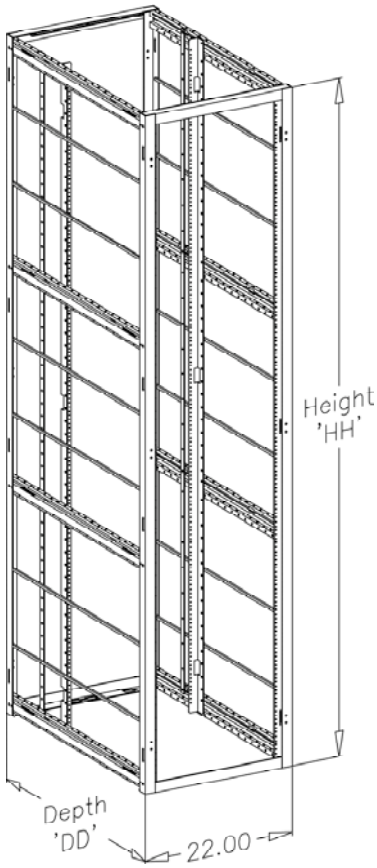
Racks and Cabinets

XMF Series- Stand-Alone or Gangable Rack/Enclosure

Design Features

- Fully welded construction, with 11 gauge corner posts, 11 gauge formed top and bottom members an 14 gauge formed rail supports.
- Four 12 gauge EIA mounting angles 10-32 tap, fully adjustable front and rear. Rails can be removed from frame without removing hardware. Rack unit marking on all rails.
- Doors mounted with lift off hinges capable of 180 degree swing even when cabinets are ganged. The door swing is field reversible.
- Finished in durable black textured powder coat.
- Open top with optional configurable panels.
- Open bottom with hole pattern for bolting frame to the floor or base.
- Ganging can be accomplished after equipment is placed in rack.
- Finished in durable black textured powder coat.



Cable Management

- Numerous lacing points on two surfaces of each rail support to facilitate cable management
- Cable tie holes entire length of EIA rail on the attachment flange spaced at 1.75.

Note: Frames are available with formed 16 ga. cable tie bars welded to the side of the frame.
To order a frame with tie bars- add suffix - TB to P.N. below

Available Sizes: FRAME									
RU	57	52	51	50	49	48	46	45	44
Height (HH) inches	103	94	92.5	90.5	88.75	87	83.5	81.75	80
Depth									
24	XMF5724	XMF5224	XMF5124	XMF5024	XMF4924	XMF4824	XMF4624	XMF4524	XMF4424
30	XMF5730	XMF5230	XMF5130	XMF5030	XMF4930	XMF4830	XMF4630	XMF4530	XMF4430
36	XMF5736	XMF5236	XMF5136	XMF5036	XMF4936	XMF4836	XMF4636	XMF4536	XMF4436
40	XMF5740	XMF5240	XMF5140	XMF5040	XMF4940	XMF4840	XMF4640	XMF4540	XMF4440

Available Sizes: FRAME									
RU	43	40	39	36	32	28	24	23	21
Height (HH) inches	78.25	73	71.25	66	59	52	45	43.25	39.75
Depth									
24	XMF4324	XMF4024	XMF3924	XMF3624	XMF3224	XMF2824	XMF2424	XMF2324	XMF2124
30	XMF4330	XMF4030	XMF3930	XMF3630	XMF3230	XMF2830	XMF2430	XMF2330	XMF2130
36	XMF4336	XMF4036	XMF3936	XMF3636	XMF3236	XMF2836	XMF2436	XMF2336	XMF2136
40	XMF4340	XMF4040	XMF3940	XMF3640	XMF3240	XMF2840	XMF2440	XMF2340	XMF2140

Available Sizes: FRAME								
RU	20	19	17	16	14	13	12	11
Height (HH) inches	38	36.25	32.75	31	27.5	25.75	24	22.25
Depth								
24	XMF2024	XMF1924	XMF1724	XMF1624	XMF1424	XMF1324	XMF1224	XMF1124
30	XMF2030	XMF1930	XMF1730	XMF1630	XMF1430	XMF1330	XMF1230	XMF1130
36	XMF2036	XMF1936	XMF1736	XMF1636	XMF1436	XMF1336	XMF1236	XMF1136
40	XMF2040	XMF1940	XMF1740	XMF1640	XMF1440	XMF1340	XMF1240	XMF1140

XSF Series- Stand-Alone or Gangable Rack/Enclosure

EIA Rail Kit- 2 Pair (4 rail kit includes mounting hardware)									
RU	57	52	51	50	49	48	46	45	44
Height (HH) inches	103	94	92.5	90.5	88.75	87	83.5	81.75	80
Rail Style									
10-32 Tap	XMF57RT10	XMF52RT10	XMF51RT10	XMF50RT10	XMF49RT10	XMF48RT10	XMF46RT10	XMF45RT10	XMF44RT10
12-24 Tap	XMF57RT10	XMF52RT10	XMF51RT10	XMF50RT10	XMF49RT10	XMF48RT10	XMF46RT10	XMF45RT10	XMF44RT10

EIA Rail Kit- 2 Pair (4 rail kit includes mounting hardware)									
RU	43	40	39	36	32	28	24	23	21
Height (HH) inches	78.25	73	71.25	66	59	52	45	43.25	39.75
Rail Style									
10-32 Tap	XMF43RT10	XMF40RT10	XMF39RT10	XMF36RT10	XMF32RT10	XMF28RT10	XMF24RT10	XMF23RT10	XMF21RT10
12-24 Tap	XMF43RT10	XMF40RT10	XMF39RT10	XMF36RT10	XMF32RT10	XMF28RT10	XMF24RT10	XMF23RT10	XMF21RT10

EIA Rail Kit- 2 Pair (4 rail kit includes mounting hardware)									
RU	20	19	17	16	14	13	12	11	
Height (HH) inches	38	36.25	32.75	31	27.5	25.75	24	22.25	
Rail Style									
10-32 Tap	XMF20RT10	XMF19RT10	XMF17RT10	XMF16RT10	XMF14RT10	XMF13RT10	XMF12RT10	XMF11RT10	
12-24 Tap	XMF20RT10	XMF19RT10	XMF17RT10	XMF16RT10	XMF14RT10	XMF13RT10	XMF12RT10	XMF11RT10	

Cable Tie Mount		
P.N.	XMFCTM	10pc. Cable tie Mount
P.N.	XCTV12	Velcro 12″ long
P.N.	XCTV18	Velcro 18″ long
P.N.	XCTV24	Velcro 24″ long

Additional Options are available for the XME Rack/Enclosure:

Option available:

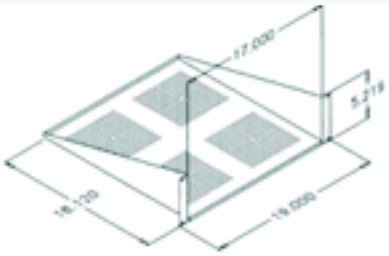
Top Options
Door Options
Side Panel Options - Flush Flat Panel and Formed Surface Mount Panel

Base/ Caster Base
Vertical Lacing Bar
Vertical Lacing Panel
Vertical Ground Bar
Vertical Spacing Panel
Bolt Kits

Contact West Penn Wire Engineering Department to get further details on the XME Options. 800-245-4964

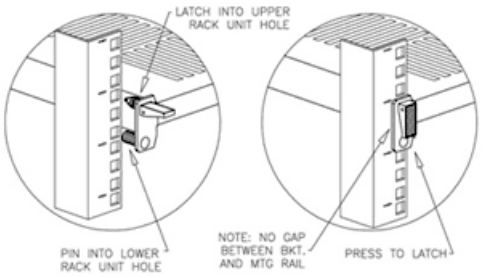
Racks and Cabinets

Shelving



19" Shelves

CATALOG #	DESCRIPTION
9010-1924	19" Adjustable Shelf (Vented) 4 Point Mounting 24" Depth, 200 lbs., Heavy Duty
9011-1912	19" Flush Mount Cantilevered Shelf (Vented) 12" Depth, Fits 20" Deep Wall Mount, 70 lbs.. Heavy Duty
9011-1918	19" Flush Mount Cantilevered Shelf (Vented) 18" Depth, 75 lbs., Heavy Duty
9011-1918-16	19" Flush Mount Cantilevered Shelf (Vented) 18" Depth, 35 lbs., Medium Duty
9012-1912-18	19" Flush Mount Cantilevered Shelf (Solid) 12" Depth, 35 lbs., Medium Duty
9012-1918	19" Flush Mount Cantilevered Shelf (Solid) 18" Depth, 75 lbs., Heavy Duty
9012-1918-16	19" Flush Mount Cantilevered Shelf (Solid) 18" Depth, 35 lbs., Medium Duty
9013-1924	19" Sliding Adjustable Shelf (Vented) 4 Point Mounting 24" Depth, 120 lbs., Heavy Duty
9014-1907	19" Keyboard Shelf (Fixed Front of Mtg. Rail w/Mouse Pad)
9015-1909	19" Pivoting Keyboard Shelf
9309-0100	WP Cable Retractable Arm. Protects and manages slack cable off the back side of a sliding shelf as it is moved in and out of the cabinet. Mounts to standard WP four point sliding shelves between rear of shelf and rear EIA rail (9013-1924 & 9113-2324 only).

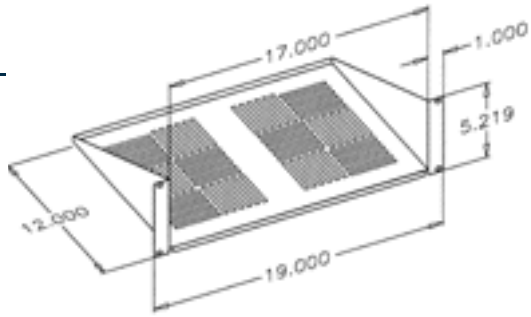


19″ Quick Disconnect Shelves

CATALOG #	DESCRIPTION
9010-1930-Q	Quick disconnect shelf for 6mm mounting rails
9010-1924-Q	19″ Mtg., 30″ Depth WPDP & WPFS series only. 200lb load rating. 19″ Mtg., 24″ Depth all enclosures 200lb load rating.
	* Shelf color is black unless otherwise noted.

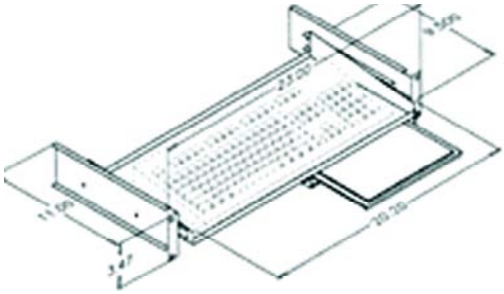
23" Shelves

CATALOG #	DESCRIPTION
9110-2324	23" Adjustable Shelf (Vented) 4 Point Mounting 24" Depth, 180 lbs., Heavy Duty
9111-2318	23" Flush Mount Cantilevered Shelf (Vented) 18" Depth, 75 lbs., Heavy Duty
9112-2318	23" Flush Mount Cantilevered Shelf (Solid) 18" Depth, 75 lbs., Heavy Duty
9113-2324	23" Sliding Adjustable Shelf (Vented) 4 Point Mounting 24" Depth, 120 lbs., Heavy Duty
9114-2307	23" Sliding Keyboard Shelf w/Mouse Pad



Frame Shelves

CATALOG #	DESCRIPTION
9210-2923	27.5" Wide Side Mount Shelf (Vented) 23.75" Depth, 180 lbs.
9211-2917	22.5" Wide Side Mount Sliding Shelf (Vented) 23.75" Depth, 120 lbs.
9212-2922	17" Wide Bottom Mount Sliding Server Shelf (Vented) 22" Depth, 120 lbs.



