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SEP 14 1993

Lynnda S. Dore
Secretary to the Commission
Public Service Commission of Wisconsin

BEFORE THE

PUBLIC SERVICE COMMISSION OF WISCONSIN

In the Matter of Proposed Revision of)
Chapter PSC 114, Wis. Adm. Code, as) 2-U-5058.28
Wisconsin State Electrical Code, Volume 1)

ORDER OF THE
PUBLIC SERVICE COMMISSION ADOPTING RULES

To repeal and recreate Chapter PSC 114, Wis. Adm. Code,
relating to rules concerning electric safety -- Revision of
Volume 1 of the Wisconsin State Electrical Code.

ANALYSIS PREPARED BY THE
PUBLIC SERVICE COMMISSION OF WISCONSIN

By letter of November 10, 1992, the Public Service
Commission appointed an advisory committee (s. 227.13, Stats.) to
review and submit recommendations for updating Volume 1 of
the Wisconsin State Electrical Code. This part of the code is
administered by the Public Service Commission.

Volume 1 has been and is based on the National Electrical
Safety Code (NESC), which is also known as American National
Standards Institute (ANSI) C2. In 1979, 1982, 1985, 1988 and
1991, the Commission adopted the 1977, 1981, 1984, 1987 and 1990
editions of the NESC, respectively, with certain changes,
deletions and additions.

The 1993 edition of the National Electrical Safety Code was recently issued, and a corresponding revision of Volume 1 is now desired to reflect the latest national code, correct existing deficiencies, and make other changes, as necessary, to update and improve the state code. Volume 1 of the Wisconsin State Electrical Code is presently found in ch. PSC 114, Wis. Adm. Code. The Commission proposes to revise ch. PSC 114. The rules in ch. PSC 114 deal with safety requirements for the installation, operation and maintenance of primarily outdoor electric supply and communications lines and facilities used by utilities, including electric and telephone suppliers, railroads, and cable television providers.

In summary, the changes being proposed reflect a routine update of Chapter PSC 114 to accomplish the following:

1. Adopt the new National Electrical Safety Code-1993 and make the necessary editorial revisions to update the various references to and citations of this code.

2. Delete several rules in the chapter which are now included in or covered by changes in the NESC-1993.

3. Revise the grounding methods rule to increase grounding requirements for rural electric lines.

4. Make other revisions, primarily editorial in nature, to clarify certain rules or their intended application.

Otherwise, the proposed revision is not considered substantive and continues unchanged most of the provisions of the present Chapter PSC 114 that reflect changes from or additions to the NESC-1993 for Wisconsin application only.

STATUTORY AUTHORITY

The Public Service Commission of Wisconsin has authority to issue rules regarding electrical safety pursuant to ss. 196.74 and 227.11, Stats.

PROPOSED RULES

The Commission proposes to repeal and recreate Chapter PSC 114, Wis. Adm. Code, as shown in the attached Appendix.

PUBLIC HEARING

Pursuant to the Commission's Notice of Investigation and Hearing issued on April 1, 1993, and published in the May 1, 1993, Wisconsin Administrative Register, public hearing was held on the proposed rules before Examiner John Crosetto in the Hill Farms State Office Building on May 13, 1993.

FISCAL ESTIMATE AND
INITIAL REGULATORY FLEXIBILITY ANALYSIS

There will be no fiscal impact of the proposed rules on state or local units of government. Utilities and others subject to these rules, including municipally-owned electric utilities that serve in rural areas, may experience modest increases in the cost of new rural distribution construction due to the increased requirements for grounding rural lines proposed herein. The proposed rules will have no effect on small businesses.

EFFECTIVE DATE

These rules will take effect on the first day of the month following publication in the Wisconsin Administrative Register, as provided in s. 227.22, Stats.

ENVIRONMENTAL ANALYSIS

This action is classified as a Type 3 action according to s. PSC 2.90(3), Wis. Adm. Code. No unusual circumstances have come to the attention of the Commission that would require further environmental review. It consequently requires neither an environmental impact statement under s. 1.11, Stats., nor an environmental assessment.

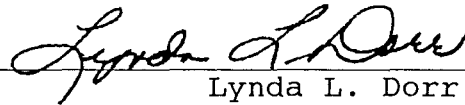
Docket 2-U-5058.28

These proposed rules were forwarded to the Legislature for review pursuant to s. 227.19, Stats. They will take effect as final rules on the first day of the month following publication in the Wisconsin Administrative Register, as provided in s. 227.22, Stats.

Dated at Madison, Wisconsin,

September 14, 1983

By the Commission.



Lynda L. Dorr
Secretary to the Commission

LLD:LLS:07089301.ERB/ORDER

See attached Notice of Appeal Rights.

Notice of Appeal Rights

Notice is hereby given that a person aggrieved by the foregoing decision has the right to file a petition for judicial review as provided in s. 227.53, Stats. The petition must be filed within 30 days after the date of mailing of this decision. That date is shown on the first page. If there is no date on the first page, the date of mailing is shown immediately above the signature line. The Public Service Commission of Wisconsin must be named as respondent in the petition for judicial review.

Notice is further given that, if the foregoing decision is an order following a proceeding which is a contested case as defined in s. 227.01(3), Stats., a person aggrieved by the order has the further right to file one petition for rehearing as provided in s. 227.49, Stats. The petition must be filed within 20 days of the date of mailing of this decision.

If this decision is an order after rehearing, a person aggrieved who wishes to appeal must seek judicial review rather than rehearing. A second petition for rehearing is not an option.

This general notice is for the purpose of ensuring compliance with s. 227.48(2), Stats., and does not constitute a conclusion or admission that any particular party or person is necessarily aggrieved or that any particular decision or order is final or judicially reviewable.

