Section 21.
General Requirements

210. Referenced Sections

The Introduction (Section 1), Definitions (Section 2), References (Section 3), and Grounding Methods (Section 9) shall apply to the requirements of Part 2.

211. Number 211 not used in this edition.

212. Induced Voltages

Rules covering supply-line influence and communication-line susceptiveness have not been detailed in this code. Cooperative procedures are recommended in the control of voltages induced from proximate facilities. Therefore, reasonable advance notice should be given to owners or operators of other proximate facilities that may be adversely affected by new construction or changes in existing facilities.

213. Accessibility

All parts that must be examined or adjusted during operation shall be arranged so as to be accessible to authorized persons by the provision of adequate climbing spaces, working spaces, working facilities, and clearances between conductors.

214. Inspection and Tests of Lines and Equipment

A. When In Service

1. Initial Compliance With Rules

   Lines and equipment shall comply with these safety rules when placed in service.

2. Inspection

   Lines and equipment shall be inspected at such intervals as experience has shown to be necessary.

   NOTE: It is recognized that inspections may be performed in a separate operation or while performing other duties, as desired.

3. Tests

   When considered necessary, lines and equipment shall be subjected to practical tests to determine required maintenance.

4. Record of Defects

   Any defects affecting compliance with this code revealed by inspection or tests, if not promptly corrected, shall be recorded; such records shall be maintained until the defects are corrected.

5. Remedying Defects

   Lines and equipment with recorded defects that could reasonably be expected to endanger life or property shall be promptly repaired, disconnected, or isolated.

B. When Out of Service

1. Lines Infrequently Used

   Lines and equipment infrequently used shall be inspected or tested as necessary before being placed into service.

2. Lines Temporarily Out of Service

   Lines and equipment temporarily out of service shall be maintained in a safe condition.

3. Lines Permanently Abandoned

   Lines and equipment permanently abandoned shall be removed or maintained in a safe condition.

a. Conductors with Rated Breaking Strength of 13.3 kN (3000 lb) or less

The pull of two-thirds, but not less than two, of the conductors having a rated breaking strength of 13.3 kN (3000 lb) or less. The conductors selected shall produce the maximum stress in the support.

b. Conductors with Rated Breaking Strength of more than 13.3 kN (3000 lb)

The pull resulting from one conductor when there are eight or less conductors (including overhead ground wires) having rated breaking strength of more than 13.3 kN (3000 lb), and the pull of two conductors when there are more than eight conductors. The conductors selected shall produce the maximum stress in the support.

2. Jointly Used Poles at Crossings Over Railroads, Communication Lines, or Limited Access Highways

Where a joint line crosses a railroad, a communication line, or a limited access highway, and Grade B is required for the crossing span, the tension in the communication conductors of the joint line shall be considered as limited to one-half their rated breaking strength, provided they are smaller than Stl WG No. 8 if of steel, or AWG No. 6 if of copper.

3. Deadends

The longitudinal load on a supporting structure at a deadend shall be an unbalanced pull equal to the tensions of all conductors and messengers (including overhead ground wires); except that with spans in each direction from the dead-end structure, the unbalanced pull shall be the difference in tensions.

4. Unequal Spans and Unequal Vertical Loads

The structure should be capable of supporting the unbalanced longitudinal load created by the difference in tensions in the wires in adjacent spans caused by unequal vertical loads or unequal spans.

5. Stringing Loads

Consideration should be given to longitudinal loads that may occur on the structure during wire stringing operations.

6. Longitudinal Capability

It is recommended that structures having a longitudinal strength capability be provided at reasonable intervals along the line.

7. Communication Conductors on Unguyed Supports at Railroad and Limited Access Highway Crossings

The longitudinal load shall be assumed equal to an unbalanced pull in the direction of the crossing of all open-wire conductors supported, the pull of each conductor being taken as 50% of its rated breaking strength in the heavy loading district, 33-1/3% in the medium loading district, and 22-1/4% in the light-loading district.

