Hi-Shrink Polyester Film

Hi-Shrink Tape is a tough, flexible, heat shrinkable polyester film. When wrapped around an object and heated, Hi-Shrink Tape has the unique ability to shrink and apply pressure. This simple method of pressure application is used to advantage in many industries throughout the world including: -

- Electrical
- Composites
- Defense
- Aerospace

The compression force characteristics of Hi-Shrink Tape make it an effective tool for compacting, debulking, and shaping composite parts. In addition, the tape is also commonly used to compress and consolidate high voltage coils during the manufacturing process.

Hi-Shrink Tape starts to shrink around 65°C and has been used in applications up to 180°C. If left unrestrained, lengthwise shrinkage of 20% will occur after 15 minutes at 150°C.

### Standard Product (Ex Stock)

<table>
<thead>
<tr>
<th>Widths</th>
<th>25mm and 50mm wide are Ex Stock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>0.05mm</td>
</tr>
<tr>
<td>Length</td>
<td>91.4 metres</td>
</tr>
<tr>
<td>Cardboard Core ID</td>
<td>38mm</td>
</tr>
<tr>
<td>Shrinkage</td>
<td>20%</td>
</tr>
<tr>
<td>Shrinkage Direction</td>
<td>Lengthwise</td>
</tr>
<tr>
<td>Shrinkage Starts at</td>
<td>65°C</td>
</tr>
<tr>
<td>Maximum Shrink Force of 20%</td>
<td>will occur after 15 minutes at 150°C</td>
</tr>
<tr>
<td>Release Coated</td>
<td>No</td>
</tr>
</tbody>
</table>

### Product Benefits

- Simple way to apply compaction for debulking, consolidating, and forming parts
- Well suited as sacrifice material in manufacturing of numerous types of high voltage coils
- Gives your part a high gloss, resin rich finish
- Eliminate voids in part walls
- Helps achieve smooth corner radii in high voltage hot pressed coils
- Excellent method to achieve ply compaction
- Simple to apply, easy to remove
- Enables multiple methods for adjusting compressive force on the part

The maximum shrink force of 20% is reached and maintained at 150°C which is typically coincident with the time that most resins begin to flow. Therefore, the tape will be applying the maximum compressive force right when you need it, maximising ply compaction, eliminating air voids and providing a shiny, homogeneous, resin-rich surface finish.

### Shrink Force Characteristics

Shrink force is defined as the lengthwise contraction force of the tape when heated and fully restrained. When heated, the tape shrinks in the lengthwise direction only. It will start to shrink at 65°C, and reach maximum shrink force at 150°C. In use, the practical temperature range is between 90°C and 200°C. Outside this range, the shrink force tends to drop off rapidly. The standard 0.05mm thick tape will shrink about 20% if unrestrained and if fully restrained will exert a shrink force of about 2500 PSI. Full shrink force will occur after 15 minutes at 150°C; this force is then maintained without relaxation during any baking and cooling periods. In shrinking, the tape tends to shorten in length and become slightly wider. The thickness remains relatively unchanged.

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Compression Force Characteristics
When wrapped around an object and heated, Hi-Shrink Tape will shrink until fully restrained by the object. Once fully restrained, the remaining shrink force maintains tension in the tape, which is then felt as a compression force by the underlying object. This compression force is then maintained without relaxation during any baking and cooling periods.
The compression force that can be achieved will vary according to several factors:

- Diameter of the object to be taped
  The smaller the diameter, the greater the compression force. And conversely, the larger the diameter, the lesser the compression force.

- Number of layers of the tape applied
  Two layers of tape will exert twice the compression force as one layer; three layers, three times; etc.

- Temperature to which tape is exposed
  The compression force drops off outside the range of 90°C to 200°C.

- Compressibility of the object
  The more the object compresses before the tape is fully restrained from shrinking, the less force will be available to apply final pressure.

Tape Application
When Hi-Shrink Tape is wrapped around a part which is to be compressed, the tape may be applied in single or multiple layers, directly or over clamping forms. For instance; a part with a round section, such as a rod or a tube, can be taped directly; and uniform pressure will result during shrinking. A part with a rectangular section, however, may require clamping forms; otherwise the tape may exert pressure mainly on the four corners. In other cases, a combination of directly applied tape, and tape over clamping forms or simple moulds may be most effective.

When wrapping a part, the tape should be applied reasonably tight. If the tape is wrapped too loosely, less shrink force is left for applying final pressure: For greater pressure, multiple layers of tape can be applied. In some cases, it may be desirable to shrink each layer with a heat gun to prevent wrinkles in the underlying layers.

When taping, the start end of the tape can be locked by one or two overlaps. The finish end can be secured, with adhesive tape. It may be practical to secure both the start and finish ends of the tape with a generous overlap of an adhesive tape which is compatible with the baking temperature to be used. Heat sealing to secure the ends is not practical, as the melted material is weak and brittle.

Hi-Shrink Tape, being a polyester, has excellent release characteristics from a wide range of materials. However, with any new application, tests should be run to determine the specific release characteristics of Hi-Shrink Tape from the compound or substance to be wrapped. In some cases, the tape may be removed easily while hot, but will stick when cold; in other cases, it may be necessary to remove the tape after a partial cure or set has taken place in the substance being moulded. Use of an appropriate release agent may be necessary to solve certain bonding problems:

Other Products
The family of Hi-Shrink Tapes is geared to suit many applications. Products include:

- Plain Hi-Shrink Polyester - Uncoated: up to 170°C
- Perforated* Hi-Shrink Polyester - Uncoated: up to 170°C
- Plain Hi-Shrink Polyester with PTFE Release Coating: up to 230°C
- Perforated* Hi-Shrink Polyester with PTFE Release Coating: up to 230°C
- Plain Hi-Shrink Polyimide - Uncoated: up to 400°C
- Perforated* Hi-Shrink Polyimide - Uncoated: up to 400°C
- Tedlar® Hi-Shrink Film is also available
- Various Thicknesses • Various Widths • Various Shrink Percentages

*Perforations assist with outgassing, including the removal of volatiles from the curing resin. Tedlar® is a registered Trademark of DuPont

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