Other Accessories

Rack Extenders

CATALOG #	DESCRIPTION
9810-0100	1 U 23″ EIA 19″ Reducer Bracket
9811-0200	2 U 23″ EIA 19″ Reducer Bracket
9812-0300	3 U 23″ EIA 19″ Reducer Bracket
9813-0400	4 U 23″ EIA 19″ Reducer Bracket

Filler Panels

CATALOG #	DESCRIPTION	CATALOG #	DESCRIPTION
9910-0100	1 U 19″ Solid Filler Panel	9914-0200	2 U 19″ Vented Filler Panel
9911-0200	2 U 19″ Solid Filler Panel	9915-0300	3U 19″ Vented Filler Panel
9912-0300	3 U 19″ Solid Filler Panel	9916-0400	4 U 19″ Vented Filler Panel
9913-0400	4 U 19″ Solid Filler Panel		

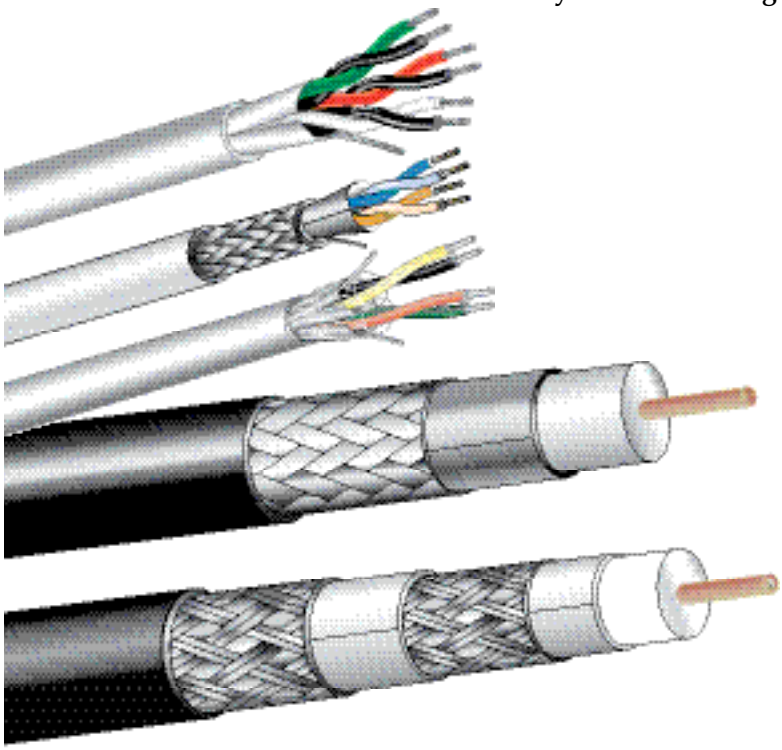
Rack Mount Cable Management

CATALOG #	DESCRIPTION
9510-1901	1 U 19″ Cable Organizer
9511-1902	2 U 19″ Cable Organizer w/ Saddle Ring
9512-1901	1 U 19″ Rack mount cable organizer w/finger stock & cover (1.5″x 2″)
9512-1902	2 U 19″ Rack mount cable organizer w/finger stock & cover (3″x 3″)
9513-1902	2 U 19″ Rack mount cable organizer w/quick touch cable organizer (2″x 3″)
9610-2301	1 U 23″ Cable Organizer
9611-2302	2 U 23″ Cable Organizer w/ Saddle Ring
9514-1901	19″ Waterfall radius cable organizer

Technical Reference

This Technical Reference Section was developed as an aid to better understanding, specifying and installing electronic wire. The information contained in this section is written for the novice while still providing a quick reference of commonly used parameters for the experienced designer, engineer, consultant or installer.

This information should only be used as a general guideline. Various parameters such as the system type, electrical and mechanical characteristics, and environmental locations will determine your exact cabling needs.



Mini Index

Technical Reference Section

Basic Cable Construction

A cable type is determined by the specifications of the system installed, basic electronic principles, and environment and regulatory agencies. These various criteria dictate the type of conductor(s), gauge of wire, type of insulation, twisted or cabled construction, type of jacket and if any shielding is required. A basic understanding of cable construction should be helpful in selecting and installing the proper cable for a particular system.

Conductors

Conductors for electronic cables can vary greatly from stranded conductors for maximum flexibility to copper covered steel which provides a stronger cable that will withstand a greater physical strain than copper. The American Society For Testing and Materials (ASTM) standards are followed for all of West Penn Wire conductor material. The ASTM standard defines standard requirements such as tensile strength, elongation, resistivity, dimensions, permissible variations, finish, inspection, and testing.

Conductor Material

There are several types of material that conduct electricity well (aluminum, nickel, gold, silver). However, copper is the most popular due to its excellent conductivity compared to other material cost. West Penn Wire uses a variety of conductors in our cable. Material used can be bare copper, tinned copper, and copper covered steel. The conductor can consist of solid or stranded construction. The type of conductor selected is determined by the application the cable will be used for.

Solid Conductors

A copper rod provides a solid conductor for a wire. A solid conductor offers lower cost and is easily formed to any shape desired. A solid conductor does not have much flexibility and may break if flexed too much in one place. For these reasons, a solid conductor is best suited for use in a fixed or permanent installation.

Stranded Conductors

By combining several strands together a stranded conductor can be formed. A stranded conductor is easy to pull, flexible, and is less likely to break if subjected to frequent bending. The finer the strands and the more strands used to assemble a conductor, the more flexible the conductor becomes. Therefore, stranded cable is ideal for installations where frequent movement of the cable is required.

Bare and Tinned Conductors

Conductors can be either tinned or plain bare copper. Most electronic connectors today are designed to be used with bare copper. In cables that are terminated with soldered connectors, tinned plated conductors can help in soldering the wire to the connector.

Copper-Covered Steel

This type of conductor uses a steel conductor covered with copper. This type of conductor make-up is used for RF applications that require a cable to withstand added tension. The steel provides added strength, and the copper provides good conductivity for higher RF signals. This type of conductor is not good for low frequency transmission.

Conductor Size (AWG)

Conductors are measured in size/diameter through a gauging system. There is no industry standard. However, the American Wire Gauge (AWG) system has been generally accepted as the standard in the wire and cable industry. The sizes are derived through a logical, geometric progression. The smaller the number, the larger the wire, and likewise, the larger the number the smaller the wire. The AWG system is important because it provides a standard reference for comparison of various conductor materials based technically on the cross-sectional area of the wire.

Example: A #22 AWG wire is smaller than a #18 AWG wire.
A #14 AWG wire is larger than a #24 AWG wire.

Dielectric

Insulation is a highly resistive material that is applied to the conductor to resist the flow of electric current to other conductors and provide protection to the conductor. There are many types of insulation materials used and each has its advantages and limitations. The type of insulation selected is based upon the application of the cable. Insulation is also referred to as the dielectric of a cable.

Dielectric Strength

This is the amount of voltage that insulation can withstand before it "breaks down". The material type and thickness determines the insulation's dielectric strength. The application and environment the cable will be used will determine the dielectric strength required.

Protection

Insulation also must provide flame retardancy in case of fire, provide resistance to abrasion and provide protection from electrical shock.

Dielectric Categories

Electrical insulations can be divided into four categories.: Thermoplastics, Thermosets, Fluoropolymers, and Elastomers. Insulations are normally applied by an extrusion process. The extrusion process forces pre-heated plastic through dyes which forms a continuous covering over the conductor. This is usually called the primary insulation.

Thermoplastics

Thermoplastic compounds are compounds that are softened by mechanical pressure and applied heat, and maintain their altered shape when cooled and/or the mechanical force is removed.

Polyvinylchloride (PVC)

This is probably the most widely used insulation for low voltage insulation. This compound is offered in a variety of formulations. Through different manufacturing processes, PVC can be made to resist sunlight, ozone, flames, oil, and most solvents. PVC insulation is fairly consistent, allowing for bright colors, and is very flexible and easy to strip.

Polyethylene

This compound offers excellent electrical properties such as low capacitance and low loss of a signal. Polyethylene is lightweight, water-resistant, and fairly chemical resistant. Polyethylene offers good abrasion resistance and is somewhat harder to strip than PVC.

Polypropylene

This material is similar to polyethylene as to electrical properties providing low loss properties with less material. Polypropylene also provides excellent mechanical properties and is very abrasion resistance although stiffer than Polyethylene. Of the four compounds listed in this category, polypropylene is the most difficult to strip.

Copolene

Copolene is a West Penn Wire Trademark. This insulation offers a low dielectric constant enabling low capacitance. Excellent electrical properties allow high speed, low distortion signal transmission.

Fluoropolymers
These compounds are commonly used for high temperature applications and areas such as plenums that require flame retardancy and low smoke characteristics. The NEC mandates the use of these types of materials in ducts, plenums, and other space used for environmental air. Using these types of compounds will allow for reduced cost in installation because there is no need to install conduit.

Halar®
A premium insulation with excellent electrical and mechanical properties. This compound offers a stable low dielectric constant over a wide range of frequencies. It is also chemical resistant, abrasion and impact resistant, and can withstand high temperatures.

Teflon®
A premium insulation with excellent electrical and mechanical properties. This compound is widely used as a solid or foamed dielectric, allowing for an extremely low loss cable. This compound can withstand high temperatures and has low flame and smoke characteristics.

Copolymer
Polyvinylidene Fluoride (PVDF). This compound has rather poor electrical properties. However, this compound has a very high temperature rating and excellent mechanical properties such as cut-through resistance, corrosion resistance, abrasion resistance, and high tensile strength.

Elastomers
This is a group of compounds that are "rubber-like" in appearance. They can be compressed or even stressed and will snap back to their original shape with the release of tension.

TPE - Thermo-Plastic Elastomer

Shielding
There are basically three types of shielding techniques: foil shielding, braid shielding, and combination shielding. Shielding is utilized to prevent radiation and signal loss of high frequencies used in electronic circuits and to reduce EMI/RFI interference. However, shielding tends to increase the overall capacitance of the cable.

Foil Shield
Foil shields are usually made of a thin layer of aluminum bonded to a polyester film. A foil shield allows for 100% coverage if applied with an appropriate overlap construction. A drain wire is used in conjunction with the foil shield to connect the shield to ground. This permits extraneous signals to be “drained off” to ground. It is very good in reducing Radio Frequency (RF) interference, but does not perform as well in blocking Electro Magnetic Interference (EMI). Foil shields do provide easy termination and low cost protection, although fragile (low tensile strength and impact resistance).

BiFoil
This type of foil shield allows for added protection by increasing the metallic coverage without adding increased thickness to the diameter of the cable. Mainly used in coaxial cable, the BiFoil shield is an aluminum-polyester-aluminum tape with 100% coverage.

Bonded BiFoil
This type of foil shield has the same aluminum-polyester-aluminum construction as the BiFoil shield, but is also bonded to the dielectric with adhesive. This allows for better shielding capabilities as well as providing excellent ease of stripping because the foil does not pull away from the dielectric.

Braid Shield
Braided shields can be constructed in various coverages, 95–98% being about the highest coverage available with this type of shielding. The material can be bare copper, tinned copper, or aluminum. Depending on the amount of coverage, braid shields reduce EMI interference well, but are not as reliable in the RF range. Braid shields also allow for a much lower shield D.C. resistance than foil

Basic Cable Construction

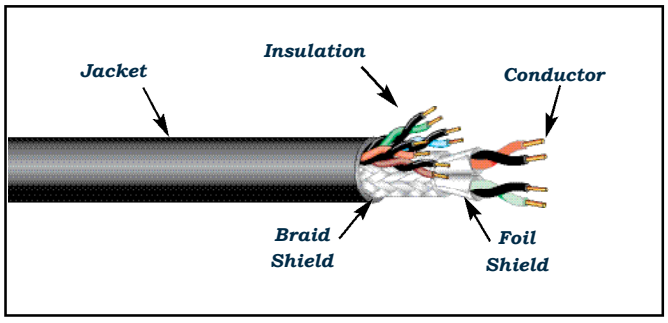
Combination Shielding
This technique offers the best of both types of shielding. First, a foil shield is applied around the primary conductors and then a braided shield is placed on top of the foil shield. This allows for greater coverage in blocking both EMI and RFI signals while allowing for a low D.C. resistance in the shield. There are also various versions of this basic technique such as triaxial and quad shielding.

Foil/Braid
This is the most common type of combination shielding. The aluminum foil is wrapped around the cabled or twisted primaries and then a braided shield is applied over top
of the aluminum foil. The metallic side of the foil shield is usually in contact with the braid. The braid is then used for shielding as well as ground termination eliminating
the need for a drain wire.

Triaxial - A Braid-Separator-Braid combination shield construction.

Quad - A Foil-Braid-Foil-Braid combination shield construction. This provides for maximum shielding against EMI/RFI interference.