D. Simultaneous Application of Loads

Where a combination of vertical, transverse, or longitudinal loads may occur simultaneously, the structure shall be designed to withstand the simultaneous application of these loads.

NOTE: Under the extreme wind conditions of Rule 250C, an oblique wind may require greater structural strength than that computed by Rules 252B and 252C.

253. Overload Factors for Structures, Crossarms, Support Hardware, Guys, Foundations, and Anchors

Loads due to the combined ice and wind loads in Rule 250B and the extreme wind loading condition in Rule 250C shall be multiplied by the overload factors in Table 253-1 or the alternate overload factors in Table 253-2. Table 253-1 shall be used with Table 261-1A. Table 253-2 shall be used with Table 261-1B.

For wood and reinforced (not prestressed) concrete, two methods for determining the capacity are included herein. Either method meets the basic requirements for safety.

Table 253-1
Overload Factors for Structures,[1] Crossarms, Support Hardware, Guys, Foundations, and Anchors to Be Used with the Strength Factors of Table 261-1A

	Overload Factors	
	Grade B	**Grade C**
Rule 250B Loads		
Vertical Loads[3]	1.50	1.90[6]
Transverse Loads		
Wind	2.50	2.20[4]
Wire Tension	1.65[2]	1.30[5]
Longitudinal Loads		
At Crossings		
In general	1.10	no requirement
At deadends	1.65[2]	1.30[5]
Elsewhere		
In general	1.00	no requirement
At deadends	1.65[2]	1.30[5]
Rule 250C Loads	1.00	1.00

[1] Includes pole.

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

[3] Where vertical loads significantly reduce the stress in a structure member a vertical overload factor of 1.0 should be used for the design of such member. Such member shall be designed for the worst case loading.

[4] This factor may be reduced to 1.75 when the span being supported is not at a crossing.

[5] For metal or prestressed concrete portions of structures and crossarms, guys, foundations, and anchors, use a value of 1.10.

[6] For metal or prestressed concrete portions of structures, crossarms, guys, foundations, and anchors, use a value of 1.50.

Table 253-2
Alternate Overload Factors for Wood and Reinforced (Not Prestressed) Concrete Structures[1,5] to Be Used with the Strength Factors of Table 261-1B

	Overload Factors			
	Grade B		Grade C	
	When Installed	At Replacement[2,3]	When Installed	At Replacement[2,3]
Rule 250B Loads				
Vertical loads[4]	2.20	1.50	2.20	1.50
Transverse loads				
Wind (at crossings)	4.00	2.67	2.67	1.33
Wind (elsewhere)	4.00	2.67	2.00	1.33
Wire tension	2.00	1.33	1.33	1.00
Longitudinal loads				
In general	1.33	1.00	No requirement	No requirement
At deadends	2.00[6]	1.33[7]	1.33	1.00
Rule 250C Loads	1.33	1.00	1.33	1.00

[1] Includes poles.

[2] Where a wood structure is built for temporary service, the overload factors at replacement may be used provided the designated fiber stress is not exceeded during the life of the structure. Where a reinforced concrete (not prestressed) structure is built for temporary service, the overload factors at replacement may be used.

[3] When structure strength deteriorates to the level of the loads multiplied by the overload factors required at replacement, the structure shall be replaced or rehabilitated. If a structure is replaced, it shall meet the "when installed" overload factors at replacement. Rehabilitated portions of structures shall have overload factors at the time of rehabilitation greater than of those required "at replacement."

[4] Where vertical loads significantly reduce the stress in a structural member, a vertical overload factor of 1.0 should be used for the design of such member. Such members shall be designed for the worst-case loading.

[5] Metal portions of a structure may be designed using the overload factors in Table 253-1.

[6] For unguyed wood poles supporting communication conductors and cables only, this factor may be reduced to 1.33.