Rev. 4/22/91

APPENDIX

PROPOSED RULES

SECTION 1. Chapter PSC 114 is repealed and recreated to read:

CHAPTER PSC 114

WISCONSIN STATE ELECTRICAL CODE, VOLUME 1

Subchapter I - Administration and Enforcement

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

Subchapter II - General Requirements

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

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

- PSC 114.07 Omissions from NESC-1993 (p.)
- PSC 114.08 Changes or additions to NESC-1993 (p.)
- PSC 114.2 Definitions (p.)
- PSC 114.3 References (p.)
- PSC 114-96C Multi-grounded systems (p.)
- PSC 114-97C Separation of Grounding Conductors (p.)
- PSC 114-110A Enclosure of equipment, Safety clearance zone (p.)
- PSC 114-127 Classified Locations (p.)
- PSC 114-202 Application of Rules, Part 2 (p.)
- PSC 114-210 Referenced sections, Part 2 (p.)
- PSC 114-219 Marking of poles and structures carrying high voltage supply lines (p.)
- Table 232-1 Vertical clearance of wires, conductors and cables above ground, rails, or water surfaces (p.)
- Table PSC 114-232-3 Reference heights (p.)
- Table PSC 114-233-1 Vertical clearance between wires, conductors and cables carried on different supporting structures (p.)
- PSC 114-234A4 Transmission lines over dwelling occupancies (p.)
- Table 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.)
- PSC 114-234C2 Guarding of supply conductors and rigid live parts (p.)
- PSC 114-234C3c Supply conductors attached to buildings or other installations (p.)
- PSC 114-234C6 Clearance of lines near stored materials (p.)
- PSC 114-234C7 Clearance of lines near fuel storage tanks (p.)

PSC 114.234C8	Clearance of lines near wells (p.)
PSC 114-234C9	Clearance of lines near antennas (p.)
PSC 114-234E1	Clearance of wires, conductors, or cables installed over or near swimming areas (p.)
PSC 114-239D	Mechanical protection near ground (p.)
PSC 114-242G	Grades of construction for conductors (p.)
PSC 114.250D	Longitudinal capability (p.)
PSC 114-261A	Supporting structure (p.)
Table PSC 114-261-4	Overload capacity factors for guys, guy anchors, foundations, and settings (p.)
PSC 114-302	Application of rules, Part 3 (p.)
PSC 114-310	Referenced sections, Part 3 (p.)
PSC 114-311C	Installation and maintenance - markers (p.)
PSC 114-317	Outdoor location of oil-insulated padmounted transformers near buildings (p.)
PSC 114-320B7	Clearances from other underground installations - gas lines
PSC 114-352E	Direct buried cable, clearances from other underground installations, gas lines (p.)
Table 353-1	Direct buried cable, depth of burial (p.)
PSC 114-354D1f	Direct buried cable, random separation (p.)
PSC 114-360A	Risers - general (p.)
PSC 114-381H	Warning signs (p.)
PSC 114-402	Referenced sections, Part 4 (p.)
PSC 114-444A3	De-energizing equipment or lines to protect employees, application of rules (p.)

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 administration 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.

(2) AVAILABILITY OF STATE ELECTRICAL CODE. The public service commission has adopted the 1993 edition of the National Electrical Safety Code (NESC-1993) 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 ch. ILHR 16 for current availability information for the NEC.

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. This chapter contains minimum provisions considered necessary for the safety of employes and the public. This chapter is 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-1993.

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 ss. 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 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.

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.

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 as modified or waived by the commission when any rule is shown to be

impractical for special reasons or where the advantage of uniformity 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 commission and within the time determined by said agency; or

(c) Where the requirement is waived by the 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 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 commission, even should an application be pending before the 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.

PSC 114.06 Adoption of standard by reference. (1) ADOPTION OF STANDARD. The National Electrical Safety Code-1993 edition (also American National Standards Institute C2-1993 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-1993 will not be effective in this state until such time as this chapter is revised to reflect such changes.

(2) CONSENT TO INCORPORATE NESC-1993 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-1993, 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-1993 are on file in the offices of the public service commission, the secretary of state, and the revisor of statutes.

Subchapter III Omissions, Changes or Additions to NESC-1993

PSC 114.07 Omissions from NESC-1993. (1) OMISSIONS. The following portions of the NESC-1993 are 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. 1-3.

(b) Rule 94B4 of Section 9 - Grounding Methods for Electric Supply and Communications Facilities, pp. 23-24.

(c) Rules 230A1 and 230A2 of Section 23 - Clearances, p. 73.

PSC 114.08 Changes, additions to NESC-1993. Changes or additions to the NESC-1993 are specified in this subchapter and are rules of the public service commission and not requirements of the NESC-1993.

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 114-96C [NESC 96C, p. 26]. 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-1993 and that the new requirement is inserted at the appropriate location.

SECTION 2. DEFINITIONS OF SPECIAL TERMS

PSC 114.2 [NESC Section 2, p. 4] Definitions (Change and Addition)
Change the definition of "Administrative Authority" to read:

Administrative authority. 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.

Add the following definition:

Commission. Public service commission of Wisconsin.

SECTION 3. REFERENCES

PSC 114.3 References [NESC, p. 14] (Change). Change reference [47] to read as follows:

ANSI/NFPA 70-1993, National Electrical Code.

SECTION 9. GROUNDING METHODS FOR ELECTRIC SUPPLY AND COMMUNICATIONS FACILITIES

PSC 114-96C [NESC 96C, p. 26] Multi-grounded Systems. (Change)
Change paragraph C to read:

C. 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. In rural districts, the primary neutral shall be connected to a made or existing electrode at each pole to which it is attached. For the purposes of this rule, rural districts are those areas outside of cities and villages.