Jackets
The cable jacket is for strength, integrity, and overall protection of the primaries and/or shield inside the jacket. There are a variety of jacketing materials that are used in cable construction. Standard compounds and special variations of these compounds can be used in making the jacket. Selecting a cable with the proper jacket for the environment it will be installed in is an important consideration. Environmental parameters that should be considered include temperature variations, chemical reactance, sunlight resistance, mechanical and abrasion impact. Jackets are usually made up of the same material as insulation used on primaries. To learn more about the various compound properties, please refer to the Insulation Section.



Coaxial Cable Construction

This section provides an introduction to understanding coaxial cable construction. These fundamentals will allow you to understand the basic materials that are used in the construction of a coaxial cable. A coax cable type is determined by the specifications of the system installed, basic electronic principles, environment, and regulatory agencies. These various criteria dictate the type of conductor, gauge of wire, type of insulation, shielding, and type of jacket. A basic understanding of coaxial cable construction should be helpful in selecting and installing the proper cable for a particular system.

Conductors

Conductors for coaxial cables can vary greatly from stranded conductors for maximum flexibility to copper covered steel which provides a stronger cable that will withstand a greater physical strain than copper. The American Society For Testing and Materials (ASTM) standards are followed for all of West Penn Wire conductor materials. The ASTM Standard defines standard requirements such as tensile strength, elongation, resistivity, dimensions, permissible variations, finish, inspection and testing.

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Solid Conductors

A copper rod provides a solid conductor for a wire. A solid conductor offers lower cost and is easily formed to any shape desired. A solid conductor does not have much flexibility and may break if flexed too much in one place. For these reasons, a solid conductor is best suited for use in a fixed or permanent installation.

Stranded Conductors

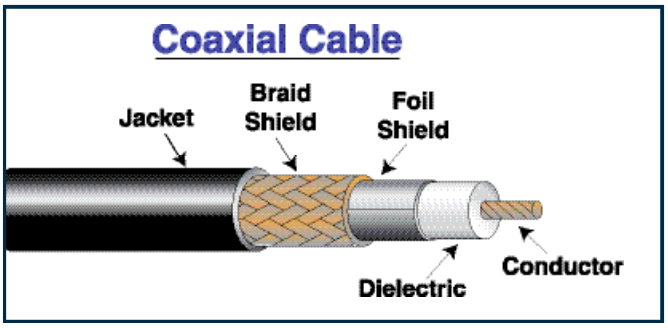
By combining several strands together, a stranded conductor can be formed. A stranded conductor is easy to pull, is flexible and is less likely to break if subjected to frequent bending. The finer the strands and the more strands used to assemble a conductor the more flexible the conductor becomes. Therefore, stranded cable is ideal for installations where frequent movement of the cable is required.

Bare and Tinned Conductors

Conductors can be either tinned or plain bare copper. Most electronic connectors today are designed to be used with bare copper. In cables that are terminated with soldered connectors, tinned plated conductors can help in soldering the wire to the connector.

Copper-Covered Steel

This type of conductor uses a steel conductor covered with copper. This type of conductor make-up is used for RF applications that require a cable to withstand added tension. The steel provides added strength and the copper provides good conductivity for higher RF signals such as CATV. This type of conductor is not good for low frequency transmission, such as CCTV.



Dielectric

A coaxial cables dielectric is a highly resistive material that is applied to the conductor to resist the flow of electric current to the shield. It also sets up a cables electrical characteristics. There are several types of insulation materials and constructions used and each has its advantages and limitations. The type of insulation selected is based upon the application of the cable. Insulation is also referred to as the dielectric of a cable.

Solid Dielectric Construction

A solid dielectric construction uses a process of extruding a solid material over the center conductor of a coaxial cable. It provides good electricals, added cable strength and uniformity of termination. However, a solid dielectric provides poorer electricals and less velocity of propagation than cellular designs.

Foamed (Cellular) Dielectric Construction

A cellular dielectric construction uses a process of extruding a cellular material over the center conductor of a coaxial cable. This improves the dielectric constant of the dielectric material which improves the electricals of a coaxial cable. The dielectric material exhibits a lower capacitance, which in turn provides lower loss. This dielectric material also provides a higher velocity of propagation. With the advent of the "Gas Injection" process, cable manufacturers are able to improve their cellular design and provide a lower loss cable with higher velocity of propagation values.

Dielectric Materials

Polyethylene

This compound offers excellent electrical properties providing for low loss of a signal. However, it can only be used on a non-plenum rated cable because the compound has a poor flame and smoke retardancy.

Teflon® (FEP)

A premium insulation that provides excellent electrical and mechanical properties. This compound is widely used as a dielectric for coaxial cables providing low loss and the ability to withstand high temperatures and also having low flame and smoke characteristics.

Coaxial Cable Construction

Shielding
There are basically three types of shielding techniques:

1. Foil Shielding, 2. Braid Shielding, 3. Combination Shielding

Shielding is utilized to prevent radiation and signal loss of high frequencies used in electronic circuits and to reduce EMI/RFI interference. However, shielding tends to increase the overall capacitance of the cable.

Foil Shield
Foil shields are usually made of a thin layer of aluminum bonded to a polyester film. A foil shield allows for 100% coverage if applied with an appropriate overlap construction. It is very good in reducing Radio Frequency (RF) interference, but does not perform as well in blocking Electro Magnetic Interference (EMI). Foil shields do provide easy termination and low cost protection, although they are fragile (low tensile strength and impact resistance).

BiFoil
This type of foil shield allows for added protection by increasing the metallic coverage without adding increased thickness to the diameter of the cable. Mainly used in coaxial cables, the BiFoil shield is an aluminum-polyester-aluminum tape with 100% coverage.

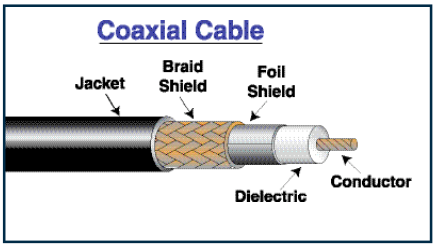
Bonded BiFoil
This type of foil shield has the same aluminum-polyester-aluminum construction as the BiFoil shield, but is also bonded to the dielectric with adhesive. This allows for better shielding capabilities and also provides excellent ease of stripping and termination because the foil does not pull away from the dielectric.

Braid Shield
Braided shields can be constructed in various coverages (95% - 98% being about the highest coverage available with this type of shielding). The material can be bare copper, tinned copper, or aluminum. Depending on the amount of coverage, braid shields reduce EMI interference well, but are not as effective in the RF range. Copper braided shields also allow for a much lower shield D.C. resistance than foil shields.

Combination Shielding
This technique offers the best of both types of shielding. First a foil shield is applied around the dielectric and then a braided shield is placed on top of the foil shield. This allows for greater coverage in blocking both EMI and RFI signals. There are also several versions of this basic technique such as triaxial, tri-shielding and qua shielding.

Foil/Braid
This is the most common type of combination shielding. The aluminum foil is placed around the dielectric and then a braided shield is applied over top the aluminum foil. The metallic side of the foil shield is usually in contact with the braid. The braid is then used for shielding as well as ground termination eliminating the need for a drain wire. There are various types of shieldings offered on West Penn Wire coaxial cable:

1. Quad Shield - A Foil-Braid-Foil-Braid combination shield construction. This provides maximum shielding against EMI/RFI interference.
2. Tri-Shield - A Foil-Braid-Foil combination
3. Triaxial - A Braid-Separator-Braid combination shield construction.



Jackets
The cable jacket is for strength, integrity, and overall protection of the other components inside the jacket. There are a variety of jacketing materials that are used in cable construction. Standard compounds and special variations of these compounds can be used in making the jacket. The selection of cable with the proper jacket and conditions of the environment the cable will be installed in are important considerations. Environmental parameters that should be considered include temperature variations, chemical reactance, sunlight resistance, mechanical and abrasion impact. Jackets are sometimes made up of the same material as insulation used on a dielectric. To learn more about various compound properties, please refer to the Dielectric Section.

Fiber Optic Cable Construction

Fiber Elements

Fiber optic cable provides the most advanced communication media available today. An increasing amount of fiber will be installed in the future as we find more and more uses for this technology. Fiber optic cable can support voice, data, video, and other types of transmission, and offers many advantages over standard copper circuits which we will discuss later in this section.

Core

This is the very center of the cable and is the light guiding area used for light transmission. The size of the core will determine the amount of light to be transmitted into the fiber. The larger the core, the greater the amount of light will that will be transmitted.

Cladding

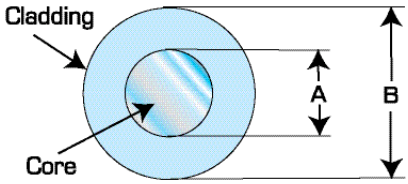
The cladding surrounds the core glass and serves to refract the light back into the core. The cladding has a different index of refraction than the core so that the lightwaves are re-directed back into the core allowing continued light transmission through the fiber.

Coating

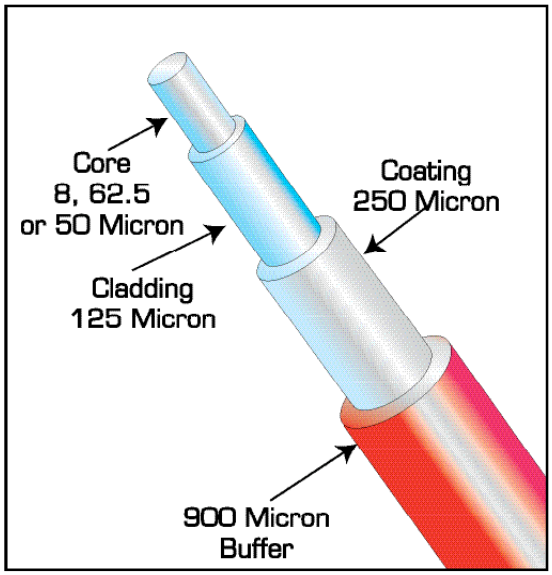
Several coatings of acrylate are usually applied to the fiber to provide tensile strength and protection to the glass fiber core.

Jacket

The cable jacket works along with the aramid fibers to provide strength, integrity, and overall protection of the fiber member. There are a variety of jacketing materials that are used in fiber optic cable construction. Standard compounds and special variations of these compounds can be used in making the jacket. The jacket should be appropriate for the environmental conditions that the fiber optic cable will be subjected to. Environmental parameters that should be considered include temperature variations, chemical reactance, sunlight resistance, mechanical and abrasion resistance.



Buffered Fiber



Fiber Optic Cable Types

Fiber Optic Size - This is measured by comparing the core size to the cladding size. This is expressed by the core diameter and then the cladding with coating diameter.

Example: 62.5/125., 62.5 being the core diameter and 125 being the cladding with coating diameter.

Fiber Optic Modes - There are basically two types or modes of fiber optic cable, single-mode and multimode.

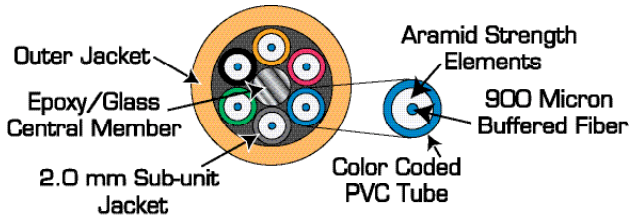
Single-Mode - The core on single-mode is about 8-10 micron. This small core size allows only one mode of light to travel within the core at a time. The higher the bandwidth, the more information carrying capacity the cable has. This type of cable is good for long distances, and is often used by telephone companies for long transmissions.

Multimode - The core on multimode is about 50 - 100 micron. A larger core allows many light pulses or modes to travel through the core simultaneously. Mode overlap can occur over extremely longer distances and may cause bit errors. Multimode is best used for lengths up to 2 kilometers.