[7] For unguyed wood poles supporting communication conductors and cables only, this factor may be reduced to 1.0.

Section 26.
Strength Requirements

260. General (see also Section 20)

A. Preliminary Assumptions

1. It is recognized that deformation, deflections, or displacement of parts of the structure may change the effects of the loads assumed. In the calculation of stresses, allowance may be made for such deformation, deflection, or displacement of supporting structures including poles, towers, guys, crossarms, pins, conductor fastenings, and insulators when the effects can be evaluated. Such deformation, deflection, or displacement should be calculated using Rule 250 loads prior to application of the overload factors in Rule 253. For crossings or conflicts, the calculations shall be subject to mutual agreement.
2. It is recognized that new materials may become available. While these materials are in the process of development, they must be tested and evaluated. Trial installations are permitted where qualified supervision is provided.

B. Application of strength factors

1. Structures shall be designed to withstand the appropriate loads multiplied by the overload factors in Section 25 without exceeding their strength multiplied by the strength factors in Section 26.
2. Unless otherwise specified, a strength factor of 0.80 shall be used for the extreme wind loading conditions specified in Rule 250C for all supported facilities.

NOTE: The latest edition of the following documents are among those available for determining structure design capacity with the specified NESC loads, overload factors, and strength factors:

ANSI/ASCE-10, Design of Latticed Steel Transmission Structures

ASCE-91, Design of Guyed Electrical Transmission Structure

ASCE-PCI, Guide for the Design of Prestressed Concrete Poles

ASCE-72, Design of Steel Transmission Pole Structures

PCI, Design Handbook-Precast and Prestressed Concrete

ACI-318, Building Code Requirements for Structural Concrete

IEEE Std 751-1990, Trial-Use Design Guide for Wood Transmission Structures

AISI, Specification for the Design of Cold-Formed Steel Structural Members

The Aluminum Association, Aluminum Design Manual

261. Grades B and C Construction

A. Supporting Structures

The strength requirements for supporting structures may be met by the structures alone or with the aid of guys or braces or both.

1. Metal, Prestressed-, and Reinforced-Concrete Structures
   a. These structures shall be designed to withstand the loads in Rule 252 multiplied by the appropriate overload factors in Table 253-1 or Table 253-2 without exceeding the permitted load.
   b. The permitted load shall be the strength multiplied by the strength factors in Tables 261-1A or 261-1B (where guys are used, see Rule 261C).
   c. All structures including those below 18 m (60 ft) shall be designed to withstand, without conductors, the extreme wind load in Rule 250C applied in any direction on the structure.
   d. Spliced and Reinforced Structures

      Reinforcements or permanent splices to a supporting structure are permitted provided they develop the required strength of the structure.

2. Wood Structures

Wood structures shall be of material and dimensions to meet the following requirements:

a. Wood structures shall be designed to withstand the loads in Rule 252 multiplied by the appropriate overload factors in Table 253-1 or 253-2, without exceeding the permitted stress level.

NOTE: When determining a fiber stress for column loads, buckling needs to be considered.

EXCEPTION 1: When installed, naturally grown wood poles acting as single-based structures or unbraced multiple-pole structures, shall meet the requirements of Rule 261A2a without exceeding the permitted stress level at the ground line for unguyed poles or at the points of attachment for guyed poles.

EXCEPTION 2: At a Grade B crossing, in a straight section of line, wood structures complying with the transverse strength requirements of Rule 261A2a, without the use of transverse guys, shall be considered as having the required longitudinal strength, providing the longitudinal strength is comparable to the transverse strength of the structure. This *EXCEPTION* does not modify the requirements of this rule for deadends.

EXCEPTION 3: At a Grade B crossing of a supply line over a highway or a communication line where there is an angle in the supply line, wood structures shall be considered as having the required longitudinal strength if all of the following conditions are met:

(a) The angle is not over 20 degrees.

