

Chapter PSC 114

WISCONSIN STATE ELECTRICAL CODE, VOLUME 1

PSC 114.01	General information	PSC 114.06	Adoption of standard by reference
PSC 114.02	Purpose and scope	PSC 114.07	Omissions from NESC-1984
PSC 114.03	Authority and statutory references	PSC 114.08	Changes or additions to NESC-1984
PSC 114.04	General requirements		
PSC 114.05	Application of rules		

Note: Chapter PSC 114 and Electrical Code, Volume 1 as they existed on February 28, 1982 were repealed and a new chapter PSC 114 was created effective March 1, 1982.

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

(2) **AVAILABILITY OF STATE ELECTRICAL CODE.** The public service commission has adopted the 1984 edition of the National Electrical Safety Code (NESC-1984) 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, Piscataway, NJ 08854, telephone 201/981-0060, or the American National Standards Institute, 1430 Broadway, New York, NY 10018, telephone 212/354-3300. 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, Wis. Adm. Code, for availability information for the NEC.

History: Cr. Register, February, 1982, No. 314, eff. 3-1-82; am. Register, May, 1985, No. 353, eff. 6-1-85.

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

(2) **SCOPE.** (a) This chapter covers supply and communications lines, equipment, and associated work practices employed by an electric supply, communication, railway, or similar utility in the exercise of its function as a utility. In addition, s. PSC 114-234A prohibits the location of a dwelling occupancy by any party under a transmission line and para-

Register, May, 1985, No. 353

graph PSC 114-234C8 fixes minimum clearance requirements for the construction of a well by any party near open electric supply conductors. 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-1984.

History: Cr. Register, February, 1982, No. 314, eff. 3-1-82; am. Register, May, 1985, No. 353, eff. 6-1-85.

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 227.014, 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. 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 code shall be construed to deprive a municipality of jurisdiction over utilities, places of employment or public buildings, except that no local requirements shall be less stringent than the requirements in this chapter. See s. 196.58, Stats.

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

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

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

History: Cr. Register, February, 1982, No. 314, eff. 3-1-82; am. (2) (a), r. (3) (a), renum. (3) (b) and (c) to be (3) (a) and (b) and am., Register, May, 1985, No. 353, eff. 6-1-85.

Register, May, 1985, No. 353

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

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

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

History: Cr. Register, February, 1982, No. 314, eff. 3-1-82.

PSC 114.05 Application of rules. (1) NEW INSTALLATIONS AND EXTENSIONS. (a) This chapter shall apply in full to all new installations, reconstructions, alterations and extensions, except when any rule is shown to be impracticable 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 directed by the public service commission and within the time determined by said agency; or

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

(2) **EXISTING INSTALLATIONS.** (a) 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.

(b) 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 which were in effect at the time of the original installation.

(3) **WAIVING RULES.** The rules are intended to apply to all installations, except as modified or waived by the public service commission. They are intended to be so modified or waived in particular cases whenever any rules are shown for any reason to be impracticable 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.

Register, May, 1985, No. 353

(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 practicable for the character of the testing done.

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

(7) **INTENT.** Rules in this code 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 practicable, it is indicated by the use of the word *should*. Other practices which are considered desirable are stated as **RECOMMENDATIONS**. **NOTES** contained herein, other than footnotes to tables, are for information purposes only and are not to be considered as mandatory or as part of the code requirements.

History: Cr. Register, February, 1982, No. 314, eff. 3-1-82; am. (1) (a) and (b), (2) (a), (3) to (7), Register, May, 1985, No. 353, eff. 6-1-85.

PSC 114.06 Adoption of standard by reference. (1) **ADOPTION OF STANDARD.** The National Electrical Safety Code 1984 edition (also American National Standards Institute C2-1984 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-1984 will not be effective in this state until such time as this chapter is revised to reflect such changes.

(2) **CONSENT TO INCORPORATE NESC-1984 BY REFERENCE.** Pursuant to s. 227.025, Stats., the attorney general and the revisor of statutes have consented to the incorporation by reference of these standards contained in the NESC-1984, 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-1984 are on file in the offices of the public service commission, the secretary of state, and the revisor of statutes.

History: Cr. Register, February, 1982, No. 314, eff. 3-1-82; am. Register, May, 1985, No. 353, eff. 6-1-85.

PSC 114.07 Omissions from NESC-1984. (1) **OMISSIONS.** The following portion of the NESC-1984 is not incorporated as part of the Wisconsin State Electrical Code, Volume 1:

(a) Rules 010-016 of Section 1 - Introduction to the National Electrical Safety Code, pp. 45-46.

History: Cr. Register, February, 1982, No. 314, eff. 3-1-82; am. Register, May, 1985, No. 353, eff. 6-1-85.

PSC 114.08 Changes or additions to NESC-1984. Following are the changes or additions to the NESC-1984 prescribed by the public service commission. Each change or addition has been prefixed by PSC 114. Following the PSC designation is the referenced NESC section or subsection and the page on which it is found in the NESC. Example: PSC 114-96A3 [NESC 96A3, p. 78]. The word "Change" following the section number and heading means that the corresponding wording of the NESC-1984 has been changed and that the new wording is substituted at the appropriate location. The word "Addition" following the section number and

Register, May, 1985, No. 353

heading means that a new requirement is incorporated in the NESC-1984 and that the new requirement is inserted at the appropriate location.

SECTION 2. DEFINITIONS OF SPECIAL TERMS

Administrative Authority [NESC, p. 49] (Change). The authority for the enforcement of this code is vested in the public service commission with respect to the installation and operation of circuits or equipment by public utilities and railroads in the exercise of their functions as utilities and railroads.

Commission [NESC, p. 50] (Addition). Public service commission of Wisconsin.

SECTION 3. REFERENCES

PSC 114.03 [NESC, p. 61] (Change). Change reference [31] to read as follows:

ANSI/NFPA 70-1984, National Electrical Code.

SECTION 9. GROUNDING METHODS FOR ELECTRIC SUPPLY AND COMMUNICATION FACILITIES

PSC 114.96A3 [NESC 96A3, p. 78] Multiple Grounded Systems. (Change). Change A3 to read:

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

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

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

PSC 114.97C [NESC 97C, p. 79] 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 exclusive of ground connections at customers' service equipment.

