

Summary of Major 2002 NESC Changes

Section 1

011B—Clarification. The new NOTE clarifies that NESC and NEC jurisdiction starts at the service point (i.e., the point of connection between the facilities serving the structure and the premises wiring).

011C—Clarification. The new rule 011C clarifies the standard practice that street and area lights supplied from systems under “exclusive” control of utilities are covered by the NESC. If customers have switches to control the lights, the NEC applies instead of the NESC. Old 011C moved to 011D.

013A2—Revision. Experimental installations must also have equivalent safety and have the agreement of all affected parties.

015D—Clarification. New Rule 015D clarifies that exceptions have always been intended to have the same force and effect as the main rule.

Section 2 — Definitions

De-energized—Revision. Specified being “disconnected.” The new language matches changes in work rules language to clearly distinguish merely disconnecting from a source of energy and both disconnecting and grounding. Most former uses of “de-energized” are now “deenergized and grounded.”

Communication lines—Revision. Adds 150 V dc to operating voltage of 90 V ac.

Multigrounded/multiple grounded system—New. Neutral intentionally grounded at required intervals. May not be “effectively grounded”

Neutral conductor—New. Conductor providing return path. Not all circuits have a neutral.

Qualified Revision.—Expanded to include requirement for training and demonstrating knowledge. Also includes requirements for an employee in training.

Readily climbable supporting structure Revision.—Specifies new limits on size and location of gap between handholds and footholds 2.45 m (8 ft) starts not more than 1.8 m (6 ft) above grade, it is not readily climbable.

Service point—New. Helps to delineate NESC and NEC jurisdictions. Point between utility and customer-owned wiring.

Shield wire—New. Grounded conductor protecting transmission and distribution from direct lightning strikes.

Single grounded

system/unigrounded

system—New. One conductor intentionally grounded at one location.

Ungrounded system—New. No conductor or point intentionally grounded directly or through an impedance.

Unigrounded system—New. Treated the same as a single grounded system.

Vault Revision.—Requires all sides, top, and bottom to be solid. The word “access” was changed to “entry.” Also, the word *the* was removed, to remove limitation on “equipment” to be inspected.

Section 3 — References

Updates, Addition, and Removals

Section 9 — Grounding Methods

Numbering Change.—Note that numbers now begin with 0, changing the Rule 90 to Rule 090, to match other general rule nomenclature.

093A—Revision. Clarified that metallic electrical equipment cases are allowed to serve as part of a grounding conductor.

094B2b, Exception—New. Different ground rod dimensions or configurations are allowed with a qualified engineering study.

096C—Revision. A recommendation was added to allow the rule to be applied to an overhead grounded shield wire meeting the requirements for multigrounding. This is consistent with Interpretations.

097A3—New. Added shield wires of power circuits to the list.

097D1—Revision. The requirement to insulate either the primary or secondary conductor was added, similar to that in 097D2.

097G—New. Requires electric and communication systems being grounded on a joint-use structure to utilize a common ground, unless separation is achieved in a manner allowed by other rules. It also requires that, where primary and secondary grounding systems are separated, that the communication system ground to the primary grounding system at the structure, not the secondary grounding system. *Caution: This requires a break in communication grounding, elsewhere to meet Rule 99C.*

099C—Revision. A recommendation was added to make sure that continuity is maintained, if water piping is used as a bonding means.

Part 1 — Electric Supply Stations

110A1b—If barbed wire is used above fence mesh, to achieve the overall height requirement at least three strands still must be used, but the 1-ft. requirement was deleted. Some angled attachments had difficulty meeting the 1-ft vertical requirement.

110B1—Clarification. Wood poles can be used as supports in a supply station without violating the noncombustibility rule.

110B2—Revision. Three Exceptions were added to expand the requirements for keeping materials stored inside a station away from live parts.

Table 110-1—Revision. Expanded to include more voltages.

120B—New. This rule clarifies that Section 12 applies to both ac and dc supply stations.

