinery unless the clearance of such lines is adequate to permit full use of the equipment. Material which requires the use of such high machinery may not be stored near or under existing lines.

Note: See NESC Rule 234F for Grain Bin clearances.

PSC 114-234C7 [follows NESC 234C5, p. 197] Near Fuel Storage Tanks (Addition). Add the following paragraph:

#### 7. Near Fuel Storage Tanks

A horizontal clearance of not less than 8 feet (2.45m) shall be maintained between above-ground flammable liquids and liquefied petroleum gas storage tanks and supply cables of all voltages meeting Rule 230C. A horizontal clearance of not less than 15 feet (4.6m) shall be maintained between such fuel storage tanks for all other supply conductors.

Exception: These requirements do not apply to liquefied petroleum gas tanks with capacity of 1,000 gallons or less.

PSC 114-234C8 [follows NESC 234C5, p. 197] Near Wells (Addition). Add the following paragraph:

#### 8. Near Wells

A horizontal clearance of at least 3/4 of the vertical clearance of the conductors to ground required by Rule 232 shall be maintained between open supply conductors and wells. Persons installing such wells shall also comply with this requirement.

Note: Electric utilities are prohibited by s. 101.865, Stats., from extending electric service to premises which are not in compliance with the Wisconsin State Electrical Code.

PSC 114-234C9 [follows NESC 234C5, p. 197] Antennas (Addition). Add the following paragraph:

#### 9. Antennas

Note: Additional requirements with respect to the proximity of antennas to power and communications lines is found in ILHR 62.39 and 62.40, Wis. Adm. Code.

PSC 114-234E1 [NESC 234E1, p. 198] Clearance of Wires, Conductors, or Cables Installed Over or Near Swimming Areas (Change). Change E to read:

E. Clearance of Wires, Conductors, or Cables Installed Over or Near Swimming Areas.

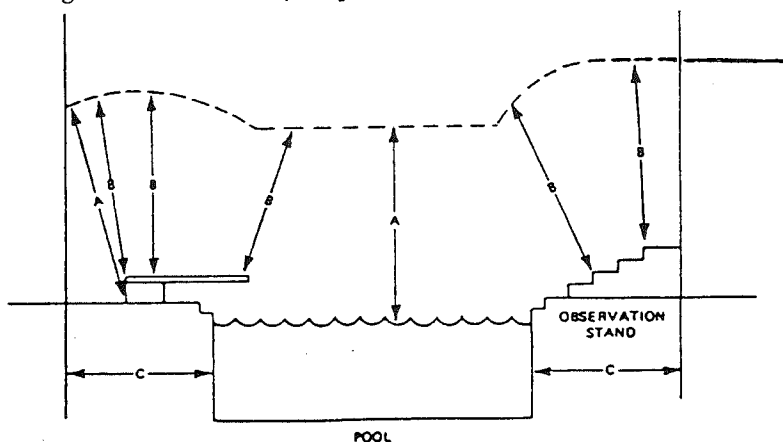
## 1. Swimming Pools

The following parts of pools shall not be placed under existing service-drop conductors or any other open overhead wiring; nor shall such wiring be installed above the following: (1) pools and the area extending 10 feet (3.05 m) horizontally from the inside of the walls of the pool; (2) diving structure; or (3) observation stands, towers, or platforms.

Exception 1: Structures listed in (1), (2), and (3) above shall be permitted under utility-owned, -operated and -maintained supply lines or service drops where such installations provide the following clearances:

	Insulated supply or service drop cables, 0-750 volts to ground, supported on and cabled together with an effectively grounded bare messenger or effectively grounded neutral conductor	All other supply or service drop conductors	
		Voltage to ground	
		0-15kV	greater than 15 to 22kV
A. Clearance in any direction to the water level, edge of water surface, base of diving platform or permanently-anchored raft	18 feet (5.49m)	25 feet (7.62m)	27 feet (8.23m)
B. Clearance in any direction to the diving platform or tower	14 feet (4.27m)	16 feet (4.88m)	18 feet (5.49m)
C. Horizontal limit of clearance measured from inside wall of the pool	This limit shall extend to the outer edge of the structures listed in (1) and (2) above but not less than 10 feet (3.05m).		