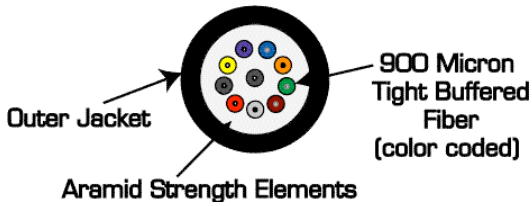
Fiber Optic Cable Construction

Fiber Optic Cable Used for Indoor Installations

Breakout Cable

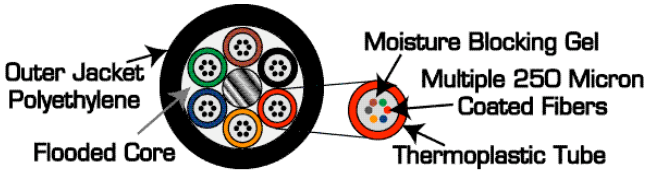


Distribution Cable

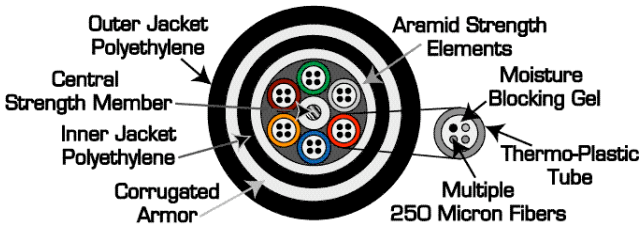


Fiber Optic Cable Used for Outdoor Installations

Loose-Tube Cable



Armored Loose-Tube Cable



Fiber Optic Cable Benefits

High Bandwidth - The higher the bandwidth, the greater the information carrying capacity. A higher bandwidth allows for higher data rates, more users and longer distances.

Easy Upgrades - Fiber optic cable allows for easy future upgrades. Because a variety of transmissions can use fiber optics, it is only necessary to change the electronics. The cable can stay in place. There is no need to pull new cable in the future.

Low Attenuation - This is a reduction of signal strength or loss of light power over the length of the fiber. Fiber optic cable usually has low attenuation characteristics which allow signals to travel over longer distances without reamplification. However, attenuation can be affected by extrinsic (environmental and physical bends), intrinsic (absorption and scattering) and wavelength. The longer the wavelength, the lower the attenuation.

EMI/RFI Immunity - Since fiber optic cables transmit light instead of electrical current, immunity to electromagnetic and radio frequency interference provides better signal quality, ensuring low bit error rates and/or low noise on the system.

Security - Again, since there is no electrical signal, fiber optic transmission is almost impossible to tap into without being detected.

Lightweight - Fiber optic cable is smaller and lighter than copper cable allowing for easier installation, especially when conduit and/or raceway space is at a premium.

Understanding the National Electrical Code

The National Electrical Code (NEC) is a set of guidelines written to govern the installation of wiring and equipment in commercial buildings and residential areas. These guidelines were developed to ensure the safety of humans as well as property against fires and electrical hazards. Understanding the National Electrical Code is important from the cable manufacturer engineer and distributor, to the designer and installer. Anyone involved in specifying cable to installation of cable should be aware of the basics of the code.

In 1987, the National Electrical Code introduced some major changes that had a major impact on the wire and cable industry. The code now has listing requirements for communication and power-limited circuit cable. These requirements developed fire resistance levels for cable. The code covers initiation of fire by electronic cable as well as flame spread characteristics of the cable.

Code Organization

The NEC code book is made up of nine chapters, with each chapter divided into separate articles pertaining to specific subjects. There are about five articles that pertain to communication and power-limited cable. Each article describes wire and cable construction, material use, cable markings, installation environments and applications.

Article Categories

There are four articles that cover communication, power-limited and CATV wiring. There is another category that deals strictly with optical fiber. The following is a list of those articles and the applications or systems they cover:

Article 725 - Class 1, Class 2, Class 3, Remote-control, Signaling and Power-Limited circuits

Article 760 - Fire Protective Signaling Systems

Article 770 - Fiber Optic Systems

Article 800 - Communication Circuits

Article 820 - Community Antenna Television

Article Overviews

The NEC code can be somewhat confusing to the novice who has not studied the code in depth. In most cases, within an article, a listing will allow for a higher listed cable to be substituted for lower listed cable. Or some listings from one article may be substituted for another article listing with possible restrictions. This section will briefly cover the basis of the code to try to make things clearer for you. You should consult the NEC book for exact specifications, wording, and accuracy of the code. This is not in any way an exact excerpt from the code.

Article 725

Article 725 covers Class 1, Class 2, and Class 3 remote control and signaling cables as well as power-limited tray cable. Power-limited tray cable can be used as a Class 3 or Class 2 cable. Cable listed multi-purpose, communications, or power-limited fire protective can be used for Class 2 and Class 3 applications. A Class 3 listed cable can be used as a Class 2 cable.

Article 760

Article 760 covers power-limited fire protective cable. Cable listed as power-limited fire protective cable can also be used as Class 2 and Class 3 cable. Cable listed as communications and Class 3 can be used as power-limited fire protective cable with restrictions to conductor material and type, gauge size and number of conductors.

Article 770

Article 770 covers fiber optic cable. This article covers three general types: non-conductive, conductive, and composite. Non-conductive type refers to cable containing no metallic members and no other electrically conductive materials. Conductive type refers to cable containing non-current carrying conductive members such as metallic strength members, etc. Composite type refers to cable containing optical fibers and current carrying electrical conductors. Composite types are classified according to the type of electrical circuit that the metallic conductor is designed for.

Article 800

Article 800 covers multi-purpose and communication cable. Multi-purpose cable is the highest listing for a cable and can be used for communication, Class 2, Class 3, and power-limited fire protective cable. Communication cable can be used for Class 2 and Class 3 cable and also as a power-limited fire protective cable with restrictions.

Article 820

Article 820 covers community antenna television and RF cable. CATV cable may be substituted with multi-purpose or communication listed coaxial cable.

Designation and Environmental Areas

Not only does listing by circuit types have to be adhered to, but installation in various environments have to also be considered. The NEC has designated four categories for various environments. These will be listed from the highest to the lowest listing. A higher listing can be used as a substitute for a lower listing.

Plenum - This listing is suitable for use in ducts, plenums, and other space used for environmental air without conduit and has adequate fire-resistant and low-smoke producing characteristics. It can also be used for applications below.

Riser - This listing is suitable for use in a vertical run, in a shaft or from floor to floor, and has fire-resistant characteristics capable of preventing the carrying of fire from floor to floor. It can also be used for applications below.

General Purpose - This listing is suitable for general-purpose use, with the exception of risers, ducts, plenums, and other space used for environmental air, and is resistant to the spread of fire. It can also be used for all applications below.

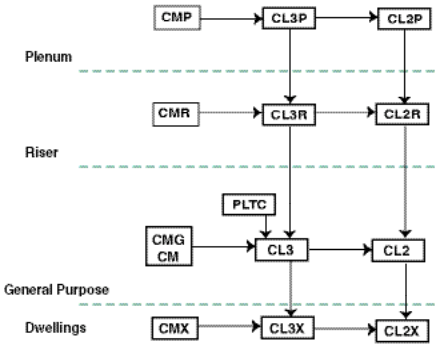
Restricted Applications - This listing is for limited use and is suitable for use in dwellings and for use in raceways and is flame retardant. Restricted use is limited to non-concealed spaces of 10 feet or less, fully enclosed in conduit or raceway, or cable with diameters less than .25" for a residential dwelling.

Understanding the National Electrical Code

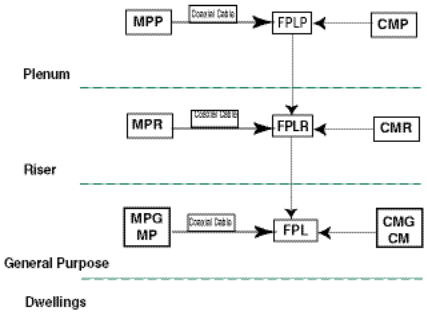
National Electrical Code Substitution Chart

The following chart explains the NEC cable hierarchy and will give you a "picture" view of how this all fits together. The chart starts with the higher listed cable at the top descending to the lower listed cable. Following the arrows will allow you to find what listing can be substituted for others. Also note restrictions in which case you will have to review the NEC code in order to see if your cable is applicable.

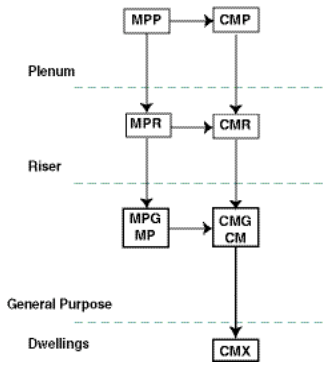
Article 725



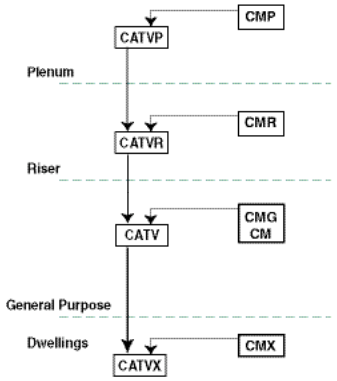
Article 760



Article 800



Article 820



Final Considerations

The National Electrical Code is widely accepted as the suggested regulations governing the proper installation of wire and cable in the United States. The code is revised every three years to keep safety in the forefront in wire and cable manufacturing and installation. Even though the code is generally accepted, each state, county, city and municipality has the option to adopt all of the code, part of the code, or develop one of its own. The local inspectors have final authority of your installation. Therefore, the NEC is a good reference when questions arise about the proper techniques for a particular installation, but local authorities should be contacted for verification.

When choosing cable for your installation there are four guidelines to follow to keep problems to a minimum:

1. The application and environment determines which type of cable you can use and what rating it should have. Make sure the cable you're installing meets the proper ratings for your application.

2. If you will be substituting a cable with another, you must have a cable that is rated higher than what the code calls for. Check with your local inspector as to what is allowed in your local area.

3. The NEC code is a general guideline that can be adopted in whole or in part. Your local state, county, city, or municipal approved code is what you must fol low. Contact your local authorities for verification of the code in your area.

4. The local inspector or fire marshal has the final authority to approve or disapprove any installation of cable based on the National Electric Code or on the local code.

If you remember these four guidelines, you should have fewer complications and headaches when installing cable in your area. Remember to always work closely with your local authorities.

Calculating Conduit Capacity

One Cable Type in Conduit

The following information is to provide you with a quick and easy reference for conduit fill requirements. This information is to be used as a general guideline. Each installation has different restrictions for installation environments and/or local codes to follow.

The Conduit Capacity Chart provided on the following page is for applications when only one type of cable is to be used in a conduit. For example, if you know the diameter of the cable you will be installing, use the cable O.D. column, and find the exact or next largest diameter cable O.D.. Follow this row over to the number of cables you need to install in a conduit. Then follow this column to the top of the chart and read the conduit size required for the number of cables you need to install.

Multiple Types of Cable in One Conduit

If you will be mixing various cable diameters in a conduit, then this overall chart does not apply. You will have to use the following guidelines to calculate the conduit fill requirements.

To determine the conduit size required for a particular installation of cable follow these steps:

1. Square the O.D. of each cable and total the results.
2. Multiply the total by .7854*. This is the total area of the cables in square inches.
3. From the Permissible Area row on the Conduit Capacity Chart shown on the following page, select the conduit size with an area equal to or greater - than the total area you calculated.

* See Important Notes and Installation Suggestions

** Permissible Area to be occupied (sq. in.) is based on the NEC standard of 40% fill, which applies to three or more non-lead covered cable installed in the same conduit.

Important Notes and Installation Suggestions

• A single cable is permitted to occupy 53% and two cables are limited to 31% conduit fill. For a single cable use .5927 in step 2, for two cables use 1.1034, and three or more cables use .7854.

• This chart is based on the maximum number of cable per mitted in conduit under the National Electrical Code, and is calculated on the area of the cable with 40% of the conduit filled. For conduit runs of 50 to 100 feet, the installed number should be reduced by 15%, or use the next larger size conduit. If more than two 90 degree bends are to be used in the conduit run, or if the run is to be over 100 feet in length, insert a pull box.

• An anti-friction agent is recommended in pulling operations.

*CAUTION: Select an anti-friction agent which is suitable for the cable jacket material. The electronic characteristics of unjacketed cable may change due to the application of anti-friction agents.

* COLD ENVIRONMENT PRECAUTION: Due to the nature of PVC compounds to become non-pliable when stored or handled in ambient temperatures of 32 degrees F or less, we recommend the following:

"Prior to installation, condition the cable for at least 24 hours at room temperature to provide the best flex properties for ease of installation."