123C—Revision. The last sentence of Rule 123C was deleted to remove the reference to using visible openings in place of grounding up to 25KV. The practice was never allowed by the work rules. Rule 173C was deleted as part of this change. These provisions were apparently added decades ago in contemplation of a work rule change that was never made.

124C3—Revised. Now specifically includes fences (which have been in common use), instead of just open railings.

127A—Revision. Ventilation requirements were revised to limit vapor-air concentration to less than 25% of lower flammable limit in coal handling areas. The specific ventilation requirements of Rule 127A3 were deleted to eliminate confusion between requirements for equipment and requirements for areas. Various NEC requirements must be met in classified areas.

131—Revision. The requirement to have the motor control switch less than 50 feet from the motor was removed. All motor control switches must now have lockout provisions to meet NESC Rule 444 and OSHA 1910.269(d).

150—The use of *nonmetallic* conduits and U-guards to protect secondary wiring on current transformers is now recognized; consideration of circulating currents is required for metallic coverings.

170—Revision. Examples of conspicuous markings for devices (numbers/letters/symbols) were added. Duplication of markings within a station was prohibited.

173C—Revision. The last sentence of Rule 123C was deleted to remove the reference to using visible openings in place of grounding up to 25KV. The practice was never allowed by the work rules. Rule 173C was deleted as part of this change. These provisions were apparently added decades ago in contemplation of a work rule change that was never made.

Part 2 — Overhead

201—Addition. Two notes added regarding NESC approach distances for communication and electric supply workers and OSHA, federal, state and local approach distances for non-utility workers.

214A2—A note was added to recognize that inspections may be performed while doing other tasks.

215C2—Revised. Clarified that guys must be “vulnerable” to *accidental energization* due to a slack conductor or guy, and not merely “exposed”. This matches the change in Rule 279A2 in the 1997 Edition.

217A2—Revision. The exception has been expanded on fencing to require the fence to meet the height requirements of Rule 110A1.

217B—Revision. Clarified that the restrictions on use of unusual conductor supports applies to line conductor, not service drops.

220B2e—Revision. Clearance for special circuits limited to 600V and 5 kW in 230C constructions may have reduced clearance of 400 mm (16 in) under controlled circumstances. This change from 600 mm (2 ft) correlates with previous changes in Rule 235.

224B2—Revision. A dc limit of 150 V was added to match the 90 V ac limit. An Exception to the general requirement to meet Rule 224B2 applies when less than 150W is transmitted.

230G, Note—Revision. A new NOTE was added to clarify how to make voltage conversions under various circumstances.

231A—Revision. Clearance of pole to fire hydrant was increased from 3 ft to 4 ft to accommodate attachment of modern Y-type valve attachments.

231B1—Revised. Clearances for pole and anchor guys to different types of curbs now specified. Poles and anchor guys must now be behind the curb, regardless of curb type. Anchor guys are a structural component and were added to the rule.

232B3 and Table 232-2—Revision. Clearances for support arms, platforms, and braces extending beyond the surface of a supporting structure were added to Table 232-2. As a result, it is clear that structure clearances also apply to external braces for platforms, etc.

232B4a—New. The clearance requirements of grounded and ungrounded luminaire cases and brackets above ground are now specified in Table 232-2. The clearance for ungrounded luminaire brackets to the pole that was formerly in this Rule was moved to Rule 236D2.

Table 232-1—Revision. Footnote 9 now recognizes the limited areas where large animals other than horses are ridden and where the animal is large enough for the rider to extend more than 8 ft above ground. An example would be camel or elephant riding areas at fairgrounds, zoos, or breeding farms.

Table 232-1—Revision. Title of clearance Category 8 on rigging and launching areas has been revised and hectares were changed to km².

Table 232-1—Revision. Footnote 13 was revised to limit application of the reduced clearances to driveways, parking lots, and alleys not subject to truck traffic.

