NATIONAL

ELECTRICAL

SAFETY

CODE®

Sixth Interim Collection

NESC®

1994-1996

INTERPRETATIONS

IEEE

NESC

Published by the
Institute of Electrical and Electronics Engineers, Inc.
December 21, 1994

SH94403

National Electrical Safety Code Committee, ASC C2

Sixth Interim Collection of the National Electrical Safety Code® Interpretations

1994–1996

Abstract: This edition includes official interpretations of the National Electrical Safety Code as made by the Interpretations Subcommittee of the National Electrical Safety Code Committee, ASC C2.

Keywords: electric supply stations, overhead electric supply and communication lines, underground electric supply and communication lines, clearances to electric supply and communication lines, strength requirements for electric supply and communication structures

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ISBN 1-55937-712-7

This is an interpretation of the *National Electrical Safety Code* (NESC). Interpretations are issued to explain and clarify the intent of a standard and are not intended to constitute an alteration to the original standard or to supply consulting information. Use of the information contained in this document is at your own risk.

Foreword

The IEEE C2 Secretariat regularly publishes Interpretation Requests received and Interpretations made by the National Electrical Safety Code® (NESC)® Subcommittee on Interpretations. The original requests have been lightly edited to remove extraneous matter and focus on the C2 problem presented. Some illustrations have been redrawn for publication. With these exceptions, requests are in the form received.

The First Interim Collection 1991–1993 provided interpretations for IR 442 and IR 443, which were still under consideration at press time of the previous volume, and incorporated interpretations for IR 444 through IR 447. The Second Interim Collection 1991–1993 provided interpretations for IR 448 through IR 453.

The Third Interim Collection 1991–1993 incorporated an interpretation for IR 454 and provided interpretations for IR 455 through IR 462. IR 463 through IR 467 were included, although the interpretations were under consideration.

The Fourth Interim Collection 1991–1993 provided interpretations for IR 463 through IR 467, and incorporated interpretations for IR 468 through IR 470.

The Fifth Interim Collection 1993–1995 provided interpretations for IR 471 through IR 474 and incorporated IR 475 through IR 489.

The Sixth Interim Collection 1994–1996 provides interpretations for IR 490 through IR 499 inclusive.

The Secretariat hopes that the publication of all interpretations will prove helpful to those concerned with the NESC.

Procedure for Requesting an Interpretation

Requests for interpretation should be addressed to:

Secretary for Interpretations
National Electrical Safety Code Committee, ANSI C2
IEEE Standards Office
445 Hoes Lane
P.O. Box 1331
Piscataway, NJ 08855-1331

Requests for interpretations should include:

1. The rule number in question.
2. The applicable conditions for the case in question.

Line drawings should be black ink or excellent black pencil originals. Photos should be black-and-white glossy prints. These illustrations must be reproduced for committee circulation and eventually will be used to supplement the text of our next edition. Clear diagrams and pictures will make the work of interpretation easier and more valuable to C2 users.

Requests, including all supplementary material, must be in a form that is easily reproduced. If suitable for Subcommittee consideration, requests will be sent to the Interpretations Subcommittee. After consideration by the Subcommittee, which may involve many exchanges of correspondence, the inquirer will be notified of the Subcommittee's decision. Decisions will be published from time to time in cumulative form and may be ordered from IEEE.

Interpretations are issued to explain and clarify the intent of specific rules and are not intended to supply consulting information on the application of the code. The Interpretations Subcommittee does not make new rules to fit situations not yet covered.

Contents

Section 2.
Definitions of Special Terms

Definition of *Service drop* and *service point*

REQUEST (17 Jan. 1995) IR 498

This is to request an interpretation of the division point between the National Electrical Code® and the NESC. Section 2 of the 1993 NESC defines *service drop* as "The overhead conductors between the electric supply or communication line and the building or structure being served." We therefore regard the service drop point and not the meter as the division between the power supplier and the consumer.

The consumer is responsible for all necessary switching and overcurrent protection on his system from the service drop connection point.

~~This request is for a joint statement~~ from the NEC and NESC.

INTERPRETATION (3 Aug. 1995)

Considering the context of your question, we assume that you are concerned with the division point between the electric supply utility and the customer in an overhead service area. In this regard, the NESC covers the lines and equipment employed by the public or private electric supply utility in the exercise of its function (see Rule 011, Scope). In essence, the NESC applies to utility facilities, while the NEC applies to customer-owned utilization wiring installations, unless an appropriate administrative authority deems otherwise.