• Permissible area chart does not apply to metallic and non-metallic surface raceways; consult the NEC for recommendations.

THE NATIONAL ELECTRICAL CODE FORBIDS
THE INSTALLATION OF COMMUNICATION CABLE
IN THE SAME CONDUIT AS POWER CABLE.

Pulling Tensions

Under the stress of approximately 15,000 lbs./sq. in. annealed copper will begin to permanently stretch. The table below lists the absolute maximum recommended pulling tensions for conductor sizes. For multiple conductor cable, multiply the appropriate value by the total number of conductors. These pulling tensions must be equally distributed among the conductors.

THESE LIMITS MUST NEVER BE EXCEEDED
EVEN MOMENTARILY!
DON'T JERK THE CABLE!

The electronic characteristics of a cable may change due to excessive tension and crushing.

Gauge	Max. Pulling Tension
24 AWG	4 lbs
22 AWG	7 lbs
20 AWG	12 lbs
18 AWG	19 lbs
16 AWG	30 lbs
14 AWG	48 lbs
12 AWG	77 lbs

Conduit Capacity Chart

Conduit Size		1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
I.D. Inches		.622	.824	1.049	1.380	1.610	2.067	2.469	3.068	3.548	4.026
Permissible Area*		0.12	0.21	0.34	0.60	0.82	1.34	1.92	2.95	3.96	5.09
Cable O.D Inch	Cable Area sq. Inch										
.100	.00785	15	27	44	76	103	171	298	450	588	751
.125	.01227	10	17	28	48	66	109	191	288	376	481
.150	.01767	7	12	19	34	46	76	132	200	261	334
.175	.02405	5	9	14	25	34	56	97	147	192	245
.200	.03142	4	6	11	19	26	42	74	112	147	188
.225	.03976	3	5	8	15	20	33	59	89	116	148
.250	.04909	2	4	7	12	16	27	47	72	94	120
.275	.0594	1	3	6	10	13	22	39	59	77	99
.300	.07069	1	3	5	8	11	19	33	50	65	83
.325	.08296	1	2	4	7	10	16	28	42	55	71
.350	.09621	1	1	3	6	8	14	24	36	48	61
.375	.011045	1	1	3	5	7	12	21	32	42	53
.400	.012566	1	1	2	4	6	10	18	28	36	47
.425	.14186	1	1	2	4	5	9	16	25	32	41
.450	.15904	1	1	1	3	5	8	14	22	29	37
.475	.17721	1	1	1	3	4	7	13	20	26	33
.500	.19635	1	1	1	3	4	7	12	18	23	30
.525	.21648	0	1	1	2	3	6	11	16	21	27
.550	.23758	0	1	1	2	3	5	10	15	19	25
.575	.25967	0	1	1	1	3	5	9	13	17	22
.600	.28274	0	1	1	1	3	4	8	12	16	21
.625	.3068	0	1	1	1	2	4	7	11	15	19
.650	.33183	0	1	1	1	2	4	7	10	14	17
.675	.35785	0	0	1	1	1	3	6	10	13	16
.700	.38484	0	0	1	1	1	3	6	9	12	15
.725	.41282	0	0	1	1	1	3	5	8	11	14
.750	.44179	0	0	1	1	1	3	5	8	10	13
.775	.47173	0	0	1	1	1	3	5	7	9	12
.800	.50265	0	0	1	1	1	2	4	7	9	11
.825	.53456	0	0	1	1	1	2	4	6	8	11
.850	.56745	0	0	1	1	1	2	4	6	8	10
.875	.60132	0	0	0	1	1	1	4	6	7	10
.900	.63617	0	0	0	1	1	1	3	5	7	9
.925	.67201	0	0	0	1	1	1	3	5	7	9
.950	.70882	0	0	0	1	1	1	3	5	6	8
.975	.74662	0	0	0	1	1	1	3	4	6	8
1.00	.7854	0	0	0	1	1	1	3	4	6	7
1.025	0.825	0	0	0	0	0	1	3	4	6	7
1.05	0.866	0	0	0	0	0	1	2	3	4	5
1.075	0.908	0	0	0	0	0	1	2	3	4	5
1.100	0.950	0	0	0	0	0	1	2	3	4	5
1.125	0.994	0	0	0	0	0	1	1	2	3	5
1.150	1.039	0	0	0	0	0	1	1	2	3	4
1.175	1.084	0	0	0	0	0	1	1	2	3	4
1.20	1.131	0	0	0	0	0	1	1	2	3	4
1.225	1.179	0	0	0	0	0	1	1	2	3	4
1.250	1.227	0	0	0	0	0	1	1	2	3	4
1.275	1.277	0	0	0	0	0	1	1	2	3	3
1.300	1.327	0	0	0	0	0	1	1	2	3	3
1.325	1.379	0	0	0	0	0	0	1	2	3	3
1.350	1.431	0	0	0	0	0	0	1	2	2	3
1.375	1.485	0	0	0	0	0	0	1	1	2	3
1.400	1.539	0	0	0	0	0	0	1	1	2	3
1.425	1.595	0	0	0	0	0	0	1	1	2	3
1.450	1.651	0	0	0	0	0	0	1	1	2	3
1.475	1.709	0	0	0	0	0	0	1	1	2	2
1.500	1.767	0	0	0	0	0	0	1	1	2	2

EXAMPLES:

Example A.

Sample Cable:
227- .269″ O.D.

Go down the Cable O.D. inch column. Find the number equal to or greater than the cable O.D. Go across to find the number of cables in the appropriate conduit size.

.269″- Closest .275″
13 in a $1^{1/2}$″ Conduit.

Example B.

Three different Cables:

227 - .269″ sqd. = .0724
434 - .411″ sqd. = .1689
6350 - .275″ sqd. = .0756
\+
.3169
x .7854
.2489

On the Permissible Area- equal to or greater. The closest area is .034
Use a 1″ Conduit

Important Note: This conduit capacity chart is to be used as a general guideline. Because local codes can vary from the NEC. West Penn Wire cannot be held responsible for this information as it pertains to your installation. Proper conduit fill is the sole responsibility of the installer and it is your responsibility to see that your installation will pass local codes.

Cable Termination Techniques

Cable Termination

There is a variety of termination methods for cable. The termination method utilized depends basically on the system installed, type of cable used and type of connector. Using the proper termination method allows for good mechanical and electrical integrity. No matter what type of termination you will be performing, the most important thing is to use the proper tools and materials for the type of termination. For example, a crimp using pliers will work, but using a crimp tool and the proper die designed for your type of cable and connector is better. Using the proper solder type and the right temperature for solder type connections will ensure a lasting connection. We will review four basic termination techniques. This is just to provide some general guidelines. The termination method may vary somewhat based on system requirements and connector manufacture design methods.

Termination Types

Solder Type

A solder type connection allows for a strong, solid mechanical and electrical connection. Clean the connection well. For electrical circuits you must use a rosin type flux to clean all connections. Do not use acid flux that is commonly used for plumbing installation. The acid based flux will cause corrosion and inherently cause intermittent problems with the electrical signal. The choice of solder is also important. Using a solder standard 60/40 formula will meet the majority of your soldering needs. However, lead-free and high-grade silver solder is available for special applications. Also, use a soldering iron of the proper wattage. If the soldering iron is not hot enough, you may not be able heat the connection enough to get a good solder joint. This may cause what is known as a "cold" solder joint and can cause intermittent problems like opens to occur. However, if the soldering iron is too hot, you can cause damage to the components of the system near the connection. This can also cause the insulation to possibly melt causing the bare primaries to make contact with each other resulting in a short.

Crimp Type

A crimp type connection allows for quick and simple installation while still maintaining a mechanical and electrical connection fairly close to a solder type termination. Solid or stranded wire can be used in this type of termination.

Some of the key points to remember for a good clean connection are as follows:

1. Make sure you use the proper size connector for the type of cable you are using.
2. Make sure all of your cuts and stripping are clean.
3. Avoid nicks as much as possible.
4. Use the proper crimp tool, don't try to improvise with pliers, etc.

The most common crimp method involves two crimps, one on the insulation for a stronger mechanical connection and one on the conductor or shield for a good electrical connection. A crimp tool is designed specifically for this type of termination for the type of connector you are using. This allows for good connections both mechanical and electrical. Using pliers will allow connection. However, it may not be a solid mechanical or electrical connection and can cause the connector to eventually come loose and intermittent problems with the electrical signal can occur.

Insulation Displacement

This type of termination is usually used in punch down blocks, wall connectors, and in the back of patch panels. This type of termination eliminates the need for stripping the conductor insulation. As the conductor is pushed though the clip, the insulation is cut into and the metal clip contact makes contact with the wire.

The best type of wire to use is a solid conductor. If you use a stranded conductor the force of the termination may allow the clip to cut some of the strands. Also, stranded wire will "crush" somewhat which will not allow for a solid connection. However, both types of conductors are used in various systems.

The connection is made by using a punch down tool. Some patch panel manufacturers supply a termination cap that terminates several wires at once without the use of a tool. Some tools will allow use of different bits for use with various terminations. (i.e. 66 block, 110 block, etc.). Just like the crimping type termination, it is important to use the correct bit for the type of termination you are doing.

Direct Connection (Utility Block/ Screw Terminals)

This type of termination has several names. Utility block, barrier strip, or screw terminals are just a few. This type of termination can use either solid or stranded conductors. It allows for easy termination as well as quick changing of wire in the future. The main point to remember about a screw connection is to strip back the insulation only to the amount of conductor that will wrap around the screw and to place the wire in the same direction as the screw turns when tightening. This will "pull" the wire in tighter as the screw tightens. If you wrap the wire around the screw opposing the tightening rotation of the screw, the wire will be pulled outward and will become unwrapped around the screw.

Splicing

It is recommended to avoid splicing whenever possible, however, when splicing of cables becomes necessary, there are several methods to do this. Splicing can be as simple as twisting conductors together, soldering and then taping. Splicing can also be more elaborate by using a variety of inline connectors and adapters. The method used is based on the type of system used, the electrical signal characteristics, and type of cable used. A simple audio or intercom system can be spliced by just connecting the conductor together with the twist method. However, a CCTV or high speed data system will require inline connectors and adapters due to the construction of the cable as well as to maintain proper impedance, resistance, and capacitance characteristics for the cable run. If the location of the splice is outdoor or in underground environments, it is recommended that a waterproof splice kit be utilized.

Connector Termination/Basic Guidelines

Cable Termination

There are a variety of termination methods for cables. The termination method utilized depends basically on the system installed, type of cable used, and type of connector. Using the proper termination method allows for good mechanical and electrical integrity. No matter what type of termination you will be performing, the most important thing to remember is to use the proper tools and materials for your type of termination. For example, a crimp using pliers will work, but using a crimp tool and the proper die designed for your type of cable and connector is better. Using the proper solder type and the right temperature for solder type connections will ensure a lasting connection. We will review some basic termination techniques. This is just to provide some general guidelines. The termination method may vary somewhat based on system requirements and connector manufacturer design methods.

Crimp Type Termination

A crimp type connection allows for quick and simple installation while still maintaining a mechanical and electrical connection fairly close to a solder type termination. Solid or stranded wire can be used in this type of termination.

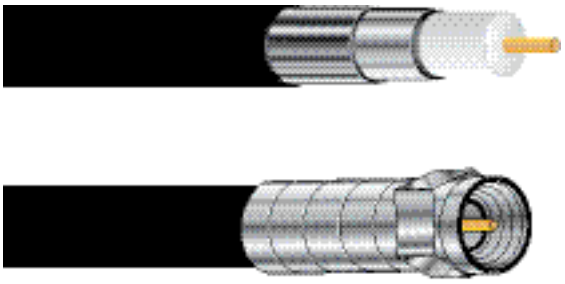
Some of the key points to remember for a good clean connection are as follows: make sure to use the proper size connector for the type of cable you are using. Make sure all your cuts and stripping are clean. Avoid nicks as much as possible. Use the proper crimp tool; don't try to improvise with pliers, etc.

The most common crimp method involves two crimps. One is on the insulation for a stronger mechanical connection and one is on the conductor or shield for a good electrical connection. A crimp tool is designed specifically for this type of termination, for the type of connector you are using. This allows for good connections, both mechanical and electrical. Using pliers will allow a connection; however, it may not be a solid mechanical or electrical connection, and can cause the connector to eventually come loose, which can cause intermittent problems with the electrical signal.