Table 232-1—Revision. FN 18 allows the 10-yr flood level to be used as “normal flood level” for uncontrolled water flow areas, if the 10-yr data is available. The original 1977 rule had used the 10-yr flood level for sailboat clearances, but that was removed when areas were discovered for which 10-yr data was not available.

Table 232-1—New. FN 26 was added to specify how to determine appropriate clearance IF a line is designed to clear an oversized vehicle of known height.

Tables 232-1 and 232-2—Values of km² were substituted for hectares.

Table 232-2—Revision. FN7 was applied to Row 2a. This allows grounded equipment cases to be attached to a pole located in a road, street or alley right-of-way at pedestrian working level provided the case does not obstruct a walkway or roadway.

233A1a(2), Table 233-1, 234A2—Revision. Trees are not considered to shelter a line.

Table 233-1—Revision. The lesser clearances were limited to effectively grounded guys, span wires and messengers, not ungrounded ones.

Table 233-1—Revision. Consent of regulatory authority is no longer required in FN2 when communication parties agree to lesser clearances between their conductors, guys, and messengers. Clearances may not be reduced if electric supply lines are on joint-use structures.

234B1a, Exception—Revision. The exception in Rule 234B1a now only applies for effectively grounded guys, messengers, and neutrals. Wind deflection must be considered for ungrounded span guys.

234B2, Exception 2—Revision. For this exception to apply, the upper circuit must be both de-energized and grounded to meet Rule 444D

234C3a—Revision. Requirements for insulating or covering all service drop construction is now specified for both 0-750 V (any 230C cables or 230D covered wire in old rule) and >750 V (230C1 added to rule).

234C3c—Revision. The required clearance for wires or cables attached to a building was revised to 3 inches rather than make the user reference Table 235-6. This effectively limited the options for these cables, became FN8 of Table 235-6 is no longer applicable.

Table 234-1—Revision. Footnote 14 was revised to allow lesser clearance over wall or railing if access via outside stairway is available, since no one is expected to stand erect on the rail or wall to access the area by ladder.

Table 234-1—Revision. Row 2a was split into two rows to recognize the differences between areas accessible vs not accessible to pedestrians and match similar treatment in Part 1 of Table 234-1. Previously, only the horizontal clearances for areas not accessible to pedestrians were specified.

234F—Revision. The wording of the grain bin clearance requirements was broken out into smaller parts and was revised for clarity and to more closely match the figure.

235C2b(1)—Revision. The existing rule was reorganized for clarity and application of exceptions was limited. The NESC recognizes that significant icing differentials are common in many areas of the country, but not in others. The new Rule 235C2b(1)c also recognizes that the sag mismatch under summer or winter design conditions may control. Both must be checked because the worst mismatch in sags can occur in the season with the smaller design sag on the upper conductor, if the lower one moves up enough.

235C4—New. The “communication worker safety zone” between communication and supply facilities is clearly defined and named. The communication worker safety zone has always been required if communication is not placed in the supply space under Rule 224A and Part 4, but its name now appears in the code.

Table 235-5, FN 2—Removed. Table 235-5 no longer requires increased clearances for communication conductors located above supply conductors in the supply space.

Table 235-6—New. Footnote 13 was added to recognize and specify clearances for communication antennas at radio frequencies.

235F—Revision. Communication lines in the supply space are allowed on the same arm with supply under specified restrictions.

235H—New. Clearances of 100 mm (4 in) are added between conductors, cables, and equipment of different communication utilities anywhere in the span. A spacing of 300 mm (12) is required. Both can be changed by agreement.

235I—New. Clearances to communication antennas and cases in the supply space are now specified.

236D2—Revision. These provisions were moved from Rule 232B4a, where they had been inappropriately placed when Section 28 was disbanded.

237F—Revision. Luminaires and support brackets were added to the list of items which may require increased clearances to meet Rules 441 or 446.

Table 238-1, FN 1—Revision. The existing footnote was rewritten to clearly specify conditions of application of the reduced clearances from communication in the communication space to grounded supply conductors and equipment. Bonding to the communication messengers is now required.

238E—New. See Rule 235C4.

239A6—New. Allows either a conduit or U-guard for vertical riser protection. In order to prevent exposure of the enclosed cable, a backing plate is required for a U-guard, unless it fits snugly to the structure.

239E2a and Table 239-2—Revision. A clearance is now specified to the pole surface and not the former spacing to the pole center. The clearance now does not vary with pole size. The clearances of Table 239-2 were revised to be consistent with Rule 239E2a, since they are now clearances to pole surface, rather than spacing from pole center.

239G1, Exception 2(c)—New. Supply grounding conductors going through the communication space must now be covered or bonded to communication messengers.

239H—Revision. Exceptions were added to no longer require covering over communication cables in the supply space on metallic or concrete supporting structures, since the structure itself is conductive.

Table 239-1, FN 5—New. Footnote 5 was added to allow reduced clearances for vertical and lateral conductors to guy insulators. This is similar to the clearance reductions allowed for line conductors by Footnote 11 on Table 235-6.

250A4—New. It recognizes that the strength required by Sections 25 and 26 are sufficient for earthquakes.

250C—Revision. This rule has been revised to use the new 3-second gust wind data and include additional factors in the wind loading formula such as gust response factor.

Figure 250-2—Revision. The basic wind speed map has been revised.

251A3—Revision. The original rule specification for calculation of ice on conductors and cables is required in the absence of a mathematical model determined by a qualified engineering study in accordance with Rule 251A4.

Table 253-1—Revision. The overload factor value for Grade C vertical loads on wood structures is increased to 1.90 so that, when strength factors for wood are applied, the total vertical strength required is the same for Grades B and C; this is because many structures see their greatest loads when workers are on them.

261A1c—Revision. The requirement for considering a gust factor on structures was removed, since it is now included in the wind data.

261A2f—New. The extreme wind loading must be applied to all wood structures alone before application of conductors. This has no impact on normal pole design but does impact the design of structures that receive guying effects from attached conductors.

261D4a(2)—Revised. The reference to Rule 261D4a(1) was corrected to Rule 261D2a(1).

Table 261-1A—Revision. The table clearly specifies that, when new items are added to existing structures, the original and present structure strength must be great enough to meet the strengths required at installation and at replacement, respectively.

261H1 and Table 261-3—Revision. The specified sizes for open supply conductors was removed.

261H2—Revision. Supply conductor hardware must have the same strength as required for the conductors.

261J and Table 261-4—Revision. Minimum sizes for Grade B and Grade C communication wires were removed.

261M—Revision. Strength for all attachment hardware not otherwise covered is specified.

264D—Revision. The design load of guys, not its rated breaking strength, is the key determinant of whether a guy shim is needed for a guy wrapped around a soft wood pole, like cedar.

276—Moved. This rule on protection of insulators from arcing and damage during installation has been moved to 447.

Part 3 Underground

314B—Revision. Metallic conduit and coverings must now be grounded if exposed to open supply conductors of greater than 300 V, similar to guys.

Section 32—Revised. A new Note 2 was added to the title to reference Section 35 and remove application of Section 32 from single-duct

conduit **not a part of a conduit system**. If single-duct conduit runs to manholes, handholes, or vaults, Section 32 applies.

320A1c—The recommendation for angle limits at conduits joints was deleted because (a) this is design information and (b) this is overly conservative for some installations. Rule 012 applies.

320B5—**Revision**. Both conduits and gas (or other fuel) lines are prohibited from being in the same manhole, handhold, or vault. Handholes and vaults were added.

323C5—**New**. Manholes deeper than 4 ft must have ladders or other suitable climbing devices.

323E3—**New**. Safety signs are now required at entrances to vaults and tunnels that contain exposed live parts.

