



PEG 2001 - NEC 830 Compliance

Cox Communications Application of NEC 830

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PEG 2001 - What Is Cox?



- **Is the 5th Largest Cable Television Company**
- **Entered the Market in 1962**
- **Serves 6.2 Million Mostly Sun Belt Customers**
- **Offers Bundled Services Over HFC Networks**
 - Digital & Analog CATV
 - High Speed Data
 - Telephony

Electrical Protection of Customer Installations – TSP 5-949-003

This TSP addresses:

1. Network Powered Coax  (emphasis on this)
2. Unpowered Coax
3. Paired Copper, and

Code Requirements:

- NEC (National Electrical Code)
- NESC (National Electrical Safety Code)

This discussion will focus on change issues:

- Code application
- Drop cable standardization
- Ground wire sizing
- Drop attachment methods

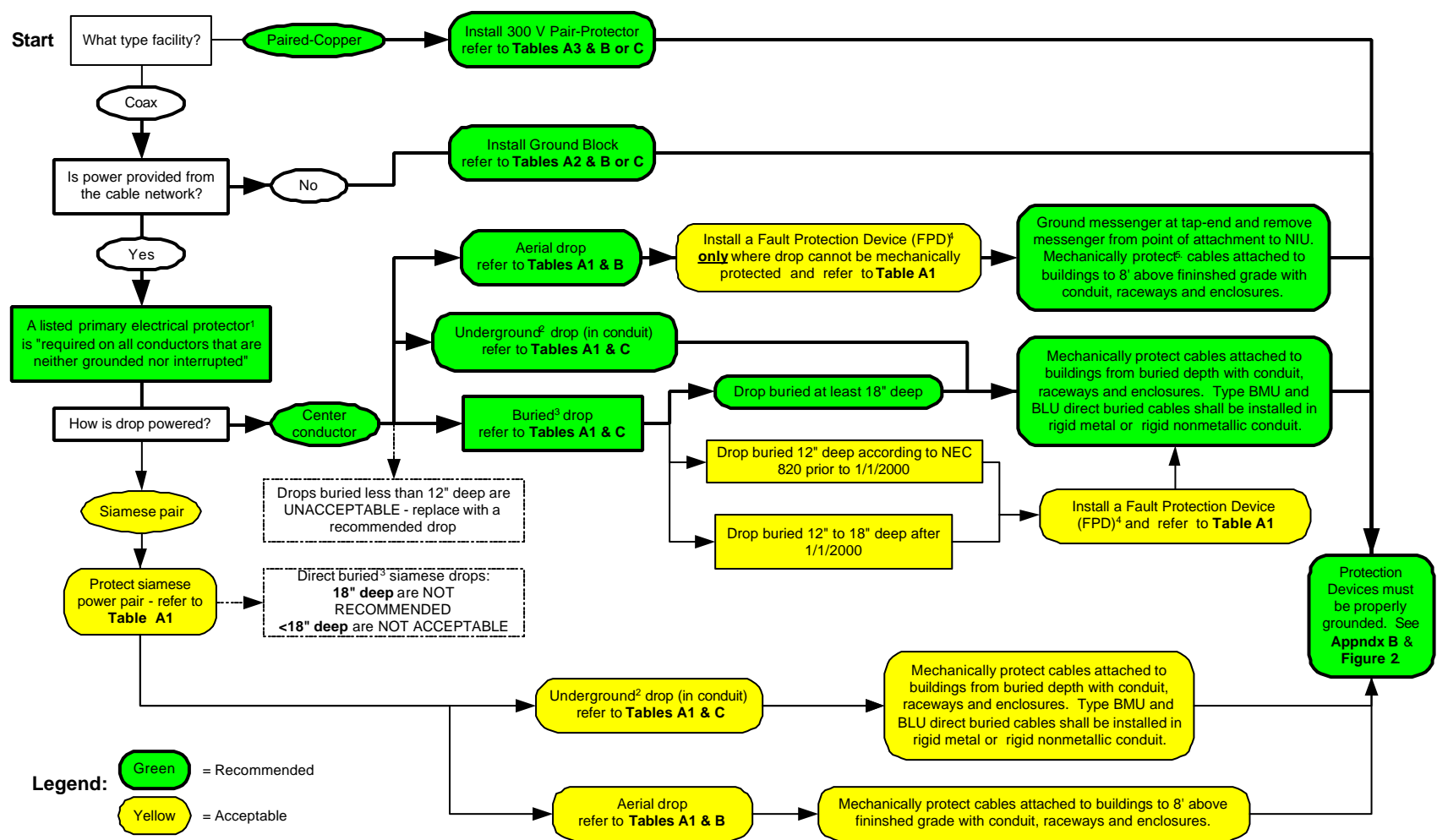


