

## JACKETING MATERIAL FOR CABLE ASSEMBLIES

Industrial automation applications often require special cables to provide reliable performance in a wide variety of environments and conditions. Custom cables and preassembled cords often make a lot of commercial sense, especially if the application requires rapid deployment of replacement cables or frequent disconnecting and reconnecting. Selecting cables that can provide reliable performance for a given environment can be tricky.

The following is an overview of the characteristics of several common jackets used for cords and cables in industrial automation applications. Because a cord is a type of cable, we'll only refer to cables throughout the rest of this Wire Wisdom.

### WHAT IS THE PURPOSE OF A CABLE JACKET?

The cable jacket is the first line of mechanical, moisture, flame and chemical defense for a cable. More specifically, the jacket provides protection for the shielding and conductors. It protects the cable from mechanical damage during and after installation. Jackets are not intended to replace cable armors, but they can provide a fairly high level of protection. They also provide moisture and chemical protection along with UV and ozone protection. **Table 1** provides information about the characteristics of certain materials often used for jackets for industrial automation cables.

### WHAT JACKET CHARACTERISTICS DO YOU NEED?

In most automation applications, a physically robust cable jacket is needed because the environment is harsh and typically industrial in nature. Most automation cables are designed with this in mind. Keep in mind that there are varying levels of ruggedness available in the market, and you often get what you pay for.

Other common characteristics that may be considered when choosing an automation cable are listed in **Table 1**.

TABLE 1. JACKET IMPACT ON APPLICATION

Jacket Characteristic	Impact on Application
Flexibility	Ease of use and long-term flex life
Chemical resistance	Life expectancy during exposure to chemicals
Low-temperature flexibility	Suitability for arctic or winter climates
High-temperature survivability	Determines peak and ambient operating temperature and contributes to ampacity rating
Color	Identification, safety and appearance
Surface texture	Ease of handling and installation
Elastic memory	Flexibility and handling, especial in coil cords
Approvals	Suitability for a given application/jurisdiction
Flame resistance	Safety and flame spread
Cross-linking level	Suitability for extreme exposure such as weld splatter

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## TYPES OF JACKETS

There are many types of jackets available. It's important that the jacket type selected is compatible with the application, connectors and environment. For example, a cable that might be disconnected in an environment with cutting fluids should not be slippery and should be able to survive occasional exposure to the cutting fluid.

Likewise, an arctic environment may require cable jackets that remain flexible at extremely low temperatures. **Table 2** contains typical characteristics of some of the most common jacket types used for industrial control cables and cords.

TABLE 2. COMMON CABLE JACKETS AND THEIR CHARACTERISTICS

<b>PUR</b> (Polyurethane)	Polyurethane is very elastic, with a very high memory, which makes it ideal for coil cord applications. It is abrasion resistant, has excellent flexibility in low-temperature environments, and performs well when exposed to oil and ozone. Other common products made from PUR are Rollerblade wheels and telephone handset cords.
<b>PVC</b> (Polyvinylchloride)	Polyvinylchloride can be formulated to function in a variety of environments and applications. In automation cables, it is usually a low-cost, flexible, fairly rugged, and flame- and oil-resistant material. PVC can be made in either a matte finish or glossy, slick finish. A common product that uses PVC is the jacket material used for portable extension cords used in residential applications.
<b>TPR/TPE</b> (Thermoplastic rubber/elastomer)	Thermoplastic elastomers have excellent low-temperature properties without spending the money needed for a thermoset material. It has good chemical and oil resistance and is also quite flexible. TPR/TPE also rivals thermoset materials in abrasion resistance and surface texture, but it is usually not as rugged as PUR. Common products that use TPR/TPE are athletic shoe soles and industrial-grade portable cord jackets.
<b>Thermoplastic CPE</b> (Chlorinated Polyethylene)	Thermoplastic chlorinated polyethylene is generally a jacket used in very harsh environments. It is lightweight, generally very rigid, and has a mildly rough surface texture and a low coefficient of friction. It's a low-cost material relative to the level of moisture, oil, chemical and UV resistance that it provides. Common products made from CPE are waterproofing membranes and automotive parts.
<b>Thermoset Polyolefins</b> (CPE, CSPE, etc.)	Thermoset polyolefins are the only products in this list that are truly melt resistant and in the same family of materials as natural rubber. They are highly elastic with excellent memory. They are known for their ruggedness, low-temperature flexibility, UV stability and heat resistance. For example, they are the preferred material for welding applications. Common products made from thermoset CPE or CSPE are premium inflatable boats and flat-roof membranes.



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