



## Heat Shrink Technology

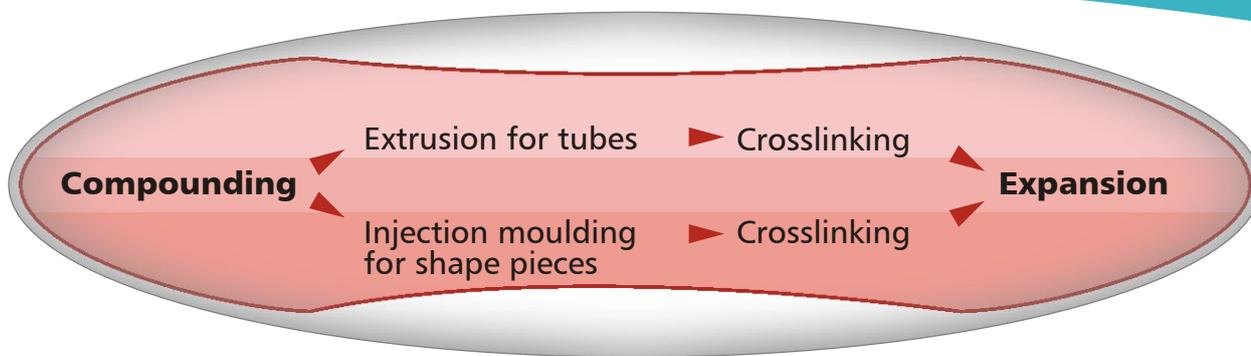
M-Seal Heat Shrink Technology offers complete range of cable jointing & termination kits for XLPE, PILC, PVC & EPR Cables from 1.1kV to 36kV voltage grades. The kits consist of heat shrinkable tubing, moulded parts, mastics & other accessories for making a complete joint/ termination. The heat shrinkable components & tubings undergo cross linking through electron beam radiation process.

M-Seal Heat Shrink product range also includes various heat shrinkable components viz. Rain sheds, Breakouts (two way, three way, four way), Right angle & Straight boots, Cable end caps, Wrap around sleeves, Bus bar tubing, Medium wall & Dual wall tubes.

M-Seal Heat Shrink components have excellent stress control properties, exceptional insulation characteristics, good long term weathering performance, offer ease of installations & unsurpassed performance in polluted environments.

M-Seal Heat Shrink product range is backed up by a nation wide network of distributors, field sales engineers and technical service personnel, ready to provide engineering support and training to satisfy customer needs.

- Covers all types of conductors and connection shapes.
- Environmental sealing by specially developed sealants.
- Effective and reliable stress control.
- Flexible kits sizes, reduces inventory.
- Compact, hence multiple terminations possible
- Unlimited shelf life.
- Immediate energisation of cable on completion
- Designed to meet International specifications IDE, IEC, IS & IEEE.



### Extrusion process for H S Tube manufacturing

In the extrusion process the extruder acts essentially as a pump, which supplies a continuous stream of molten thermoplastic compound or another material to a forming, die. The die shapes the material, or extrudes, into a product - tubing. This (hot) tubing is then delivered to a cooling and calibration system where sufficient heat is removed to solidify the tubing into the right size. A take-off device removes the tubing from the cooling system and delivers it to a winder, where the tubing is wound on spools. The extruders have a specially designed screw configuration, for optimal mixing and homogeneous and consistent tubing. These tubing are then crosslinked using electron beam radiation process.

### Injection Moulding process for H S shaped component manufacturing

In an injection moulding process, injector acts essentially as a pump, which feeds the molten material to a forming die under pressure. The die shapes the material, and delivers components of desired shape. This hot component is then air cooled to restore its shape. Dies can be designed with multiple cavity to achieve optimum utilization of raw materials and to economize production cost. These components are then cross linked.

### Cross linking of Heat-shrinkable products through radiation chemistry

Thermoplastic materials are composed of extremely long, very thin molecules in a random arrangement. The strength of such materials depend upon the distance between its molecules and the crystalline nature of its molecular structure. It is these crystals, which provide most of the strength to the material. As the material is heated, the crystals disappear. The molecules can then slip past each other easily and the material flows. The material may be formed into almost any desired shape in this heated condition. Subsequently the material is allowed to cool and the crystals reform is providing substantial strength to retain the plastic in the shape in which it has been formed.

This material is then exposed to high energy penetrating radiation which causes a bonding of the various adjacent molecular chains. This process of forming the bond is "cross linking" and it results in the transformation of plastic structure into new three dimensional network.

Once the material has been cross linked, it will not flow at any temperature. When the material is heated, the crystals still disappear as before, but it will no longer flow or change shape because the crosslinks act as ties between the molecules. The cross linked structure, however, is elastic. The unique heat-shrinkable properties of these products are obtained through the exposure of special thermoplastic formulations to radiation. Because of the resultant cross linking, such products have good elastic memory.

While manufacturing these products are fabricated into their final form and then subjected to high energy radiation, thus permanently "freezing" them into the desired shape.

### Expansion technology

In this thermal process the diameter of the tubing/ moulded article is increased by forces at a temperature slightly above the crystalline melting point of the polymer used. Due to the three dimensional crosslinks which are incorporated by means of the crosslinking process, the product does not melt and obtains its perfect shape memory. Immediately after the tubing /moulded article reaches its required expanded size, it is cooled down far below its crystalline melting point and thus reaches a state in which many radial stresses are present in the tubing. This stage is called the "expanded" state.

These products are supplied in a deformed or expanded condition to cover the object around which they have been placed. They are ideal for covering a variety of electrical and electronic components, as well as wires, lugs, terminals and connectors. These expanded tubes/ components are subjected to heating to shrink them on to the desired substrate.

#### Important Notice

Before using this product, you must evaluate it and determine if it is suitable for your intended application. You assume all risks and liability associated with such use.

#### Warranty; Limited Remedy; Limited Liability.

This product will be free from defects in material and manufacture at the time of purchase. **3M MAKES NO OTHER WARRANTIES**



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