Figure 3. Protection Requirements for Customer Drops & Entrance Cables

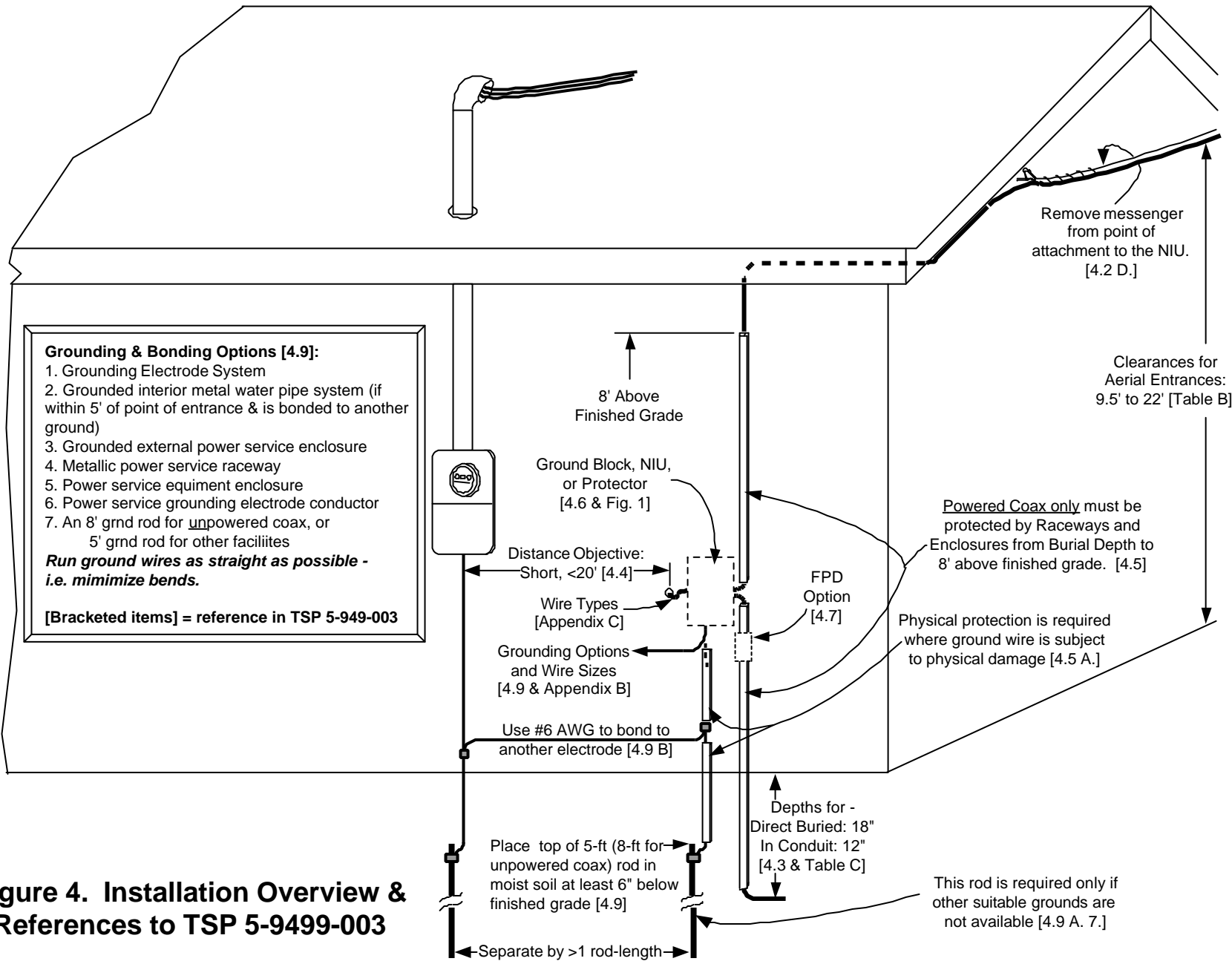


Figure 4. Installation Overview & References to TSP 5-9499-003

Code & Ground Wire Sizing Issues

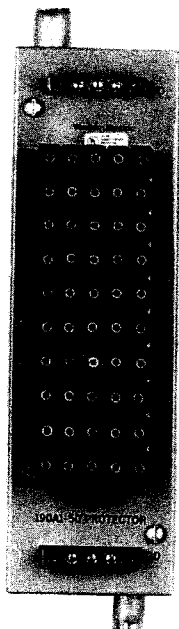


Figure 800.3 A primary protector unit typically installed in commercial buildings. This is the interface to the outside plant cable. (AT&T)

tor and the equipment, it shall be listed for the purpose. The secondary protector shall provide means to safely limit currents to less than the current-carrying capacity of listed indoor communications wire and cable, listed telephone set line cords, and listed communications terminal equipment having ports for external wire line communications circuits. Any overvoltage protection, arresters, or grounding connection shall be connected on the equipment terminals side of the secondary protector current-limiting means.