Figure PSC 114-234E1, Eception No. 1



Exception 2: Utility-owned, -operated, and -maintained communication conductors, community antenna system coaxial cables complying with Article 820 [NEC-1990-WSEC, Volume 2], and the supporting messengers shall be permitted at a height of not less than 10 feet (3.05 m) above swimming and wading pools, diving structures and observation stands, towers, or platforms.

Exception 3: This rule does not apply to a pool fully enclosed by a solid or screened permanent structure.

PSC 114-234I [NESC 234I, p. 202] Clearance of Wires Conductors, or Cables to Rail Cars (Change). Change the definition of "V" to read:

V = vertical clearance from the wire, conductor or cable above the top of the rail as specified in Rule 232 minus 20 ft. (6.1m), the assumed height of the rail car.

PSC 114-239D [NESC 239D, p. 257] Mechanical Protection Near Ground (Change). Change paragraph D to read:

D. Mechanical Protection Near Ground.

Where within 8 feet (2.45 m) of the ground, all vertical conductors, cables, and grounding wires shall be protected by a raceway which gives suitable mechanical protection. Raceways installed on poles shall be of rigid metal conduit, intermediate metal conduit, PVC Schedule 80 or equivalent conduit or U-guards made of galvanized steel or nonmetallic material equivalent to PVC Schedule 80, extending from at least 1 foot (0.30 m) below ground level up to a point 8 feet (2.45 m) above finished grade.

(No change to present "Exceptions" 1 through 5)

PSC 114-239G8 [follows NESC 239G7, p. 262] Requirements for Vertical Supply Conductors Passing Through Communication Space on Jointly Used Line Structures (Addition). Add the following paragraph:

8. Concentric Neutral or Similar Cable

Concentric neutral or similar cables may be fastened directly to the surface of the line structure. Such cables shall be protected with suitable non-metallic covering up to a distance of 40 inches (1 m) above the highest communication attachment. All splices and connections in the cable shall be insulated.

## SECTION 24. GRADES OF CONSTRUCTION

PSC114-242G [follows NESC 242F, p. 269]

Grades of Construction for Conductors (Addition). Add the following subsection:

G. Circuits Exceeding 175kV to Ground

Grade B construction shall always be used if the voltage exceeds 175kV to ground.

## SECTION 25. LOADING FOR GRADES B, C, AND D

PSC 114.250D [follows NESC 250C, p. 277] Longitudinal Capability (Addition). Add the following subsection:

D. Longitudinal Capability. Each supply line designed to operate at 300 kV phase to phase or above shall be constructed to limit the effects of a cascading-type failure to a line segment not exceeding 6 miles to 10 miles in length. Such construction requirement may be met by providing, at appropriate intervals, structures and associated facilities having full dead-end capability under the loading provisions of 250 A, B and C. Consideration shall be given to factors such as structure type and mate-

rial, length of line, distance between dead-end or heavy angle structures, and other basic design criteria in determining the length of such individual line segments. For lines supported by "flexible" structures designed with plastic, energy-absorbing capability in failure, this requirement may be met if such design and construction will provide equivalent limitation to longitudinal cascading.

PSC 114-261A [NESC 261A, p.286] Supporting Structure (Addition)  
Add the following after the first sentence of 261A.

Where conductors or equipment are altered or replaced on existing structures, the structures need not be replaced provided the resultant overload capacity exceeds the "At replacement" factor of Tables 261-1 or 261-3A.

Table PSC 114-261-4 [NESC, Table 261-4, p. 305] Overload Capacity Factors for Guys, Guy Anchors, Foundations, and Settings. (Change)  
Change NESC Table 261-4 as follows:

Add Footnote 2 and its references to entries 3 and 4 of column 1.

Add Footnote 3 and its reference to entry 2 in Column 2.

Table PSC 114-261-4 Overload Capacity Factors for Guys, Guy Anchors, Foundations, and Settings

	Overload capacity factors	
	Grade B	Grade C
Vertical loads <sup>①</sup>	1 .50	1 .50
Trasverse loads		
Wind	2 .50	2 .20 <sup>③</sup>
Wire tension	1 .65 <sup>②</sup>	1 .10
Longitudinal loads		
In general	1 .10	no re- quirement
At dead ends	1 .65 <sup>②</sup>	1 .10

① Where vertical loading significantly reduces the loading on a structure member, a vertical overload factor of 1.0 should be used for the design of such member. Such members shall be designed for their worst case loading condition.