Exception 1: In underground multi-grounded systems where an insulating jacket or nonmetallic conduit is used over direct-buried concentric-neutral supply cable, this requirement may 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: Multi-grounded 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. 26] 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.

PSC 114-97D2 [NESC 97D2, pp. 26-27] Multi-grounded Systems (Change) Change paragraph 2 to read:

2. Multi-grounded Systems

On multi-grounded systems, the primary and secondary neutrals shall be interconnected according to Rule 97B. However, where it is necessary to separate the neutrals, interconnection of the neutrals shall be made through a spark gap or an electronic switching device designed for the purpose. The gap or device shall have a 60 Hz breakdown voltage not exceeding 3 kV and have a short circuit current withstand capability greater than the short circuit current available at the location of installation. At least one other grounding connection on the secondary neutral shall be provided in addition to the customer's grounds at each service entrance. A distance of not less than 12 feet (3.60 m) shall separate the secondary neutral grounding electrode from the primary neutral and surge arrester ground electrode and any buried portion of bare grounding electrode conductors connected to either electrode. Since a difference of potential will exist where primary and secondary neutrals are not directly interconnected, the primary or secondary grounding conductor shall be insulated for 600 V.

Note: Cooperation of all communications and supply utilities, customers of these utilities, and others may be necessary to obtain effective isolation between primary and secondary neutrals.

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

SECTION 11. PROTECTIVE ARRANGEMENTS IN ELECTRICAL SUPPLY
STATIONS

PSC 114-110A2 [NESC 110A2, p. 30] General Requirements, Safety
Clearance Zone (Change) Change paragraph 2 to read:

2. Safety Clearance Zone

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.

Note: IEEE Standard 1119-1988 [74] may be utilized to provide
guidance for other station fence safety clearances.

SECTION 12. INSTALLATION AND MAINTENANCE OF EQUIPMENT

PSC 114-127 [NESC 127, pp. 42-49] Classified Locations (Change)
Change the following paragraphs of Rule 127, by changing the
citations of Reference No. [47] from "ANSI/NFPA 70-1990" to
"ANSI/NFPA 70-1993."

127	line 2	page 42
127A1	line 3	page 42
127A2	line 2	page 42
127A4	line 3	page 42
127A4	line 5	page 42
127E2	line 2	page 46
127E3	line 4	page 46
127F1	line 6	page 48
127F2	line 3	page 48
127H1	line 2	page 48
127K3	line 2	page 49
127L3	line 2	page 49

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. 63] Application of Rules (Change)
Change the paragraph 202 to read:

202. Application of rules

The general requirements for application of these rules are contained in Rule PSC 114.05. However, when a structure is replaced, arrangement of equipment shall conform to the current edition of Rule 238C.

SECTION 21. GENERAL REQUIREMENTS

PSC 114-210 [NESC 210, p. 64] Referenced Sections (Change)
Change paragraph 210 to read:

210. Referenced Sections

The Introduction (Section 1) as amended by ss. PSC 114.01 to 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. 67] 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; and
- (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 a 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 1¼ inches (3.175 cm).

3. Warning signs installed as replacements or installed as new facilities shall comply with the standards as prescribed in s. PSC 114-219(2).

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

SECTION 23. CLEARANCES

Note: The specification of clearances in Rules 232, 233, and 234, first adopted in the NESC-1990, and continued in the 1993 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 and NESC-1993. Because the approach and the application of the rules have been revised, it must be understood that clearance values of editions of the national and state codes prior to 1990 cannot be directly compared to those of editions of the codes after 1990. See Appendix A of NESC-1990 or NESC-1993.

NESC Table PSC 232-1 [NESC, Table 232-1, pp. 78-79: Feet; pp. 80-81: Metric] Vertical Clearance of Wires, Conductors and Cables Above Ground, Rails, or Water Surfaces (Changes and Additions)

The Footnotes for NESC Table 232-1 on page 79 (Feet) and page 81 (Metric) contain the following changes and additions:

Change Footnote 10, paragraph (c) to read as follows:

(c) Supply cables of any voltage meeting Rule 230C1, supply cables limited to 150 V to ground meeting Rules 230C2 or 230C3 and neutral conductors meeting Rule 230E1.

Change Footnote 17 to read as follows:

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 one-mile-long (1,600 m) segment which includes the crossing. The clearance over a river, stream, or canal 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.

Add Footnote 26 which reads as follows:

② A diagonal clearance equal to the required vertical clearance shall be maintained to uneven or sloping terrain within a horizontal distance of 3/4 of the required vertical clearance. All distances shall be measured from the conductors in their wind-displaced position as defined in NESC Rule 234A2.

Add the reference to Footnote 26 in NESC-1993 Table 232-1 on page 78 (Feet) and page 80 (Metric) to the conductor category titles of columns 3, 4 and 5. It applies to all clearances in those columns.

Table PSC 114-232-3 [NESC, Table 232-3, p. 84] Reference Heights (Change) Change Footnote 3 to read:

③ 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, p. 90 (Feet) and p. 91 (Metric)] Vertical Clearance Between Wires, Conductors, and Cables Carried on Different Supporting Structures (Changes)

Table PSC 114-233-1 (Feet), which follows, contains the following changes in NESC Table 233-1 (Feet):

The value in Item 1, Column 6 is revised from "4" to "2.5".
The value in Item 2, Column 6 is revised from "6" to "4.5".
The value in Item 5, Column 2 is revised from "4" to "2.5".
The value in Item 5, Column 3 is revised from "6" to "4.5".
The value in Item 6, Column 6 is revised from "6" to "4.5".