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

SECTION II. *PROTECTIVE ARRANGEMENTS IN
ELECTRICAL SUPPLY STATIONS*

PSC 114-110A [NESC 110A, p. 83] Enclosure of Equipment. (Addi-
tion). Add to third paragraph:

In the case of chain-link, mesh or other open-type fences through
which sticks or other objects can be inserted to make contact with live
parts or parts that may become alive, horizontal clearance as specified in
column 3 of Table 124-1, Minimum Clearance from Live Parts, shall be
provided.

SECTION 12. *INSTALLATION AND MAINTENANCE OF
EQUIPMENT*

PSC 114.127 [NESC 127, p. 101-117] Classified Locations (Change).

Revise the following subsections of Rule 127, by changing the citations
of Reference No. [31] from "ANSI/NFPA 70-1981" to "ANSI/NFPA 70-
1984."

127	line 2	page 101
127A.3.	line 5	page 101
127A.5	line 8	page 102
127A.6	line 9	page 102
127E.2.	line 2	page 108
127E.3.	line 4	page 111
127F.1.	line 5	page 112
127F.2.	line 5	page 112
127H.1.	line 4	page 113
127H.2.	line 5	page 113
127K.3.	line 3	page 113
127L.3.	line 3	page 117

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. 131] Application of Rules (Change).
Change the first sentence to read:

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

SECTION 21. *GENERAL REQUIREMENTS*

PSC 114-210 [NESC 210, p. 131] Referenced Sections (Change).
Change rule 210 to read:

210. Referenced Sections

Register, May, 1985, No. 353

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

PSC 114-217 [follows NESC 216, p. 134] Marking of Poles and Structures Carrying High Voltage Supply Lines (Addition). Add the following section:

PSC 114-217 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 by January 1, 1988 place warning signs from 4 to 6 feet (1.22 to 1.83 m) above the ground upon all poles or other structures supporting the line:

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

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

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

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

2. Letters of the words "High Voltage" shall be in red, black, orange, or reflective letters on the contrasting white background and at least 2 inches (5.08 cm) in height. Exception: For those specific signs having dimensions of 10 inches (25.4 cm) horizontal by 7 inches (17.78 cm) vertical the height of letters shall not be less than 1¼ inches (3.175 cm).

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

Note: This rule amends and expands the application of the warning sign requirements of s. 196.67, Stats. See § 196.67 (1m).

SECTION 23. CLEARANCES

PSC 114-230C1 [NESC 230, p. 138] Supply Cables (Change). Change C.1. to read:

1. Cables of any voltage having an effectively grounded continuous metal sheath or shield, or cables designed to operate on a multigrounded system at 22 kV or less, having a semiconducting insulation shield in combination with suitable metallic drainage, all supported on and cabled together with an effectively grounded bare messenger-neutral.

PSC 114

PSC 114-231C [NESC 231C, p. 140] Clearances from Railroad Tracks (Deletion). Delete Exception 1.

Renumber Exceptions 2, 3 and 4 to 1, 2 and 3.

Table PSC 114-232-1 [NESC, Table 232-1, pp. 142-146; feet; pp. 148-152; metric] Minimum Vertical Clearance of Wires, Conductors and Cables Above Ground, Rails, or Water (Changes, Deletions, Additions).

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

Footnote 17 has been changed.

Footnote 18 has been deleted.

Footnote 23 has been deleted.

Footnote 24 has been changed.

Footnote 25 has been changed.

Footnote 26 has been added.

Footnote 27 has been added and its reference in column 1 of item 4.

The second column heading has been changed.

A collective title has been added (including reference to Footnote 26) over headings of third, fourth, and fifth columns as shown.

References to Footnote 23 have been deleted in lines 2 and 9 of the second column.

Item 7 has been changed as follows:

- a. Reference to Footnote 18 has been deleted.
- b. For 7 (a), (b) and (c) substitute the corresponding provisions of the 1981 Wisconsin supplement.

Table PSC 114-232-1.

MINIMUM VERTICAL CLEARANCE of WIRES, CONDUCTORS, and CABLES ABOVE GROUND, RAILS or WATER FT

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

Nature of surface underneath wires, conductors, or cables	Communication conductors and cables, guys, messengers, surge protection wires, neutral conductors meeting Rule 230E1, supply line, street lighting, and service drop cables meeting Rule 230C1 and supply cables of 0 to 750 V meeting Rules 230C2 or 230C3 ① (ft)	Supply line, street lighting, and service drop conductors ②			Trolley and electrified railroad contact conductors and associated span or messenger wires ①	
		Open supply line conductors 0 to 750 V. Supply cables of all voltages meeting Rule 230C2 or 230C3 (ft)	Open supply line conductors		0 to 750 V to ground (ft)	750 V to 50 kV to ground (ft)
			750 V to 22 kV (ft)	22 to 50 kV (ft)		
Where wires, conductors, or cables cross over or overhang						
1. Track rails of railroads (except electrified railroads using overhead trolley conductors) ②③④	③⑤27	③27	③28	29	④22	④22
2. Roads, streets, alleys; nonresidential driveways, parking lots, and other areas subject to truck traffic ②②	⑥③18	18	20	21	⑤18	⑤20
3. Residential driveways; commercial areas not subject to truck traffic ②②	④12	⑧15	20	21	⑤18	⑤20
4. Other land traversed by vehicles such as cultivated, grazing, forest, orchard, etc.	⑦18	18	20	21	—	—
5. Spaces or ways accessible to pedestrians only ③	⑦⑥15	⑥④15	15	16	16	18
6. Water areas not suitable for sailboating or where sailboating is prohibited ④	15	15	17	17	—	—
7. Water areas suitable for sailboating including lakes, ponds, reservoirs, tidal waters, rivers, streams, and canals with an unobstructed surface area of: ⑦⑧						
(a) Less than 10 acres	18	18	20	22	—	—
(b) 10 to 80 acres	30	30	31	33	—	—
(c) Over 80 acres	40	40	40	42	—	—
8. Public or private land and water areas posted for rigging or launching sailboats			Clearance above ground shall be 5 ft. greater than in 7 above, for the type of water areas served by the launching site			
Where wires, conductors, or cables run along and within the limits of highways or other road rights-of-way but do not overhang the roadway						
9. Roads, streets, or alleys in urban districts	⑩②18	18	20	22	⑤18	⑤20
10. Roads in rural districts where it is unlikely that vehicles will be crossing under the line	⑩②14	⑩15	18	20	⑤18	⑤20

Footnotes for Table PSC 114-232-1:

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

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

③ These clearances may be reduced to 25 ft. where paralleled by trolley-contact conductor on the same street or highway.