FPN No. 1: One way to determine applicable requirements for a listed secondary protector is to refer to the *Standard for Secondary Protectors for Communications Circuits*, UL 497A-1996.

FPN No. 2: Secondary protectors on exposed circuits are not intended for use without primary protectors.

800-33. Cable Grounding. The metallic sheath of communications cables entering buildings shall be grounded as close as practicable to the point of entrance or shall be interrupted as close to the point of entrance as practicable by an insulating joint or equivalent device.

For purposes of this section, the point of entrance shall be considered to be at the point of emergence through an exterior wall, a concrete floor slab, or from a rigid metal conduit or an intermediate metal conduit grounded to an electrode in accordance with Section 800-40(b).

D. Grounding Methods

800-40. Cable and Primary Protector Grounding. The metallic member(s) of the cable sheath, where required to be grounded by Section 800-33, and primary protectors shall be grounded as specified in (a) through (d).

(a) Grounding Conductor.

(1) **Insulation.** The grounding conductor shall be insulated and shall be listed as suitable for the purpose.

(2) **Material.** The grounding conductor shall be copper or other corrosion-resistant conductive material, stranded or solid.

(3) **Size.** The grounding conductor shall not be smaller than No. 14.

(4) **Run in Straight Line.** The grounding conductor shall be run to the grounding electrode in as straight a line as practicable.

(5) **Physical Damage.** Where necessary, the grounding conductor shall be guarded from physical damage. Where the grounding conductor is run in a metal raceway, both ends of the raceway shall be bonded to the grounding conductor or the same terminal or electrode to which the grounding conductor is connected.

(b) **Electrode.** The grounding conductor shall be connected as follows.

(1) To the nearest accessible location on the following:

(a) The building or structure grounding electrode system as covered in Section 250-50

the exterior wall of the mobile home it serves, shall be considered to meet the requirements of this section.

FPN: Selecting a primary protector location to achieve the shortest practicable primary protector grounding conductor will help limit potential differences between communications circuits and other metallic systems.

(c) **Hazardous (Classified) Locations.** The primary protector shall not be located in any hazardous (classified) location as defined in Article 500, nor in the vicinity of easily ignitable material.

Exception: As permitted in Sections 501-14, 502-14, and 503-12.

800-31. Primary Protector Requirements. The primary protector shall consist of an arrester connected between each line conductor and ground in an appropriate mounting. Primary protector terminals shall be marked to indicate line and ground as applicable.

FPN: One way to determine applicable requirements for a listed primary protector is to refer to the *Standard for Protectors for Paired Conductor Communications Circuits*, ANSI/UL 497-1995.

800-32. Secondary Protector Requirements. Where a secondary protector is installed in series with the indoor communications wire and cable between the primary protec-

section permanently separated from such conductors by means of a suitable barrier.

(b) Direct-Buried Cables and Raceways. Direct-buried coaxial cable shall be separated at least 12 in. (305 mm) from conductors of any light or power or Class 1 circuit.

Exception No. 1: Where electric service conductors or coaxial cables are installed in raceways or have metal cable armor.

Exception No. 2: Where electric light or power branch-circuit or feeder conductors or Class 1 circuit conductors are installed in a raceway or in metal-sheathed, metal-clad, or Type UF or Type USE cables; or the coaxial cables have metal cable armor or are installed in a raceway.

See the commentary following Section 800-10(c), Exception.

C. Protection

820-33. Grounding of Outer Conductive Shield of a Coaxial Cable. Where coaxial cable is exposed to lightning or to accidental contact with lightning arrester conductors or power conductors operating at a voltage of over 300 volts to ground, the outer conductive shield of the coaxial cable shall be grounded at the building premises as close to the point of cable entry as practicable. For purposes of this section, the point at which the exposed cable enters shall be considered to be the point of emergence through an exterior wall, a concrete floor slab, or from a rigid or intermediate metal conduit grounded to an electrode in accordance with Section 820-40(b).

For purposes of this section, grounding located at mobile home service equipment located in sight from and not more than 30 ft (9.14 m) from the exterior wall of the mobile home it serves, or at a mobile home disconnecting means grounded in accordance with Section 250-32 and located in sight from and not more than 30 ft (9.14 m) from the exterior wall of the mobile home it serves, shall be considered to meet the requirements of this section.

FPN: Selecting a grounding location to achieve the shortest practicable grounding conductor will help limit potential differences between CATV and other metallic systems.

(a) Shield Grounding. Where the outer conductive shield of a coaxial cable is grounded, no other protective devices shall be required.

(b) Shield Protection Devices. Grounding of a coaxial drop cable shield by means of a protective device that does not interrupt the grounding system within the premises shall be permitted.

Section 820-33(b) permits the use of a shield protection device that does not interrupt the grounding system within the premises. This permits protection against overheating for the CATV service-drop cable.