(b) The angle structure is guyed in the plane of the resultant of the conductor tensions. The tension in this guy under the loading in Rule 252 multiplied by an overload factor of 2.0 shall not exceed the rated breaking strength multiplied by the strength factor in Table 261-1A.

(c) The angle structure has sufficient strength to withstand, without guys, the transverse loading of Rule 252 multiplied by the appropriate overload factors in Table 253-1 or 253-2, which would exist if there were no angle at that structure without exceeding the permitted stress level.

b. Permitted Stress Level

(1) Natural Wood Pole
The permitted stress level of natural wood poles of various species meeting the requirements of ANSI O5.1-1992 shall be determined by multiplying the designated fiber stress set forth in that standard by the appropriate strength factors in Tables 261-1A or 261-1B.

(2) Sawn or Laminated Wood Structural Members, Crossarms, and Braces
The permitted stress level of sawn or laminated wood structural members, crossarms, and braces shall be determined by multiplying the appropriate ultimate fiber stress of the material by the appropriate strength factors in Tables 261-1A or 261-1B.

c. Strength of Guyed Poles

Guyed poles shall be designed as columns, resisting the vertical component of the tension in the guy plus any other vertical loads.

d. Spliced and Reinforced Poles

Reinforcements or permanent splices at any section along the pole are permitted provided they develop the required strength of the pole.

e. Average Strength of Three Poles

A pole (single-base structure) not individually meeting the transverse strength requirements will be permitted when reinforced by a stronger pole on each side, if all of the following are met:

(1) The average strength of the three poles meets the transverse strength requirements,

(2) The weak pole shall have not less than 75% of its required strength,

(3) The sag and tension of the wires, conductors, and cables in the adjacent spans shall provide adequate additional support for the weak pole, and

(4) The average of the spans does not exceed 45 m (150 ft).

EXCEPTION 1: The span may exceed 45 m (150 ft), but shall not be greater than 91 m (300 ft), if overhead guys are run between the three poles and the line section is head-guyed and back-guyed.

An extra pole inserted in a normal span for the purpose of supporting a service drop may be ignored in this strength determination.

EXCEPTION 2: This rule does not apply to crossings over railroads, communication lines, or limited access highways.

f. All structures including those below 18 m (60 ft) shall be designed to withstand, without conductors, the extreme wind load in Rule 250C applied in any direction on the structure.

3. Transverse Strength Requirements for Structures Where Side Guying Is Required, But Can Be Installed Only at a Distance

Grade B: If the transverse strength requirements of this section cannot be met except by the use of side guys or special structures, and where it is physically impractical to employ side guys, the transverse strength requirements may be met by side-guying the line at each side of, and as near as practical to, the crossing, or other transversely weak structure, and with a distance between such side-guyed structures of not over 250 m (800 ft), provided that:

a. The side-guyed structures for each such section of 250 m (800 ft) or less shall be designed to withstand the calculated transverse load due to wind on the supports and ice-covered conductors, on the entire section between side-guyed structures.
b. The line between such side-guyed structures shall be substantially in a straight line and the average span between the side-guyed structures shall not exceed 45 m (150 ft).
c. The entire section between the structures with the required transverse strength shall comply with the highest grade of construction concerned in the given section, except as to the transverse strength of the intermediate poles or towers.

Grade C: The above provisions do not apply to Grade C.

4. Longitudinal Strength Requirements for Sections of Higher Grade in Lines of a Lower Grade Construction

a. Methods of Providing Longitudinal Strength

Grade B: The longitudinal strength requirements for sections of line of higher grade in lines of a lower grade (for assumed longitudinal loading, see Rule 252) may be met by placing a structure of the required longitudinal strength at each end of the higher grade section.

Where this is impractical, the structures of the required longitudinal strength may be located away from the section of higher grade, within 150 m (500 ft) on each side and with not more than 250 m (800 ft) between the structures of the required longitudinal strength. This is permitted provided the following conditions are met:

(1) The structures and the line between them meet the requirements for transverse strength and stringing of conductors of the highest grade occurring in the section, and
(2) The line between the structures of the required longitudinal strength is approximately straight or suitably guyed.

The longitudinal strength requirement of the structures may be met by using guys.

Grade C: The above provisions do not apply to Grade C.

b. Flexible Supports

Grade B: When supports of the section of higher grade are capable of considerable deflection in the direction of the line, it may be necessary to increase the clearances required in Section 23 or to provide line guys or special reinforcements to reduce the deflection.

Grade C: The above provision does not apply to Grade C.

B. Strength of Foundations, Settings, and Guy Anchors

Foundations, settings, and guy anchors shall be designed or be determined by experience to withstand the loads in Rule 252 multiplied by the overload factors in Table 253-1 without exceeding the permitted load. The permitted load shall be equal to the strength multiplied by the strength factors in Table 261-1A.

NOTE: Excessive movement of foundations, settings, and guy anchors or errors in settings may reduce clearances or structure capacity.

C. Strength of Guys and Guy Insulators

The strength requirements for guys and guy insulators are covered under Rules 264 and 279A1c, respectively.

1. Metal and Prestressed-Concrete Structures

Guys shall be considered as an integral part of the structure.

2. Wood and Reinforced-Concrete Structures

When guys are used to meet the strength requirements, they shall be considered as taking the en-

tire 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.

NOTE: Excessive movement of guys may reduce clearances or structure capacity.

D. Crossarms and Braces

1. Concrete and Metal Crossarms and Braces

Crossarms and braces shall be designed to withstand the loads in Rule 252 multiplied by the overload factors in Table 253-1 without exceeding the permitted load. The permitted load shall be equal to the strength multiplied by the strength factors in Table 261-1A.

2. Wood Crossarms and Braces

a. Strength

(1) Crossarms and braces shall be designed to withstand the loads in Rule 252 multiplied by the overload factors in Table 253-1 or 253-2 without exceeding their permitted stress level.

(2) The permitted stress level of solid sawn or laminated wood crossarms and braces shall be determined by multiplying their ultimate fiber stress by the strength factors in Table 261-1A or 261-1B.

b. Material and Size

Wood crossarms and braces of select Southern pine or Douglas fir shall have a cross section of not less than those in Table 261-2. Crossarms of other species may be used provided they have equal strength.

3. Crossarms and Braces of Other Materials

Crossarms and braces should meet the strength requirements of Rule 261D2.

4. Additional Requirements

a. Longitudinal Strength

(1) General

(a) Crossarms shall be designed to withstand a load of 3.1 kN (700 lb) applied at the outer conductor attachment point without exceeding the permitted stress level for wood crossarms or the permitted load for crossarms of other materials, as applicable.

(b) At each end of a transversely weak section, as described in Rule 261A3, the longitudinal load shall be applied in the direction of the weak section.

(2) Methods of Meeting Rule 261D2a(1)

Grade B: Where conductor tensions are limited to a maximum of 9.0 kN (2000 lb) per conductor, double wood crossarms having cross sections in Table 261-2 and properly assembled will comply with the longitudinal strength requirements in Rule 261D2a(1).

Grade C: This requirement is not applicable.

(3) Location

At crossings, crossarms should be mounted on the face of a pole away from the crossing, unless special bracing or double crossarms are used.

b. Bracing

Crossarms shall be supported by bracing, if necessary, to support expected loads, including line personnel working on them.

c. Double Crossarms or Brackets

Grade B: Where pin-type construction is used, double crossarms, each crossarm having the strength required by Rule 261D2a, or a support assembly of equivalent strength shall be used at each crossing structure, at ends of joint use or conflict sections, at deadends, and at corners where the angle of departure from a straight line exceeds 20 degrees. Under similar conditions, where a bracket supports a conductor operated at more than 750 V to ground and there is no crossarm below, double brackets shall be used.

EXCEPTION: The above does not apply where communication cables or conductors cross below supply conductors and either are attached to the same pole, or where supply conductors are continuous and of uniform tension in the crossing span and each adjacent span. This exception does not apply to railroad crossings and limited access highways except by mutual agreement.

Grade C: The above requirement is not applicable.

E. Insulators

The strength requirements for insulators are covered under Rules 277 and 279.

F. Strength of Pin-Type or Similar Construction and Conductor Fastenings

1. Longitudinal Strength

a. General

Pin-type or similar construction and ties or other conductor fastenings shall be designed to withstand the applicable longitudinal loads in Rule 252, multiplied by the overload factors in Table 253-1, or 3.1 kN (700 lb) applied at the pin, whichever is greater.

b. Method of Meeting Rules 261F1a

Grade B: Where conductor tensions are limited to 9.0 kN (2000 lb) and such conductors are supported on pin insulators, double wood pins and ties or their equivalent will be considered to meet the requirements of Rule 261F1a.

Grade C: No requirement.

c. At Deadends and at Ends of Higher Grade Construction in Line of Lower Grade

Grade B: Pins and ties or other conductor fastenings connected to the structure at a deadend or at each end of the higher grade section shall be designed to withstand an unbalanced pull due to the conductor load in Rule 251 multiplied by the overload factors in Rule 253-1.

Grade C: This requirement is not applicable except for deadends.

d. At Ends of Transverse Sections Described in Rule 261A3

Grade B: Pins and ties or other conductor fastenings connected to the structure at ends of the transverse section as described in Rule 261A3 shall be designed to withstand the unbalanced pull in the direction of that transverse section under the load in Rule 252 multiplied by the overload factors in Rule 253-1.

Grade C: No requirement.

2. Double Pins and Conductor Fastenings

Grade B: Double pins and conductor fastenings shall be used where double crossarms or brackets are required by Rule 261D4c.

EXCEPTION: The above does not apply where communication cables or conductors cross below supply conductors and either are attached to the same pole, or where supply conductors are continuous and of uniform tension in a crossing span and each adjacent span. This exception does not apply in the case of railroad crossings and limited access highway crossings except by mutual agreement.

Grade C: No requirement.

3. Single Supports Used in Lieu of Double Wood Pins

A single conductor support and its conductor fastening, when used in lieu of double wood pins, shall develop strength equivalent to double wood pins and their conductor fastenings as specified in Rule 261F1a.

G. Armless Construction

1. General

Open conductor armless construction is a type of open conductor supply line construction in which conductors are individually supported at the structure without the use of crossarms.

2. Insulating Material

Strength of insulating material shall meet the requirements of Section 27.

3. Other Components

Strengths of other components shall meet the requirements of Rules 260 and 261.

H. Open Supply Conductors and Overhead Shield Wires

1. Sags and Tensions

a. The supply conductor and overhead shield wire tensions shall be not more than 60 percent of their rated breaking strength for the load of Rule 250B in Rule 251 multiplied by an overload factor of 1.0.

b. The tension at 15 °C (60 °F), without external load, shall not exceed the following percentages of their rated breaking strength:

Initial unloaded tension	35%
Final unloaded tension	25%

EXCEPTION: In the case of conductors with a generally triangular cross section, such as cables composed of three wires, the final unloaded tension at 15 °C (60 °F) shall not exceed 30% of the rated breaking strength of the conductor.

NOTE: The above limitations are based on the use of recognized methods for avoiding fatigue failures by minimizing chafing and stress concentration. If such practices are not followed, lower tensions should be employed.

2. Splices, Taps, Dead-End Fittings, and Associated Attachment Hardware

a. Splices should be avoided in crossings and adjacent spans. If it is impractical to avoid such splices, they shall have sufficient strength to withstand the maximum tension resulting from the loads of Rule 250B in Rule 251 multiplied by an overload factor of 1.65. If Rule 250C is applicable, splices shall not be stressed beyond 80% of their rated breaking strength under the loads of Rule 250C in Rule 251 multiplied by an overload factor of 1.0.

b. Taps should be avoided in crossing spans but, if required, shall be of a type that will not impair the strength of the conductors to which they are attached.

c. Dead-end fittings, including the associated attachment hardware, shall have sufficient strength to withstand the maximum tension resulting from the loads of Rule 250B in Rule 251 multiplied by an overload factor of 1.65. If Rule 250C is applicable, deadend fittings shall not be stressed beyond 80% of their rated breaking strength under the loads of Rule 250C in Rule 251 multiplied by an overload factor of 1.0.

3. Trolley-Contact Conductors

In order to provide for wear, no trolley-contact conductor shall be installed of less size than AWG No. 0, if of copper, or AWG No. 4, if of silicon bronze.

I. Supply Cable Messengers

Messengers shall be stranded and shall not be stressed beyond 60% of their rated breaking strength under the loads of Rule 250B in Rule 251 multiplied by an overload factor of 1.0. If Rule 250C is applicable, messengers shall not be stressed beyond 80% of their rated breaking strength under the loads of Rule 250C in Rule 251 multiplied by an overload factor of 1.0.

NOTE: There are no strength requirements for cables supported by messengers.

J. Open-Wire Communication Conductors

Open-wire communication conductors in Grade B or C construction shall have the tensions and sags in Rule 261H2 for supply conductors of the same grade.

EXCEPTION: Where supply conductors are trolley-contact conductors of 0 to 750 V to ground, WG No. 12 Stl may be used for communication conductors for spans of 0 to 30 m (0 to 100 ft), and Stl WG No. 9 may be used for spans of 38 to 45 m (125 to 150 ft).

K. Communication Cables

1. Communication Cables

There are no strength requirements for communication cables supported by messengers. See Rule 261K2 for the strength requirements for messengers supporting communication cables.

2. Messenger

The messenger shall not be stressed beyond 60% of its rated breaking strength under the loads of Rule 250B in Rule 251 multiplied by an overload factor of 1.0. If Rule 250C is applicable, messengers shall not be stressed beyond 80% of their rated breaking strength under the loads of Rule 250C in Rule 251 multiplied by an overload factor of 1.0.

L. Paired Communication Conductors

1. Paired Conductors Supported on Messenger

a. Use of Messenger
A messenger may be used for supporting paired conductors in any location, but is required for paired conductors crossing over trolley-contact conductors of more than 7.5 kV to ground.

b. Sag of Messenger
Messenger used for supporting paired conductors required to meet Grade B construction because of crossing over trolley-contact conductors shall meet the sag requirements for Grade B.

c. Size and Sag of Conductors
There are no requirements for paired conductors when supported on messenger.

2. Paired Conductors Not Supported on Messenger

a. Above Supply Lines
Grade B: Sizes and sags shall be not less than those in Rule 261H1 for supply conductors of similar grade.
Grade C: Sizes and sags shall be not less than the following:
Spans 0 to 30 m (0 to 100 ft)—No sag requirements.
Each conductor shall have a rated breaking strength of not less than 0.75 kN (170 lb).
Spans 30 to 45 m (100 to 150 ft)—Sizes and sags shall be not less than required for Grade B communication conductors.
Spans exceeding 45 m (150 ft)—Sizes and sags shall be not less than required for Grade C supply conductors. (See Rule 261H2).

b. Above Trolley-Contact Conductors
Grade B: Sizes and sags shall be not less than the following:
Spans 0 to 30 m (0 to 100 ft)—No size requirements. Sags shall be not less than for AWG No. 8 hard-drawn copper. (See Rule 261H2.)
Spans exceeding 30 m (100 ft)—Each conductor shall have a rated breaking strength of not less than 0.75 kN (170 lb). Sags shall be not less than for AWG No. 8 hard-drawn copper. (See Rule 261H2.)
Grade C: Sizes and sags shall be as follows:
Spans 0 to 30 m (0 to 100 ft)—No requirements.
Spans exceeding 30 m (100 ft)—No sag requirements.
Each conductor shall have a rated breaking strength of not less than 0.75 kN (170 lb).

M. Support and Attachment Hardware
The strength required for all support and attachment hardware not covered by Rule 261F or Rule 261H2 shall be not less than the load times the appropriate overload factor given in Section 25. For appropriate strength factors, see Rule 260B.

Table 261-1A

Strength Factors for Structures,[1] Crossarms, Support Hardware, Guys, Foundations, and Anchors for Use with Overload Factors of Table 253-1

[It is recognized that structures will experience some level of deterioration after installation, depending upon materials, maintenance, and service conditions. The table values specify strengths required at installation. Footnotes specify deterioration allowed, if any. When new or changed facilities add loads to existing structures (a) the strength of the structure when new shall have been great enough to support the additional loads and (b) the strength of the deteriorated structure shall exceed the strength required at replacement. If either (a) or (b) cannot be met, the structure must be replaced, augmented, or rehabilitated.]

	Grade B	Grade C
Strength factors for use with loads of Rule 250B		
Metal and Prestressed-Concrete Structures[6]	1.0	1.0
Wood and Reinforced-Concrete Structures[2,4]	0.65	0.85
Support Hardware	1.0	1.0
Guy Wire[5,6]	0.9	0.9
Guy Anchor and Foundation[6]	1.0	1.0
Strength factors for use with loads of Rule 250C		
Metal and Prestressed-Concrete Structures[6]	1.0	1.0
Wood and Reinforced-Concrete Structures[3,4]	0.75	0.75
Support Hardware	1.0	1.0
Guy Wire[5,6]	0.9	0.9
Guy Anchor and Foundation[6]	1.0	1.0

[1] Includes poles.

[2] Wood and reinforced concrete structures shall be replaced or rehabilitated when deterioration reduces the structure strength to 2/3 of that required when installed. If a structure is replaced, it shall meet the strength required by Table 261-1A. Rehabilitated portions of structures shall have strength greater than 2/3 of that required when installed.

[3] Wood and reinforced concrete structures shall be replaced or rehabilitated when deterioration reduces the structure strength to 3/4 of that required when installed. If a structure is replaced, it shall meet the strength required by Table 261-1A. Rehabilitated portions of structures shall have strength greater than 3/4 of that required when installed.

[4] Where a wood or reinforced concrete structure is built for temporary service, the structure strength may be reduced to values as low as those permitted by footnotes (2) and (3) provided the structure strength does not decrease below the minimum required during the planned life of the structure.

[5] For guy insulator requirements, see Rule 279.

[6] Deterioration during service shall not reduce strength capability below the required strength.

Table 261-1B

Strength Factors for Structures[1,2] and Crossarms for Use with Overload Factors of Table 253-2

[It is recognized that structures will experience some levels of deterioration after installation, depending upon materials, maintenance, and service conditions. The table values specify strengths required at installation. Footnotes specify deterioration allowed for wood and reinforced concrete structures. When new or changed facilities add loads to existing structures (a) the strength of the structure when new shall have been great enough to support the additional loads, and (b) the strength of the deteriorated structure shall exceed the strength required at replacement. If either (a) or (b) cannot be met, the structure must be replaced, augmented, or rehabilitated.]

	Grade B	Grade C
Strength factors for use with loads of Rule 250B and Rule 250C		
Wood and Reinforced-Concrete Structures	1.0	1.0

[1] Includes poles.

[2] Where a wood or reinforced-concrete structure is built for temporary service, the structure strength may be reduced to values as low as those permitted by the *at replacement* overload factors in Table 253-2, footnotes (2) and (3) provided the structure strength does not decrease below the minimum required during the planned life of the structure.