Note: The factors in this table apply for the loading conditions of Rule 250B. For extreme wind loading conditions, see Rule 260C.

② This value may be reduced to 1.50 for guys.

③ This value may be reduced to 2.00 for guys.

### PART 3. UNDERGROUND LINES

#### SECTION 31. GENERAL REQUIREMENTS APPLYING TO UNDERGROUND LINES

PSC 114-310 Referenced Sections [NESC 310, p. 327](Change). Change Rule 310 to read as follows:

§10. The Introduction (Section 1) as amended by PSC 114.01- PSC 114.07, Definitions (Section 2) as amended by Section 2 of Chapter PSC 114, List of Referenced Documents (Section 3) as amended by Section 3 of Chapter PSC 114 and Grounding Methods (Section 9) as amended by Section 9 of Chapter PSC 114 shall apply to the requirements of Part 3.

PSC 114-311C [follows NESC 311B, p. 328] Installation and Maintenance - Markers (Addition). Add the following subsection:

##### C. Markers

When underground electric supply lines over 750 volts between conductors are located outside cities, villages, or developed areas, their location shall be marked in a manner recognizable to the public at each road crossing, railroad crossing, or drainage ditch crossing to identify the location of the facility.

PSC 114-317 [follows NESC 316, p. 330] Outdoor Location of Oil-Insulated Padmounted Transformers Near Buildings (Addition). Add the following section:

#### PSC 114-317 OUTDOOR LOCATION OF OIL-INSULATED PADMOUNTED TRANSFORMERS NEAR BUILDINGS

##### A. Noncombustible and Combustible Walls

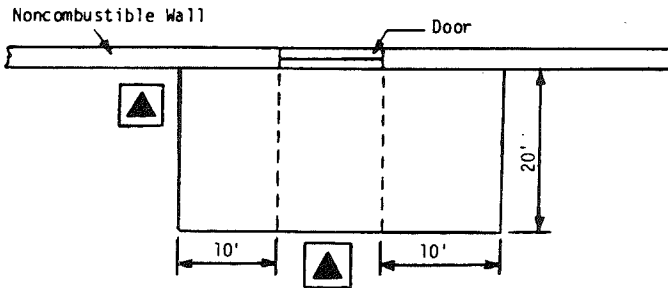
For the purposes of this section, combustible walls are walls of Type No. 8 buildings as determined by s. ILHR 51.03, Wis. Adm. Code. All other walls are considered to be non-combustible.

### B. Noncombustible Walls

Padmounted oil-insulated transformers may be located directly next to noncombustible walls if the following clearances are maintained from doors, windows and other building openings.

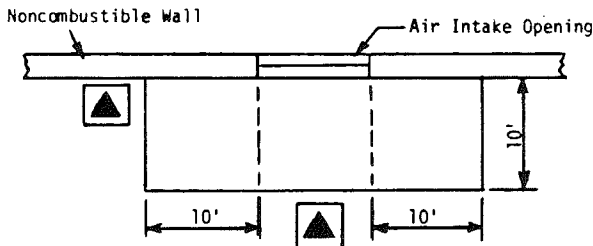
1. Padmounted oil-insulated transformers shall not be located within a zone extending 20 feet outward and 10 feet to either side of a building door. See Figure PSC 114-317B1.

FIGURE PSC 114-317B1.



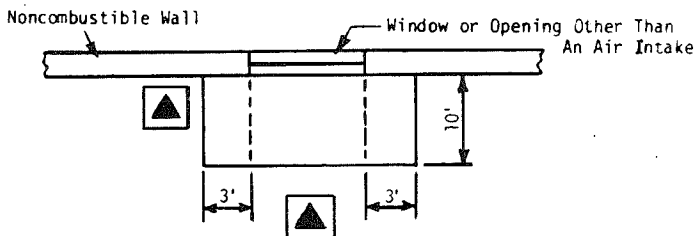
2. Padmounted oil-insulated transformers shall not be located within a zone extending 10 feet outward and 10 feet to either side of an air intake opening. Such transformers may be located within said zone beneath an air intake opening provided there is not less than 25 feet diagonal separation between the transformer and said opening. See Figure PSC 114-317B2.