Overheating can occur due to neutral fault currents in the power and lighting systems. Such a protective device would have to maintain the integrity of the coaxial system to prevent RF leakage. An ordinary fuse, for example, ~~would not be suitable.~~

D. Grounding Methods

820-40. Cable Grounding. Where required by Section 820-33, the shield of the coaxial cable shall be grounded as specified in (a) through (d).

(a) Grounding Conductor.

(1) Insulation. The grounding conductor shall be insulated and shall be listed as suitable for the purpose.

(2) Material. The grounding conductor shall be copper or other corrosion-resistant conductive material, stranded or solid.

(3) Size. The grounding conductor shall not be smaller than No. 14. It shall have a current-carrying capacity approximately equal to that of the outer conductor of the coaxial cable.

(4) Run in Straight Line. The grounding conductor shall be run to the grounding electrode in as straight a line as practicable.

(5) Physical Protection. Where subject to physical damage, the grounding conductor shall be adequately protected. Where the grounding conductor is run in a metal raceway, both ends of the raceway shall be bonded to the grounding conductor or the same terminal or electrode to which the grounding conductor is connected.

(b) Electrode. The grounding conductor shall be connected as follows.

(1) To the nearest accessible location on the following:

- (a) The building or structure grounding electrode system as covered in Section 250-50
- (b) The grounded interior metal water piping system as covered in Section 250-104(a)
- (c) The power service accessible means external to enclosures as covered in Section 250-92(b)
- (d) The metallic power service raceway
- (e) The service equipment enclosure
- (f) The grounding electrode conductor or the grounding electrode conductor metal enclosure, or
- (g) To the grounding conductor or to the grounding electrode of a building or structure disconnecting means that is grounded to an electrode as covered in Section 250-32; or

(2) If the building or structure served has no grounding means as described in (b)(1), to any one of the individual electrodes described in Section 250-50; or

(3) If the building or structure served has no grounding means as described in (b)(1) or (b)(2), to an effectively

an arrester connected between each conductor to be protected and ground, a fuse in series with each conductor to be protected, and an appropriate mounting arrangement. Fused primary protector terminals shall be marked to indicate line, instrument, and ground, as applicable.

(b) **Location.** The location of the primary protector, where required, shall comply with (1), (2), or (3).

(1) A listed primary protector shall be applied on each network-powered broadband communications cable external to and on the network side of the network interface unit.

(2) The primary protection function shall be an integral part of and contained in the network interface unit. The network interface unit shall be listed for the purpose and shall have an external marking indicating that it contains primary electrical protection.

(3) The primary protector(s) shall be provided on the derived circuit(s) (output side of the NIU), and the combination of the NIU and the protector(s) shall be listed for the purpose.

A primary protector, whether provided integrally or external to the network interface unit, shall be located as close as practicable to the point of entrance.

For purposes of this section, a network interface unit and any externally provided primary protectors located at mobile home service equipment located in sight from and not more than 30 ft (9.14 m) from the exterior wall of the mobile home it serves, or at a mobile home disconnecting means grounded in accordance with Section 250-32 and located in sight from and not more than 30 ft (9.14 m) from the exterior wall of the mobile home it serves, shall be considered to meet the requirements of this section.

FPN: Selecting a network interface unit and primary protector location to achieve the shortest practicable primary protector grounding conductor will help limit potential differences between communications circuits and other metallic systems.

(c) **Hazardous (Classified) Locations.** The primary protector or equipment providing the primary protection function shall not be located in any hazardous (classified) location as defined in Article 500 or in the vicinity of easily ignitable material.

Exception: As permitted in Sections 501-14, 502-14, and 503-12.

830-33. Grounding or Interruption of Metallic Members of Network-Powered Broadband Communications Cables. The shields of network-powered broadband communications cables used for communications or powering shall be grounded at the building as close to the point of entrance as practicable. Metallic cable members not used for communications or powering shall be grounded or interrupted by an insulating joint or equivalent device as close to the point of entrance as practicable.

For purposes of this section, grounding or interruption of network-powered broadband communications cable metallic members installed at mobile home service equipment located in sight from and no more than 30 ft (9.14 m) from the

exterior wall of the mobile home it serves, or at a mobile home disconnecting means grounded in accordance with Section 250-24 and located in sight from and not more than 30 ft (9.14 m) from the exterior wall of the mobile home it serves, shall be considered to meet the requirements of this section.

FPN: Selecting a grounding location to achieve the shortest practicable grounding conductor will help limit potential differences between the network-powered broadband communications circuits and other metallic systems.

D. Grounding Methods

830-40. Cable, Network Interface Unit, and Primary Protector Grounding. Network interface units containing protectors, NIUs with metallic enclosures, primary protectors, and the grounded metallic members of the network-powered broadband communications cable shall be grounded as specified in (a) through (d).

