



Practical Guide to Cable Selection

Cabling is often overlooked until the end of a product design process. While it is true that cables are flexible both literally and fundamentally, cable cost can quickly add up if the options are not planned in advance. Here are a few of the common characteristics of cabling that will help you to get the most out of your product.

- 1. Flat or Round** – Flat cables (also known as ribbon cables) are designed for mass termination. An IDC connector may be used to terminate all wires on a given flat cable quickly and efficiently. Flat cables run straight across (1:1 or 1:N), so terminating is not very customizable. Flat cables are flexible in only one plane, so their usefulness is limited as your distance between terminations is increased. Round cables are flexible in multiple planes and can include a myriad of other options. These options include, but are not limited to, the items discussed below.
- 2. Twisted Pairs** – For differential applications, twisting wires may be needed. By twisting pairs (or more) of wire, the two wires experience equal interference or noise. This way, system bias error is reduced or even eliminated between the two wires.
- 3. Shielding** – EMI effects can be dramatically reduced by adding shielding to cabling. Typical shields are braided sleeve, served, and spiral tape. Some applications require double shielding or shielding of twisted pairs. The tradeoff with adding shielding is larger diameter cable and lower flexibility. Value add on a shielded cable can be notably more expensive because the labor to remove or pull back portions of a shield add up quickly. Shields can be grounded by drain wire or by using the connector housing (or pin) as a drain.
- 4. Conductors** – Inner conductors may be manufactured as a solid conductor, but they are more commonly made as a stranded conductor. Stranded wire is much more flexible and carries improved flex life. The higher the strand count, the more flexibility and cost your cable will have. Stranded wire is more suited for solder and crimp terminations. IDC may be used with both, although it is important to choose a connector that is designed to mate the type of wire you are using. Tinned copper is the standard material for stranded wire, although other coatings may be utilized for special applications.
- 5. Insulators** – Wire and cable insulation serve three main purposes. The first is obvious: electrical insulation, or dielectric constant. All standard material types do a good job of this. Next is the rate at which energy is absorbed by the dielectric, called dissipation factor. Finally, the insulation is the outermost barrier and serves as environmental and flammability protection. PVC is a standard offering, but polyolefin is only marginally more expensive and offers superior dielectric properties. For high temperatures or special applications, TPE is also an option.

TLC has the expertise to solve your needs

TLC Electronics has worked with hundreds of different types of cables and has the knowledge to help you figure out exactly what you need for your application. We work with experienced cable manufacturers and can provide you with cable handpicked for your needs.