In the normal situation, the utility installs the service drop and meter. The customer installs the service entrance conductors or cable, conduit if applicable, and service entrance equipment. Practices regarding meter sockets or cabinets vary, although the customer usually installs such equipment even if it is supplied by the utility. Consequently, the normal division point between the NESC and the NEC is at the connection between the service drop and the service entrance conductors or cable, excluding metering facilities.

Please note the following:

1. The NESC does not cover either switching or overcurrent protection requirements on customer-owned systems.

2. You have correctly stated the NESC definition for "service drop"; it covers *overhead* conductors only, from the last supporting structure (pole) to the building being served. "Service drop" does not include underground service runs.
3. This interpretation is limited to normal service drop installations (overhead service in overhead area); it does not cover special types of overhead services or underground services in any form.

INFORMAL INTERPRETATION (from the NFPA)

The term *service point* is used in the NEC to establish the division between the serving utility and the consumer. (The actual location of the service point is usually established by agreement between the utility and consumer.)

There are no restrictions in the NEC on the length of service conductors. Section 230-90 requires overload (versus overcurrent) protection for the service conductors. This protection is required to be located at the load end of the service conductors (refer to Sections 230-91 and 230-70). There is a restriction on the length of service conductors in a building; see Section 230-70(a).

Section 240-21(e) does not apply in the situation you described. Section 240-21(m) would apply if the outside conductors were tapped to a feeder (for example, where service equipment is located at the service pole).

Please refer to Article 100 for definitions of all the "service" terms. See the printed "Notice on Interpretations" below.

Notice on Interpretations: This correspondence is not a Formal Interpretation of the NFPA. Any opinion expressed is the personal opinion of the author, and does not represent the official position of the NFPA or its Technical Committees. In addition, this correspondence is neither intended, nor should be relied upon, to provide professional advice, consultation or services.

Section 15.
Transformers and Regulators

Rule 150

Size of primary voltage area

REQUEST (8 Nov. 1994) IR 493

This interpretation request is in regard to the lack of a definition for "primary voltage area." I have found no definition either in the Code, or in the IEEE Standard Dictionary of Electrical and Electronics Terms. I can see the following two possible interpretations:

1. *Primary voltage area* refers to the whole secondary circuit, regardless of size. If the CT primary exceeds 600 V, Rule 150 applies.
2. *Area* refers to physical dimensions in most dictionaries. If the CT secondary is in the vicinity of a primary voltage circuit exceeding 600 V (in the same raceway for example), Rule 150 applies. If this is the correct interpretation, then how big is the area?

INTERPRETATION (27 March 1995)

The intent of Rule 150 is to provide personnel protection against the effects of accidentally opened or damaged CT secondary circuit conductors in the vicinity of primary circuits energized at more than 600 V. Accidentally opened or damaged CT secondary circuit conductors may cause excessively high voltage and arcing that will not be cleared by circuit protective devices.

Protection in the form of grounded metallic conduit or grounded metallic covering must be provided when the CT installation is within an electric supply station (see definition) and the CT or the secondary circuit(s) are in the vicinity of a primary circuit energized at more than 600 V (as connected to such a primary circuit). However, protection is not required for short lead lengths at the secondary terminals of the CT.

The primary voltage area is not defined. This must be determined by a competent engineer or designer.

Section 16.
Conductors

Rule 161A

Scope of overcurrent protection

REQUEST (15 Dec. 1994) IR 494

Rule 161A currently reads:

"161. Electrical Protection

A. Overcurrent protection required

Conductors and insulation shall be protected against excessive heating by the design of the system and by overcurrent, alarm, indication, or trip devices."

I do not understand the intended scope of the words "conductors and insulation." Does Rule 161A apply only to utility-owned conductors within the perimeter of an electric supply station, as might be inferred from Rule 161A's inclusion in Part 1, which is entitled "Rules for the Installation and Maintenance of Electric Supply Stations and Equipment"; or does it apply generally, as implied by the title of Section 16, "Conductors"?

A related question is whether Rule 161A is intended to require overcurrent protection on supply conductors at locations outside the perimeter of an electric supply station, such as where a short branch street lighting circuit of, say, AWG No. 10 conductors, is tapped off a continuing main line of, say, AWG No. 3/0 conductors? (Any overcurrent protection appropriate for the protection of the AWG No. 3/0 conductor is unlikely to be very useful in protecting the AWG No. 10 branch circuit.)

INTERPRETATION (27 Mar. 1995)

NESC Part 1 applies and is limited to electric supply conductors and equipment, along with the associated structural arrangements, in electric supply stations (see Rule 101 and definition of "electric supply station"). Note that such supply stations do not have to be utility-owned (see Rule 011). Section 16, including Rule 161A,

applies only to electric supply conductors within the perimeter of an electric supply station.

