

Flexible Polyolefin Heat Shrinkable Tubing

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What is Heat Shrink?

Heat shrink is a common name for heat shrinkable tubing which is a simple and reliable method to apply insulation, protection, or covering for a wide variety of electrical, electronic, and mechanical applications.

How Does Heat Shrink Work?

A good percentage of the most popular heat shrinkable tubing in the industry today is irradiated (or cross-linked) polyolefin. Cross-linking converts the polyolefin, a meltable or thermoplastic material, into a non-melting, thermoset material and imparts a permanent “memory” to the polyolefin. This permits the material to be supplied in the expanded state and, with the application of heat, shrink to its original size. In the process, the polyolefin is transformed into an entirely new class of high temperature material with significantly improved properties including increased temperature resistance, improved mechanical properties, solvent and chemical resistance, and thermal stability.

Heat shrinkable tubing is normally supplied in an expanded state, ready to use. Once heat is applied, it will shrink and conform to an object forming a skin tight fit and once it is has shrunk to a smooth surface, additional heat will not shrink the tube any further.

Installation Equipment

The most common method of heating is with a hot air heat gun, but in specialized applications forced hot air circulation ovens (for batch processes), conveyor or tunnel ovens (for continuous feed) and Infrared (IR) heaters or toaster ovens for high volume bench work are being used. In some cases, especially in heavier-wall tubing applications where electricity is not readily available (outdoors or direct burial), a butane torch is used.

Heat Shrink-Applications

Some typical uses for heat shrinkable tubing are:

- Insulation of terminations and splices in electronic wire systems
- Environmental protection from moisture, dust, oil, and airborne contaminants
- Mechanical protection from abrasion, cuts, and harsh treatment
- Strain relief protection from premature breaking, cracking, or kinking of wire insulation and delicate components
- Identification and bundling of wire for cable management
- Chemical and corrosion protection
- Temperature protection
- Finishing and/or appearance

Product Selection-Performance Requirements

There are a number of considerations when choosing the right product for the application. They include:

- Temperature rating requirements-shrink temperature
- Environmental requirements
- Flammability requirements
- Flexible requirements
- Chemical resistance
- Abrasion resistance/mechanical strength
- Shrink ratio (sizing)
- Recovered wall thickness
- Color/printing

Product Selection-Sizing

- Identify max/min O.D. of cable or component
- 80/20 rule-tubing should shrink at least 20% before it encounters resistance to avoid splitting
- Then determine the expansion ratio-2:1, 2.5:1, 3:1, 4:1. The typical ratio on the most popular applications of thin wall tubing is 2 to 1. 1 inch tubing is supplied at 1 inch diameter and fully shrinks to ½ inch, etc.

Single Wall (or referred to as Thin Wall)-Applications

Single wall tubing is typically used as an electrical insulation over cable splices and terminations. It is also used for lightweight wire harness covering, wire marking, wire bundling, component packaging, and fire-resistant covering.

3M™ Brand FP-301 Flexible Polyolefin is a single wall application product and is, by far, the most popular of tubing used. It has the following characteristics:

- General purpose
- 2:1 shrink ratio
- Flame retardant-self extinguishing
- 14 standard sizes-7 colors
- 4 foot sticks/spools/6 inch pieces
- UL Recognized, CSA Certified
- SAE-AMS-DTL-23053/5 Class 1 (clear Class 2)
- Operating temperature -55° C to 135° C
- Withstand temp to 300° C for short time

Newark carries a complete compliment of 3M™ Brand Heat Shrinkable Tubing and Tubing kits.