Splicing

It is recommended to avoid splicing whenever possible. However, when splicing of cables becomes necessary, there are several methods to do this. Splicing can be as simple as twisting conductors together, soldering, and then taping. Splicing can also be more elaborate by using a variety of inline connectors and adapters. The method used is mainly based on the type of system used, the electrical signal characteristics, and type of cable used. A simple audio or intercom system can be spliced by just connecting the conductor together with the twist method. However, a CCTV or high speed data system will require inline connectors and adapters due to the construction of the cable as well as to maintain proper impedance, resistance, and capacitance characteristics for the cable run. If the location of the splice is outdoor or in underground environments, it is recommended that a waterproof splice kit be utilized.

"F" Type Connector



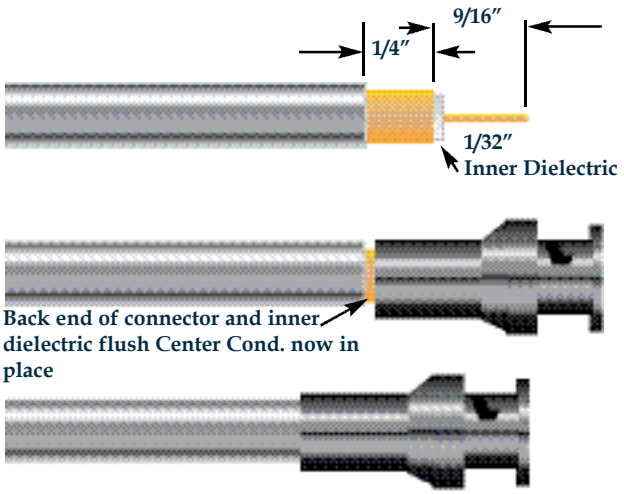
1. Strip 1/2" of the jacket to expose the braid shield.

2. Bend the exposed shield (Braid) back over the outer jacket. Do not disturb the foil shield beneath the braid.

3. Strip core back to expose conductor 1/4".

4. Slide the shank of the "F" connector over the foil shield and under the braid shield. Push the connector onto the cable, until the shoulder of the connector is firmly seated against the braid shield. Crimp connector with proper tool as recommended by your connector manufacturer.

BNC - Connector Termination



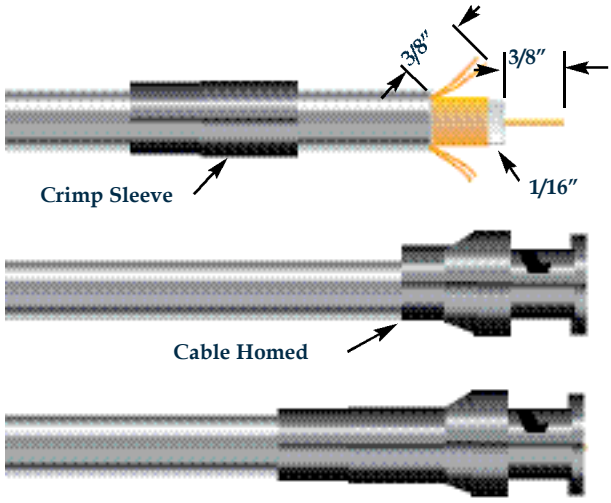
Twist On BNC Connector

1. Trim cable as shown, taking care not to nick the center conductor or outer braid.

2. Twist the outer braid in a clockwise direction in such a manner that at least 1/32″ of the inner dielectric is bared, and the braid is left flat. (Stray or loose braid can cause shorts).

3. Gently insert the center conductor down into the back end of the connector, feeling it into the guide hole. When the center conductor is not in place approx. 1/8″ of center conductor will show.

4. Firmly push the cable home as far as possible. Then screw the connector on the cable in a clockwise direction until it stops.



2 Piece BNC Connector

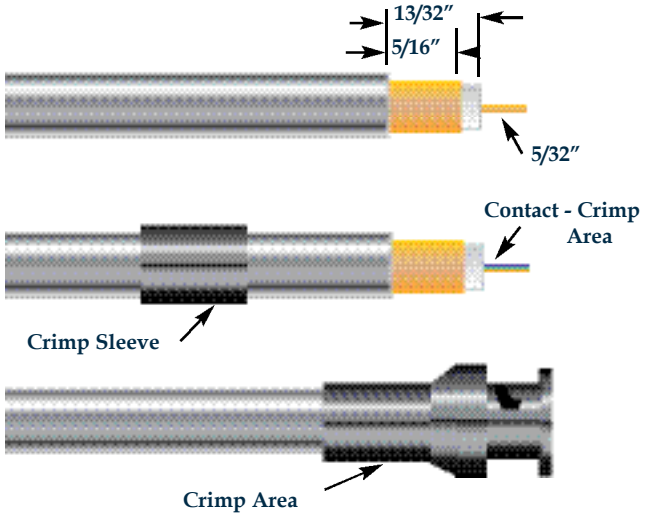
1. Run crimp sleeve down cable.

2. Trim cable as shown. Taking care not to nick the center conductor or outer braid

3. Gently insert the center conductor into the guide hole, in the rear of the connector, and firmly push the cable home.

4. Push crimp sleeve into place. Sandwiching the braid between the connector and sleeve.

5. Crimp the sleeve into place with the proper crimp tool.



3 Piece BNC Connector

1. Trim cable as shown. Taking care not to nick the center conductor or outer braid.

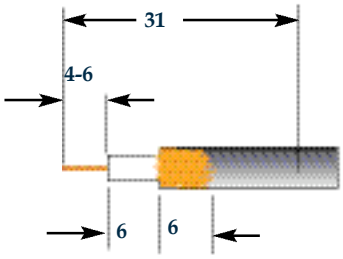
2. Slip crimp sleeve over cable. Place inner conductor into contact, note that the end of the contact and inner dielectric must be butting and square. Crimp with proper crimp tool.

3. Flair outer braid, and gently but firmly push the contact into the connector housing until a gentle snap is felt. Indicating the contact is in place. Slip the crimp sleeve in place, butting the flange against the connector body, and crimp with proper tooling.

Coaxseal Compression- Connector Termination

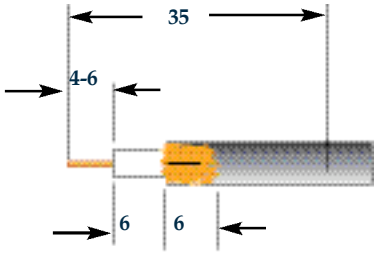
BNC

RG59/U Plenum RCA
RG6/U Plenum and RG6/U Quad-shield Plenum BNC
RG59/U Plenum and RG59/U Quad-shield Plenum BNC
RG6/U and RG6/U BNC, BNC Right angle, BNC Jack
RG59/U BNC, BNC Right angle, BNC Jack



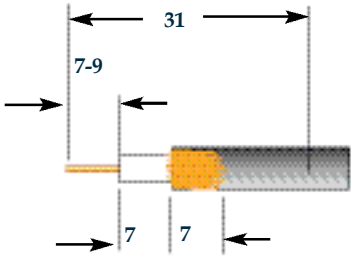
RCA

RG6/U and RG6/U Plenum Quad-shield RCA, RCA Jack
RG6/U -RG6/U Quad Shield RCA Right angle
RG6/U Quad Shield RCA Jack
RG59/U RCA, RCA Right angle, RCA Jack



" F" Type

All "F" Type Compression Connectors

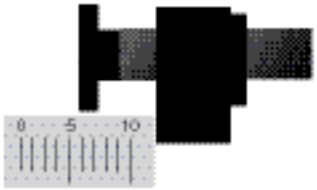


NOTE:
Slitting the jacket 3-4 mm will help in seating the connector properly.
Mark the jacket at 31 or 35 mm to help guide the connector to the appropriate location.

" F" Type

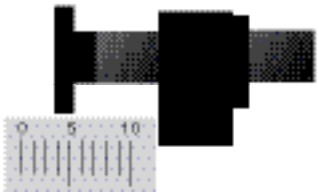
"F" Type compression connectors set the adjustable crimp ferrule to 1.

BNC



BNC Type compression connector set the adjustable crimp ferrule to 6.

RCA



RCA Type compression connectors set the adjustable crimp ferrule to 4.

NOTE:
Adjustments apply only to the SNS Style compression connectors.
Slight adjustments may be necessary

Connector Cross-Reference

Cable Part No.	Connector Type	Connector Part No.	Crimp Tool	Strip Tool
1100	"F"	CN-F11ALX	TL-112	TL-124**
	Comp. "F"	CN-FSNS-11	TL-SNS11	TL-SNS11ST
1110	"F"	CN-F11ALX	TL-112	TL-124**
	Comp. "F"	CN-FSNS-11	TL-SNS11	TL-SNS11ST
1130	"F"	CN-F11ALX	TL-112	TL-124**
	Comp. "F"	CN-FSNS-11	TL-SNS11	TL-SNS11ST
1135	"F"	CN-F11ALX	TL-112	TL-124**
	Comp. "F"	CN-FSNS-11	TL-SNS11	TL-SNS11ST
	3 Pc. BNC	BN-BM53-26	TL-113	TL-124
1150	Triax Female	7703-1	KTH-1000	--
	Triax Male	7705-1	KTH-1000	--
	Die		KTH-2040	--
1165	Triax Female	7703-3	KTH-1000	--
	Triax Male	7705-3	KTH-1000	--
	Die		KTH-2041	--
252815	1Pc. BNC	CN-BM51-10	--	TL-120
	2Pc. BNC	CN-BM52-10	TL-100	TL-120**
	3PC. BNC	CN-BM53-30	TL-103	TL-121
	75Ω 3Pc. BNC	CN-BM74-32 CN-BM73-30	TL-104	TL-121
	Comp. BNC	CN-CSBNC-59	TL-SNSA	TL-CSST
252825	SVHS	CN-SVHS-M	--	--
	75Ω 3Pc. BNC	CN-BM74-18	TL-105	TL-825
	Comp. BNC	CN-CSBNC-25	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-25	TL-SNSA	TL-CSST
	Female BNC	CN-BF74-18	TL-105	TL-825
253815	Triax Female	7703-6	KTH-1000	--
	Triax Male	7705-4	KTH-1000	--
	Die		KTH-2002	--
253CRGB 255CRGB 252CSVHS	Comp. BNC	CN-FS1BNC	TL-SNSA	TL-CSST
	Comp. RCA	CN-FS1RCA	TL-SNSA	TL-CSST
256350	"F"	CN-F56TFE	TL-111	TL-120
	Comp. "F"	CN-CSF-6	TL-SNSA	TL-SNSST
	75Ω 3Pc. BNC	CN-BM73-4	--	TL-121
	Comp. BNC	CN-CSBNC-6	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-6	TL-SNSA	TL-CSST

Cable Part No.	Connector Type	Connector Part No.	Crimp Tool	Strip Tool
256CRGB2P	Comp. BNC	CN-FS1BNC	TL-SNSA	TL-CSST
	Comp. RCA	CN-FS1RCA	TL-SNSA	TL-CSST
25806	1Pc. BNC	CN-BM51-4	--	TL-120
	2Pc. BNC	CN-BM52-4	TL-101	TL-120**
	3PC. BNC	CN-BM53-4	TL-104	TL-121
	75Ω 3Pc. BNC	CN-BM73-4	TL-107	TL-121
	Comp. BNC	CN-CSBNC-6	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-6	TL-SNSA	TL-CSST
25810	3PC. BNC	CN25810KBNC	TL-115	TL-124
25811	"F"	CN-F11TFE	TL-115	TL-124**
25812	3PC. BNC	CN-BM53-25	TL-105	TL-121
25815	1Pc. BNC	CN-BM51-10	--	TL-120
	2Pc. BNC	CN-BM52-10	TL-100	TL-120**
	3PC. BNC	CN-BM53-30	TL-103	TL-121
	75Ω 3Pc. BNC	CN-BM74-32 CN-BM73-30	TL-104	TL-121
	Comp. BNC	CN-CSBNC-59	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-59	TL-SNSA	TL-CSST
25819	"F"	CN-F59TFE/WP	TL-111	TL-120
	Comp. "F"	CN-FSNS-2	TL-SNSA	TL-SNSST
	75Ω 3Pc. BNC	CN-BM74-32 CN-BM73-30	TL-104	TL-121
	Comp. BNC	CN-CSBNC-59	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-59	TL-SNSA	TL-CSST
25821	"F"	CN-F11TFE	TL-115	TL-124**
25825	75Ω 3Pc. BNC	CN-BM74-18	TL-105	TL-825
	Comp. BNC	CN-CSBNC-25	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-25	TL-SNSA	TL-CSST
	Female BNC	CN-BF74-18	TL-105	TL-825
25841	"F"	CN-F56TFE	TL-111	TL-120
	Comp. "F"	CN-CSF-6	TL-SNSA	TL-CSST
25Q821	"F"	CN-F11TFE	TL-115	TL-124**