(a) Grounding Conductor.

(1) **Insulation.** The grounding conductor shall be insulated and shall be listed as suitable for the purpose.

(2) **Material.** The grounding conductor shall be copper or other corrosion-resistant conductive material, stranded or solid.

(3) **Size.** The grounding conductor shall not be smaller than No. 14, and shall have a current-carrying capacity approximately equal to that of the grounded metallic member(s) and protected conductor(s) of the network-powered broadband communications cable. The grounding conductor shall not be required to exceed No. 6.

(4) **Run in Straight Line.** The grounding conductor shall be run to the grounding electrode in as straight a line as practicable.

(5) **Physical Protection.** Where subject to physical damage, the grounding conductor shall be adequately protected. Where the grounding conductor is run in a metal raceway, both ends of the raceway shall be bonded to the grounding conductor or the same terminal or electrode to which the grounding conductor is connected.

(b) **Electrode.** The grounding conductor shall be connected as follows.

(1) To the nearest accessible location on the following:

- The building or structure grounding electrode system as covered in Section 250-50
- The grounded interior metal water piping system as covered in Section 250-104(a)
- The power service accessible means external to enclosures as covered in Section 250-92(b)
- The metallic power service raceway
- The service equipment enclosure
- The grounding electrode conductor or the grounding electrode conductor metal enclosure, or
- To the grounding conductor or to the grounding electrode of a building or structure disconnecting means that

D. Grounding Methods

800-40. Cable and Primary Protector Grounding. The metallic member(s) of the cable sheath, where required to be grounded by Section 800-33, and primary protectors shall be grounded as specified in (a) through (d).

(a) Grounding Conductor.

(1) **Insulation.** The grounding conductor shall be insulated and shall be listed as suitable for the purpose.

(2) **Material.** The grounding conductor shall be copper or other corrosion-resistant conductive material, stranded or solid.

(3) **Size.** The grounding conductor shall not be smaller than No. 14.

(4) **Run in Straight Line.** The grounding conductor shall be run to the grounding electrode in as straight a line as practicable.

(5) **Physical Damage.** Where necessary, the grounding conductor shall be guarded from physical damage. Where

fuse, for example, ~~would not be suitable.~~

D. Grounding Methods

820-40. Cable Grounding. Where required by Section 820-33, the shield of the coaxial cable shall be grounded as specified in (a) through (d).

(a) Grounding Conductor.

(1) **Insulation.** The grounding conductor shall be insulated and shall be listed as suitable for the purpose.

(2) **Material.** The grounding conductor shall be copper or other corrosion-resistant conductive material, stranded or solid.

(3) **Size.** The grounding conductor shall not be smaller than No. 14. It shall have a current-carrying capacity approximately equal to that of the outer conductor of the coaxial cable.

(4) **Run in Straight Line.** The grounding conductor shall be run to the grounding electrode in as straight a line as practicable.

(5) **Physical Protection.** The grounding conductor shall be protected from physical damage.

D. Grounding Methods

830-40. Cable, Network Interface Unit, and Primary Protector Grounding. Network interface units containing protectors, NIUs with metallic enclosures, primary protectors, and the grounded metallic members of the network-powered broadband communications cable shall be grounded as specified in (a) through (d).

(a) Grounding Conductor.



(1) **Insulation.** The grounding conductor shall be insulated and shall be listed as suitable for the purpose.

(2) **Material.** The grounding conductor shall be copper or other corrosion-resistant conductive material, stranded or solid.

(3) **Size.** The grounding conductor shall not be smaller than No. 14, and shall have a current-carrying capacity approximately equal to that of the grounded metallic member(s) and protected conductor(s) of the network-powered broadband communications cable. The grounding conductor shall not be required to exceed No. 6.

(4) **Run in Straight Line.** The grounding conductor shall be run to the grounding electrode in as straight a line as practicable.

Ground Wire Sizing Table for use with Outdoor Drop Cable

Commscope Part Numbers	Cox Part Number	RG () Type	Makeup of Conductive Elements			Ground Wire Sizes (AWG) Where installed as below and used with Buried Cable		Ground Wire Sizes (AWG) Where installed as below and used with Aerial Cable	
						96-104°F Ambient Air Temp		96-104°F Ambient Air Temp	
			Shield Material(s) for Cox-Recommended Cable Types	Center Conductor Diameter	No. of 22 AWG Siamese Pow Prs	Grnd Wire in UG or Raceways	Grnd Wire In Free Air	Grnd Wire in UG or Raceways	Grnd Wire In Free Air
Tri-Shield Construction 60% Braid									
F6TSVM-BW-830	240-2629	6 Aerial	Bonded foil, 60% braid, non-bonded tape, PVC jacket, .051 inch messenger. BrightWire anti-corrosive	0.0403"		12	14	14	14
F6TSVM-BW-1/22-830	240-2630	6 Aerial	Bonded foil, 60% braid, non-bonded tape, PVC jacket, .051 inch messenger. BrightWire anti-corrosive	0.0403"	1	12	14	14	14
F11TSVM-BW-830	240-6952	11 Aerial	14 gauge copper clad aluminum, bonded foil, 60% braid, non-bonded tape, PVC jacket, .072 inch messenger, BrightWire anti-corrosive	0.0641"		10	14	14	14
F11TSVM-BW-1/22-830	240-1385	11 Aerial	14 gauge copper clad aluminum, bonded foil, 60% braid, non-bonded tape, PVC jacket, .072 inch messenger. BrightWire anti-corrosive	0.0641"	1	10	14	14	14
F6TSEF-830	240-2631	6 UG	Bonded foil, 60% braid, non-bonded tape, flooded for underground, PE jacket	0.0403"		12	14	14	14
F6TSEF-1/22-830	240-2628	6 UG	Bonded foil, 60% braid, non-bonded tape, flooded for underground, PE jacket	0.0403"	1	12	14	14	14
F11TSEF-830	240-6949	11 UG	Bonded foil, 60% braid, non-bonded tape, flooded for underground, PE jacket	0.0641"		10	14	14	14
F11TSEF-1/22-830	240-6948	11 UG	Bonded foil, 60% braid, non-bonded tape, flooded for underground, PE jacket	0.0641"	1	10	14	14	14
Super-Shield Construction 60% + 42% Braid									
F6SSVM-BW-830	240-5143	6 Aerial	Bonded foil, 60% braid, non-bonded tape, 42% braid, PVC jacket, .051 inch messenger. BrightWire anti-corrosive	0.0403"		10	14	14	14
F6SSVM-BW-1/22-830	240-1353	6 Aerial	Bonded foil, 60% braid, non-bonded tape, 42% braid, PVC jacket, .051 inch messenger. BrightWire anti-corrosive	0.0403"	1	10	14	14	14
F11SSVM-BW-830	240-6947	11 Aerial	14 gauge copper clad aluminum, bonded foil, 60% braid, non-bonded tape, 40% braid, PVC jacket, .072 inch messenger. BrightWire anti-corrosive	0.0641"		8	10	10	14
F11SSVM-BW-1/22-830	240-6946	11 Aerial	14 gauge copper clad aluminum, bonded foil, 60% braid, non-bonded tape, 40% braid, PVC jacket, .072 inch msngr, BrightWire anti-corrosive	0.0641"	1	8	10	10	14
F6SSEF-830	240-6178	6 UG	Bonded foil, 60% braid, non-bonded tape, 42% braid, flooded for underground, PE jacket	0.0403"		10	14	14	14
F6SSEF-1/22-830	240-6179	6 UG	Bonded foil, 60% braid, non-bonded tape, 42% braid, flooded for underground	0.0403"	1	10	14	14	14
F11SSEF-830	240-2633	11 UG	Bonded foil, 60% braid, non-bonded tape, 40% braid, flooded for underground, PE jacket	0.0641"		8	10	10	14
F11SSEF-1/22-830	240-6180	11 UG	Bonded foil, 60% braid, non-bonded tape, 40% braid, flooded for underground, PE jacket	0.0641"	1	8	10	10	14

Notes: Because messengers are nonconductive to the premises and their attachment "web-thickness" is small, they do not enter into Ampacity & Ground Wire sizing calculations.

Legend: #6 or 8 AWG #10 AWG #12 AWG #14 AWG

For **Paired-Copper** use #14 AWG for 1-protector, #12 for 2-protectors, #6 for all other protectors and for bonding between electrodes.

Drop Cable Attachments at:

- **Tap-End**
- **Customer-End**

215. Grounding of Circuits, Supporting Structures, and Equipment

A. Methods

Grounding required by these rules shall be in accordance with the applicable methods given in Section 9.

B. Circuits

1. Common Neutral

A conductor used as a common neutral for primary and secondary circuits shall be effectively grounded as specified in Section 9.

2. Other Neutrals

Primary line, secondary line, and service neutral conductors shall be grounded as specified in Section 9.

EXCEPTION: Circuits designed for ground-fault detection and impedance-current-limiting devices.

3. Other Conductors

Line or service conductors, other than neutral conductors, that are intentionally grounded, shall be grounded as specified in Section 9.

4. Surge Arresters

Where the operation of surge arresters is dependent upon grounding, they shall be grounded in accordance with the methods outlined in Section 9.

5. Use of Earth as Part of Circuit

a. Supply circuits shall not be designed to use the earth normally as the sole conductor for any part of the circuit.

b. Monopolar operation of a bipolar HVDC system is permissible for emergencies and limited periods for maintenance.

C. Non-current-Carrying Parts

1. General

Metal or metal-reinforced supporting structures, including lamp posts; metal conduits and raceways; cable sheaths; messengers; metal frames, cases, and hangers of equipment; and metal switch handles and operating rods shall be effectively grounded.

EXCEPTION 1: This rule does not apply to frames, cases, and hangers of equipment and switch handles and operating rods that are 2.45 m (8 ft) or more above readily accessible surfaces or are otherwise isolated or guarded and where the practice of not grounding such items has been a uniform practice over a well-defined area.

EXCEPTION 2: This rule does not apply to isolated or guarded equipment cases in certain specialized applications, such as series capacitors where it is necessary that equipment cases be either ungrounded or connected to the circuit. Such equipment cases shall be considered as energized and shall be suitably identified.

EXCEPTION 3: This rule does not apply to equipment cases, frames, equipment hangers, conduits, messengers, raceways, and cable sheaths enclosing or supporting only communication conductors, provided they are not exposed to contact with open supply conductors of over 300 V.

2. Guys

Guys shall be effectively grounded if attached to a supporting structure carrying any supply conductor of more than 300 V or if exposed to such conductors due to a slack conductor or guy.

EXCEPTION 1: This rule does not apply to guys containing an insulator or insulators installed in accordance with and meeting the requirements of Rule 279A.

EXCEPTION 2: This rule does not apply to guys attached to supporting structures if all supply conductors are in cable conforming to the requirements of Rules 230C1, 230C2, or 230C3.

EXCEPTION 3: This rule does not apply if the guy is attached to a supporting structure on private right-of-way if all the supply circuits exceeding 300 V meet the requirements of Rule 220B2.

3. Multiple Messengers on the Same Structure

Communication cable messengers exposed to power contacts, power induction, or lightning, shall be bonded together at intervals specified in Rule 92C.

C. Non-current-Carrying Parts

1. General

Metal or metal-reinforced supporting structures, including lamp posts; metal conduits and raceways; cable sheaths; messengers; metal frames, cases, and hangers of equipment; and metal switch handles and operating rods shall be effectively grounded.

EXCEPTION 1: This rule does not apply to frames, cases, and hangers of equipment and switch handles and operating rods that are 2.45 m (8 ft) or more above readily accessible surfaces or are otherwise isolated or guarded and where the practice of not grounding such items has been a uniform practice over a well-defined area.

EXCEPTION 2: This rule does not apply to isolated or guarded equipment cases in certain specialized applications, such as series capacitors where it is necessary that equipment cases be either ungrounded or connected to the circuit. Such equipment cases shall be considered as energized and shall be suitably identified.

EXCEPTION 3: This rule does not apply to equipment cases, frames, equipment hangers, conduits, messengers, raceways, and cable sheaths enclosing or supporting only communication conductors, provided they are not exposed to contact with open supply conductors of over 300 V.

2. Guys

Guys shall be effectively grounded if attached to a supporting structure carrying any supply conductor of more than 300 V or if exposed to such conductors due to a slack conductor or guy.

EXCEPTION 1: This rule does not apply to guys containing an insulator or insulators installed in accordance with and meeting the requirements of Rule 279A.

EXCEPTION 2: This rule does not apply to guys attached to supporting structures if all supply conductors are in cable conforming to the requirements of Rules 230C1, 230C2, or 230C3.

EXCEPTION 3: This rule does not apply if the guy is attached to a supporting structure on private right-of-way if all the supply circuits exceeding 300 V meet the requirements of Rule 220B2.

3. Multiple Messengers on the Same Structure

Communication cable messengers exposed to power contacts, power induction, or lightning, shall be bonded together at intervals specified in Rule 92C.

an arrester connected between each conductor to be protected and ground, a fuse in series with each conductor to be protected, and an appropriate mounting arrangement. Fused primary protector terminals shall be marked to indicate line, instrument, and ground, as applicable.

(b) Location. The location of the primary protector, where required, shall comply with (1), (2), or (3).

(1) A listed primary protector shall be applied on each network-powered broadband communications cable external to and on the network side of the network interface unit.

(2) The primary protection function shall be an integral part of and contained in the network interface unit. The network interface unit shall be listed for the purpose and shall have an external marking indicating that it contains primary electrical protection.

(3) The primary protector(s) shall be provided on the derived circuit(s) (output side of the NIU), and the combination of the NIU and the protector(s) shall be listed for the purpose.

A primary protector, whether provided integrally or external to the network interface unit, shall be located as close as practicable to the point of entrance.

For purposes of this section, a network interface unit and any externally provided primary protectors located at mobile home service equipment located in sight from and not more than 30 ft (9.14 m) from the exterior wall of the mobile home it serves, or at a mobile home disconnecting means grounded in accordance with Section 250-32 and located in sight from and not more than 30 ft (9.14 m) from the exterior wall of the mobile home it serves, shall be considered to meet the requirements of this section.