FIGURE PSC 114-317B2.



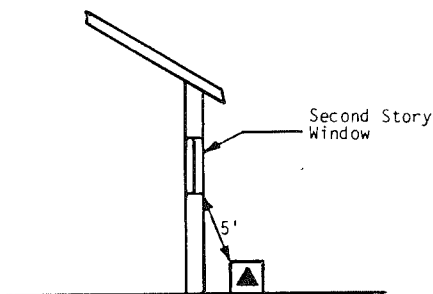
3. a. Padmounted oil-insulated transformers shall not be located within a zone extending 10 feet outward and 3 feet to either side of a building window or opening other than an air intake. See Figure PSC 114-317B3a.

FIGURE PSC 114-317B3a.



b. For second story windows, the transformer shall not be located less than 5 feet from any part of the window. See Figure PSC 317B3b.

FIGURE PSC 114-317 B3b.



### C. Combustible Walls

1. Padmounted oil-insulated transformers in sizes up to and including 100 kVA shall be located according to the provisions set forth in Subsection B for noncombustible walls.

2. Padmounted oil-insulated transformers in sizes above 100 kVA shall be located a minimum of 10 feet from the building wall in addition to the clearances from building doors, windows and other openings set forth for noncombustible walls. Also, a sump shall be installed for transformers in sizes exceeding 500 kVA if the immediate terrain is pitched toward the building.

### D. Barriers

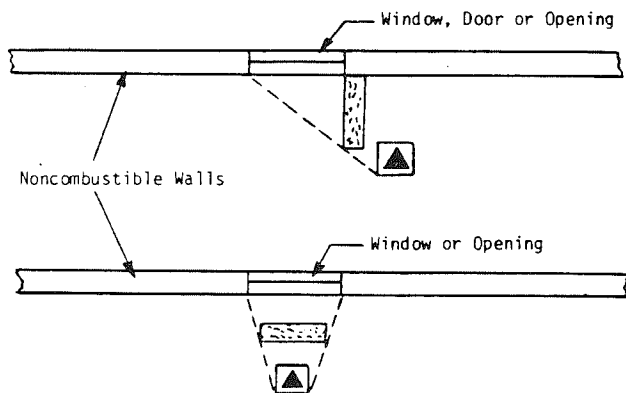
If the clearances specified above cannot be obtained, a fire-resistant barrier may be constructed in lieu of the separation. The following methods of construction are acceptable:

#### 1. Noncombustible Walls

The barrier shall extend to a projection line from the corner of the padmount to the furthest corner of the window, door or opening in question. The height of the barrier shall be 1 foot above the top of the padmount transformer. See Figure PSC 114-317D1.



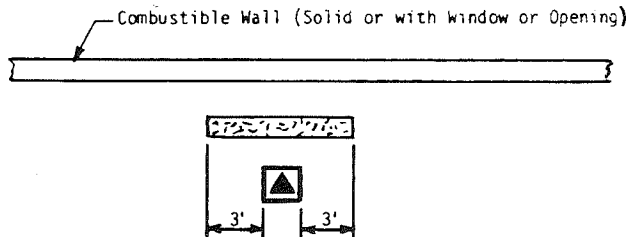
FIGURE PSC 114-317D1.



## 2. Combustible Walls

The barrier shall extend 3 feet beyond each side of the padmount transformer. The height of the barrier shall be 1 foot above the top of the transformer. See Figure PSC 114-317D2.

FIGURE PSC 114-317D2.



## E. Fire Escapes

Padmounted oil-insulated transformers shall be located such that a minimum clearance of 20 feet is maintained from fire escapes at all times.

## SECTION 32. UNDERGROUND CONDUIT SYSTEMS

PSC 114-320B7 [follows NESC 320B6, p. 333] Clearances from Other Underground Installations - Gas Lines (Addition). Add the following paragraph:

### 7. Gas Lines

a. The separation in any direction of gas transmission lines from electric supply and communications conduit systems shall be a minimum of 12 inches.

b. The separation in any direction of gas distribution or service lines from electric supply and communication conduit systems shall be a minimum of 6 inches.