Note: ** Center Conductor blade must be removed before using

Connector Cross-Reference

Cable Part No.	Connector Type	Connector Part No.	Crimp Tool	Strip Tool
25Q841	"F"	CN-F56ALM	TL-111	TL-120
	Comp. "F"	CN-CSF-6	TL-SNSA	TL-CSST
25843	"F"	CN-F59TFE/W	TL-111	TL-120
25Q843	"F"	CN-F59ALX	TL-111	TL-120
2806B	75Ω 3Pc. BNC	CN-BM73-5	TL-107	TL-121
	Comp. BNC	CN-CSBNC-6	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-6	TL-SNSA	TL-CSST
2815B	1Pc. BNC	CN-BM51-2	--	TL-120
	2Pc. BNC	CN-BM52-2	TL-101	TL-120**
	3PC. BNC	CN-BM53-2	TL-104	TL-121
	75Ω 3Pc. BNC	CN-BM73-2 CN-BM74-32	TL-104	TL-121
	Comp. BNC	CN-CSBNC-59	TL-SNSA	TL-CSST
2825	SVHS	CN-SVHS-M	--	--
	75Ω 3Pc. BNC	CN-BM74-18	TL-105	TL-825
	Comp. BNC	CN-CSBNC-25	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-25	TL-SNSA	TL-CSST
	Female BNC	CN-BF74-18	TL-105	TL-825
3811	Triax Female	7703-1	KTH-1000	--
	Triax Male	7705-1	KTH-1000	--
	Die		KTH-2040	-
3815	Triax Female	7703-9	KTH-1000	--
	Triax Male	7705-9	KTH-1000	--
	Die		KTH-2002	--
4806	1Pc. BNC	CN-BM51-5	--	TL-120
	75Ω 3Pc. BNC	CN-BM73-5	TL-107	TL-121
4811	3PC. BNC	CN-BM53-26	TL-113	TL-124**
4815	1Pc. BNC	CN-BM51-2	--	TL-120
	3PC. BNC	CN-BM53-2	TL-104	TL-124
	75Ω 3Pc. BNC	CN-BM74-32 CN-BM73-2	TL-104	TL-121
5990	1Pc. BNC	CN-BM51-2	--	TL-120
	3PC. BNC	CN-BM53-2	TL-104	TL-121
	75Ω 3Pc. BNC	CN-BM74-32 CN-BM73-2	TL-104	TL-121
5992	Triax Female	7703-9	KTH-1000	--
	Triax Male	7705-9	KTH-1000	--
	Die		KTH-2002	--

Cable Part No.	Connector Type	Connector Part No.	Crimp Tool	Strip Tool
5994	Triax Female	7703-2	KTH-1000	--
	Triax Male	7705-2	KTH-1000	--
	Die		KTH-2002	-
5CRGB	Comp. BNC	CN-CSBNC-26	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-26	TL-SNSA	TL-CSST
6100	"F"	CN-F56ALM	TL-111	TL-120
	Comp. "F"	CN-FSNS-6	TL-SNSA	TL-SNSST
6140	"F"	CN-F56ALM	TL-111	TL-120
	Comp. "F"	CN-FSNS-6	TL-SNSA	TL-SNSST
6150	"F"	CN-F56ALM	TL-111	TL-120
	Comp. "F"	CN-FSNS-6	TL-SNSA	TL-SNSST
6300 6310	"F"	CN-F56ALX	TL-111	TL-120
	Comp. "F"	CN-FSNSQS-6	TL-SNSA	TL-SNSST
6350	"F"	CN-F56ALM	TL-111	TL-120
	Comp. "F"	CN-FSNS-6	TL-SNSA	TL-SNSST
	75Ω 3Pc. BNC	CN-BM73-5	TL-107	TL-121
	Comp. BNC	CN-CSBNC-6	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-6	TL-SNSA	TL-CSST
6500	"F"	CN-F56ALM	TL-111	TL-120
	Comp. "F"	CN-FSNSQS-6	TL-SNSA	TL-SNSST
6CRGB2P 6CRGB4P	Comp. BNC	CN-CSBNC-26	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-26	TL-SNSA	TL-CSST
806 806R	75Ω 3Pc. BNC	CN-BM73-5	TL-107	TL-121
	Comp. BNC	CN-CSBNC-6	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-6	TL-SNSA	TL-CSST
807	3PC. BNC	CN-BM53-8X	TL-119	--
	"N" Type	CN-NM53-8X	TL-119	--
810	3PC. BNC	CN-BM53-8	TL-113	TL-124
	"N" Type	CN-NM53/110	TL-106	TL-124
811	3PC. BNC	CN-BM53-26	TL-113	TL-124
812	3PC. BNC	CN-BM53-13	TL-103	TL-121
813	1PC. BNC	CN-BM51-1	--	TL-120
	3PC. BNC	CN-BM53-13	TL-103	TL-121
815 815E 815R	1Pc. BNC	CN-BM51-2	--	TL-120
	2Pc. BNC	CN-BM52-2	TL-101	TL-120**
	3PC. BNC	CN-BM53-2	TL-104	TL-121
	75Ω 3Pc. BNC	CN-BM73-2 CN-BM74-32	TL-104	TL-121
	Comp. BNC	CN-CSBNC-59	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-59	TL-SNSA	TL-CSST

Note: ** Center Conductor blade must be removed before using

Connector Cross-Reference

Cable Part No.	Connector Type	Connector Part No.	Crimp Tool	Strip Tool
819	"F"	CN-F59ALM	TL-111	TL-120
	Comp. "F"	CN-FSNS-2	TL-SNSA	TL-SNSST
	75Ω 3Pc. BNC	CN-BM74-32 CN-BM73-2	TL-104	TL-121
	Comp. BNC	CN-CSBNC-59	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-59	TL-SNSA	TL-CSST
821	"F"	CN-F11ALX	TL-112	TL-124**
	Comp. "F"	CN-FSNS-11	TL-SNS11	TL-SNS11ST
825	75Ω 3Pc. BNC	CN-BM74-18	TL-105	TL-825
	Comp. BNC	CN-CSBNC-25	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-25	TL-SNSA	TL-CSST
	Female BNC	CN-BF74-18	TL-105	TL-825
841	"F"	CN-F56ALM	TL-111	TL-120
	Comp. "F"	CN-FSNS-6	TL-SNSA	TL-SNSST
A2815	1Pc. BNC	CN-BM51-2	--	TL-120
	2Pc. BNC	CN-BM52-2	TL-101	TL-120**
	3PC. BNC	CN-BM53-2	TL-104	TL-121
	75Ω 3Pc. BNC	CN-BM73-2 CN-BM74-32	TL-104	TL-121
	Comp. BNC	CN-CSBNC-59	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-59	TL-SNSA	TL-CSST
AQC2806 AQC806	1PC. BNC	CN-BM51-5	--	TL-120
	75Ω 3Pc. BNC	CN-BM73-5	TL-107	TL-121
	Comp. BNC	CN-CSBNC-6	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-6	TL-SNSA	TL-CSST
AQC815 AQC819	1Pc. BNC	CN-BM51-2	--	TL-120
	2Pc. BNC	CN-BM52-2	TL-101	TL-120**
	3PC. BNC	CN-BM53-2	TL-104	TL-121
	75Ω 3Pc. BNC	CN-BM74-32 CN-BM73-2	TL-104	TL-121
	Comp. BNC	CN-CSBNC-59	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-59	TL-SNSA	TL-CSST
AQC841	"F"	CN-F56AQ	TL-111	TL-120
	Comp. "F"	CN-FSNS-6	TL-SNSA	TL-SNSST

Cable Part No.	Connector Type	Connector Part No.	Crimp Tool	Strip Tool
HD825 HD25825	75Ω 3Pc. BNC	CN-BM74-18	TL-105	TL-825
	Comp. BNC	CN-CSBNC-25	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-25	TL-SNSA	TL-CSST
	Female BNC	CN-BF74-18	TL-105	TL-825
HQ841 Q841	"F"	CN-F56ALX	TL-111	TL-120
	Comp. "F"	CN-FSNSQS-6	TL-SNSA	TL-SNSST
Q821	Comp. "F"	CN-FSNS-11	TL-SNS11	TL-SNS11ST
WP258195	75Ω 3Pc. BNC	CN-BM74-32 CN-BM73-2	TL-104	TL-121
	Comp. BNC	CN-CSBNC-59	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-59	TL-SNSA	TL-CSST
WP8253 WP8255 WP258255	75Ω 3Pc. BNC	CN-BM74-18	TL-105	TL-825
	Comp. BNC	CN-CSBNC-25	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-25	TL-SNSA	TL-CSST
	Female BNC	CN-BF74-18	TL-105	TL-825
WP258263 WP258265	75Ω 3Pc. BNC	CN-BM74-19	TL-105	TL-825
	Comp. BNC	CN-CSBNC-26	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-26	TL-SNSA	TL-CSST
WP6355	75Ω 3Pc. BNC	CN-BM73-5	TL-107	TL-121
	Comp. BNC	CN-CSBNC-6	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-6	TL-SNSA	TL-CSST
WP8195	75Ω 3Pc. BNC	CN-BM74-32 CN-BM73-2	TL-104	TL-121
	Comp. BNC	CN-CSBNC-59	TL-SNSA	TL-CSST
	Comp. RCA	CN-CSRCA-59	TL-SNSA	TL-CSST

SPECIALTY CABLES:

PAN TILT ZOOM CABLE:

PTZ815 - SEE 815 CABLE
PTZ25815- SEE 25815 CABLE
PTZ825 - SEE 825 CABLE
PTZ25825 - SEE 25825 CABLE

HOMENETWORKING COMPOSITE CABLES:

•HN5161 • HN5162 • HN5261 • HN5262 • HN5262F
•LSHN6262 • LSHN5262 • LSHN6262F
SEE HQ841 CABLE

MEDIA CONTROL CABLE: (ELAN)

E1854 - SEE 815 CABLE

Cable Finder: General Cables

2 Conductor (Solid)												
	12 Awg		14 Awg		16 Awg		18 Awg		20 Awg		22 Awg	
	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.
CM											450 AQC290	
CMR											290	220
CMP											25290B	
FPL		974	D995	972	D991	D990 971	D975	D980 970				
FPLR	999	998	995	994	991	990	975	980				
FPLP	60994B	60995B	60992B	60993B	60990B	60991B	60975B	60980B				

2 Conductor (Stranded)																
	10 Awg		12 Awg		14 Awg		16 Awg		18 Awg		20 Awg		22 Awg		24 Awg	
	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	
CM							AQC225		AQC293 77293	AQC224	AQC292 77292		AQC291 AQC290 452 77291		DA2401 D2401 D4851	
CMR					295 CL2R		294	225	293	224	292	222	291 (X)454	221 S221		
CL2		HA210	77296	C207 HA227	77295	C206 HA226	77294	C205 HA225								
FPL			AQ296	AQ227	AQ295	AQ226	AQ294	AQ225	AQ293	AQ224						
CL2R			296	227		226										
CL2P		25210	25296B	25227B	25295B	25226B										
CMP							25294B D25294	25225B	25293B D25293	25224B	25292B D25292	25222B	25291B D25291 D25454	25221B	DA252401 D252401 D254841	
TC		C210														

3 Conductor (Solid)												
	16 Awg		18 Awg		20 Awg		22 Awg					
	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.				
CM							451 AQC351	AQC351				
CMR							300 351	230 351				
CMP							25300B					

