

## CABLE JACKET TYPES 101

Almost every cable has a jacket and for good reason: jackets help mechanically protect the insulation and conductor core of the cable. Without a jacket, cables are susceptible to abrasion, heat damage and oxidation damage, as well as weather-related damage. But not every jacket is created equal; it is imperative that each cable have the correct jacket type for each application in order for the cable to operate properly. This wire wisdom will explore some of the different cable jacket types and provide an overview on the jackets' mechanical and chemical properties.

### WHAT IS A CABLE JACKET?

A jacket is the outermost layer of a cable whose primary function is to protect the insulation and conductor core from external physical forces and chemical deterioration. In a sense, the cable jacket is the first line of mechanical defense for a cable by protecting the cable's inner components. Cable jackets offer mechanical, moisture, flame and chemical protection, while also protecting the cable from damage during or after installation. It is important to note that the cable jacket has little to do with the electrical performance of the cable.

### CABLE JACKET TYPES

Cable jacket types can be broken down into two categories: thermoplastic jackets and thermoset jackets. A thermoplastic jacket is a type of material that when hot enough will melt and reform, whereas a thermoset jacket is a "set" material – it doesn't have the ability to reform when heated. There are many different types of both thermoplastic and thermoset jackets, and the options listed below are only a small array of the choices one has with cable jacket types.

#### Thermoplastic

**PVC** – Polyvinyl Chloride (PVC) jackets, while not exhibiting a wide range of thermal characteristics, do have the ability to resist oils, acids, sunlight, heat, weathering and abrasion. By having such strong physical assets, PVC is an ideal jacket for cables that will be used for direct burial, street lighting and control cable. Since PVC is inherently flame-retardant, it is the most common jacketing material for electronic cable.

**Polyurethane** – A polyurethane (PUR) jacket has excellent oxidation, oil, and ozone resistance, and when specially formulated, a polyurethane jacket can also have good flame resistance. These types of jackets also have great "memory" properties, which make it an ideal jacket for retractile cords.

**CPE** – Chlorinated Polyethylene (CPE) is one of the few polymers that is available as both a thermoplastic and a thermoset jacket (thermoset CPE would be a cross-linked version). The thermoplastic CPE jacket has excellent oxidation, heat, oil, weather/sun and flame resistance. Although the thermoset version has better high-temperature properties, the thermoplastic version contains other excellent properties.

#### Thermoset

**Neoprene** – Neoprene is a synthetic rubber that allows for a resilient jacket. By not embrittling at cold temperatures, resisting permanent deformation under heat, and resisting aging due to oxidation and sunlight, neoprene jackets are suitable for cables in rugged environments, such as mine trailing cables and dredge cables.

**EPR** – Ethylene Propylene Rubber (EPR), another form of synthetic rubber, is a type of jacket that is a modified form of the EPR insulating compound. EPR jackets have excellent heat, abrasion, oxidation resistance and can also withstand cold temperatures down to -60°C. With fairly good high-temperature characteristics overall, when formulated correctly, EPR can be fairly flame retardant as well.

**CPE** – The thermoset CPE jacket (cross-linked) has excellent physical properties that make it suitable for many cable jacket applications. This polymer is resistant to ozone and ultraviolet degradation, and if properly compounded, can also withstand prolonged immersion in water. With strong resistance to most acids, bases, and solvents, thermoset CPE jackets are well-suited for chemical plant use.

## PROPERTIES OF CABLE JACKETS

As stated earlier, jackets provide mechanical protection to the insulation and conductor core. In order to provide the best possible protection for the cable, a jacket can be modified by the addition of fillers, plasticizers, activators, and inhibitors to enhance a particular physical characteristic. Some of those physical characteristics are as follows:

- Toughness, tear and abrasion resistance
- Flexibility during cable installation, at low temperature
- Stability over a range of temperatures
- Resistance to heat aging
- Resistance to cable deformation
- Flame resistance
- Oil resistance
- Low moisture absorption
- Resistance to abnormal concentrations of chemicals
- Weather and ultraviolet resistance

	Thermoplastic			Thermoset		
	PVC	Polyurethane	CPE	Neoprene	EPR	CPE
Oxidation resistance	E	E	E	G	E	E
Heat resistance	E	G	E	G	E	E
Low-temperature flexibility	P-G	G	E	F-G	G-E	F
Weather/ sun resistance	G-E	G	E	G	E	E
Abrasion resistance	F-G	O	E-O	G-E	G	G-E
Flame resistance	E	P	E	G	P	G
Water resistance	F-G	P-G	O	E	G-E	G-E
Underground burial	P-G	G	E-O	G-E	E	E

P = Poor, F = Fair, G = Good, E = Excellent, O = Outstanding

If you would like more information on cable jackets, please see the [Anixter Wire and Cable Technical Information Handbook](#), as well as the [IEEE 532 guide](#).

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