Exception: If these clearances cannot be attained, the gas line must be protected from damage that might result from the proximity of the electric supply or communication conduit system.

Note: The definition of gas "transmission line," "distribution line," and "service line" as used herein is the same as that found in s. PSC 135.09-192.3, Wis. Adm. Code.

### SECTION 35. DIRECT BURIED CABLE

PSC 114-352E [follows NESC 352D, p. 348] Clearances from Other Underground Installations - Gas Lines (Addition). Add the following subsection:

#### E. Gas Lines

The separation in any direction of gas pipelines from direct buried electric supply and communication facilities shall be a minimum of 12 inches.

Exception: If this clearance cannot be attained, the gas line must be protected from damage that might result from the proximity of the electric supply or communication direct buried system.

PSC 114-353D2c [NESC 353D2c, p. 349]

Depth of Burial (Change and Addition). Add the following Exception to NESC 353D2c:

Change Exception to Exception 1.

Add Exception 2 as follows:

Exception 2: Installations of secondary underground cables operating at less than 600 volts between conductors shall be permitted to be laid on the ground during winter months provided they are suitably protected.

PSC 114-354E4 [NESC 354E4, p. 352] Random Separation - Protection (Change). Change paragraph 4 to read:

#### 4. Adequate Bonding

a. Bonding shall be provided between the effectively grounded supply conductor or conductors and the communication cable shield or sheath at intervals which should not exceed 1,000 feet (300m).

b. At each above or below grade transformer or above or below grade pedestal, all existing grounds shall be interconnected. These include primary neutral, secondary neutral, power cable shield, metal duct, or sheath and communication cable sheath.

c. Communication protectors, communication service cable shields and secondary neutrals shall be connected to a common ground at each customer's service entrance when communication circuits are underground without separation from power conductors.

### SECTION 36. RISERS

PSC 114-360A [NESC 360A, p. 352] Risers-General (Change). Change subsection to read:

A. Mechanical protection for supply conductors or cables shall be provided as required by Part 2 of this code. Raceways installed on poles shall be of rigid metal conduit, intermediate metal conduit, PVC Schedule 80

or equivalent conduit or U-guards made of galvanized steel or nonmetallic material equivalent to PVC Schedule 80 extending from at least 1 foot (0.30 m) below ground level up to a point 8 feet (2.45m) above finished grade.

### SECTION 38. EQUIPMENT

PSC 114-381H [follows NESC 381G, p. 356] Warning Signs (Addition). Add subsection to read:

#### H. Warning Signs

1. Where a padmounted transformer, switchgear, pedestal, or similar above-grade enclosure is not within a fenced or other protected area and contains live parts in excess of 600 volts, a permanent and conspicuous warning sign shall be provided reading substantially as follows: "Caution — High Voltage Inside — Keep Out."

2. Electric supply equipment installed prior to the effective date of these rules shall be signed to comply with these rules.

### PART 4. RULES FOR THE OPERATION OF ELECTRIC-SUPPLY AND COMMUNICATIONS LINES AND EQUIPMENT

#### SECTION 40. PURPOSE AND SCOPE

PSC 114-402 [NESC 401, p. 359] Referenced Sections (Change). Change first sentence of Rule 402 to read as follows:

The Introduction (Section 1) as amended by PSC 114.01 - PSC 114.07, Definitions (Section 2) as amended by Section 2 of Chapter PSC 114, List of Referenced Documents (Section 3) as amended by Section 3 of Chapter PSC 114 and Grounding Methods (Section 9) as amended by Section 9 of Chapter PSC 114 shall apply to the requirements of Part 4.

#### SECTION 44. SUPPLY SYSTEMS — RULES FOR EMPLOYEES

PSC 114-444A3 [NESC 444A3, p. 385] De-energizing Equipment or Lines to Protect Employees, Application of Rules (Addition). Add the following Exception and Note to 444A3:

Exception: This does not apply to interactive installations of 20 kW or less.

Note: See s. PSC 113.70(5), Wis. Adm. Code.