Consequently, Rule 161A does not apply outside the perimeter of an electric supply station.

220B2e/Table 235-5

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

Rule 220B2e/Table 235-5, Footnote 1

Relative levels: Supply and communication conductors, special construction for supply circuits

REQUEST (3 Nov. 1994) **IR 492**

This interpretation request is for clarification of an apparent conflict between Footnote 1 of Table 235-5 and Rule 220B2e in the NESC 1993 Edition. Footnote 1 clearly states that a supply cable meeting Rule 230C1 construction, and not exceeding stated voltage and power limitations in the footnote, may be located 16 in below a communications cable. Criteria listed in Rule 220B must also be met.

Rule 220B2e states that a cable meeting the requirements of Rule 230C1 may be installed below communications attachments and must have a minimum vertical separation of 2 ft. This conflicts with Footnote 1 of Table 235-5.

We have researched this subject by means of earlier editions and it is our belief that the conflict came about when information in Table 11, Rule 238A in the 1973 Edition was transferred into the 1977 Edition in the newly created Table 235-5. (Note that although Table 11 (1973) dealt with cross arm construction, Rule 238D directed one to apply the same clearance to line conductors not carried on cross arms.) Up until this time, 1973 Edition's Table 11 and its Footnote 1 and Rule 220B3 were consistent with a 2 ft clearance requirement.

When the new table and its new footnote were created, Rule 220B2e should likewise have been changed to require 16 in, to be consistent with the new footnote.

We are preparing to build a new system in which a communications cable will be placed above a Rule 230C1 supply cable that meets all the criteria in both Footnote 1 and Rule 220B2 except for the inconsistency in Rule 220B2e. For the reasons stated above, we will

use a vertical clearance of 16 in per Footnote 1 as this appears to reflect the most recent intent of the Code.

Do you agree that we will comply with the 1993 Edition?

INTERPRETATION (21 Feb. 1995)

As you state, Footnote 1 of Table 235-5 allows Rules 230C1, C2, or C3 supply cables to be located 16 in below communication circuits, provided that the supply cables meet the voltage and power limitations of Footnote 1 and also meet applicable requirements of Rule 220B2. However, Rule 220B2e requires a 2 ft vertical separation.

The Interpretations Subcommittee believes that the 16 in clearance stated in Footnote 1 of Table 235-5 is correct for the stated circumstances.

You are correct that this conflict first appeared in the 1977 Edition, apparently due to insufficient coordination within the technical subcommittee organization.

Rule 230F1b

Clearances between dielectric fiber-optic cable and energized conductors

REQUEST (13 Apr. 1995) IR 497

The only clearance specified by the Code regarding entirely dielectric fiber-optic—supply cable is in Rule 230F1b. This rule specifies the clearance requirements to communications facilities only. We interpret this to mean that safety is not an issue in determining the clearance between an entirely dielectric fiber-optic cable and an energized conductor. Therefore, no requirements are specified in the Code for minimum clearances between entirely dielectric fiber-optic—supply cable and energized conductors.

Is our assumption correct?

INTERPRETATION (28 Aug. 1995)

Vertical clearances between conductors at supports are found in Table 235-5; see other rules for clearances in span. In this table, an entirely dielectric fiber-optic—supply cable is considered to be a

communication cable. Assuming it to be located in the supply space (and installed and maintained by authorized and qualified personnel; see Rule 224A1), clearances are found on line 1b: 16 in minimum to supply conductors or cables energized up to 8.7 kV, with greater clearances required to supply conductors of higher voltages.

With the emergence of fiber optic cable, Rule 230F was introduced in the 1990 Edition to ensure appropriate separation between communication and supply facilities. Rule 230F1 was expanded in the 1993 Edition. Rule 230F1b clarified application of clearances between entirely dielectric fiber optic–supply cable and communication facilities; no action was taken regarding clearances to energized supply conductors at that time.

Rule 234C4

Communication conductors and cables attached to buildings

REQUEST (18 Jan. 1995) **IR 495**

According to Rule 234C4, "Communication conductors and cables may be attached directly to buildings or other installations." Does this allow communication guys to be attached to an anchor or anchors that have been incorporated into concrete building foundations, assuming that the strength of the anchor(s) is sufficient for the required load? Some concern has been expressed by our people concerning possible safety considerations during lightning strikes, although we have no record that such damage has occurred.

Does the bonding of the anchor rod to the reinforcement steel in the concrete affect the answer to the above question?

INTERPRETATION (8 June 1995)

Rule 234C4 allows communication conductors and cables to be attached directly to buildings. While communication guys are not included in the rule, nothing prohibits attachment of guys to buildings provided that good practice is followed and strength requirements are met (see Rule 012C and Rule 261B).

Bonding of the guy to the building reinforcing steel does not affect the above answer. However, it does raise several points, as follows:

1. Rule 215C2 states conditions under which guys must be effectively grounded or insulated.
2. Rule 92C2 provides methods for effectively grounding guys; Rule 279A provides methods for insulating guys.
3. Rule 94 states requirements for grounding electrodes. Rule 94A3 covers steel reinforcing bars in concrete; see also the note, which gives reasoning and justification for bonding an anchor rod to reinforcement steel. In addition, see IR 440, which states that a connection to an anchor rod cannot be the sole means of grounding a guy.

Rule 234F2a, EXCEPTION (3)

Clearances of wires, conductors, cables, and rigid live parts from grain bins

REQUEST (16 Aug. 1994) (IR 491)

Rule 234F2a states that the clearance of wires, conductors, and cables from grain bins that are expected to be loaded by use of a portable auger, conveyor, or elevator shall not be less than the values illustrated in Figure 234-3. This figure shows that all electrical wires, cables, etc., shall be at least 15 ft (4.6 m) from any part that is considered as a loading side.

Rule 234F2a, Exception (3), has an exception for supply cables of 0 to 750 V if they are on the non-loading side of the grain bins. However, some grain bins do not have an area that could be classified as "non-loading." In this situation, is it the intent of the Code to ban overhead service to such grain bins?

INTERPRETATION (29 Nov. 1994)

Yes; a non-loading side must be available in order to install an overhead service drop to a grain bin loaded by a portable auger, conveyor, or elevator. The purpose of Rule 234F2 is to provide a clear area adjacent to a grain bin that will permit safe movement of portable grain loaders during bin loading operations and the safe use of long tube grain temperature monitoring devices. The intent is accomplished by providing a clearance envelope around that portion of the bin where such activities occur. The EXCEPTION in Rule 234F2a allows Rule

234C clearances from buildings to be used for designated types of electric supply facilities on the non-loading side of a grain bin. EXCEPTION (3) lists supply cables of 0 to 750 V. Rule 234C3 covers service drops to buildings or other installations. Consequently, overhead service drop cables of 0 to 750 V (meeting Rule 234C3) may be installed on the non-loading side of a grain bin.

If a non-loading side is not available or cannot be designated (see Rules 234F2b and c), other alternatives, such as underground service, are required.

Rule 261C2

Guys used to meet strength requirements

REQUEST (24 Mar. 1995) **IR 496**

According to Rule 261C2, "When guys are used to meet the strength requirements, they shall be considered as taking the entire load in the direction in which they act, the structure acting as a strut only, except for those structures considered to possess sufficient rigidity so that the guy can be considered an integral part of the structure."

Please consider the case of a tangent structure with one or more circuits in the tangent (main line) direction and a tap circuit deadended so as to add load in a direction transverse to the main line. Our interpretation is that, for wood pole structures, a guy added to provide for the tap circuit deadend must have sufficient strength to take the transverse wind loading of the tangent circuit or circuits as well as the longitudinal load of the tap circuit deadend. This would appear to be because the guy prevents the pole from deflecting under transverse wind loading, as it would normally do as a tangent structure, and thus transfers all transverse loads to the guy. Is this a correct interpretation?

INTERPRETATION (4 Dec. 1995)

Your understanding is correct: both longitudinal and transverse loads apply. Please note that appropriate overload capacity factors must be applied, as stated in Rule 261C2a for Grades B and C construction.

In your request for interpretation, you used an illustration in which a pole would normally deflect under transverse loading of the tangent

circuit(s) but is prevented from deflecting by a guy installed to hold a tap circuit dead-end. In this case the pole acts as a strut only; the guy must withstand the entire load in the direction in which it acts. This is the normal situation encountered in the field.

However, note that Rule 261C2 also allows the guy to be considered as an integral part of the structure if the pole possesses sufficient rigidity (stiffness). Caution must be used with this approach. Consideration should be given to factors such as pole flexibility, pole embedment, guy strength and anchor movement. A statically indeterminate analysis is usually required.

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

Rule 350F

Direct-buried cable, general

REQUEST (6 July 1994) IR 490

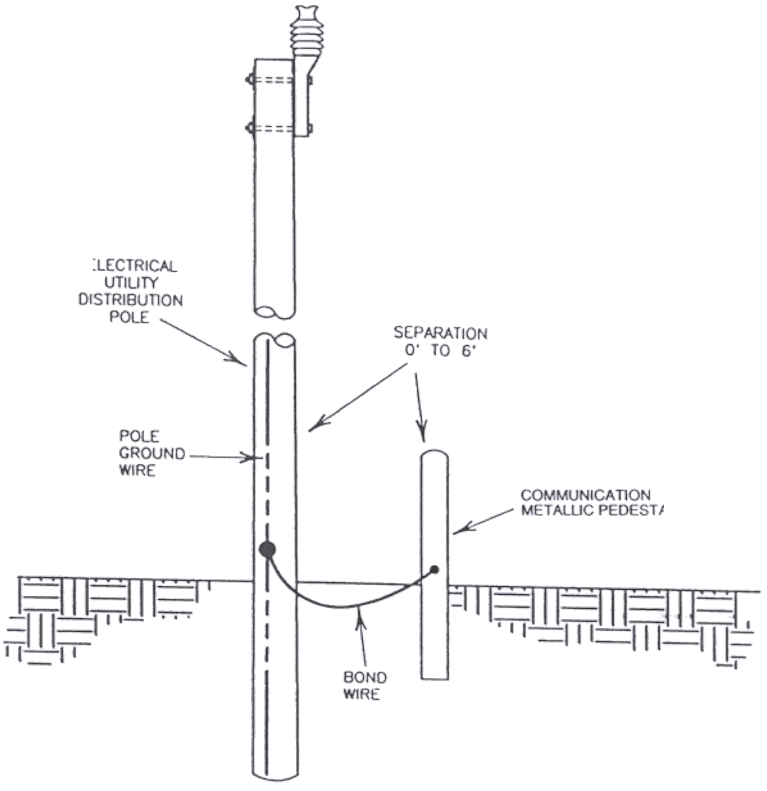
Rule 350F states "Bonding should be provided between all above ground metallic power and communications apparatus (pedestals, terminals, apparatus cases, transformer cases, etc.) that are separated by a distance of 6 ft (1.80 m) or less."

The attached drawing (Fig IR 490) shows an above ground communications apparatus (pedestal) within 6 ft of a power utility pole with a metallic ground wire. Does this ground wire constitute a metallic power apparatus and, as such, would bonding between the ground wire and communications apparatus be required under Rule 350F?

INTERPRETATION (13 Jan. 1995)

Rule 350F does not require bonding between a vertical ground wire on a pole (pole ground) and a communication pedestal, even though they are 6 ft or less apart. While *apparatus* does not appear in the NESC definitions, the parenthetical listing of pedestals, terminals, apparatus cases, transformer cases, etc., supplies the context of items to be bonded under Rule 350F. This listing was not intended to include conductors. The "pole ground wire" shown in your drawing is a conductor (see definitions); it is not included in the listing of items to be bonded.

Please note that Rule 350F does not prohibit bonding.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UTILITY
DISTRIBUTION
POLE
SEPARATION
0' TO 6'
POLE
GROUND
WIRE
COMMUNICATION
METALLIC PEDEST
BOND
WIRE

Fig 490

Rule 350G

Maximum diameter of buried coaxial cables

REQUEST (16 Aug. 1995) IR 499

Rule 350G states that "All direct-buried jacketed supply cable meeting Rule 350B and all direct-buried communication cables shall be legibly marked as follows:

The appropriate identification symbol shown in Figure 350-1 shall be indented or embossed in the outermost cable jacket at a spacing of not more than 40 in (1 m)."

Earlier interpretation requests (see IR 471) dealt with twisted-pair cables with diameters ranging from 0.275 in through 0.350 in, yet also stated that "larger" buried communication cables capable of being marked must be marked.

Clarification is requested as to the maximum diameter of buried coaxial communication service drop cables that do not require symbol indentation or embossing. CATV drop cable ranges in diameter from 0.230 in (59 Series) to 0.430 in (11 Series Quad Shield). Cable diameters and jacket thickness are standardized (see Society of Cable Television Engineers IPS-SP-001) for connector fit.

INTERPRETATION (22 Mar. 1996)

Essentially, Rule 350G requires all direct-buried communication cables to be legibly marked, either by indenting or by embossing, unless EXCEPTION 1 applies. The minimum size cable that must be marked is not specified in the rule, nor was it discussed in IR 471. The decision as to what cables are practical to legibly mark must be made by the individual manufacturer and approved by the party responsible for the installation (utility, CATV company, etc.).

In summary, Rule 350G requires that the cable be marked if it can be done effectively; if not, EXCEPTION 1 applies.