④ In communities where 21 ft. has been established, this clearance may be continued if carefully maintained. The elevation of the contact conductor should be the same in the crossing and next adjacent spans. (See Rule 239D2 for conditions which must be met where uniform height above rail is impractical.)

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

⑥ If a communication service drop or a guy which is effectively grounded or is insulated against the highest voltage to which it is exposed, up to 8.7 kV, crosses residential streets and roads, the clearance may be reduced to 16 ft. at the side of the traveled way provided the clearance at the center of the traveled way is at least 18 ft. This reduction in clearance does not apply to arterial streets and highways which are primarily for through traffic, usually on a continuous route.

⑦ This clearance may be reduced to the following values:

	<i>feet</i>
(a) For insulated communication conductors and communication cables	8
(b) For conductors of other communication circuits	10
(c) For guys	8
(d) For supply cables meeting Rule 230C1	10

⑧ This clearance may be reduced to the following values:

	<i>feet</i>
(a) 12 ft for supply conductors limited to 300 V to ground.	12
(b) 10 ft for drip loops of supply conductors limited to 150 V to ground and meeting Rules 230C2 or 230C3 and located at the electric service entrance to buildings.	10

⑨ Spaces and ways accessible to pedestrians only are areas where vehicular traffic is not normally encountered or not reasonably anticipated.

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

	<i>feet</i>
(a) Insulated communication conductor and communication cables	8
(b) Conductors of other communication circuits	10
(c) Supply cables of any voltage meeting Rule 230C1 and supply cables limited to 150 V to ground meeting Rules 230C2 or 230C3	10
(d) Supply conductors limited to 300 V to ground	12
(e) Guys	8

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

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

⑬ Where this construction crosses over or runs along alleys, driveways, or parking lots, this clearance may be reduced to 15 ft. for spans limited to 150 ft.

⑭ Where supply circuits of 600 V or less, with transmitted power of 5000 W or less, are run along fenced (or otherwise guarded) private rights-of-way in accordance with the provisions specified in Rule 220B2, this clearance may be reduced to 10 ft.

⑮ The value may be reduced to 25 ft. for guys, for cables carried on messengers, and for supply cables meeting Rule 230C1. This value may be reduced to 25 ft. for conductors effectively grounded throughout their length and associated with supply circuits of 0 to 22 kV, only if such conductors are stranded, are of corrosion-resistant material, and conform to the strength and tension requirements for messengers given in Rule 2611.

⑯ Adjacent to tunnels and overhead bridges which restrict the height of loaded rail cars to less than 20 ft., these clearances may be reduced by the difference between the highest loaded rail car handled and 20 ft. if mutually agreed to by the parties at interest.

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 1 mi. long segment which includes the crossing. The clearance over a canal, river, or stream normally used to provide access for sailboats to a larger body of water shall be the same as that required for the larger body of water.

⑱ Where the US Army Corps of Engineers, or the State, or a surrogate thereof has issued a crossing permit, clearances of that permit shall govern.

⑲ See Rule 234H for the required horizontal and diagonal clearances to rail cars.

⑳ These clearances do not allow for the future road resurfacing.

㉑ For the purpose of this rule, trucks are defined as any vehicle exceeding 8 ft. in height. Areas not subject to truck traffic are areas where truck traffic is not normally encountered or not reasonably anticipated.

㉒ This clearance may be reduced to 10 ft for communication conductors and cables, guys, and messengers.

㉓ Communication cables supported on a steel messenger may have a 60° F clearance of 15 ft where span lengths do not exceed 150 ft, 16 ft where span lengths do not exceed 200 ft, and 17 ft where span lengths do not exceed 250 ft, and poles are back of curbs or other deterrents to vehicular traffic.

㉔ A diagonal clearance the same as the vertical clearance shall be maintained to uneven or sloping terrain within a horizontal distance of $\frac{1}{4}$ of the vertical clearance, all distances to be measured from the conductors in their wind-displaced position as defined in Rule 234A1.

㉕ The clearance for communication conductors and cables not supported by a messenger shall be permitted to be installed at a minimum of 15 feet.

Table PSC 114-232-1

MINIMUM VERTICAL CLEARANCE OF WIRES, CONDUCTORS, AND CABLES ABOVE GROUND, RAILS, OR WATER M

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

Nature of surface underneath wires, conductors, or cables	Communication conductors and cables, guys, messengers, surge protection wires, neutral conductors meeting Rule 230E1, supply line, street lighting, and service drop cables meeting Rule 230C1 and supply cables of 0 to 750 V meeting Rules 230C2 or 230C3 (1) (m)	Supply line, street lighting, and service drop conductors (2)		Trolley and electrified railroad contact conductors and associated span or messenger wires (1)		
		Open supply line conductors 0 to 750 V and supply cables over 750 V meeting Rules 230C2 or 230C3 (m)	Open supply line conductors		0 to 750 V to ground (m)	750 V to 50 kV to ground (m)
			750 V to 22 kV (m)	22 to 50 kV (m)		
Where wires, conductors, or cables cross over or overhang						
1. Track rails of railroads (except electrified railroads using overhead trolley conductors) (2)(16)(2)	(3)(16)8.2	(3)8.3	(3)8.5	8.8	(4)6.7	(4)6.7
2. Roads, streets, alleys; nonresidential driveways, parking lots, and other areas subject to truck traffic (2)(2)	(6)(13)5.5	5.5	6.1	6.4	(5)5.5	(5)6.1
3. Residential driveways; commercial areas not subject to truck traffic (2)(2)	(2)3.7	(9)(4)4.6	6.1	6.4	(5)5.5	(5)6.1
4. Other land traversed by vehicles such as cultivated, grazing, forest, orchard, etc.	(2)5.5	5.5	6.1	6.4	—	—
5. Spaces or ways accessible to pedestrians only (9)	(7)(8)4.6	(8)(10)4.6	4.6	4.9	4.9	5.5
6. Water areas not suitable for sailboating or where sailboating is prohibited (19)	4.6	4.6	5.2	5.2	—	—
7. Water areas suitable for sailboating including lakes, ponds, reservoirs, tidal waters, rivers, streams, and canals with an unobstructed surface area of: (17)(19)						
(a) Less than 4 ha	5.5	5.5	6.1	6.7	—	—
(b) 4 to 32 ha	9.1	9.1	9.1	10.0	—	—
(c) Over 32 ha	12.2	12.2	12.2	12.8	—	—
8. Public or private land and water areas posted for rigging or launching sailboats		Clearance above ground shall be 1.5 m greater than in 7 above, for the type of water areas served by the launching site				
Where wires, conductors, or cables run along and within the limits of highways or other road rights-of-way but do not overhang the roadway						
9. Roads, streets, or alleys (13)	(25)5.5	5.5	6.1	6.4	(5)5.5	(5)6.1
10. Roads in rural districts where it is unlikely that vehicles will be crossing under the line	(10)(24)4.3	(10)4.6	5.5	5.8	(5)5.5	(5)6.1

M Footnotes for Table PSC 114-232-1

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

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

③ These clearances may be reduced to 7.6 m where paralleled by trolley-contact conductor on the same street or highway.

