Tape Solutions for Protection Composite Molding

**KEY CONTRIBUTOR**

Substrate

Adhesive

**RELATIVE SURFACE TEXTURE**

What is it: Surface roughness often shortened to roughness, is a component of surface texture. It is quantified by the deviations thickness from its ideal smooth surface. If these deviations are large, the surface is rough; if they are small, the surface is smooth. To measure it, a stylus is pulled across the surface of the film to measure the high and low areas of the surface of the substrate.

- = Low/Smoothest
- = Medium
- = High

Importance: Tapes that have a surface texture will leave the impression of that texture onto molded parts. Some parts need a smooth finish, and some need a textured finish. Matte finishes can make the abrading process easier, but some parts need to be smooth straight out to maintain the impression of that texture onto molded parts. Some textured surface finishes can be used to imitate the impression of that texture onto molded parts. To avoid this, a scrim or other fiber reinforcement is used to increase the tear resistance. When a nick is made in a reinforced tape with high tear strength, the tear will not propagate across the film.

**Importance:** A low COF prevents the cured resin from sticking to the composite molding tape.

**Industry Standard Test:** ASTM D1894

**SURFACE ENERGY**

What is it: Energy associated with the intermolecular forces at the interface between two materials. High surface energy liquids more easily wet out onto a surface.

Importance: To prevent a liquid resin from wetting out on the composite molding tape and sticking, the surface energy of the liquid resin must be higher than the surface energy of the mold release tape. Mold release tapes are designed with a very low surface energy to prevent wet out.

**Importance:** A low COF prevents the cured resin from sticking to the composite molding tape.

**Industry Standard Test:** ASTM D7334

**DIMENSIONAL STABILITY & RIGIDITY**

What is it: Ability of the material to resist shrinkage and swelling with changing temperature and moisture.

Importance: If the backing shrinks and swells as the temperature changes during cure, the backing will move and form a wrinkle. Wrinkles must be smoothed out or replaced to avoid a defect in the molded part when additional parts are made from the same mold. Eventually the mold release tape must be replaced, but sometimes 20 parts can be made before the release tape needs to be changed out.

- = Excellent
- = Good
- = Poor

**Importance:** A high tensile strength tape is a stronger tape.

**Industry Standard Test:** ASTM D1204

**TEAR STRENGTH**

What is it: Ability of the tape to resist tear when a nick is made in the edge. Many plastic films will easily tear with very low force once a nick is made in the edge. To avoid this, a scrim or other fiber reinforcement is used to increase the tear resistance. When a nick is made in a reinforced tape with high tear strength, the tear will not propagate across the film.

- = Excellent
- = Good
- = Poor

**Importance:** The tapes that line a mold can be damaged when a part is removed from the mold. A strong tape prevents tearing that would require the entire mold release tape to be replaced. If small sections tear, the small areas can be repaired as long as the tear does not go all the way across.

**Industry Standard Test:** ASTM D624 “Trouser Test”

**TENSILE STRENGTH**

What is it: Measure of the force required to break a tape. A high tensile strength tape is a stronger tape.

**Importance:** Tensile strength in this application primarily makes the tape easy to remove and replace without coming apart in pieces.

**Industry Standard Test:** ASTM D1000

**THICKNESS**

What is it: Measured distance of the cross-section of the tape.

**Importance:** Thicker PTFE glass tapes have thicker, stronger glass cloth and sometimes feature a textured surface finish. Thicker PTFE films are stronger and are easier to handle without forming wrinkles when being put into place on a large mold.

**Industry Standard Test:** ASTM D1000

**ADHESION STRENGTH TO TOOLING**

What is it: Measure of adhesion strength to stainless steel after 20 minutes.

**Importance:** The tape needs to stick to a low surface energy tooling material. If the tape does not stick, the masking line will not be effective.

**Industry Standard Test:** ASTM D1000

**OPERATING TEMPERATURE**

What is it: Temperature exposure requirements and the clean removal of the tape after exposure to temperature.

**Importance:** The tape should not thermostet after exposure to curing temperatures (typically 350°F to 400°F). The tape is often at these temperatures for 6 hours or more and should still remove cleanly without leaving adhesive residue once the part has cooled.

**Industry Standard Test:** Shear Adhesion Failure Test (“SAFT”)
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<td>RELATIVE SURFACE TEXTURE</td>
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<td>Protection + Performance</td>
<td>TOUGTHNESS</td>
<td>The force required to break a tape. A high tensile strength is important for ensuring that the tape can be used in demanding applications.</td>
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<td>TEAR STRENGTH</td>
<td>The ability of the tape to resist tear when a nick is made in the edge. Many plastic films will readily tear with very low force once a nick is made in the edge. To avoid this, a scrim or other protective layer is often used to increase the tear resistance. When a nick, a nick is made in a reinforced tape with high tear resistance, the tear will not propagate across the film.</td>
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<td>Protection + Performance</td>
<td>ENERGY</td>
<td>Energy of the tape to resist tear when a nick is made in the edge. If the force required for tear propagation is low, the tape is said to have a high tear strength.</td>
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<td>COEFFICIENT OF TRACTION (SCF):</td>
<td>A value that shows the relationship between the force of friction and the clean removal of the tape from a surface.</td>
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<td>Flies more easily between two materials. High surface energy liquids more easily react between the objects that touch.</td>
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