FPN: Selecting a network interface unit and primary protector location to achieve the shortest practicable primary protector grounding conductor will help limit potential differences between communications circuits and other metallic systems.

(c) Hazardous (Classified) Locations. The primary protector or equipment providing the primary protection function shall not be located in any hazardous (classified) location as defined in Article 500 or in the vicinity of easily ignitable material.

Exception: As permitted in Sections 501-14, 502-14, and 503-12.

830-33. Grounding or Interruption of Metallic Members of Network-Powered Broadband Communications Cables. The shields of network-powered broadband communications cables used for communications or powering shall be grounded at the building as close to the point of entrance as practicable. Metallic cable members not used for communications or powering shall be grounded or interrupted by an insulating joint or equivalent device as close to the point of entrance as practicable.

For purposes of this section, grounding or interruption of network-powered broadband communications cable metallic members installed at mobile home service equipment located in sight from and no more than 30 ft (9.14 m) from the

exterior wall of the mobile home it serves, or at a mobile home disconnecting means grounded in accordance with Section 250-24 and located in sight from and not more than 30 ft (9.14 m) from the exterior wall of the mobile home it serves, shall be considered to meet the requirements of this section.

FPN: Selecting a grounding location to achieve the shortest practicable grounding conductor will help limit potential differences between the network-powered broadband communications circuits and other metallic systems.

D. Grounding Methods

830-40. Cable, Network Interface Unit, and Primary Protector Grounding. Network interface units containing protectors, NIUs with metallic enclosures, primary protectors, and the grounded metallic members of the network-powered broadband communications cable shall be grounded as specified in (a) through (d).

(a) Grounding Conductor.

(1) **Insulation.** The grounding conductor shall be insulated and shall be listed as suitable for the purpose.

(2) **Material.** The grounding conductor shall be copper or other corrosion-resistant conductive material, stranded or solid.

(3) **Size.** The grounding conductor shall not be smaller than No. 14, and shall have a current-carrying capacity approximately equal to that of the grounded metallic member(s) and protected conductor(s) of the network-powered broadband communications cable. The grounding conductor shall not be required to exceed No. 6.

(4) **Run in Straight Line.** The grounding conductor shall be run to the grounding electrode in as straight a line as practicable.

(5) **Physical Protection.** Where subject to physical damage, the grounding conductor shall be adequately protected. Where the grounding conductor is run in a metal raceway, both ends of the raceway shall be bonded to the grounding conductor or the same terminal or electrode to which the grounding conductor is connected.

(b) Electrode. The grounding conductor shall be connected as follows.

(1) To the nearest accessible location on the following:

- (a) The building or structure grounding electrode system as covered in Section 250-50
- (b) The grounded interior metal water piping system as covered in Section 250-104(a)
- (c) The power service accessible means external to enclosures as covered in Section 250-92(b)
- (d) The metallic power service raceway
- (e) The service equipment enclosure
- (f) The grounding electrode conductor or the grounding electrode conductor metal enclosure, or
- (g) To the grounding conductor or to the grounding electrode of a building or structure disconnecting means that

830-33. Grounding or Interruption of Metallic Members of Network-Powered Broadband Communications Cables. The shields of network-powered broadband communications cables used for communications or powering shall be grounded at the building as close to the point of entrance as practicable. Metallic cable members not used for communications or powering shall be grounded or interrupted by an insulating joint or equivalent device as close to the point of entrance as practicable.

For purposes of this section, grounding or interruption of network-powered broadband communications cable metallic members installed at mobile home service equipment located

From TSP 5-949-003 Section 4.2 D:

D. The grounding of:

- **Coax drop shields** is accomplished at both ends through F-connectors.
- **Messengers (tap-end)** - *NEC 215 C.1.* requires that messengers be effectively grounded unless they are **unexposed** (Cox requires this ground on **all drop messengers**). This requirement is satisfied by grounding the messenger to the cable plant ground system at the **tap-end** only. This connection should be made as shown in *Figure 1.* by bonding the stripped-end of the drop messenger to a double-nutted strand clamp attached to the cable messenger.



Figure 1. Strand-Grounded Span Clamp

- **Messengers (customer-end)** - For powered coax *NEC 830-33* requires, *"Metallic cable members not used for communications or powering [i.e., messengers] shall be grounded or interrupted by insulating joint or equivalent device as close to the point of entrance as practicable."* Therefore, **messengers at the customer-end** are not grounded – instead they are interrupted and attached to an insulated P-hook as shown in *Figure 2.* The messenger is removed beyond the P-hook to the NIU.



Figure 2. Insulated P-Hook



Figure 1. Strand-Grounded Span Clamp

PEG 2001 - NEC 830 Compliance

**In Conclusion, Our
Expectations are for Modest
Improvements in:**

- Customer Safety
- Employee Safety
- Equipment Protection