④ In communities where 6.4 m has been established, this clearance may be continued if carefully maintained. The elevation of the contact conductor should be the same in the crossing and next adjacent spans. (See Rule 289D2 for conditions which must be met where uniform height above rail is impractical.)

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

⑥ If a communication service drop or a guy which is effectively grounded or is insulated against the highest voltage to which it is exposed, up to 8.7 kV, crosses residential streets and roads, the clearance may be reduced to 4.9 m at the side of the traveled way provided the clearance at the center of the traveled way is at least 5.5 m. This reduction in clearance does not apply to arterial streets and highways which are primarily for through traffic, usually on a continuous route.

⑦ This clearance may be reduced to the following values:

	(m)
(a) For insulated communication conductors and communication cables	2.45
(b) For conductors of other communication circuits	3.0
(c) For guys	2.45
(d) For supply cables meeting Rule 230C1	3.0

⑧ This clearance may be reduced to the following values:

- (a) 3.6 m for supply conductors limited to 300 V to ground.
- (b) 3.0 m for drip loops of service drop conductors limited to 150 V to ground and meeting Rules 230C2 or 230C3 and the portion of the associated service drop span located within 4.6 m of the service entrance to buildings.

⑨ Spaces and ways accessible to pedestrians only are areas where vehicular traffic is not normally encountered or not reasonably anticipated.

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

	(m)
(a) Insulated communication conductor and communication cables	2.45
(b) Conductors of other communication circuits	3.0
(c) Supply cables of any voltage meeting Rule 230C1 and supply cables limited to 150 V to ground meeting Rules 230C2 and 230C3	3.0
(d) Supply conductors limited to 300 V to ground	3.6
(e) Guys	2.45

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

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

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

⑭ Where supply circuits of 600 V or less, with transmitted power of 5000 W or less, are run along fenced (or otherwise guarded) private rights-of-way in accordance with the provisions specified in Rule 220B2, this clearance may be reduced to 3.0 m.

⑨ The value may be reduced to 7.6 m for guys, for cables carried on messengers, and for supply cables meeting Rule 230C1. This value may be reduced to 7.6 m for conductors effectively grounded throughout their length and associated with supply circuits of 0 to 22 kV, only if such conductors are stranded, are of corrosion-resistant material, and conform to the strength and tension requirements for messengers given in Rule 2611.

⑩ Adjacent to tunnels and overhead bridges which restrict the height of loaded rail cars to less than 6.1 m, these clearances may be reduced by the difference between the highest loaded rail car handled and 6.1 m, if mutually agreed to by the parties at interest.

⑪ For controlled impoundments, the surface area and corresponding clearances shall be based upon the design high water level. For other waters, the surface area and clearances shall be based upon the normal high water level. The clearance over rivers, streams, and canals shall be based upon the largest surface area of any 1600 m long segment which includes the crossing. The clearance over a canal, river, or stream normally used to provide access for sailboats to a larger body of water shall be the same as that required for the larger body of water.

⑫ Where the US Army Corps of Engineers, or the State, or a surrogate thereof has issued a crossing permit, clearances of that permit shall govern.

⑬ See Rule 234H for the required horizontal and diagonal clearances to rail cars.

⑭ These clearances do not allow for the future road resurfacing.

⑮ For the purpose of this rule, trucks are defined as any vehicle exceeding 2.45 m in height. Areas not subject to truck traffic are areas where truck traffic is not normally encountered or not reasonably anticipated.

⑯ This clearance may be reduced to 3.0 m for communication conductors and cables, guys, and messengers.

⑰ Communication cables supported on a steel messenger may have a 15° C clearance of 4.6 m where span lengths do not exceed 45m, 4.9 m where span lengths do not exceed 61 m, and 5.2 m where span lengths do not exceed 76 m, and poles are back of curbs or other deterrents to vehicular traffic.

⑱ A diagonal clearance the same as the vertical clearance shall be maintained to uneven or sloping terrain within a horizontal distance of $\frac{1}{4}$ of the vertical clearance, all distances to be measured from the conductors in their wind-displaced position as defined in Rule 234A1.

⑲ The clearance for communication conductors and cables not supported by a messenger shall be permitted to be installed at a minimum of 4.6 m.

Table PSC 114-232-3 [NESC, Table 232-3, p. 160] Reference Heights (Changes).

Change f. to read as follows:

f.	Water areas suitable for sailboating including lakes, ponds, reservoirs, tidal waters, rivers, streams and canals with an unobstructed surface area of:	Ft.	m.
	(1) Less than 10 acres	18	5.5
	(2) 10 to 80 acres	30	9.0
	(3) Over 80 areas	40	12.0

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.

Delete Footnote 4.

PSC 114-234A4 [follows NESC 234A3, p. 180] Transmission Lines Over Dwelling Occupancies (Addition). Add the following paragraph:

4. Transmission Lines Over Dwelling Occupancies

Supply lines designed to operate at voltages in excess of 35 kV shall not be constructed over dwellings or mobile homes intended for residential occupancy and dwellings or mobile homes intended for residential occupancy shall not be located under such lines. This provision is also intended to cover the line conductors in their wind-displaced position as defined in Rule 234A1.

Note 1: The term "dwelling" as used herein is the same as defined in Volume 2, Wisconsin State Electrical Code (NEC/NFPA 70-1984), 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.

PSC 114-234-1 [NESC Table 234-1, pp. 182-183: feet; pp. 184-185; metric] Clearance of Supply Wires, Conductors, and Cables Passing By But Not Attached to Buildings and Other Installations Except Bridges (Changes and Additions).