Table PSC 114-233-1 (Metric), which follows, contains the following changes in NESC Table 233-1 (Metric):

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

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 definitions section for voltages of other systems. See Rules 233C1 and 233C2a.)

Upper level Lower level	Guys, span wires, neutral conductors meeting Rule 230E1, and surge-protection wires (ft)	Communication conductors and cables, and messengers (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, and supply cables over 750 V meeting Rule 230C2 or 230C3 (ft)	Open supply conductors over 750 V to 22 kV (ft)
1. Guys ①, span wires, neutral conductors meeting Rule 230E1, and surge-protection wires	2①②	2①	2①	2	2.5
2. Communication conductors and cables, and messengers	2	2①	2	4③	4.5⑤
3. Supply cables meeting Rule 230C1, and supply cables of 0 to 750 V meeting Rules 230C2 or 230C3	2	2	2	2	2
4. Open supply conductors, 0 to 750 V; supply cables over 750 V meeting Rule 230C2 or 230C3	2	4①	4	2	2
5. Open supply conductors, 750 V to 22 kV	2.5	4.5⑤⑥	4②	4①	2
6. Trolley and electrified railroad contact conductors and associated span and messenger wires	4③	4③	4③	4②④	4.5

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 electrified railroad contact conductors of more than 750 V should have at least 6 ft of 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 pole leaving the 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 750 V to 8.7 kV cross a communication line more than 6 ft horizontally from a communications 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 definitions section for voltages of other systems. See Rules 233C1 and 233C2a.)

Upper level Lower level	Guys, span wires, neutral conductors meeting Rule 230E1, and surge-protection wires (m)	Communication conductors and cables, and messengers (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, and supply cables over 750 V meeting Rule 230C2 or 230C3 (m)	Open supply conductors over 750 V to 22 kV (m)
1. Guys ①, span wires, neutral conductors meeting Rule 230E1, and surge-protection wires	0.60 ①①	0.60 ①	0.60 ①	0.60	0.75
2. Communication conductors and cables, and messengers	0.60	0.60 ①	0.60	1.20 ①	1.35 ①
3. Supply cables meeting Rule 230C1, and supply cables of 0 to 750 V meeting Rules 230C2 or 230C3	0.60	0.60	0.60	0.60	0.60
4. Open supply conductors, 0 to 750 V; supply cables over 750 V meeting Rule 230C2 or 230C3	0.60	1.20 ①	1.20	0.60	0.60
5. Open supply conductors, 750 V to 22 kV	0.75	1.35 ①①	1.20 ①	1.20 ①	0.60
6. Trolley and electrified railroad contact conductors and associated span and messenger wires	1.20 ①	1.20 ①	1.20 ①	1.20 ①①	1.35

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 electrified railroad contact conductors of more than 750 V should have at least 1.80 m of 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 pole leaving the 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 750 V to 8.7 kV cross a communication line more than 6 ft horizontally from a communications 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. 93] Transmission Lines Over Dwelling Occupancies (Addition) Add the following paragraph 8:

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 70-1993), 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, p. 97 (Feet) and p. 98 (Metric)] Clearance of Wires, Conductors, Cables, and Unguarded Rigid Live Parts Adjacent But Not Attached to Buildings and Other Installations Except Bridges (Changes, Deletions and Additions).

Table PSC 114-234-1 (Feet), which follows, contains the following changes, deletions and additions to NESC Table 234-1 (Feet):

The references to Footnotes 1 and 2 for the value in Item 1.a.(2), Column 5 are deleted.

The value in Item 1.b.(1), Column 2 is revised from "3.0" to "8.0"

The value in Item 1.b.(1), Column 3 is revised from "3.5" to "8.0"
Footnote 13 is added.

The reference to Footnote 13 is added to the values in Item 1.b.(1), Columns 2 and 3.

Table PSC 114-234-1 (Metric), which follows, contains the following changes, deletions and additions to NESC Table 234-1 (Metric):

The references to Footnotes 1 and 2 for the value in Item 1.a.(2), Column 5 are deleted.

The value in Item 1.b.(1), Column 2 is revised from "0.90" to "2.45".

The value in Item 1.b.(1), Column 3 is revised from "1.07" to "2.45".

Footnote 13 is added.

The reference to Footnote 13 is added to the values in Item 1.b.(1), Columns 2 and 3.

**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 definitions section for voltages of other systems. Clearances are with no wind displacement except where stated in the footnotes below. See Rules 234C1a, 234C2, and 234H4.)

Clearance of	Insulated communication conductors and cables; messengers; surge-protection wires; grounded guys; neutral conductors meeting Rule 230E1; supply cables meeting Rule 230C1 (ft)	Supply cables of 0 to 750 V meeting Rules 230C2 or 230C3 (ft)	Unguarded rigid live parts, 0 to 750 V; noninsulated communication conductors (ft)	Supply cables over 750 V meeting Rules 230C2 or 230C3; open supply conductors, 0 to 750 V (ft)	Open supply conductors, over 750 V to 22 kV (ft)	Unguarded rigid live parts, over 750 V to 22 kV (ft)
1. Buildings						
a. Horizontal						
(1) To walls, projections, and guarded windows	4.5 ^①	5.0	5.0	5.5 ^{①②③}	7.5 ^{①②③④⑤}	7.0
(2) To unguarded windows ^①	4.5	5.0	5.0	5.5 ^④	7.5 ^{④⑤}	7.0
(3) To balconies and areas readily accessible to pedestrians ^①	4.5	5.0	5.0	5.5 ^③	7.5 ^{④⑤}	7.0
b. Vertical						
(1) Over or under roofs or projections not readily accessible to pedestrians ^①	8.0 ^③	8.0 ^③	10.0	10.5	12.5	12.0
(2) Over or under balconies and roofs readily accessible to pedestrians ^①	10.5	11.0	11.0	11.5	13.5	13.0
(3) Over roofs accessible to vehicles but not subject to truck traffic ^③	10.5	11.0	11.0	11.5	13.5	13.0
(4) Over roofs accessible to truck traffic ^③	15.5	16.0	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^①						
	3.0	3.5	5.0	5.5 ^{①②③}	7.5 ^{①②③④⑤}	7.0
b. Vertical over or under^①						
	3.0	3.5	5.5	6.0 ^①	8.0	7.5

① Where building, sign, chimney, antenna, tank, or other installation does not require maintenance such as painting, washing, changing of sign letters, or other operations that 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 2 ft provided the conductors, including splices and taps, have covering that 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 readily accessible to pedestrians if it can be casually accessed through a doorway, ramp, window, stairway, or permanently mounted ladder by a person on foot who neither exerts extraordinary physical effort nor employs special tools or devices to gain entry. 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 The clearance at rest shall be not less than the value shown in this table. Also, when the conductor or cable is displaced by wind, the clearance shall be not less than 3.5 ft; see Rule 234C1b.

⑩ The clearance at rest shall be not less than the value shown in this table. Also, when the conductor or cable is displaced by wind, the clearance shall be not less than 4.5 ft; 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 8.7 kV to ground.

⑫ The clearance values shown in this table are computed by adding the applicable Mechanical and Electrical (M&E) value of Table A-1 to the applicable Reference Component of Table A-2b of Appendix A.

⑬ 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 (vertical) to 3 (horizontal).

**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 definitions section for voltages of other systems. Clearances are with no wind displacement except where stated in the footnotes below. See Rules 234C1a, 234C2, and 234H4.)

Clearance of	Insulated communication conductors and cables; messengers; surge-protection wires; grounded guys; neutral conductors meeting Rule 230E1; supply cables meeting Rule 230C1 (m)	Supply cables of 0 to 750 V meeting Rules 230C2 or 230C3 (m)	Unguarded rigid live parts, 0 to 750 V; noninsulated communication conductors (m)	Supply cables over 750 V meeting Rules 230C2 or 230C3; open supply conductors, 0 to 750 V (m)	Open supply conductors, over 750 V to 22 kV (m)	Unguarded rigid live parts, over 750 V to 22 kV (m)
1. Buildings						
a. Horizontal						
(1) To walls, projections, and guarded windows	1.40 ^⑦	1.50	1.50	1.70 ^{①②③}	2.30 ^{①②⑩⑪}	2.00
(2) To unguarded windows ^①	1.40	1.50	1.50	1.70 ^④	2.30 ^{⑩⑪}	2.00
(3) To balconies and areas readily accessible to pedestrians ^①	1.40	1.50	1.50	1.70 ^①	2.30 ^{⑩⑪}	2.00
b. Vertical						
(1) Over or under roofs or projections not readily accessible to pedestrians ^①	2.45 ^⑬	2.45 ^⑬	3.0	3.2	3.8	3.6
(2) Over or under balconies and roofs readily accessible to pedestrians ^①	3.2	3.4	3.4	3.5	4.1	4.0
(3) Over roofs accessible to vehicles but not subject to truck traffic ^④	3.2	3.4	3.4	3.5	4.1	4.0
(4) Over roofs accessible to truck traffic ^④	4.7	4.9	4.9	5.0	5.6	5.5
2. Signs, chimneys, billboards, radio and television antennas, tanks, and other installations not classified as buildings or bridges						
a. Horizontal^①	0.90	1.07	1.50	1.70 ^{①②③}	2.30 ^{①②⑩⑪}	2.00
b. Vertical over or under^①	0.90	1.07	1.70	1.80 ^①	2.45	2.30

① Where building, sign, chimney, antenna, tank, or other installation does not require maintenance such as painting, washing, changing of sign letters, or other operations that 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 that 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 readily accessible to pedestrians if it can be casually accessed through a doorway, ramp, window, stairway, or permanently mounted ladder by a person on foot who neither exerts extraordinary physical effort nor employs special tools or devices to gain entry. 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 The clearance at rest shall be not less than the value shown in this table. Also, when the conductor or cable is displaced by wind, the clearance shall be not less than 1.07 m; see Rule 234C1b.

⑩ The clearance at rest shall be not less than the value shown in this table. Also, when the conductor or cable is displaced by wind, the clearance shall be not less than 1.40 m; see Rule 234C1b.

⑪ Where available space will not permit this value, the clearance may be reduced to 2.00 m for conductors limited to 8.7 kV to ground.

⑫ The clearance values shown in this table are computed by adding the applicable Mechanical and Electrical (M&E) value of Table A-1 to the applicable Reference Component of Table A-2b of Appendix A.

⑬ 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 (vertical) to 3 (horizontal).

PSC 114-234C2 [NESC 234C2, p.99] Guarding of Supply Conductors.
(Change) Change paragraph 2 and its note to read:

2. Guarding of Supply Conductors and Rigid Live Parts

Where the clearances set forth in Table PSC 114-234-1 cannot be obtained, supply conductors and rigid live parts shall be guarded.

Note: Supply cables meeting Rule 230C1 are considered to be guarded within the meaning of this rule.

PSC 114-234C3c [NESC 234C3c, p. 99] Supply Conductors Attached to Buildings or Other Installations. (Change) Change Exception 1 to read:

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

PSC 114-234C6 [Follows NESC 234C5, p. 100] Clearance of Lines Near Stored Materials. (Addition) Add the following paragraph 6 and note:

6. Clearance of Lines Near Stored Materials

Lines, under wind-displaced conditions stated in Rule 234A2, shall 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 shall not be stored near or under existing lines.

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

PSC 114-234C7 [Follows NESC 234C5, p. 100] Clearance of Lines Near Fuel Storage Tanks. (Addition) Add the following paragraph 7 and exceptions 1 and 2:

7. Clearance of Supply Lines Near Fuel Storage Tanks

Supply lines shall not be run over above-ground flammable liquids and liquified petroleum gas (LPG) storage tanks. A horizontal clearance of not less than 8 feet (2.45m) with cables at rest, and not less than 6 feet (1.80m) with cables displaced by wind according to Rule 234A2, 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) with conductors at rest, and not less than 10 feet (3.0m) with conductors displaced by wind according to Rule 234A2, shall be maintained between such fuel storage tanks and all other supply conductors.

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

Exception 2: These requirements do not apply to tanks enclosed in a building or fully covered by a roof or canopy capable of preventing falling overhead supply conductors from directly contacting the tank. In this case, the vertical and horizontal clearance requirements of conductors from buildings apply. See Rule 234C.

PSC 114.234C8 [Follows NESC 234C5, p. 100] Clearance of Lines Near Wells (Addition) Add the following paragraph 8 and note:

8. Clearance of Open Supply Lines Near Wells

Open supply lines shall not be run over wells. A horizontal clearance with conductors at rest of no less than 3/4 of the vertical clearance of the conductors to ground required by Rule 232, and a horizontal clearance of not less than 10 feet (3.0m) with conductors displaced by wind according to Rule 234A2, 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. 100] Clearance of Lines Near Antennas (Addition) Add the following paragraph heading 9 and note:

9. Clearance of Lines Near Antennas

Note: Besides the applicable clearances of Rule 234C, additional requirements with respect to the proximity of antennas to power and communications lines are found in ss. ILHR 62.39 and 62.40, Wis. Adm. Code.

PSC 114-234E1 [NESC 234E1, p. 100] Clearance of Wires, Conductors, or Cables Installed Over or Near Swimming Areas With No Wind Displacement (Change) Change paragraph E1 to read:

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 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	
		0-15 kV	greater than 15 to 50kV
A. Clearance in any direction to the water level, edge of water surface, base of diving platform, or permanently-anchored raft	18 feet (5.49 m)	25 feet (7.62 m)	27 feet (8.23 m)
B. Clearance in any direction to the diving platform or tower	14 feet (4.27 m)	16 feet (4.88 m)	18 feet (5.49 m)
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 (3.05 m).		

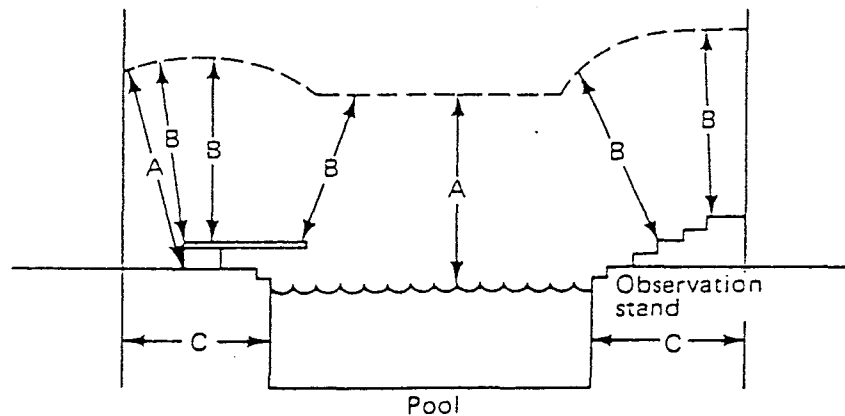


Figure PSC 114-234E1, Exception 1

EXCEPTION 2: Utility-owned, -operated, and -maintained communication conductors, community antenna system coaxial cables complying with Article 820 [NEC-1993-WSEC, Volume 2], and the supporting messengers shall be permitted at a height of not less than 10 feet (3.0m) 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 114-239D [NESC 239D, p. 131] Mechanical Protection Near Ground
(Change) Change paragraph D to read:

D. Mechanical Protection Near Ground

Where within 8 feet (2.45m) 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 (0.30m) below ground level up to a point 8 feet (2.45m) above finished grade.

(The present Exceptions 1 through 5 and the Note that apply to NESC Rule 239D remain unchanged.)

SECTION 24. GRADES OF CONSTRUCTION

PSC 114-242G [Follows NESC 242F, p. 138] Grades of Construction for Conductors (Addition) Add the following paragraph G:

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. 144] Longitudinal Capability (Addition) Add the following paragraph D:

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 Rules 250 A, B and C. Consideration shall be given to factors such as structure type and material, 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.

SECTION 26. STRENGTH REQUIREMENTS

PSC 114-261A [NESC 261A, p. 149] Supporting Structures (Addition)
 Add the following after the first sentence of Rule 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 NESC Tables 261-1 or 261-3A.

Table PSC 114-261-4 [NESC, Table 261-4, p. 156] Overload Capacity Factors for Guys, Guy Anchors, Foundations, and Settings (Additions)

Table PSC 261-4, which follows, contains the following additions:

Footnotes 2 and 3 are added.

The reference to Footnote 2 is added to the values of "1.65" in the third and fifth entries on Column 2.

The reference to Footnote 3 is added to the value of "2.20" in the second entry of Column 3.

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

	Overload capacity factors	
	Grade B	Grade C
Vertical loads①	1.50	1.50
Trasverse loads		
Wind	2.50	2.20③
Wire tension	1.65②	1.10
Longitudinal loads		
In general	1.10	no re- quirement
At dead ends	1.65②	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. SAFETY RULES FOR THE INSTALLATION AND MAINTENANCE
OF UNDERGROUND ELECTRIC SUPPLY AND COMMUNICATION LINES

SECTION 30. PURPOSE, SCOPE, AND APPLICATION OF RULES

PSC 114-302 [NESC 302, p. 175] Application of Rules (Change) Change Rule 302 to read:

302. Application of rules

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

SECTION 31. GENERAL REQUIREMENTS APPLYING TO
UNDERGROUND LINES

PSC 114-310 [NESC 310, p. 176] Referenced Sections (Change) Change Rule 310 to read:

310. Referenced sections

The Introduction (Section 1) as amended by ss. PSC 114.01 to 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. 176] Installation and Maintenance (Addition) Add the following paragraph C:

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. 170] 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 (6.1m) outward and 10 feet (3.0m) to either side of a building door. See Figure PSC 114-317B1.

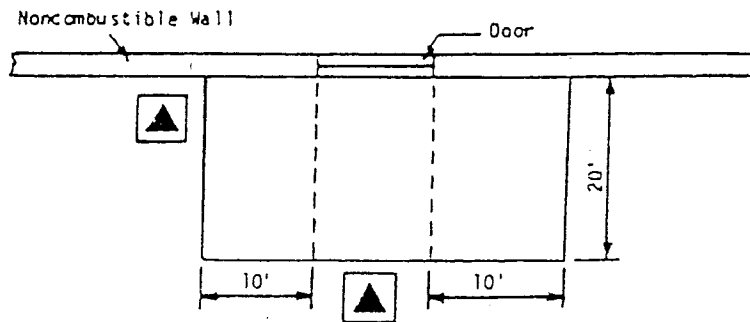


FIGURE PSC 114-317B1.

2. Padmounted oil-insulated transformers shall not be located within a zone extending 10 feet (3.0m) outward and 10 feet (3.0m) 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 (7.6m) diagonal separation between the transformer and said opening. See Figure PSC 114-317B2.

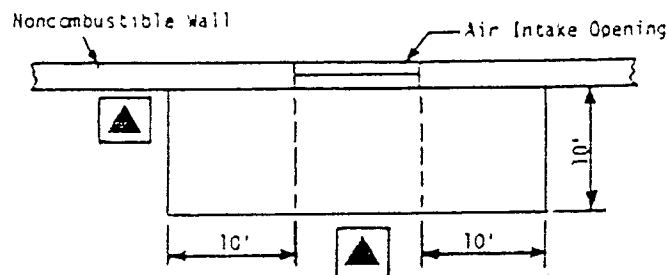


FIGURE PSC 114-317B2.

3.a. Padmounted oil-insulated transformers shall not be located within a zone extending 10 feet (3.0m) outward and 3 feet (0.9m) to either side of a building window or opening other than an air intake. See Figure PSC 114-317B3a.

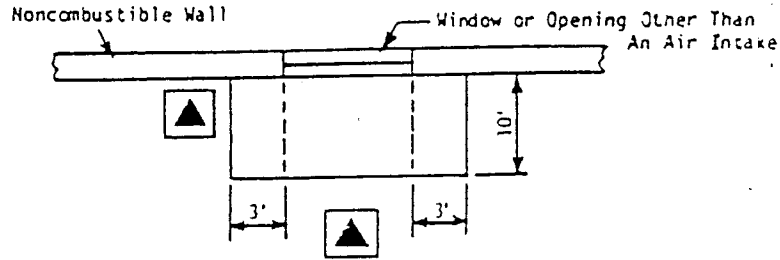


FIGURE PSC 114-317B3a.

3.b. For second story windows, the transformer shall not be located less than 5 feet (1.5m) from any part of the window. See Figure PSC 317B3b.

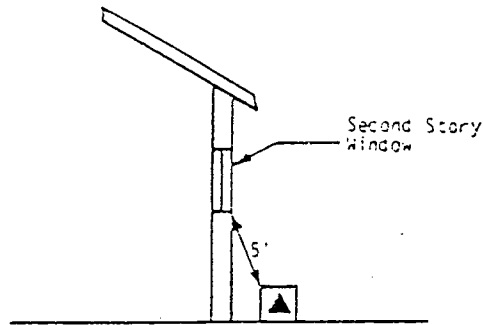


FIGURE PSC 114-317 B3b.

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 (3.0m) 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 size 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 required separation. The following methods of construction are acceptable:

1. Noncombustible Walls

The barrier shall extend to a projection line from the corner of the padmounted transformer to the furthest corner of the window, door or opening in question. The height of the barrier shall be 1 foot (0.3m) above the top of the padmounted transformer. See Figure PSC 114-317D1.

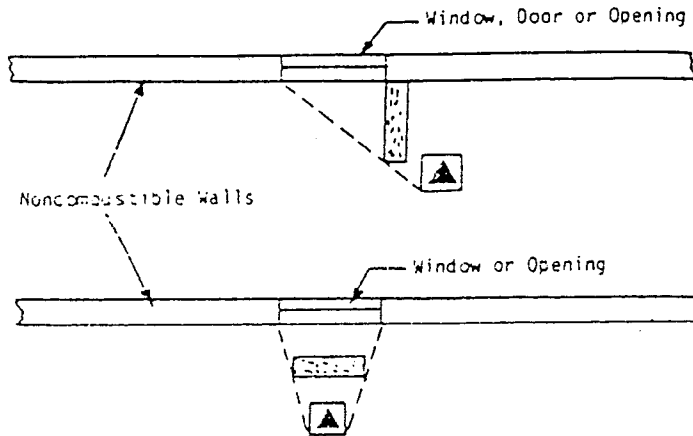


FIGURE PSC 114-317D1.

2. Combustible Walls

The barrier shall extend 3 feet (0.9m) beyond each side of the padmounted transformer. The height of the barrier shall be 1 foot (0.3m) above the top of the transformer. See Figure PSC 114-317D2.

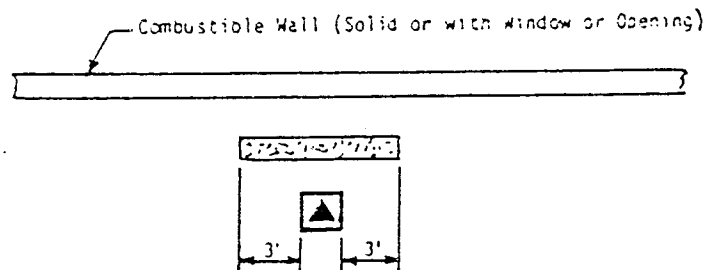


FIGURE PSC 114-317D2.

E. Fire Escapes

Padmounted oil-insulated transformers shall be located such that a minimum clearance of 20 feet (6.1m) is maintained from fire escapes at all times.

SECTION 32. UNDERGROUND CONDUIT SYSTEMS

PSC 114-320B7 [Follows NESC 320B6, p. 179] Separation From Other Underground Installations (Addition) Add the following paragraph 7:

7. Gas Lines

a. The separation in any direction of gas transmission lines from electric supply and communication conduit systems shall be a minimum of 12 inches (0.3m).

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 (0.15m).

Exception: If these separations 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.

SECTION 35. DIRECT-BURIED CABLE

PSC 114-352E [Follows NESC 352D, p. 192] Separations From Other Underground Structures (Addition) Add the following paragraph E:

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 (0.3m).

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

NESC Table 353-1 [NESC Table 353-1, p. 193] Supply Cable or Conductor Burial Depth (Change and Addition)

Change the present "Exception" after the table to "Exception 1".

Add a new Exception 2 as follows:

Exception 2: Installations of insulated 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 114-354D1f [NESC 354D1f, p. 194] Random Separation - Additional Requirements (Change) Change paragraph f to read:

f. Adequate bonding shall be provided between the effectively grounded supply conductor or conductors and the communication cable shield or sheath at intervals that should not exceed 1,000 feet (300m). At each above or below grade transformer or above or below grade pedestal, all existing grounds shall be interconnected. These include the primary neutral, secondary neutral, power cable shield, metal duct, or sheath and communication cable sheath. 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. 195] General (Change) Change paragraph A 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 (0.3m) below ground level up to a point 8 feet (2.45m) above finished grade.

SECTION 38. EQUIPMENT

PSC 114-381H [Follows NESC 381G, p. 197] Warning Signs (Addition) Add paragraph H 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 this chapter 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 402, p. 201] Referenced Sections (Change)
Change first sentence of Rule 402 to read:

The Introduction (Section 1) as amended by ss. PSC 114.01 to
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. ADDITIONAL RULES FOR SUPPLY EMPLOYEES

PSC 114-444A3 [NESC 444A3, p. 220] De-energizing Equipment or Lines
to Protect Employees-Application of Rule (Addition) Add the
following Exception and Note to Rule 444A3:

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

Note: See ss. PSC 113.70(5) and PSC 113.73.

[END]

ELECCODE/WP5.1



Public Service Commission of Wisconsin

4802 Sheboygan Avenue
P. O. Box 7854
Madison, Wisconsin 53707-7854

Cheryl L. Parrino, Chairman
John T. Coughlin, Commissioner
Scott A. Neitzel, Commissioner

File No. 2-U-5058.28

September 14, 1993

Mr. Gary Poulson
Assistant Revisor of Statutes
131 W. Wilson St., Suite 800
Madison, WI 53703

RE: In the Matter of Proposed Revision of Chapter PSC 114, Wis.
Adm. Code, as Wisconsin State Electrical Code, Volume 1
Docket 2-U-5058.28

Dear Mr. Poulson:

Enclosed are two certified copies of the September 14, 1993, order of the Public Service Commission adopting rules in this docket. The rules were sent to legislative committees on July 23, 1993, and recently cleared the legislative review process without comment.

We have included a data disk with the text of the rules in WordPerfect 5.1. Blank pages or spaces were left for tables and figures. These spaces are marked with a notation in brackets identifying the table or figure from the hard copy that is to be inserted. For the most part, the text is in the same format as that of the existing Chapter PSC 114. Most of the figures are also the same. The tables, however, are copied from the National Electrical Safety Code, from which they are adopted, with the proposed revisions shown. This format for presentation of the tables was chosen for improved clarity over attempting to revise the tables in the current edition of Chapter PSC 114. Let us know if there are any questions or problems.

Due to the complexity of the code, our engineers who administer the Code would appreciate the ability to review the galley proofs before final printing. The principal staff contact for this is Lanny Smith of our Electric Division, at 6-3165.

Thank you for your cooperation and assistance.

Sincerely,

David A. Ludwig
by *D.A.L.*

David A. Ludwig
Legal Counsel
Electric Division

DAL:LLS:09039302.ERB/LETTER.ELE
Enclosure

cc: Lanny Smith, Electric Division

Fax No: (608) 266-3957