341A7—**New**. Multiple communication cables may be in the same duct, if all parties agree.

341B3b—**Revision**. Like joint-use manholes, joint-use vaults now require marking of cables as to utility name and type of cable use.

350H—**New**. The requirements of Section 35 (not Section 32) also apply to single-duct conduit not installed as a part of a conduit system (i.e. it runs directly from equipment to equipment, or pole to equipment, with out manholes, vaults, or hand holes. See NOTE 2 under the title of Section 32.

351A1—**Revision**. Adherence to Rule 353 *or* 354 is **required** for cables installed parallel to and directly over or under another subsurface structure.

352—**Moved**. Was formerly 353.

Table 352-1—**Revised**. The EXCEPTION that allows a lesser burial depth than the table values for street light cables is now limited to only those cases where the table values cannot be achieved.

353—**Revision**. Formerly Rule 352. Now titled “Deliberate” Separation, it applies when radial separation not less than 12 in is maintained between supply and communication cables themselves or to other underground facilities.

353B4—**Revision**. The allowance of less than 12 inches of separation on crossings by agreement (formerly contained in 252B4 before renumbering) was removed, since the entire rule now applies when 12 in separation will be maintained.

354A2—**New**. There is now a required separation of electric supply and communication cables and conductors from gas lines by at least 12 inches.

354D—**Revision**. A new exception allows entirely dielectric fiber-optic communication cables to be installed with less than 12 inches of separation, if all are in agreement and Rules 354D1a, b, c, and d are met; meeting Rule 354D2 or Rule 354D3 is not required for entirely dielectric fiber-optic communication as it is for other communication cables in random lay with supply cables.

354E—**New**. Clearances of direct-buried facilities from nonconductive water lines are now specified. Random lay is generally allowed.

380D—**New**. A 1.2 m (4 ft) clearance is now specified from padmounted equipment and pedestals to fire hydrants, except 900 mm (3 ft) can be used where 1.2 m (4 ft) cannot be achieved. This is similar to the overhead rule.

381G—**Revision**. Other above-ground equipment besides padmounted equipment is now required to be locked or secured. This includes both communications and supply equipment.

Part 4 — Work Rules

410A2—**Revision**. Similar to the more recent OSHA requirements, employers must ensure that employees working around exposed energized facilities demonstrate their knowledge of safe work practices or be retrained.

411D—**Revision**. Both safety signs and safety tags must meet ANSI Z535.

423C4—**New**. Visibly exposed gas or other fuel lines shall be protected by clearance or barriers from torches or open flames used in underground splicing work.

423D5—**New**. Shoring or other methods are required where cave-in hazards exist.

431A—**Revision**. When communication workers are repairing communication lines damaged in storms, those communication lines that are joint-use with supply lines must be treated as if energized, unless the supply lines are appropriately de-energized and grounded.

431B—**New**. Altitude correction factors are now required for approach distances for communication workers as for supply workers.

441A1a—**Revision**. The rule was clarified to require a line to be grounded, as well as de-energized. This requirement appears in other Rules in Part 4 also.

441A3c—**New**. When rubber-gloving systems above 15 kV phase-to-phase, additional protection (such as an insulated bucket or platform) must also be used.

441A4a—**New**. Must use transient overvoltage study on 121kV to 362kV lines to set approach distances.

Table 441-6—**New**. This table of maximum use voltages and its Footnote 1 with exceptions plainly clarifies that the phase-to-ground voltage may be used for glove ratings when there is no phase-to-phase exposure.

441B4a—**New**. When an employee is working on the grounded end of an insulator string, the minimum approach distance need not exceed the distance across the insulator string.

441 B4 b and c—**Revision**. Above 230 kV up to three insulator units may now be temporarily shorted out as part of work procedures, so long as approach distances of Rule 441 are met.

447—**Moved**. The requirements for avoidance of arcing or damage to insulators during installation was formerly in Rule 276.