Table PSC 114-234-1 which follows contains the following changes and additions:

Clearance value for the fourth entry of column 1 has been changed.

Footnote 8 has been added.

Table PSC 114-234-1.
CLEARANCE OF SUPPLY WIRES, CONDUCTORS, AND CABLES PASSING BY BUT NOT ATTACHED TO BUILDINGS AND OTHER INSTALLATIONS EXCEPT BRIDGES FT

(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.)

Clearance of	Communication conductors and cables, guys, messengers, lightning protection wires, neutral conductors meeting Rule 230E1, supply cables of all voltages meeting Rule 230C1, and supply cables of 0 to 750 V meeting Rule 230C2 or 230C3 (ft)	Supply line conductors, street lighting conductors, and service drops			
		Open supply line conductors 0 to 750 V, and supply cables over 750 V meeting Rule 230C2 or 230C3 (ft)	Open supply line conductors		
			750 V to 8.7 kV (ft)	8.7 to 22 kV (ft)	22 to 50 kV (ft)
Buildings					
Horizontal					
To walls and projections	⑦ 3	①② 5	①② 5	6	7
To unguarded windows	3	①② 5	5	6	7
To balconies and areas accessible to pedestrians ③	3	5	5	6	7
Vertical					
Above or below roofs or projections not accessible to pedestrians ③④	8	10	10	10	11
Above or below balconies and roofs accessible to pedestrians ③	8	⑤15	15	15	16
Above roofs accessible to truck traffic ⑥	18	18	20	20	21
Above roofs accessible to vehicles, but not subject to truck traffic ⑥	10	⑤15	20	20	21
Signs, chimneys, radio and television antennas, tanks, and other installations not classified as buildings or bridges ④					
Horizontal	3	①② 5	①② 5	③ 6	7
Vertical above or below	3	① 5	8	8	9

① Where building, sign, chimney, antenna, tank, or other installation does not require maintenance such as painting, washing, changing of sign letters, or other operation which would require persons to work or pass between supply conductors and structure, the clearance may be reduced to 3 ft.

② Where available space will not permit this value, the clearance may be reduced to the maximum practical clearance but the minimum clearance may not be less than 3 ft. provided the conductors, including splices and taps, have covering which provides sufficient dielectric to prevent a short circuit in case of a momentary contact between the conductors and a grounded surface.

③ A roof, balcony, or area is considered accessible to pedestrians if the means of access is through a doorway, ramp, stairway, or permanently mounted ladder.

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

⑤ This clearance may be reduced to 12 ft. for supply conductors limited to 300 V to ground.

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

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

⑧ This clearance may be reduced to 3 ft. for supply conductors limited to 300 V to ground and communication conductors and cables if the roof has a slope of not less than 1 to 3.

Table PSC 114-234-1.

**CLEARANCE OF WIRES, CONDUCTORS, AND CABLES PASSING BY BUT NOT ATTACHED TO BUILDING AND
OTHER INSTALLATIONS EXCEPT BRIDGES M**

(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.)

Clearance of	Communication conductors and cables, guys, messengers, surge protection wires, neutral conductors meeting Rule 230E1, supply cables of all voltages meeting Rule 230C1, and supply cables and service drops of 0 to 750 V meeting Rule 230C2 or 230C3 (m)	Supply line conductors, street lighting conductors, and service drops			
		Open supply line conductors of 0 to 750 V, and supply cables over 750 V meeting Rule 230C2 or 230C3 (m)	Open supply line conductors		
			750 V to 8.7 kV (m)	8.7 to 22 kV (m)	22 to 50 kV (m)
Buildings					
Horizontal					
To walls and projections	⑦0.90	①②1.50	①②1.50	1.50	2.13
To unguarded windows	0.90	①②1.50	1.50	1.80	2.13
To balconies and areas accessible to pedestrians ③	0.90	1.50	1.50	1.80	2.13
Vertical					
Above or below roofs or projections not accessible to pedestrians ④⑤	2.45	3.0	3.0	3.0	3.4
Above or below balconies and roofs accessible to pedestrians ③	2.45	⑤4.6	4.6	4.6	4.9
Above roofs accessible to truck traffic ⑥	5.5	5.5	6.1	6.1	6.4
Above roofs accessible to vehicles, but not subject to truck traffic ⑦	3.0	⑤4.6	6.1	6.1	6.4
Signs, chimneys, radio and television antennas, tanks, and other installations not classified as buildings or bridges ④					
Horizontal	0.90	①②1.50	①②1.50	1.80	2.13
Vertical above or below	0.90	①1.50	2.45	2.45	2.74

① Where building, sign, chimney, antenna, tank, or other installation does not require maintenance such as painting, washing, changing of sign letters, or other operation which would require persons to work or pass between supply conductors and structure, the clearance may be reduced to 0.90 m.

② Where available space will not permit this value, the clearance may be reduced to the maximum practical clearance but the minimum clearance may not be less than 0.90 m provided the conductors, including splices and taps, have covering which provides sufficient dielectric to prevent a short circuit in case of a momentary contact between the conductors and a grounded surface.

③ A roof, balcony, or area is considered accessible to pedestrians if the means of access is through a doorway, ramp, stairway, or permanently mounted ladder.

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

⑤ This clearance may be reduced to 3.6 m for supply conductors limited to 300 V to ground.

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

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

⑧ This clearance may be reduced to 0.90 m for supply conductors limited to 300 V to ground and communication conductors and cables if the roof has a slope of not less than 1 to 3.

PSC 114-234C4c [NESC 234C4c, p. 187] Supply Conductors Attached to Buildings (Change). Change Exception 1 to read as follows:

Exception 1: Where the voltage between conductors does not exceed 300 volts and the roof has a slope of not less than 4 inches in 12 inches, the clearance may be reduced to 3 feet (0.90 m).

PSC 114-234C6 [follows NESC 234C5, p. 187] Near Stored Materials (Addition). Add the following paragraph:

6. Near Stored Materials

Lines should not be run over 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.

Note: Material which requires the use of such high machinery should not be stored near or under existing lines.

PSC 114-234C7 [follows NESC 234C5, p. 187] Near Fuel Storage Tanks (Addition). Add the following paragraph:

7. Near Fuel Storage Tanks

A horizontal clearance of not less than 8 feet 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 shall be maintained between such fuel storage tanks for all other supply conductors.

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

PSC 114-234C8 [follows NESC 234C5, p. 187] Near Wells (Addition). Add the following paragraph:

8. Near Wells

A horizontal distance of at least $\frac{3}{4}$ of the required vertical clearance of the conductors to ground (Rule 232) shall be maintained between open conductors and wells. Persons installing such wells shall also comply with this requirement.

Note: Electric utilities are prohibited by s. 101.805, 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. 187] Antennas (Addition). Add the following paragraph:

9. Antennas

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

PSC 114-234E1 [NESC 234E1, p. 190] Minimum Clearance of Wires, Conductors, or Cables Installed Over or Near Swimming Areas (Change). Change E to read:

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

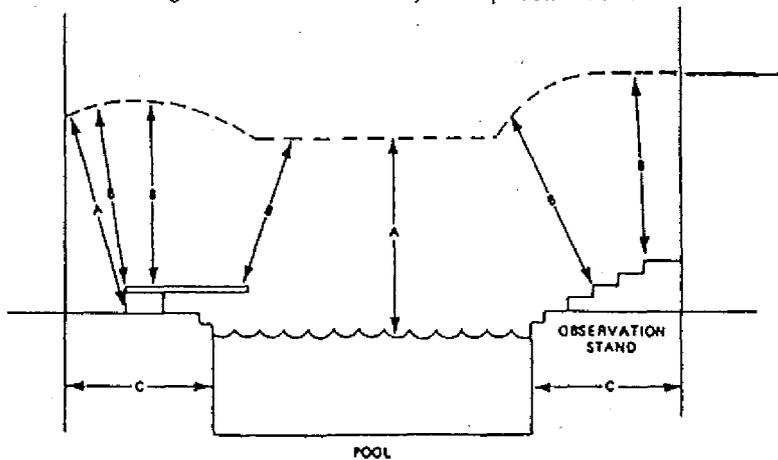
1. Swimming Pools

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

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

	Insulated supply or service drop cables, 0-750 volts to ground, supported on and cabled together with an effectively grounded bare messenger	All other supply or service drop conductors	
		Voltage to Ground	
		0-15 kV	15-50 kV
A. Clearance in any direction to the water level, edge of water surface, base of diving platform or permanently-anchored raft	18 feet (5.49m)	25 feet (7.62m)	27 feet (8.23m)
B. Clearance in any direction to the diving platform or tower	14 feet (4.27m)	16 feet (4.88m)	18 feet (5.49m)
C. Horizontal limit of clearance measured from inside wall of the pool.	This limit shall extend to the outer edge of the structures listed in (1) and (2) above but not less than 10 feet (3.05m).		

Figure PSC 114-234E1, Exception No. 1



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

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

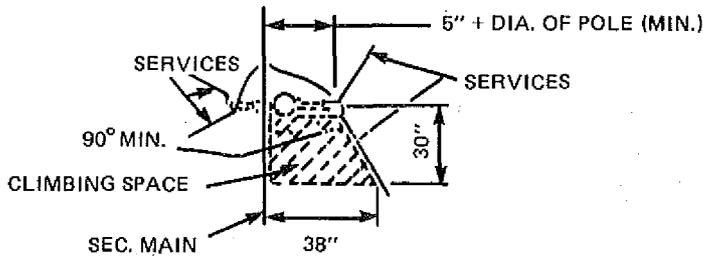
PSC 114-236J [follows NESC 236I, p. 223] Climbing Space in Rack Construction (Addition). Add the following subsection:

J. Climbing Space in Rack Construction

Where the voltage between conductors is less than 600 volts, climbing space shall be maintained through the levels of conductors supported in rack construction and for a vertical distance of not less than 40 inches above the top conductor and not less than 40 inches below the bottom conductor so supported. The width of the climbing space measured horizontally through the center of the pole shall be not less than 5 inches plus the diameter of the pole. The depth of the climbing space shall be not less than 30 inches measured perpendicularly to this climbing space boundary through the center line of pole. The width of the climbing space, perpendicular to and at the extremity of this 30-inch depth dimension, shall be not less than 38 inches and neither of the other 2 side boundaries shall make an angle of less than 90 degrees with the boundary through the center line of pole. The climbing spaces through the levels of conductors of two or more rack groups which are separated less than 6 feet shall be maintained in the same quadrant or on the same side of the pole. Vertical conductors are not permitted in the climbing spaces through conductors in rack construction.

Figure PSC 114-236J depicts the general climbing space past rack construction.

Figure PSC 114-236J
CLIMBING SPACE PAST RACK CONSTRUCTION



PSC 114-239C [NESC 239C, p. 230] Mechanical Protection Near Ground (Change). Change paragraph C to read:

C. Mechanical Protection Near Ground.

Where within 8 feet (2.45 m) of the ground, all vertical conductors, cables, and grounding wires shall be protected by a covering 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 galvanized steel U-guards extending from at least 1 foot (0.30 m) below ground level up to a point 8 ft. (2.45 m) above finished grade. For grounding wires from surge arresters, the protective covering shall be of wood molding or of other nonmetallic material giving equivalent mechanical protection.

(No change to "Exceptions")

PSC 114-239F8 [follows NESC 239F7, p. 236] Requirements for Vertical Supply Conductors Passing Through Communication Space on Jointly Used Line Structures (Addition). Add the following paragraph:

8. Concentric Neutral or Similar Cable

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

SECTION 24. GRADES OF CONSTRUCTION

Table PSC 114-242-1 [NESC, Table 242-1, pp. 240-242] Grades of Construction for Supply Conductors Alone, at Crossing, or on the Same Structures With Other Conductors (Addition).

Table PSC 114-242-1, which follows, contains the following addition:

Footnote 11 has been added.

Table PSC 114-242-1

GRADES of CONSTRUCTION for SUPPLY CONDUCTORS ALONE, at CROSSING, or on the SAME STRUCTURES WITH OTHER CONDUCTORS

(The voltages listed in this table are line to ground values for: effective grounded ac circuits, two wire grounded circuits, or center grounded dc circuits; otherwise line to line values shall be used. The grade of construction for supply conductors, as indicated across the top of the table, must also meet the requirements for any lines at lower levels except when otherwise noted.)

Supply conductors at higher levels ①	Constant-potential supply conductors										Constant current supply conductors	Communication conductors used exclusively in the operation of and run as supply lines	
	0-0.75 kV		0.75-8.7 kV				Exceeding 8.7 kV①						
	Urban	Rural	Urban		Rural		Urban		Rural				
	Open or Cable	Open or Cable	Open	Cable	Open	Cable	Open	Cable	Open	Cable			
Conductors, tracks and rights of way at lower levels											Open	Cable	Open or Cable
Exclusive private rights-of-way	N	N	②N	N	N	N	②N	②N	N	N	B, C, or N; see Rule 242A		C or N; see Rule 242C
Common or public rights-of-way	N	N	C	N	N	N	③C	C	N	N			
Railroad tracks and limited access highways	B	B	B	B	B	B	B	B	B	B	B	B	B
Constant potential supply conductors 0 to 750 V Open or cable	N	N	C	N	N	N	③C	C	④C	N			
750 V to 8.7 kV	⑤C	N	C	C	N	N	③C	C	N	N	B, C or N; see Rule 242A		B, C, or N; see Rule 242C
Open													
Cable	N	N	C	N	N	N	③C	C	N	N			
Exceeding 8.7 kV	⑤B	⑤C	B	B	N	N	③C	C	N	N			
Open													
Cable	⑥C	N	C	N	N	N	③C	C	N	N			
Constant current supply conductors: Open or cable	B, C, or N; see Rule 242A										B, C, or N; see Rule 242A	B, C, or N; see Rules 242A and 242C	
Communication conductors: Open or cable, used exclusively in the operation of supply lines ⑩	B, C, or N; see Rule 242C										B, C, or N; see Rules 242A and 242C	B, C, or N; see Rule 242C	
Communication conductor: Urban or rural, open or cable ⑥	N	N	⑦⑧B	C	⑦⑧B	C	⑥B	C	⑥B	C	⑥⑨B	C or N; see Rule 242A	B, C, or N; see Rule 242C

Footnotes for Table PSC 114-242-1:

① The words "open" and "cable" appearing in the headings have the following meanings as applied to supply conductors: Cable means the Type 1 cables described in Rule 241A; open means open wire and Type 2 cables.

② Lines that can fall outside the exclusive private rights-of-way shall comply with the grades specified for lines not on exclusive private rights-of-way.

③ Supply conductors shall meet the requirements of grade B construction if the supply circuits will not be promptly de-energized, both initially and following subsequent breaker operations, in the event of a contact with lower supply conductors or other grounded objects.

④ Grade N construction may be used if crossing over supply services only.

⑤ If the wires are service drops, they may have grade N sizes and tensions as set forth in Table 263-2.

⑥ Grade N construction may be used where the communication conductors consist only of not more than one insulated twisted-pair or parallel-lay conductor, or where service drops only are involved.

⑦ Grade C construction may be used if the voltage does not exceed 2.9 kV.

⑧ The supply conductors need only meet the requirements of grade C construction if both of the following conditions are fulfilled:

(1) The supply voltage will be promptly removed from the communication plant by de-energization or other means, both initially and following subsequent circuit breaker operations in the event of a contact with the communication plant.

(2) The voltage and current impressed on the communication plant in the event of a contact with the supply conductors are not in excess of the safe operating limit of the communication protective devices.

⑨ Grade C construction may be used if the current cannot exceed 7.5 A or the open-circuit voltage of the transformer supplying the circuit does not exceed 2.9 kV.

⑩ Communication circuits located below supply conductors shall not affect the grade of construction of the supply circuits.

⑪ Grade B construction shall always be used if the voltage exceeds 175 kV (to ground).

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

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

D. Longitudinal Capability

Each supply line designed to operate at 300 kV phase to phase or above shall be constructed to limit the effects of a cascading-type failure to a line segment not exceeding 6 miles to 10 miles in length. Such construction requirement may be met by providing at appropriate intervals, structures and associated facilities having full dead-end capability under the loading provisions of 250 A, B and C. Consideration shall be given to factors such as structure type and 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 114-261-3 [NESC, Table 261-3, p. 259] Overload Capacity Factor for Wood Structures (Addition).

Table PSC 114-261-3, which follows, contains the following addition:

Footnote 1 has been added.

Table PSC 114-261-3
Overload Capacity Factors for Wood Structures

	Grade B		Grade C	
	When installed	At [Ⓛ] replacement	When installed	At [Ⓛ] replacement
Transverse (wind) and Vertical strength				
At Crossings	4.0	2.67	2.67	1.33
Elsewhere	4.0	2.67	2.00	1.33
Transverse (wire tension load) strength				
At Crossings	2.0	1.33	1.33	1.00
Elsewhere	2.0	1.33	1.33	1.00
Longitudinal Strength				
In general	1.33	1.00	no requirement	no requirement
At dead-ends	2.00	1.33	1.33	1.00

1 "When installed" values apply to the initial installation of the wood structure. Where conductors or equipment are altered or replaced on existing structures the structures need not be replaced provided the resultant overload capacity factor exceeds the "At Replacement" value.

Notes: (1) Where structures are built for temporary service the overload capacity factors at replacement may be used provided that the designated fiber stress is not exceeded during the life of the structure.

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

(3) Metal portions of a structure, except guys, may use the overload capacity factors for metal shown in Table 261-2.

PART 3. UNDERGROUND LINES

SECTION 31. GENERAL REQUIREMENTS APPLYING TO UNDERGROUND LINES

PSC 114-310 [NESC 310, p. 296] (Change). Change Rule 310 to read as follows:

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

PSC 114-311C [follows NESC 311B, p. 296] Installation and Maintenance—Markers (Addition). Add the following subsection:

C. Markers

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

PSC 114-317 [follows NESC 316, p. 299] 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

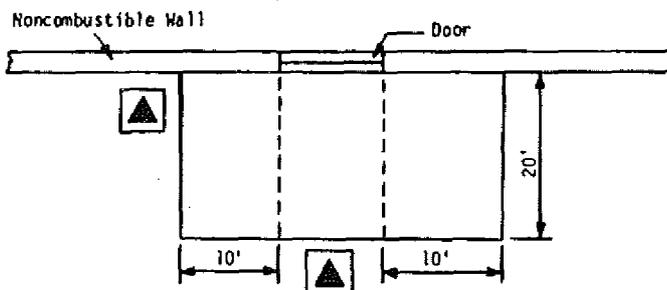
For the purposes of this section, combustible walls are walls of Type No. 8 buildings as determined by s. ILHR 51.03, Wis. Adm. Code. All other walls are considered to be non-combustible.

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:

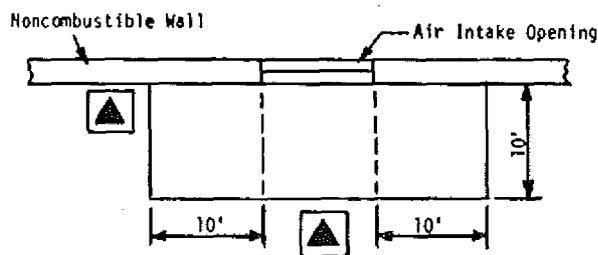
1. Padmounted oil-insulated transformers shall not be located within a zone extending 20' outward and 10' to either side of a building door. See Figure PSC 114-317B1.

Figure PSC 114-317B1.



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

Figure PSC 114-317B2.

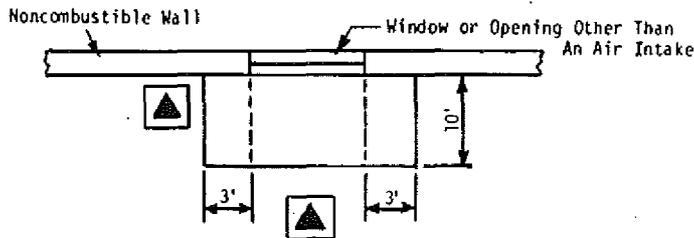


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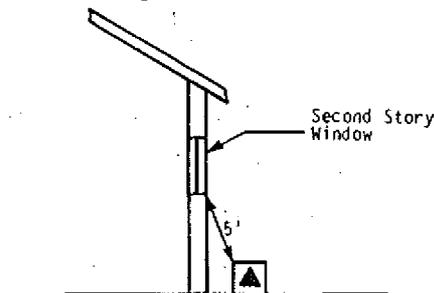
3. a. Padmounted oil-insulated transformers shall not be located within a zone extending 10' outward and 3' to either side of a building window or opening other than an air intake. See Figure PSC 114-317B3a.

Figure PSC 114-317B3a.



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

Figure PSC 114-317B3b.



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' from the building wall in addition to the clearances from building doors, windows and other openings set forth for noncombustible walls. Also, a sump shall be installed for transformers in sizes exceeding 500 kVA if the immediate terrain is pitched toward the building.

D. Barriers

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

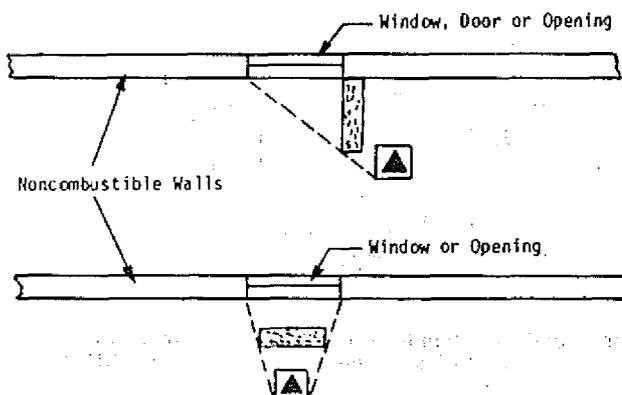
1. Noncombustible Walls

The barrier shall extend to a projection line from the corner of the padmount to the furthest corner of the window, door or opening in ques-

Register, May, 1985, No. 353

tion. The height of the barrier shall be 1' above the top of the padmount transformer. See Figure PSC 114-317D1.

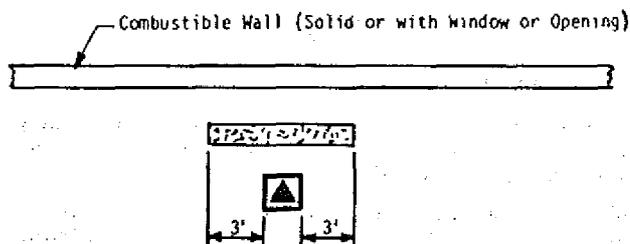
Figure PSC 114-317D1.



2. Combustible Walls

The barrier shall extend 3' beyond each side of the padmount transformer. The height of the barrier shall be 1' 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' is maintained from fire escapes at all times.

SECTION 32. UNDERGROUND CONDUIT SYSTEMS

PSC 114-320B7 [follows NESC 320B6, p. 301] Clearances from Other Underground Installations—Gas Lines (Addition). Add the following paragraph:

7. Gas Lines

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

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

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

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

SECTION 35. *DIRECT BURIED CABLE*

PSC 114-352E [follows NESC 352D, p. 315] Clearances from Other Underground Installations—Gas Lines (Addition). Add the following subsection:

E. Gas Lines

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

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

PSC 114-353D2a [NESC 353D2a, p. 316] Depth of Burial (Change and Addition). Add the following Exception to NESC 353D2a:

Change Exception to Exception 1 add Exception 2 as follows:

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

PSC 114-354E4 [NESC 354E4, p. 319] Random Separation—Protection (Change). Change the paragraph to read:

4. Adequate Bonding

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

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

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

SECTION 36. *RISERS*

PSC 114-360A [NESC 360A, p. 319] General (Change). Change subsection to read:

A. Mechanical protection for supply conductors or cables shall be provided as required by Part 2 of this code. Raceways installed on poles shall be of rigid metal conduit, intermediate metal conduit, PVC Schedule 80 or equivalent conduit or galvanized steel U-guards extending from at least 1 foot (0.30 m) below ground level up to a point 8 feet (2.45 m) above finished grade.

SECTION 38. *EQUIPMENT*

PSC 114-381H [follows NESC 381G, p. 323] Warning Signs (Addition). Add subsection to read:

H. Warning Signs

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

2. Electric supply equipment installed prior to the March 1, 1982 effective date of the 1982 edition of these rules was to have been signed to comply with these rules by October 1, 1984.

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

SECTION 40. *PURPOSE AND SCOPE*

PSC 114-402 [NESC 401, p. 326] Referenced Sections (Change). Change first sentence of Rule 402 to read as follows:

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

SECTION 42. *SUPPLY SYSTEMS—RULES FOR EMPLOYEES*

PSC 114-423A3 [NESC 423A3, p. 344] De-energizing Equipment or Lines to Protect Employees, Application of Rules (Addition). Add the following Exception and Note to 423A3:

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

Note: See s. PSC 113.70 (5).

History: Cr. Register, February, 1982, No. 314, eff. 3-1-82; am. Register, May 1985, No. 353, eff. 6-1-85.