3 Conductor (Stranded)												
	12 Awg		14 Awg		16 Awg		18 Awg		20 Awg		22 Awg	
	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.
CM									AQC358		AQC352	AQC352
CMR					304	235	303	234	302 358	232 358	301 352	231 352
CL3R		238	305	236								
CMP		25238B CL2P					25303B	25234B	25302B 25358B	25232B 25358B	25301B 25352B	25231B 25352B
CL2P				25236B								

Not all West Penn Wire Products are listed in the cable finder

Cable Finder: General Cables

4 Conductor (Solid)												
	14 Awg		16 Awg		18 Awg		20 Awg		22 Awg		24 Awg	
	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.
CM									AQC355 D420 AQC420	AQC240 AQC355		
CMR									355 3251 420	240 355 251		
FPL		AQ246	AQC3245 D993	AQ245	AQC3244 D982	AQ244						
FPLR		700	993	992	982	977			1083			
FPLP		60700B	603164B	60164B	60977B	60982B						
CMP									25355B M54089	25355B	D252402	

4 Conductor (Stranded)														
	12 Awg		14 Awg		16 Awg		18 Awg		20 Awg		22 Awg		24 Awg	
	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.
CM							D440		AQC359	AQC359	AQC357 AQC430 D430	AQC357	DA2402 D4852	
CMR					3245	245	3244 360 3751	244 360 751	3011 359	242 359	3241 357 D3651 3651	241 357 651		
CL2				HA246		HA245								
FPL				AQ246	AQ3245	AQ245	AQ3244	AQ244	AQ293	AQ224				
CL2R		248		246										
CMP						25245B	25440B 253244B	25244B 25751B	253244B 25359B	25242B 25359B	253241B 25357B 25510B D25430 D253651	25241B 25357B	DA252402 D254852	
CL2P		25248B		25246B										

5 Conductor (Stranded)								
	18 Awg		20 Awg		22Awg			
	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.		
CMR	3280	280	3262	262	3855	855		
CMP					253855B	25855B		

6 Conductor (Solid)								
	18 Awg		22 Awg					
	Shld.	Unshld.	Shld.	Unshld.				
CM			AQC369 AQC373					
CMR			3252 421 369	369				

Not all West Penn Wire Products are listed in the cable finder

6 Conductor (Stranded)								
	18 Awg		20 Awg		22 Awg		24 Awg	
	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.
CM	AQC3186 D441				D3652 D431		D2403 D4853	
CMR	3752	3021 752	752		3270 3652	270 652		
CMP	253186B	25186B 25752B			253270B 25441B D253652 D25431	25270B	D252403	

7 Conductor (Stranded)								
	16 Awg		18 Awg		20 Awg			
	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.		
CMR		663	3281	281	3263	263		

8 Conductor (Solid)								
	18 Awg		22 Awg		23 Awg		24 Awg	
	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.
CM			AQC429					M58762
CMR			3253 429			4246		4245
CMP						254246		254245

8 Conductor (Stranded)								
	18 Awg		20 Awg		22 Awg		24 Awg	
	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.
CM	AQC188 D442				AQC439 D3653 D439		DA2404S D2404 D4854	
CMR	3753	753			3271 3653	271 653		4245
CMP	253188B	25188B 25753B			253271B D253653 D25439	25271B	D252404	

9 Conductor (Stranded)								
	18 Awg		20 Awg					
	Shld.	Unshld.	Shld.	Unshld.				
CMR	3282	282	3264	264				

10 Conductor (Solid and Stranded)								
	18 Awg		22 Awg					
	Shld.	Unshld.	Shld.	Unshld.				
CMR			3272 Strd.	272 Strd.				
CMP				25272B Strd.				

Not all West Penn Wire Products are listed in the cable finder

Cable Finder: General Cables

12 Conductor (Solid)								
	22 Awg							
	Shld.	Unshld.						
CM	AQC422							
CMR	422							

12 Conductor (Stranded)								
	18 Awg		20 Awg		22 Awg		24 Awg	
	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.
CM	AQC3283				AQC432 WP4546 D432		DA2406	
CMR	3283	754 283	3265	265	3654 3273	654 273		
CMP					D25432	25273B	DA252406	

15 Conductor (Solid and Stranded)								
	18 Awg		20 Awg		22 Awg			
	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.		
CM					AQC3274 D432			
CMR		284			3274	274		
CMP					253274B	25274B		

16 Conductor (Stranded)								
	22Awg		24 Awg					
	Shld.	Unshld.	Shld.	Unshld.				
CM	WP4548		DA2408S					

18 Conductor								
	18 Awg		22 Awg					
	Shld.	Unshld.	Shld.	Unshld.				
CMR Strd.		755		655				
CMR Solid			423					

20 Conductor								
	18 Awg		20 Awg		22 Awg			
	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.		
CMR Strd.		285			3275			

Not all West Penn Wire Products are listed in the cable finder

24 Conductor								
	22 Awg							
	Shld.	Unshld.						
CM Strd.	D434 AQC434 WP45412 DA2412S							
CMR Strd.	3656	656						
CM Solid	AQC424							
CMR Solid	424							

30 Conductor								
	18 Awg		22 Awg					
	Shld.	Unshld.	Shld.	Unshld.				
CMR Solid			425					

	32 Conductor				38 Conductor			
	22 Awg		22 Awg		22 Awg			
	Shld.	Unshld.	CM Shld.		Shld.	Unshld.		
CMR Strd.		657	WP45416					

	46 Conductor		48 Conductor		54 Conductor		64 Conductor	
	22 Awg		22 Awg		22 Awg		22 Awg	
	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.	Shld.	Unshld.
CM Strd.			WP45424 CM		D438		WP45432 CM	

Not all West Penn Wire Products are listed in the cable finder

Cable Finder- *Coaxial Cables*

RG59/U CATV Coaxial Cables			RG59/U CCTV Coaxial Cables		RG59/U Pro-Video Coaxial Cables		MiniMax Cables	
CATV	CATVP	CATV Outdoor	CM CMR	CMP	CM CMR	CMP	CM CMR	CMP
	25843 25Q843 Quad		815 815R 2815B A2815 AQC815	25815 252815	819 AQC819	25819	825 HD825 45825 2825 SVHS	25825 HD25825 252825

RG6/U CATV Coaxial Cables			RG6/U CCTV Coaxial Cables		RG6/U Pro-Video Coaxial Cables	
CATV	CATVP	CATV Outdoor	CM CMR	CMP	CM CMR	CMP
841 6100 AQC841 6150 Dual 6285 Dual HQ841 Q841 6300 6500 Quad	25841 25Q841 Quad	6140 6310 Quad	806 806R 2806B AQC2806 AQC806 4806 6325 Outdoor	25806	6350	256350

RG11/U CATV Coaxial Cables			RG11/U CCTV Coaxial Cables		RG11/U Pro-Video Coaxial Cables	
CATV	CATVP	CATV Outdoor	CM CMR	CMP	CM CMR	CMP
821 1100 Q821	25821 25Q821 Quad	1110 1125	811 4811 1130 Outdoor	25811	1135	

RGBHV Minimax & Miniature			RG59/U RGBHV		RG6/U RGBHV	
3 Coax	4 Coax	5 Coax	4 Coax	5 Coax	3 & 4 Coax	5 Coax
WP8253 CM 253CRGB WP258263 CMP		WP8255 5CRGB WP258255 WP258265 255CRGB CMP		WP8195 WP258195 CMP		WP6355

Special RGB Cables:
6CRGB2P, 6CRGB4P
256CRGB2P

50 Ohm Coaxial Cables		
	PVC	Plenum
RG8/U	810	25810
RG58/U	812 813	25812

Specialty Cables

HomeNetworking:	HN5261 - HN5262 - HN5262F - LSHN5262 - LSHN6262 - LSHN6262F
Media Control Cables:	77350 - D25350 - E1854 - HA1624
Access Control Cables:	AC1822 - LS1822 - LS251822
Video over UTP:	CC2418 - CC2416 - CC252418 - CC252416
PTZ Composite Cables:	PTZ825 - PTZ815 - PTZ25825 - PTZ25815
Composite A/V Cables:	LS25AV, LSAV
FLat Parallel Cables:	WP37123 - WP37127 - WP37125 - WP37129
Low Skew UTP Cables:	M58813, M58814

Not all West Penn Wire Products are listed in the cable finder

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Discontinued List & Replacement Cables

Disc P.N.	Replace P.N.
103	-
104	-
105	-
110	-
115	-
117	-
118	-
119	-
120	-
151	751
152	752
153	753
154	754
223	-
228	-
233	234
237	234
243	244
249	244
254	654
255	655
256	656
257	657
258	-
259	-
260	-
266	284
267	285
286	-
287	-
288	-
289	292
306	302
370	-
371	-
372	-
385	-
386	-
387	-
388	-
389	-
392	-
430	D430
431	D431
432	D432
433	D433
434	D434
435	425
436	D436
438	D438
439	D439
440	D440
441	D441

Disc P.N.	Replace P.N.
442	D442
444	-
460	291
510	77510
511	-
533	-
534	-
535	-
555	855
570	270
571	271
572	272
573	273
574	274
575	275
576	276
577	277
801	-
804	-
814	815
816	815
818	-
842	841
843	841
950	-
951	-
961	-
976	977
984	-
986	-
988	-
1084	-
1086	-
1125	-
1977	-
1980	-
1982	-
1984	-
1986	-
1988	-
1992	-
1993	-
1998	-
2010	-
2015	-
2017	-
2018	-
2816	2815B
3010	3241
3151	3751
3152	3752
3153	3753
3154	3754
3254	3654
3255	3655

Disc P.N.	Replace P.N.
3256	3656
3257	-
3258	-
3259	-
3260	-
3266	-
3267	-
3277	-
3284	-
3285	-
3657	-
3755	-
5900	6100
5915	6140
6170	-
6190	-
6285	-
6373	6350
6961	-
6962	-
7100	1100
7120	1110
7200	811
7210	1135
7325	1130
25221	25221B
25222	25222B
25224	25224B
25225	25225B
25226	25226B
25227	25227B
25231	25231B
25232	25232B
25234	25234B
25235	25235B
25238	25238B
25241	25241B
25242	25242B
25244	25244B
25245	25245B
25270	25270B
25271	25271B
25272	25272B
25274	25274B
25280	25186B
25281	25188B
25290	25290B
25291	25291B
25292	25292B
25293	25293B
25294	25294B
25300	25300B
25301	25301B
25302	25302B
25303	25303B

Disc P.N.	Replace P.N.
25352	25352B
25355	25355B
25357	25357B
25358	25358B
25359	25359B
25372	25372B
25373	-
25374	-
25440	25440B
25441	25441B
25510	25510B
25814	25815
25855	25855B
25950	-
60975	60975B
60977	60977B
60980	60980B
60982	60982B
60990	60990B
60991	60991B
60992	60992B
60993	60993B
60994	60994B
60995	60995B
60996	-
60997	-
60998	-
251976	-
251977	-
251989	-
251993	-
251997	-
253241	253241B
253244	253244B
253270	253270B
253271	253271B
253272	253272B
253274	253274B
253280	253186B
253281	253188B
253855	253855B
257210	-
506970	-
506971	-
506972	-
506974	-
225D	225
226D	226
227D	227
235D	235
25Q841S	-
25T843	25Q843
292D	292
841S	-
D2406	-

Disc P.N.	Replace P.N.
D252403	-
D252406	-
D2524125	-
D25303	-
D253654	D25432
D291	77291
D292	77292
D293	77293
D294	77294
D301	-
D303	-
D3654	-
D510	77510
D976	-
D977	-
D989	-
D993	-
D999	-
HA248	248
HA294	294
HA3245	3245
HA3246	3246
HN5162	LSHN5162
HN5262C	-
M54089	-
TC1601	TC2991
TC1602	-
TC1603	-
TC1604	-
TC1606	-
TC1801	TC2975
TC1802	-
TC1802S	-
TC1803	-
TC1803S	-
TC1804	-
TC1804S	-
TC1806	-
TC1806S	-
WP258194	WP258195
WP258254	255CRGB
WP6354	WP6355
WP8254	5CRGB
WP82561	6CRGB2P
WP82564	-

WEST PENN WIRE

Replacement Cable are deemed to be the closest construction West Penn Wire offers. For more details on Replacement Cables Call our Engineering Department: 800-245-4964

Make your Notes: