**Clearinghouse Rule 13-039**

BEFORE THE

PUBLIC SERVICE COMMISSION OF WISCONSIN

Revision of Wis. Admin. Code ch. PSC 114, as Wisconsin State Electrical Code, Volume 1

1-AC-238

## NOTICE OF HEARING

| | |
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| **Hearing Date:** | **Friday, June 28, 2013**<br>**2:00 p.m.** |
| **Hearing Location:** | **Public Service Commission, 610 North Whitney Way, Madison, WI** |

| Comments Due: | Address Comments To: |
|---|---|
| **Monday, July 15, 2013 – Noon** | Sandra J. Paske, Secretary to the Commission<br>Public Service Commission<br>P.O. Box 7854<br>Madison, WI 53707-7854 |

The Public Service Commission of Wisconsin proposes an order to repeal and recreate ch. PSC 114 regarding the adoption of the 2012 Edition of the National Electrical Safety Code into Volume 1 of the State Electrical Code.

## ANALYSIS PREPARED BY THE PUBLIC SERVICE COMMISSION OF WISCONSIN

The analysis is set forth as Attachment A.

## TEXT OF PROPOSED RULE

The text of the proposed rule is set forth as Attachment B.

## INITIAL REGULATORY FLEXIBILITY ANALYSIS

This rule will not affect small businesses. The s. 227.114(12), Stats., definition of "small business" states that to be considered a small business, the business must not be

dominant in its field. Since electric utilities are monopolies in their service territories, they are dominant in their fields and, so, are not small businesses.

## FISCAL ESTIMATE

An Economic Impact Analysis is included as Attachment C.

## NOTICE OF HEARING

**NOTICE IS GIVEN** that pursuant to s. 227.16(2)(b), Stats., the commission will hold a public hearing on these proposed rule changes in the Amnicon Falls Hearing Room at the Public Service Commission Building, 610 North Whitney Way, Madison, Wisconsin, on Friday, June 28, 2013 at 2:00 p.m. This building is accessible to people in wheelchairs through the Whitney Way (lobby) entrance. Handicapped parking is available on the south side of the building.

## WRITTEN COMMENTS

Any person may submit written comments on these proposed rules. The record will be open for written comments from the public, effective immediately, and until Monday, July 15, 2013 at **noon**. All written comments must include a reference on the filing to docket 1-AC-238. File by one mode only.

**Industry**: File comments using the Electronic Regulatory Filing system. This may be accessed from the commission's website (psc.wi.gov).

**Members of the Public:**

Please submit your comments in one of the following ways:

- **Electronic Comment**. Go to the commission's web site at http://psc.wi.gov, and click on the "ERF - Electronic Regulatory Filing" graphic on the side menu bar. On the next page, click on "Need Help?" in the side menu bar for instructions on how to upload a document.

- **Web Comment.** Go to the commission's web site at http://psc.wi.gov, click on the "Public Comments" button on the side menu bar. On the next page select the "File a comment" link that appears for docket number 1-AC-238.

- **Mail Comment.** All comments submitted by U.S. mail must include the phrase "Docket 1-AC-238 Comments" in the heading, and shall be addressed to:

Sandra J. Paske, Secretary to the Commission
Public Service Commission
P.O. Box 7854
Madison, WI 53707-7854

The commission does not accept comments submitted via e-mail or facsimile (fax). Any material submitted to the commission is a public record and may appear on the commission's web site. The commission may reject a comment that does not comply with the requirements described in this notice.

**CONTACT PERSON**

Questions regarding this matter should be directed to Mohammed Monawer at (608) 266-3900 or mohammed.monawer@wisconsin.gov. Small business questions may be directed to Anne Vandervort at (608) 266-5814 or anne.vandervort@wisconsin.gov. Media questions should be directed to Matt Pagel, Communications & Policy Liaison, at (608) 267-2160. Hearing- or speech-impaired individuals may also use the commission's TTY number: if calling from Wisconsin, (800) 251-8345; if calling from outside Wisconsin, (608) 267-1479.

The commission does not discriminate on the basis of disability in the provision of programs, services, or employment. Any person with a disability who needs accommodations to participate in this proceeding, or who needs to get this document in a different format, should contact the Docket Coordinator as indicated in the previous paragraph as soon as possible.

Dated at Madison, Wisconsin May 16, 2013

By the Commission,

*/s/ Sandra J. Paske*

Sandra J. Paske
Secretary to the Commission

SJP:JMD:hms:DL: 00722488

**ANAYSIS PREPARED BY THE**
**PUBLIC SERVICE COMMISSION OF WISCONSIN**

## A. Statutory Authority and Explanation of Authority

This rule is authorized under ss. PSC 196.02 (1) and (3), 196.06 (3), 196.74 and 227.11.

Section 227.11 authorizes agencies to promulgate administrative rules. Section 196.02 (1) authorizes the commission to do all things necessary and convenient to its jurisdiction. Section 196.02 (3) grants the commission specific authority to promulgate rules.

Section 196.74 provides specific authority to promulgate these rules, stating in relevant part: "Each public utility and railroad which owns, operates, manages or controls along or across any public or private way any wires over which electricity or messages are transmitted shall construct, operate and maintain the wires and any related equipment in a manner which is reasonably adequate and safe and which does not unreasonably interfere with the service furnished by any other public utility or railroad. The commission may issue orders or rules, after hearing, requiring electric construction and operating of such wires and equipment to be safe. The commission may revise the orders or rules as may be required to promote public safety . . . ."

## B. Statute Interpreted

This rule interprets s. 196.74, Stats.

## C. Related Statutes or Rules

Section 196.74, which requires utilities to construct, operate and maintain facilities in a reasonably adequate and safe manner.

Chapter SPS 316, which is volume 2 of the Wisconsin State Electrical Code.

## D. Brief Summary of Rule

Volume 1 of the Wisconsin State Electrical Code (WSEC), codified in ch. PSC 114, is administered by the Commission. It deals 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 telecommunications suppliers, railroads, and cable television providers.

Chapter PSC 114 has been, and is, based on the National Electrical Safety Code (NESC). The NESC is revised and updated every five years necessitating subsequent periodic revision of WSEC, Volume 1, to adopt the latest national standard. The 2012 edition of the NESC was issued in August 2011. A corresponding revision of ch. PSC 114 is necessary to implement the latest edition of the national code and make any other necessary changes to update and improve the code. A technical advisory committee was appointed and met to recommend and discuss rule changes.

The changes to ch. PSC 114 are summarized as follows:

PSC 114.003(2): The heading is renamed to meet current drafting convention, and references to the repealed s. 101.865 Stats., in the subsection and note are deleted. The existing Paragraph (b) is deleted and recreated as subsection (5) in this section to meet current drafting convention.

A new paragraph (b) is created to require utilities to obtain proof of compliance with the Wisconsin Electrical Code before extending service to premises. This provision reflects the longstanding statutory requirement in s. 101.865, Stats. which was repealed by 2007 Act 63. The requirements of that provision are retained in the rule of the Department of Safety and Professional Services, s.SPS 316.950, which covers the connection of electric service. The Department of Safety and Professional Services, however, does not have authority over utilities. The proposed rule places the same requirements as found in s. SPS 316.950 on utilities under the Commission's jurisdiction. Requiring utilities to obtain proof of compliance protects utility workers and property, as well as the public from the hazards of energizing of service to premises that do not comply with the Wisconsin State Electrical Code.

PSC 114.005(8): Subsection (8) was created to offer guidance to utilities in dealing with situations not specifically addressed by ch. PSC 114. The language in this provision is similar to that in NESC under 012C.

PSC 114.215C4b and PSC 114.215C5b: For both of these subsections, a new exception is added for supply cables meeting Rule 230C3. Changes in the 2007 and 2012 NESC make it difficult to interpret where to install guy insulators, and this exception clarifies the requirements. This exception does not eliminate the public safeguards including the requirement that the bottom of insulators be placed 8 feet or more above ground level.

PSC 114.219 (2) (a): An additional recommended change involves s. PSC 114.219(2)(a) referencing American National Standards Institute (ANSI) standard Z535 pertaining to the format and color for signage required for high voltage supply line poles and

structures. The existing rule references ANSI Z535.4 2006 which covers product safety signs. The proposed change is to, instead, reference ANSI Z535.2 which covers environmental and facility safety signs and, as such, is a more appropriate reference for high voltage supply line poles and structures than the existing reference to product safety signs. Further, the reference should reflect the most recent version of ANSI Z535 which is 2011.

Table PSC 114.232-1, footnotes: The editorial revisions to the footnotes reflect NESC-2012 updates to footnotes for NESC Table 232-1.

Footnote 26 is added to define bodies of water not suitable for sail boating, which is not provided in NESC Table 232-1. NESC rules prescribe greater clearances for bodies of water suitable for sail boating than for those which are unsuitable. This definition in Footnote 26 clarifies when the greater clearance requirements apply.

PSC 114.234C1c: The substitution of the term "dwelling unit" for "occupancies" relies on the definition of "dwelling unit" in ch. SPS 316, which adopts the NESC 2008 definition of dwelling unit by reference, instead of the undefined "occupancies." Other changes are made to meet current drafting convention, and the references to ch. SPS 316 are corrected.

PSC 114.234C1a: Addition of the language "flagpoles, flags and banners" matches revised language in 2012 NESC.

PSC Table 114.253-2: This table was deleted in its entirety consistent with the removal of the table in 253-2 in the 2012 NESC.

PSC 114.261-1A: Table PSC 114.261-1A is renumbered to be Table PSC 114.261-1, and Footnotes 2 and 3 are deleted in their entirety so as to rely instead on the corresponding NESC Footnotes 2 and 3 for this table.

PSC 114.410: The existing Note 3 is deleted and replaced with Note 4, which sets an expectation for cooperation and sharing of information in order to fulfill the requirements of the NESC rule concerning arc hazard risk assessment in a facility.

**E. Comparison with Existing or Proposed Federal Legislation**

The National Electric Safety Code, which is incorporated by reference in PSC 114, covers provisions for safeguarding of persons from hazards arising from installation, operation, or maintenance of conductors and equipment in electric supply stations, and overhead and underground electric supply and communication lines. The federal standard is applicable to systems and equipment owned by utilities.

## F. Comparison with Similar Rules in Surrounding States

This rulemaking adopts the latest edition of the National Electric Safety Code (NESC). Minnesota automatically adopts each new NESC edition by reference. Michigan does not specifically adopt the NESC but effectively does so by referencing it as "standards of good practice." Iowa adopts all but Part 4 and Illinois adopts sections of Part 1 and Parts 2 and 3.

## G. Effect on Small Business

The s. 227.114(1), Stats., definition of "small business" states that to be considered a small business, the business must not be dominant in its field. Since they are monopolies in their service territories, electric utilities are dominant in their fields and, so, are not small businesses.

## H. Comments

Comments on this rule may be submitted as outlined in the Notice of Hearing.

## I. Accommodation

The Commission does not discriminate on the basis of disability in the provision of programs, services, or employment. Any person with a disability who needs accommodations to participate in this proceeding or who needs to obtain this document in a different format should contact the docket coordinator listed below.

## J. Agency Contact Person

Questions regarding this rule should be directed to Mohammed Monawar, Docket Coordinator, at (608) 266-3900 or mohammed.monawar@wisconsin.gov. Small business questions may be directed to Anne Vandervort at (608) 266-5814 or anne.vandervort@wisconsin.gov. Media questions should be directed to Matt Pagel, Communications and Policy Liaison, at (608) 266-9600. Hearing- or speech-impaired individuals may also use the Commission's TTY number: if calling from Wisconsin, (800) 251-8345; if calling from outside Wisconsin, (608) 267-1479.

# TEXT OF THE 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 114.001 | General information. |
| PSC 114.002 | Purpose and scope. |
| PSC 114.003 | Authority and statutory references. |

**Subchapter II - General Requirements**

| | |
|---|---|
| PSC 114.004 | General requirements. |
| PSC 114.005 | Application of rules. |
| PSC 114.006 | Adoption of standard by reference. |

**Subchapter III – Omissions, Changes or Additions to NESC-2012**

| | |
|---|---|
| PSC 114.007 | Omissions, changes or additions to NESC-2012. |
| PSC 114.010 | Omissions. |
| PSC 114.02 | Definitions. |
| PSC 114.092B2b(3) | Cable with insulating jacket |
| PSC 114.092D | Current in grounding conductor |
| PSC 114.094 | Grounding electrodes. |
| PSC 114.096C | Multi-grounded systems. |
| PSC 114.097 | Separation of grounding conductors. |
| PSC 114.099 | Additional requirements for grounding and bonding of communication apparatus and transmission lines. |

**Part 2—Safety Rules for the Installation and Maintenance of Overhead Electric Supply and Communication Lines**

| | |
|---|---|
| PSC 114.202 | Application of rules. |
| PSC 114.210 | Referenced sections. |
| PSC 114.215C | Non-current-carrying parts |
| PSC 114.219 | Marking of poles and structures carrying high voltage supply lines. |
| PSC 114.230A | Clearances. |
| PSC 114.230I | Maintenance of clearances and spacings. |

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|---|---|
| PSC 114.234C1a | Vertical and horizontal clearances. |
| PSC 114.234C1c | Transmission lines over dwelling units. |
| PSC 114.234C3d | Supply conductors attached to buildings or other installations. |
| PSC 114-234C6 | Clearance of lines near stored materials. |
| PSC 114-234C7 | Clearance of lines near fuel storage tanks. |
| PSC 114-234C8 | Clearance of lines near wells. |
| PSC 114-234C9 | Clearance of lines near antennas. |
| PSC 114-234E1 | Swimming pools. |
| PSC 114-234F1 | Grain bins loaded by permanently installed augers, conveyers, or elevator system. |
| PSC 114.235C2b(1)(a) | Sag-related clearances. |
| PSC 114.242G | Grades of construction for conductors. |
| PSC 114.250C | Extreme wind loading. |
| PSC 114.250E | Longitudinal capability. |
| Table PSC 114.253-1 | Load factors for structures, crossarms, support hardware, guys, foundations, and anchors to be used with the strength factors of Table 261-1 |
| Table PSC 114.261-1 | Strength factors for structures, crossarms, braces, support hardware, guys, foundations, and anchors |

**Part 3—Safety Rules for the Installation and Maintenance of Underground Electric Supply and Communication Lines**

| | |
|---|---|
| PSC 114.302 | Application of rules. |
| PSC 114.310 | Referenced sections. |
| PSC 114.317 | Outdoor location of oil-insulated padmounted transformers near buildings. |
| PSC 114.320B7 | Separation from other underground installations-gas lines. |
| PSC 114.323E3 | Vault and utility tunnel access. |
| PSC 114.350F | General |
| Table PSC 114.352-1 | Supply cable, conductor, or duct burial depth. |
| PSC 114.353E | Deliberate separations – Equal to or greater than 300 mm (12 in) from underground structures or other. |
| PSC 114.354D1g | Random separation - Separation less than 300 mm (12 in) from underground structures or other cables. |
| PSC 114.354E | Supply and communication cables or conductors, foundations and water and sewer lines. |
| PSC 114.381H | Warning signs. |

**Part 4—Rules for the Operation of Electric Supply and Communications Lines and Equipment**

| | |
|---|---|
| PSC 114.402 | Referenced sections. |

PSC 114.410 General requirements.

## Subchapter I - Administration and Enforcement

**PSC 114.001 General information. (1)** ADMINISTRATIVE AUTHORITIES. The Wisconsin State Electrical Code is issued and administered by the public service commission and the department of safety and professional services, division of safety and buildings 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 safety and professional services, division of safety and buildings has similar responsibility for issuance and administration of Volume 2 which is found in ch. SPS 316.

**(2)** AVAILABILITY OF STATE ELECTRICAL CODE. The public service commission has adopted the 2012 edition of the National Electrical Safety Code (NESC-2012) 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 the NESC may be ordered online at http://standards.ieee.org/nesc. 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). Unofficial copies of the rules can be obtained online at http://docs.legis.wi.gov/code/admin_code/psc/114/

**Note:** The department of safety and professional services, division of safety and buildings, 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. SPS 316 for current availability information for the NEC.

**PSC 114.002 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 basic provisions considered necessary for the safety of employees and the public. This chapter is not intended as a design specification or an instruction manual.

**(2)** SCOPE. (a) This chapter applies to 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 and prohibits 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 safety and professional services as part of

Volume 2, Wisconsin State Electrical Code, for application to installations over 600 volts of parties other than utilities.

(b) This chapter applies to utility facilities and functions up to the service point.

(c) This chapter applies to street and area lights, supplied by underground or overhead conductors, under the exclusive control of utilities, including their authorized contractors, and municipal electrical departments.

(d) This chapter does not apply to installations in mines, ships, railway rolling equipment, aircraft or automotive equipment, or utilization wiring except as covered in Parts 1 and 3, NESC-2012.

**PSC 114.003 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)** COMPLIANCE WITH ELECTRIC CODE. (a) A utility may not provide electric service unless it is in compliance with the requirements of Volume 1, Wisconsin State Electrical Code, though some portions of the code may not be directly enforceable by state agencies. 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:** The authority for the enforcement of Volume 1, Wisconsin State Electrical Code, is vested in the 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.

(b) A utility must obtain proof of compliance with the Wisconsin state electric code before extending service to a premise. Proof of such compliance shall consist of a certificate furnished by a municipal or other recognized inspection department or officer, or if there is no such inspection department or officer it shall consist of a written statement furnished by the contractor or other person doing the wiring, indicating that there has been such compliance.

**(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.

**Note**: See s. 196.58, Stats.

(b) A utility may seek public service commission approval of 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. 66.0831, 86.16, 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.

**(5)** ENFORCEMENT. The requirements in the code are enforceable in the same manner as other orders of the commission.

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

## Subchapter II - General Requirements

**PSC 114.004 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 loss of 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 or use.

**PSC 114.005 Application of rules. (1)** NEW INSTALLATIONS AND EXTENSIONS. This chapter shall apply in full to all new installations, reconstructions, alterations and extensions, except as modified or 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 directed for safety reasons by the commission and within the time determined by said agency.

(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 the rules in effect at one of the following times:
1. At the time of the original installation.
2. At the time of an addition, alteration, or replacement.
3. Currently, in accordance with par. (a).

**(3)** WAIVING RULES. This chapter is intended to apply to all installations, except as modified or waived by the commission. The rules 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. (a) The word “shall” indicates provisions that are mandatory.

(b) The word “should” indicates provisions that are normally and generally practical for the specified conditions. However, where the word “should” is used, it is recognized that, in certain instances, additional local conditions not specified herein may make these provisions

impractical. When this occurs, the difference in conditions shall be appropriately recognized and s. PSC 114.002 shall be met.

(c) A footnote to a table has the force and effect required or allowed by the rule that specifies the use of the table.

(d) Exceptions to a rule have the same force and effect required or allowed by the rule to which the exception applies.

(e) The word "RECOMMENDATION" indicates provisions considered desirable, but that are not intended to be mandatory.

(f) The word "NOTE" or the word "EXAMPLE" used in a rule indicates material provided for information or illustrative purposes only. "NOTES" and "EXAMPLES" are not mandatory and are not considered to be a part of Code requirements.

(g) A "RECOMMENDATION," "EXCEPTION," or "NOTE" applies to all text in that rule above its location that is indented to the same level.

**(8)** APPLICATIONS NOT SPECIFICALLY ADDRESSED. For all applications not specifically addressed in these rules, the design, construction, operations, and maintenance shall be done in accordance with accepted good practice for the given local conditions known at the time.

**PSC 114.006 Adoption of standard by reference. (1)** ADOPTION OF STANDARD. The National Electrical Safety Code-2012 edition (also American National Standards Institute C2-2012 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-2012 will not be effective in this state until such time as this chapter is revised to reflect such changes.

**(2)** CONSENT TO INCORPORATE NESC-2012 BY REFERENCE. Pursuant to s. 227.21, Stats., the attorney general has consented to the incorporation by reference of these standards contained in the NESC-2012, except for the omissions, changes and additions as shown later in this chapter. Copies of the NESC-2012 are on file in the offices of the public service commission and the legislative reference bureau.

## Subchapter III - Omissions, Changes or Additions to NESC-2012

**PSC 114.007 Omissions, changes, additions to NESC-2012.** Omissions, changes or additions to the NESC-2012 are specified in this subchapter and are rules of the public service commission and not requirements of the NESC-2012.

**Note:** Each omission, change or addition is found in the same location in this subchapter as the appropriate NESC part, section or subsection where the affected rule is found. Each change or addition has been prefixed by ch. 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 114.096C [NESC 096C, p. 32]. The word "Change" following the section number and heading means that the corresponding wording of the NESC-2012 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-2012 and that the new requirement is inserted at the appropriate location.

**Note**: To observe federal directives and recommendations that national standards adopt the metric system for units of measure, the numerical values of the NESC-2012 are stated in the metric system and in the customary inch-foot-pound system. To conform to this more international convention, this revision of the Wisconsin State Electrical Code, Volume 1 also adopts the same measurement convention. In the text, the metric value is now shown first with the customary inch-foot-pound value (in parentheses) following. In tables, the metric values are also given first and where the entire tables are duplicated, the table of metric values appears first with the table of inch-foot-pound values following.

## Section 1. Introduction to the National Electrical Safety Code

**PSC 114.010 Omissions. [NESC 010 through 016, pp. 1-6]** Introduction to the National Electrical Safety Code (Section 1) (Omission) Rules 010 through 016 of the NESC-2012 are omitted and not incorporated as part of the Wisconsin State Electrical Code, Volume 1.

## Section 2. Definitions of Special Terms

**PSC 114.02 Definitions. [NESC Section 2, p. 7]** (Change and Addition)

**(1)** Change the definition of "Administrative Authority" to read:

(a) *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.

**(2)** Add the following definition:

(a) *Commission*. Public service commission of Wisconsin.

## Section 9. Grounding Methods for Electric Supply and Communications Facilities

**PSC 114.092B2b(3) Cable with insulating jacket. [NESC 092B2b(3), p. 23]** (Change) Change paragraph (3) to read:

**(3)** Cable with insulating jacket

Additional bonding and connections between the cable insulation shielding or sheaths and the system ground are recommended. Where uninsulated cable joints in multi-grounded shielded cable systems are exposed to contact by personnel, the shielding (including sheath or concentric neutral) at the joint shall be grounded. Accessible insulated cable joints are not required to be grounded by this rule. Where multi-grounded shielding cannot be used for electrolysis of sheath-current reasons, the shielding sheaths and splice-enclosure devices shall be insulated for the voltage that may appear on them during normal operation. Bonding transformers or reactors may be substituted for direct ground connection at one end of the cable.

**PSC 114.092D Current in grounding conductor. [NESC 092D, p. 24]** (Change) Change paragraph D to read:

D. Current in grounding conductor

Ground connection points shall be so arranged that under normal operating circumstances there will be no objectionable flow of current over the grounding conductor. If an objectionable flow of current occurs over a grounding conductor due to the use of multi-grounds, the following options may be used:
1. Determine the source of the objectionable ground conductor current and take action necessary to reduce the current to an acceptable level at its source.
2. Subject to the approval of the commission, other effective means may be used to limit the current, but no means employed shall create a situation of excessive voltage buildup on the neutral.

The system ground of the source transformer shall not be removed.

Under normal system conditions a grounding conductor current will be considered objectionable if the electrical or communications system's owner or operator deems such current to be objectionable, or if the presence or electrical characteristics of the grounding conductor current is in violation of rules and regulations governing the electrical system, as set forth by the commission.

The temporary currents set up under abnormal conditions while grounding conductors are performing their intended protective functions are not considered objectionable. The conductor shall have the capability of conducting anticipated fault current without thermal overloading or excessive voltage buildup. Refer to Rule 93C.

**Note**: Some amount of current will always be present on the grounding conductors of an operating AC electrical system. That current may be conducted and/or induced and is not, in and of itself, objectionable.

**PSC 114.094 Grounding electrodes. [NESC 094B4, p. 29]** (Section 9)

**(1)** Rule 094B4 of the NESC-2012 is omitted and not incorporated as part of the Wisconsin State Electrical Code, Volume 1.

**PSC 114.096C Multi-grounded systems. [NESC 096C, p. 32]** (Change)

**(1)** 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 1.6 km (1 mi) 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 1.6 km (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--Separation Less Than 300 mm (12 in) from Underground Structures or Other Cables."

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.

Recommendation: This rule may be applied to shield wire(s) grounded at the source and which meet the multi-grounded requirements of this rule.

**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 114.097 Separation of grounding conductors. [NESC 097C, p. 32]** (Changes)

**(1)** 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 1.6 km (1 mi) of line, including those grounds at transformer locations, but not including ground connections at customers' service equipment.

**(2)** Change paragraph D to read:

D. Multi-grounded systems

On multi-grounded systems, the primary and secondary neutrals shall be interconnected according to Rule 097B.

Exception: Where it is necessary to separate the neutrals, interconnection of the neutrals shall be made through an electronic switching device designed for the purpose and of a type acceptable to the authority having jurisdiction. The 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 3.60 m (12 ft) nor more than 6.1 m (20 ft.) shall separate the secondary neutral grounding electrode from the primary neutral and surge arrester grounding electrode, which shall not be relocated to accommodate this separation. Since a difference of potential will exist where primary and secondary neutrals are not directly interconnected, the primary and secondary grounding conductors 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.

**PSC 114.099 Additional requirements for grounding and bonding of communication apparatus. [NESC 099, p. 33]** (Change and Addition) Change title 099 to read:

**PSC 114.099 Additional requirements for grounding and bonding of communication apparatus and transmission lines.**

(Change) Change paragraph C to read:

C. Bonding of electrodes

A bond not smaller than AWG No. 6 copper or equivalent shall be placed between the communication grounding electrode and the supply system neutral grounding electrode where separate electrodes are used at the structure or building being served. All separate electrodes shall be bonded together except where separation is required per Rule 97.

Bonding to other systems shall not be done on or within a metering enclosure unless a means of bonding, intended for inter-system bonding, is furnished as part of the metering enclosure.

Recommendation: If water piping is used as a bonding means, care must be taken to assure that the metallic path is continuous between electrodes.

**Note** 1: See NEC Article 800-100(D) for corresponding NEC requirements.

**Note** 2: The bonding together of all separate electrodes limits potential differences between them and between their associated wiring systems.

(Addition) [Follows NESC 099C, p. 34] Add paragraph D to read:

D. Transmission shield wire systems and transmission systems with under-built multi-grounded distribution systems

1. The shield wire system providing lightning protection for transmission lines (69 kV phase-to-phase and greater) shall be connected to a made or existing grounding electrode at every transmission pole or structure for each shield wire.

(a) If the transmission line has any under-built distribution attached to the same pole or structure, the shield wire system shall be bonded to the grounding conductor of the distribution neutral at each pole or structure.

(b) The under-built distribution neutral may be connected to its own made or existing ground electrode at each pole or structure.

Exception: Shield wires that are segmented and isolated from ground at a particular pole or structure need not follow this rule.

2. The shield wire of the transmission system shall not be used as the distribution neutral conductor in lieu of the installed distribution neutral conductor.

## 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 Application of rules. [NESC 202, p. 73]** (Change) Change the paragraph 202 to read:

202. Application of rules

The general requirements for application of these rules are contained in s. PSC ll4.005. However, when a structure is replaced, arrangement of equipment shall conform to the 2012 Edition of Rule 238C.

## Section 21. General Requirements

**PSC 114.210 Referenced sections. [NESC 210, p. 74]** (Change) Change paragraph 210 to read:

210. Referenced sections

The Introduction (Section 1) as amended by s. PSC 114.010, Definitions (Section 2) as amended by Section 2 of Chapter PSC 114, List of Referenced Documents (Section 3) and Grounding Methods (Section 9) as amended by Section 9 of Chapter PSC 114 shall apply to the requirements of Part 2.

**PSC 114.215C4b Use of insulators in anchor guys.[NESC 215C4b, p.76]** (Addition) Add Exception to read:

Exception: This requirement does not apply to supply cables meeting Rule 230C3 or communication cables.

**PSC 114.215C5b Use of insulators in span guys and span wires supporting luminaries and traffic signals. [NESC 215C5b, p. 76]** (Addition) Add Exception to read:

Exception: This requirement does not apply to supply cables meeting Rule 230C3 or communication cables.

**PSC 114.219 Marking of poles and structures carrying high voltage supply lines. [Follows NESC 218, p. 79]** (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 1.2 to 2.45 m (4 to 8 ft) above the ground upon all poles or other structures supporting the line.

Exception: Existing poles and structures which were required to be signed by s. 196.67, stats. and were installed prior to January 1, 1995, are permitted to comply with the warning sign requirements which existed on December 31, 1994.

**(2)** Warning signs installed as replacements or new facilities on overhead electrical supply line poles and structures shall comply with the following standards:

(a) Warning signs which meet the requirements as to format and color of American National Standards Institute standard ANSI Z535.2-2011 for safety signs.

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

Exception: Existing poles and structures installed prior to July 1, 2003, are permitted to continue to use the "Danger - High Voltage" sign format meeting the requirements of the prior rule until such signs are replaced.

**Note:** This rule amends and expands the application of the warning sign requirements of s. 196.67, stats., as it existed prior to its revision which became effective on January 1, 1995. In 1993, this statute was revised by deleting the specified location provisions limiting the required signing to certain poles. As a result, all poles and structures supporting lines with a voltage of 2,000 or more installed after the effective date of January 1, 1995, are required to carry warning signs. 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 1997 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, NESC-1993, NESC-1997, NESC-2002, NESC-2007 and NESC-2012. 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, NESC-1993, NESC-1997, NESC-2002, and NESC-2007 or NESC-2012.

**PSC 114.230A Clearances. [NESC 230A(1) and 230A(2), p. 85]** (Section 23) Rules 230A(1) and 230A(2) of the NESC-2007 are omitted and not incorporated as part of the Wisconsin State Electrical Code, Volume 1.

**PSC 114.230I Maintenance of clearances and spacings. [NESC 230I, p. 89]** (Section 23) (Change) Change the Note in paragraph I to read:

**Note:** See rule PSC 114.005(2) to determine the applicable edition.

Table PSC 114.232-1 **[NESC, Table 232-1, pp. 94-97: Metric; pp. 97-100: Feet]** 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 96-97 (Metric) and page 99-100 (Feet) contain the following changes and additions:

Change Footnote 18 to read as follows:

[18] For uncontrolled water flow areas, the surface area and clearances shall be based on the normal high water level.

Change Footnote 21 to read as follows:

[21]Where the US Army Corps of Engineers, or the state, or surrogate thereof has issued a crossing permit, the greater clearances of that permit or this code shall govern.

Add Footnote 26 to read as follows:

[26] Water areas not suitable for sailboating include portions of meandering rivers, streams and canals where the widest width does not exceed 50 m (165 feet) within any unobstructed,1.6-km (1-mile) long segment that includes the crossing or where the width does not exceed 50 m (165 feet) within the surface area of any segment less than 1.6-km (1-mile) long on the line-crossing side of an overwater obstruction. All rivers, streams, canals and creeks as defined by the Wisconsin department of natural resources (DNR) which meet this definition are considered not suitable for sailing.

Exception: Regardless of width, 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 water areas suitable for sailboating on the larger body of water. This also applies where a sailboat may be transported across such water with its mast extended.

Add the reference to Footnote 26 in NESC-2012 Table 232-1 on pp. 94-97 (Metric) and pp. 97-100 (Feet) to the sailboating category titles of rows 6 and 7. It applies to all clearances in those rows.

Add Footnote 27 which reads as follows:

[27]A diagonal clearance equal to the required vertical clearance shall be maintained to uneven or sloping terrain within a horizontal distance of 3/4 (75%) 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 27 in NESC-2012 Table 232-1 on pp. 94-97 (Metric) and pp. 97-100 (Feet) to the conductor category titles of columns 3, 4 and 5. It applies to all clearances in those columns.

Table PSC 114.232-2 **[NESC, Table 232-2, pp. 101-102 (Metric) and pp. 102-103 (Feet)]** Vertical Clearance of Equipment Cases, Support Arms, Platforms, Braces and Unguarded Rigid Live Parts Above Ground, Roadway, or Water Surfaces (Change)

Change Footnote 8 to read as follows:

[8]Where the US Army Corps of Engineers, or the state, or surrogate thereof has issued a crossing permit, the greater clearances of that permit or this code shall govern.

Table PSC 114.232-3 **[NESC, Table 232-3, p. 104]** 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 1.6-km-long (1 mi) 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.

**PSC 114.234C1a Vertical and horizontal clearances. [NESC 234C1a, p. 118]** (Change)

Change paragraph (1) (a) to read:

(a) *Clearances.* Unguarded or accessible wires, conductors, cables, or rigid live parts may be located adjacent to buildings, signs, billboards, chimneys, radio and television antenna, tanks, flagpoles and flags, banners and other installations and any projections therefrom. The vertical and horizontal clearances of such rigid and nonrigid parts shall be not less than the values in Table 234-1 when at rest under the conditions specified in Rule 234A1. These facilities may be installed beside, over or under buildings, building projections and other installation, as illustrated in Figs. 234-1(a) and 234-1(b) and 234-1(c). Buildings, signs, billboards, chimneys, radio and television antennas, tanks, flagpoles and flags, banners and other installations and any projections therefrom shall not be located near existing wires, conductors, cables or rigid live parts if doing so results in clearances less than the values given in Table 234-1.

**PSC 114. 234C1c Transmission lines over dwelling units. [follows NESC 234 C1b, p. 119]** (Addition) Add the following paragraph 4c:

c. Transmission lines over dwelling units.

No utility may construct conductors of supply lines designed to operate at voltages in excess of 35 kV over-any portion of a dwelling unit. This provision also covers line conductors in their wind-displaced position as defined in Rule 234A2.

**Note**: It is the intent under s. SPS 316.225(6) that the public not construct any portion of a dwelling unit under such lines.

**Note:** The term "dwelling unit", has the meaning given in ch. SPS 316, which adopts by reference the definitions in NEC-2008.

**Note:** See s. SPS 316.225(6) Clearance Over Buildings and Other Structures which refers to ch. PSC 114 regarding clearance of conductors over 600 volts and for the prohibition of dwellings under or near overhead lines.

**PSC 114.234C3d Supply conductors attached to buildings or other installations. [NESC 234C3d, p.119]** (Change) Change Exception 2(a) to read:

Exception 2(a): 2.45 m (8 feet). This clearance may be reduced to 0.90 m (3 ft) for supply conductors limited to 300 volts to ground and communication conductors and cables if the roof has a slope of not less than 1 (vertical) to 3 (horizontal).

**PSC 114.234C6 Clearance of lines near stored materials. [Follows NESC 234C5, p. 120]** (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 Clearance of lines near fuel storage tanks. [Follows NESC 234C5, p. 120]** (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 liquefied petroleum gas (LPG) storage tanks. A horizontal clearance of not less than 2.45 m (8 ft) with cables at rest, and not less than 1.80 m (6 ft) 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 4.6 m (15 ft) with conductors at rest, and not less than 3.0 m (10 ft) 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 Clearance of lines near wells. [Follows NESC 234C5, p. 120]** (Addition) Add the following paragraph 8 and exception:

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 3.0 m (10 ft) 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.

Exception: This rule does not apply to Groundwater Monitoring Wells defined in Wis. Admin. Code ch. NR 141 provided such wells are installed using hydraulic push methods, such as a Geoprobe type rig (The vertical clearance required for a Geoprobe is typically less than 10 feet.) and where sampling is accomplished using a bailer or a submersible pump attached to flexible tubing. This exception is not intended to apply to monitoring wells installed with drilling rigs that are taller than 14 feet or sampling methods that require sections of piping (steel or plastic pipe)

**PSC 114.234C9 Clearance of lines near antennas. [Follows NESC 234C5, p. 120]** (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 Wisconsin Building Code (Antenna Setback and Antenna Support, IBC Chapter 31, Sections 3108.1, 3108.2 and 3108.4).

**PSC 114.234E1 Swimming pools. [NESC 234E1, p. 121]** (Addition) Add the following sentence to the beginning of paragraph E1:

1. Swimming Pools

Pools and appurtenances shall not be placed under or near existing service-drop conductors or any other overhead wiring; nor shall such wiring be installed over a swimming pool or the surrounding area unless such installation complies with the clearances or the exceptions specified in NESC Rule 234E1.

**PSC 114.234F1 Grain bins loaded by permanently installed augers, conveyers, or elevator systems. [Following NESC 234F1, P. 122] (**Addition) Add Exception and Note to read:

Exception: Farm silos that are loaded by a blower through a vertical metal tube permanently attached to the side of the structure are not considered grain bins.

**Note:** Typical cylindrical farm silos are considered buildings for the purposes of this code and the clearance requirements of NESC Rule 234C, as amended herein, would apply.

Table PSC ll4.234-l **[NESC Table 234-l, pp. 130-133 (Metric) and pp. 134-137 (Feet)]** 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 ll4.234-l Metric contains the following changes and additions to NESC Table 234-1 Metric:

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

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

Add Footnote 17, which reads as follows:

[17]This clearance may be reduced to 0.90 m for supply conductors limited to 300 V to ground and communications conductors and cables if the roof has a slope of not less than 1 (vertical) to 3 (horizontal).

The reference to Footnote 17 is added to the values in Item (Row) 1.b.(1), Columns 2 and 3.

Table PSC 114.234-1 Feet contains the following changes, deletions and additions to NESC Table 234-1 Feet:

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

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

Add Footnote 17, which reads as follows:

[17]This clearance may be reduced to 3 ft for supply conductors limited to 300 V to ground and communications conductors and cables if the roof has a slope of not less than 1 (vertical) to 3 (horizontal).

The reference to Footnote 17 is added to the values in Item (Row) 1.b.(1), Columns 2 and 3.

**PSC 114.235C2b(1)(a) Sag-related clearances. [Follows NESC 235C2b(1)(a) Exception 2, p. 150]** (Change)

**(1)** Change Exception 2 to read:

Exception 2: For supply conductors of different utilities, vertical clearance at any point in the span need not exceed 75% of the values required at the supports for the same utility by Table 235-5.

## Section 24. Grades of Construction

**PSC 114.242G Grades of construction for conductors. [Follows NESC 242F, p. 187]** (Addition) Add the following paragraph G to read:

G. Circuits exceeding 175 kV to ground

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

## Section 25. Loading for Grades B and C

**PSC 114.250C Extreme wind loading. [Alternative to NESC 250C, p. 191]** As an alternate to NESC Tables 250-2 and Table 250-3, the following Table PSC 114.250-2 and the related definitions and formulas for $k_Z$ and $G_{RF}$ may be used. (NESC Figure 250-2(b) "Basic Wind Speeds" is a part of this rule by reference.)

C. Extreme wind loading

If no portion of a structure or its supported facilities exceeds 18 m (60 ft) above ground or water level, the provision of the rule are not required, except as specified in Rule 261A.1.2.f. Where a structure or its supported facilities exceeds 18 m (60 ft) above ground or water level, the structure and its supported facilities shall be designed to withstand the extreme wind load associated with the Base Wind Speed as specified by NESC Figure 250-2(b). The wind pressures calculated shall be applied to the entire structure and supported facilities without ice.

The following formula shall be used to calculate wind load.

$$\text{Load in Newton} = 0.613 \cdot (V_{m/s})^2 \cdot k_Z \cdot G_{RF} \cdot I \cdot C_d \cdot A(m^2)$$

$$\text{Load in pounds} = 0.00256 \cdot (V_{mi/h})^2 \cdot k_Z \cdot G_{RF} \cdot I \cdot C_d \cdot A(ft^2)$$

Where:

0.613 Ambient Air Density Value, reflects the mass density of air for the standard

| | |
|---|---|
| 0.00256 | atmosphere, i.e., temperature of 15ºC (59ºF) and average sea level pressure of 760 mm (29.92 in) of mercury. (No adjustment in the velocity to pressure coefficient has been made relative to changes in air density with altitude.) The dimensions associated with this coefficient are, for metric, 0.613 $Ns^2/m^4$; and, for English, 0.00256 $lbhr^2/mi^2 ft^2$. |
| $k_Z$ | Velocity-Pressure Exposure Coefficient, as defined in Table PSC 114-250-2. |
| V | Basic wind speed, from NESC 250C, Figure 250-2 given in m/s at 10 m (mi/h at 33 ft) above ground; |
| $G_{RF}$ | Gust Response Factor, as defined in Table PSC 114-250-2. |
| I | Importance factor equal to 1.0 for utility structures and their supported facilities, |
| $C_d$ | Shape Factor as defined as defined in NESC Rule 252B, |
| A | Projected wind area, $m^2$ ($ft^2$). |

**Table PSC 114.250-2 (Metric)**
**Velocity Pressure Exposure Coefficient, $k_Z$**
**Gust Response Factor, $G_{RF}$**

| | $k_Z \cdot G_{RF}$ | |
|---|---|---|
| | For Structures: | For Wires: |
| For structures with a total height of 30 m or less above ground or water level | 1.0 | 0.85 |
| For structures with a total height exceeding 30 m above ground or water level | 0.93+0.00245(h) | 0.78+0.00245(h) |

**Table PSC 114.250-2 (English)**
**Velocity Pressure Exposure Coefficient, $k_Z$**
**Gust Response Factor, $G_{RF}$**

| | $k_Z \cdot G_{RF}$ | |
|---|---|---|
| | For Structures: | For Wires: |
| For structures with a total height of 100 ft or less above ground or water level | 1.0 | 0.85 |
| For structures with a total height exceeding 100 ft above ground or water level | 0.93+0.00075(h) | 0.78+0.00075(h) |

Where:

h = height of the structure above ground or water level. For wind loads on wires attached to the structure, the height of the highest wire attachment above ground or water level may be used if less than the height of the structure. In unique terrain where the height of the wire above ground at mid-span may be substantially higher than at the attachment point, engineering judgment may be used to determine an appropriate value the height of the wire.

**Note**: The height of all wire attachments should be based on the height of the highest attachment or total structure height. The formulas to determine $k_Z G_{RF}$ were based on this premise, not the height of each attachment.

The wind pressure parameters ($k_Z$, V, and $G_{RF}$) are based on open terrain with scattered obstructions (Exposure Category C as defined in ASCE 7-98). Exposure Category C is the basis of the NESC extreme wind criteria. Topographic features such as ridges, hills, and escarpments may increase the wind loads on site-specific structures. A topographic Factor, $k_{zt}$, from ASCE7-98 may be used to account for these special cases.

**PSC 114.250E Longitudinal capability. [Follows NESC 250D, p. 193]** (Addition) Add the following paragraph E:

E. 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 9.6 km (6 mi) to 16 km (10 mi) 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, C and D. 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.

Table PSC 114.253-1 **[NESC Table 253-1, p. 212]** Load factors for structures[1], crossarms, support hardware, guys, foundations, and anchors to be used with the strength factors of Table 261-1. (Changes)

Change Footnote 2 to read:

[2] For guys and anchors associated with structures supporting communications conductors and cables only, this factor may be reduced to 1.33. For guys associated with structures supporting supply conductors or supply conductors and communications conductors and cables, this factor may be reduced to 1.5.

Change Footnote 4 to read:

[4] For guys associated with structures supporting only supply conductors or supply conductors and communications conductors and cables, this factor may be reduced to 2.00. This factor may be reduced to 1.75 for wood and reinforced (not prestressed) concrete structures when the span being supported is not at a crossing.

**Section 26. Strength Requirements**

Table PSC 114.261-1 **[NESC Table 261-1, p. 222]** Strength factors for structures, crossarms, braces, support hardware, guys, foundations, and anchors (Change)

**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 Application of rules. [NESC 302, p. 233]** (Change) Change Rule 302 to read:

302. Application of Rules

The general requirements for application of these rules are contained in s. PSC 114.005.

**Section 31. General Requirements Applying to Underground Lines**

**PSC 114.310 Referenced sections. [NESC 310, p. 234]** (Change) Change Rule 310 to read:

310. Referenced Sections

The Introduction (Section 1) as amended by s. PSC 114.010, Definitions (Section 2) as amended by Section 2 of Chapter PSC 114, List of Referenced Documents (Section 3), and Grounding Methods (Section 9) as amended by Section 9 of Chapter PSC 114, shall apply to the requirements of Part 3.

**PSC 114.317 Outdoor location of oil-insulated padmounted transformers near buildings. [Follows NESC 316, p. 236]** (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.V buildings as determined by Wisconsin Building Code (Construction Classification IBC Chapter 6). 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 6.1 m (20 ft) outward and 3.0 m (10 ft) to either side of a building door. See Figure PSC 114-317B1.

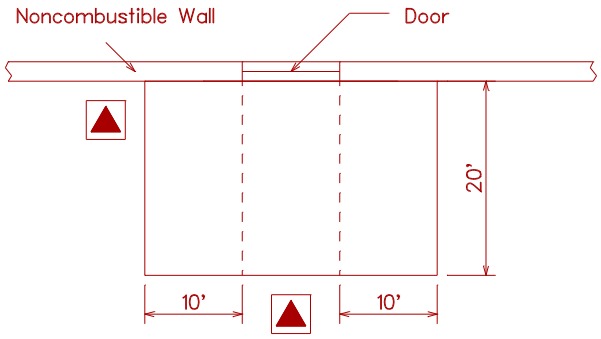


Figure PSC 114-317B1.

2. Padmounted oil-insulated transformers shall not be located within a zone extending 3.0 m (10 ft) outward and 3.0 m (10 ft) 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 7.6 m (25 ft) diagonal separation between the transformer and said opening. See Figure PSC 114-317B2.

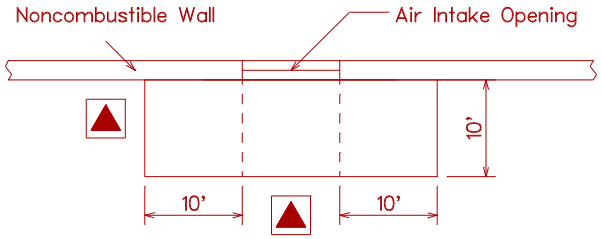


Figure PSC 114-317B2.

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

Exception: This does not apply to a glass block or fire window meeting the requirements of the Wisconsin Commercial Building Code (Fire Window IBC Chapter 7, Section 714.3).

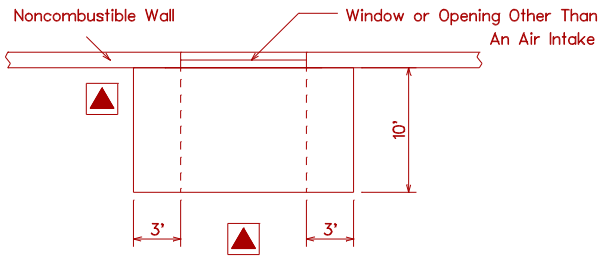


Figure PSC 114-317B3a.

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

Exception: This does not apply to a glass block or fire window meeting the requirements of the Wisconsin Commercial Building Code (Fire Window, IBC Chapter 7, Section 714.3).

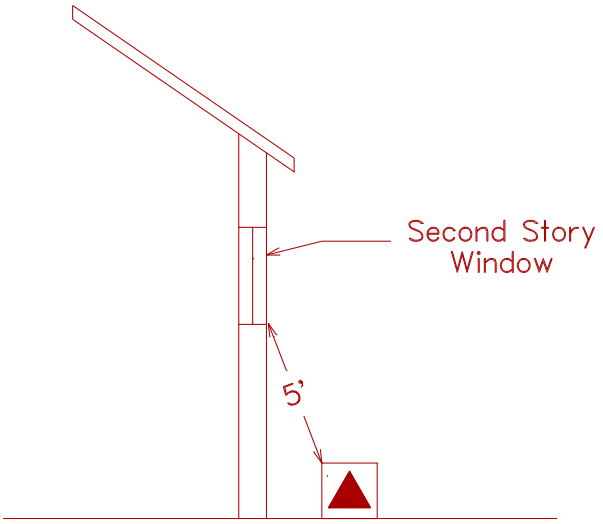


Figure PSC 114-317 B3b.

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 3.0 m (10 ft) 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 in PSC 114.317 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 0.3 m (1 ft) above the top of the padmounted transformer. See Figure PSC 114-317D1.

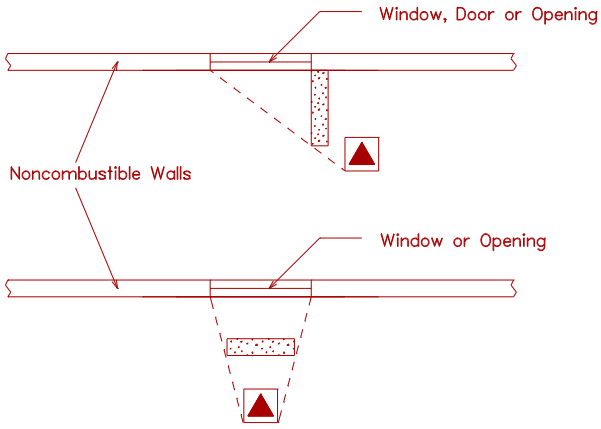


Figure PSC 114-317D1.

2. Combustible Walls

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

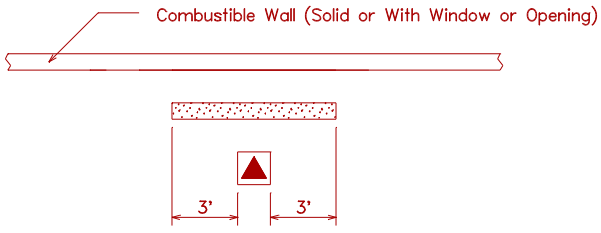


Figure PSC 114-317D2.

E. Fire Escapes

1. Padmounted oil-insulated transformers shall not be located within a zone extending 6.1 m (20 ft) outward and 3 m (10 ft) to either side of the point where a fire escape meets the ground. See Figure PSC 114-317E1.

2. Padmounted oil-insulated transformers located beneath fire escapes shall have a vertical clearance of not less than 3 m (10 ft) from the top of the transformer to the bottom of the fire escape. See Figure PSC 114-317E2.

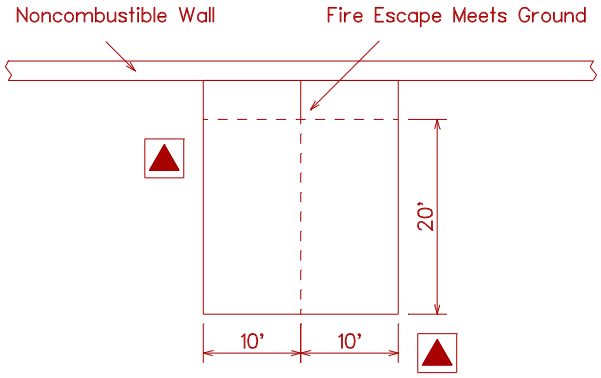


Figure PSC 114-317E1

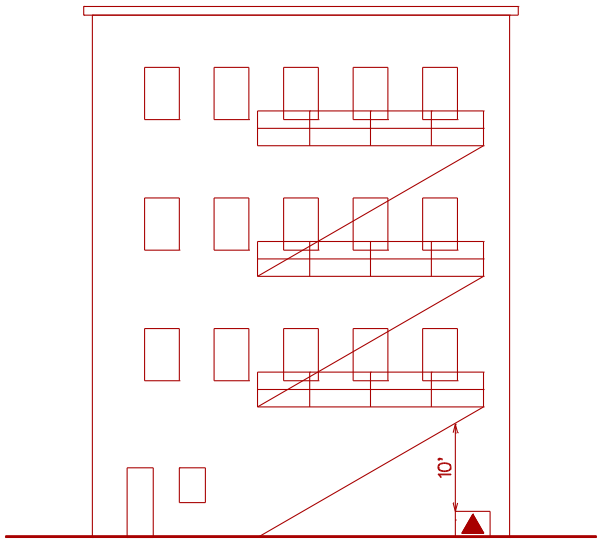

Figure PSC 114-317E2

## Section 32. Underground Conduit Systems

**PSC 114.320B7 Separation from other underground installations. [Follows NESC 320B6, p. 238]** (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 0.3 m (12 in).

b. The separation in any direction of gas distribution or service lines from electric supply and communication conduit systems shall be a minimum of 0.15 m (6 in).

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 49 CFR192.

**PSC 114.323E Vault and utility tunnel access. [NESC 323E, p. 241]** (Change and Addition)

Change paragraph 3 to read:

3. Where accessible to the public, access doors to utility tunnels and vaults shall be locked unless qualified persons are in attendance to restrict entry by unqualified persons.

(Addition) Add Recommendation to read:

Recommendation: When vaults and utility tunnels contain exposed live parts, and where entry is through a vertical door a prominent safety sign should be visibly posted on the outside of the door.

## Section 35. Direct-Buried Cable

**PSC 114.350F General. [NESC 350F, p. 248]**(Section 35) (Change) Change paragraph F to read:

F. All direct-buried jacketed supply cable meeting Rule 350B and all direct-buried communication cables shall be legibly marked as follows:

The appropriate identification symbol shown in Fig 350-1 shall be indented or embossed in the outermost cable jacket at a spacing of not more than 1m (40 in). The symbol may be separate or sequentially combined with other data, or symbols, or both, printed on the jacket. If the symbol is sequentially combined, it shall be separated as indicated in Fig 350-1. If optional supplemental striping is used, only supply cables or non-metallic duct containing or intended to contain supply cables may have three equally separated longitudinal red stripes.

This rule applies to cable installed on or after January 1, 1996.

Exception 1: Cables with jackets that cannot be effectively marked in accordance with Rules 350F need not be marked.

Exception 2: Unmarked cable from stock existing prior to 1 January 1996 may be used to repair unmarked direct-buried jacketed supply cables and communication cables.

Table PSC 114.352-1 **[NESC Table 352-1, p. 251]** Supply cable, conductor, or duct 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.

(Addition) Add Note to read:

**Note:** Grounding and bonding conductors are covered by Rule 093.

**PSC 114.353E Deliberate separations—Equal to or greater than 300 mm (12 in) from underground structures or other cables. [Follows NESC 353D, p. 252]** (Addition) Add the following paragraph E to read:

E. Gas lines

The separation in any direction of gas pipelines from direct- buried electric supply and communication facilities shall be a minimum of 0.3 m (12 in).

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.

**PSC 114.354D1g Random separation – Separation less than 300 mm (12 in) from underground structures or other cables. [NESC 354D1g, p. 253]** (Change) Change paragraph g to read:

g. 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 300 m (1,000 ft). 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.

**PSC 114.354E Supply and communication cables or conductors and non-metallic water and sewer lines. [NESC 354E, p. 254]** (Change) Change paragraph E to read:

E. Supply and communication cables or conductors, foundations and water and sewer lines.

**(1)** Supply cables and conductors and water and sewer lines or foundations may be buried together with no deliberate separation between facilities and at the same depth, provided all parties involved are in agreement.

**(2)** Communication cables and conductors and water and sewer lines or foundations may be buried together with no deliberate separation between facilities and at the same depth, provided all parties involved are in agreement.

**(3)** Supply cables or conductors, communication cables or conductors, water and sewer lines or foundations may be buried together with no deliberate separation between facilities and at the same depth, provided the applicable rules in Rule 354D are met and all parties involved are in agreement.

## Section 38. Equipment

**PSC 114.381H Warning signs. [Follows NESC 381G, p. 257]** (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 on the outside of the enclosure

which meets the requirements as to format and color of American National Standards Institute standard ANSI Z535.1-2011, ANSI Z535.2-2011, ANSI Z535.3-2011, ANSI Z535.4-2011, and ANSI Z535.5-2011 for safety signs.

2. Electric supply equipment installed prior to July 1, 2003 shall be signed to comply with these rules or the rule in effect in 2003. Warning signs installed as replacements or installed on new facilities shall comply with the standard as prescribed in s. PSC 114.381H1 above. The "Mr. Ouch" symbol may be used as the optional pictorial part of this sign.

## Part 4. Rules for the Operation of Electric Supply and Communications Lines and Equipment

### Section 40. Purpose and Scope

**PSC 114.402 Referenced sections. [NESC 402, p. 261]** (Change) Change first sentence of Rule 402 to read:

The Introduction (Section 1) as amended by s. PSC 114.010, Definitions (Section 2) as amended by Section 2 of Chapter PSC 114, List of Referenced Documents (Section 3), and Grounding Methods (Section 9) as amended by Section 9 of Chapter PSC 114, shall apply to the requirements of Part 4.

### Section 41. Supply and communications systems—Rules for employers

**PSC 114.410 General requirements. [NESC 410A3, p. 262]** (Addition) Add the following clarifying note to Rule 410A3b:

**Note 4**: It is the intent of this rule that the facility owner and equipment owner cooperate to provide the necessary arc assessment of their respective area of responsibility where work is to be performed. Either the facility owner or the equipment owner may request the appropriate information from the other party and perform the assessment on behalf of the other.

**SECTION 2**. This rule shall take effect on the first day of the month following publication in the Wisconsin Administrative Register as provided in s. 227.22 (2) (intro.), Stats.

(end)

STATE OF WISCONSIN
DEPARTMENT OF ADMINISTRATION
DOA-2049 (R03/2012)

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# ADMINISTRATIVE RULES
## Fiscal Estimate & Economic Impact Analysis

1. Type of Estimate and Analysis
☒ Original ☐ Updated ☐ Corrected

2. Administrative Rule Chapter, Title and Number
PSC 114 Wisconsin State Electrical Code, Volume 1

3. Subject
Electric safety and adopting the latest National Electrical Safety Code into Volume I of the Wisconsin Sate Electrical Code

4. Fund Sources Affected
☐ GPR ☐ FED ☒ PRO ☐ PRS ☐ SEG ☐ SEG-S

5. Chapter 20, Stats. Appropriations Affected

6. Fiscal Effect of Implementing the Rule
☒ No Fiscal Effect
☐ Indeterminate
☐ Increase Existing Revenues
☐ Decrease Existing Revenues
☐ Increase Costs
☐ Could Absorb Within Agency's Budget
☐ Decrease Cost

7. The Rule Will Impact the Following (Check All That Apply)
☐ State's Economy
☐ Local Government Units
☐ Specific Businesses/Sectors
☐ Public Utility Rate Payers
☐ Small Businesses **(if checked, complete Attachment A)**

8. Would Implementation and Compliance Costs Be Greater Than $20 million?
☐ Yes ☒ No

9. Policy Problem Addressed by the Rule
The existing ch. PSC 114 administers an outdated version of the National Electric Safety Code. This rulemaking updates the rule to include provisions from the latest version of that code.

10. Summary of the businesses, business sectors, associations representing business, local governmental units, and individuals that may be affected by the proposed rule that were contacted for comments.
All electric utilities; Wisconsin Utilities Association; Utility Workers Associations; Wisconsin Federation of Independent Business; Wisconsin Manufacturers and Commerce; Citizens Utility Board, League of Wisconsin Municipalities, Wisconsin Towns Association,. Wisconsin Alliance of Cities, IBEW, Municipal Electric Utilities of Wisconsin

11. Identify the local governmental units that participated in the development of this EIA.
Municipalities with municipal electric utilities and members of the League of Wisconsin Municipalities, Wisconsin Towns Association, and Wisconsin Alliance of Cities.

12. Summary of Rule's Economic and Fiscal Impact on Specific Businesses, Business Sectors, Public Utility Rate Payers, Local Governmental Units and the State's Economy as a Whole (Include Implementation and Compliance Costs Expected to be Incurred)
There are no estimated state fiscal effects from the draft revisions to PSC 114 Wisconsin State Electrical Code, Volume 1

As drafted, the revised Wisconsin State Electrical Code, Volume 1 adopts federal requirements as state rule. The proposed rule clarifies 1) that a utility must obtain proof of compliance with Wisconsin state electric code before extending service to a premise, 2) water areas not suitable for sailboating, 3) when a utility may not construct conductors of supply lines, and 4) defines clearances. The rule also specifies that applicants not addressed should follow accepted good practices known at the time. Other changes are reference number changes only.

Revisions to PSC 114 Wisconsin State Electrical Code, Volume 1 are clarifications and do not impact state staff

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## ADMINISTRATIVE RULES
## Fiscal Estimate & Economic Impact Analysis

workload or electric utilities. Therefore, the revised rule is not anticipated to have a fiscal effect.

13. Benefits of Implementing the Rule and Alternative(s) to Implementing the Rule

This rulemaking will update provisions of the Wisconsin Electrical Code so that they are consistent with the National Electric Safety Code. This allows the Wisconsin code to be consistent with the latest best practices and with surrounding states.

14. Long Range Implications of Implementing the Rule

This rulemaking provides for the continued oversight of an up to date state electrical code. This rulemaking will update the Wisconsin Electrical Code so that they are consistent with the National Electric Safety Code. This allows the Wisconsin code to be consistent with the latest best practices and with surrounding states.

15. Compare With Approaches Being Used by Federal Government

Not applicable.

16. Compare With Approaches Being Used by Neighboring States (Illinois, Iowa, Michigan and Minnesota)

This rulemaking adopts the latest edition of the National Electric Safety Code (NESC). Minnesota automatically adopts each new NESC edition by reference. Michigan does not specifically adopt the NESC but effectively does so by referencing it as "standards of good practice." Iowa adopts all but Part 4 and Illinois adopts sections of Part 1 and Parts 2 and 3.

| 17. Contact Name | 18. Contact Phone Number |
|---|---|
| Lisa Farrell | 608-267-9086 |

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