Adhesives Reference Tool

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Selecting the Right Tape

When selecting a Pressure-Sensitive Adhesive (PSA), specific characteristics of the materials, environmental factors, application conditions, cost concerns, and the required bonding performance all need to be considered.

Substrates

Substrates or surfaces vary widely though you should pay attention to a few key attributes:

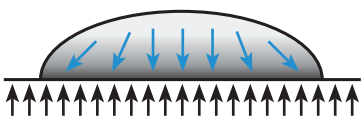
1. Surface Energy - The strength of attraction between two surfaces is determined by the surface energy of the material. The higher the surface energy, the greater the molecular bond. The lower the surface energy, the weaker the attractive forces.

High Surface Energy *(HSE)* materials allow the adhesive to flow or "wet out" for a stronger bond. For example, when it rains on an unwaxed car, the water spreads out creating puddles. In this case, the car's surface is displaying High Surface Energy *(HSE.)* However, a waxed car will cause water to bead up because the car's surface is displaying Low Surface Energy *(LSE)* and therefore resist adhesive wet out and makes bonding more challenging.

Rubber based and modified acrylic adhesives typically offer better adhesion to LSE substrates, as they are softer and flow better.

High Surface Energy

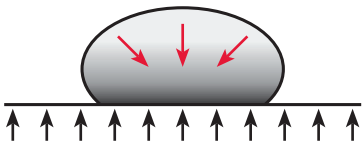
Easy-to-adhere
good adhesive "wet-out"



HSE Materials: Metals, Kapton, Polyester, Polyurethane, ABS, Polycarbonate, PVC, Acrylic

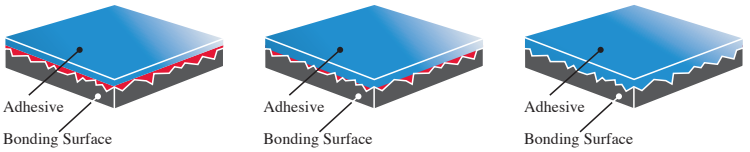
Low Surface Energy

Hard-to-adhere
poor adhesive "wet-out"

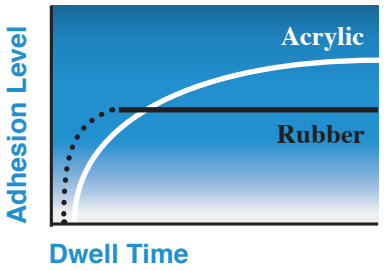


LSE Materials: Polyvinyl Acetate, Polystyrene, Acetal, EVA, Powder Paints, Polyethylene, Polypropylene (Tedlar & Teflon)

2. Adhesive Surface Contact - Applying firm pressure to the bond increases adhesive flow and contact for a more secure bond. Time and temperature will typically further increase the contact and adhesive values.



Dwell Time gives the adhesive time to flow, effectively covering your substrates. Rubber adhesives set up more quickly where Acrylic Adhesives typically require 72 hours before testing for the ultimate adhesion strength.



3. Surface Contamination - Grease, moisture, oil, mold, chemicals, and dust are just a few contaminates that affect tackiness and can result in a poor permanent bond. Always clean and dry your substrates before applying a pressure sensitive adhesive!

4. Chemical/Solvent/Plasticizers - Some substrates can cause adhesive swelling, softening and even dissolve your adhesive. Many acrylic adhesives have varying resistance and can withstand these effects for extended periods of time.

5. Temperature - Apply adhesives at room temperature. Low temperatures can reduce tack and make the adhesive firm and brittle. High temperatures can reduce cohesive strength, shear strength and cause softening. Know the temperature range of your application to choose the proper adhesive.

6. UV Light - Exposure may cause discoloration, adhesive brittleness and chemical degradation. If UV light is a factor, select and adhesive that is UV resistant.

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Performance Standards

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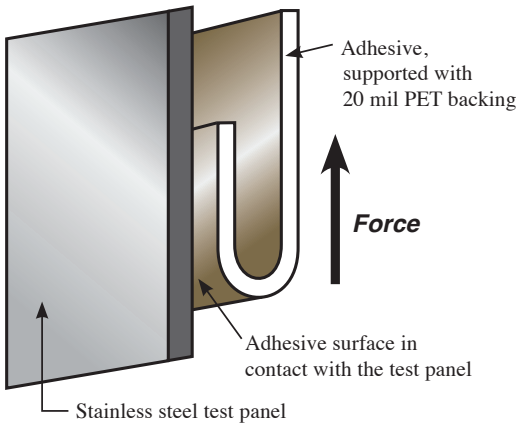
Peel Adhesion

This test measures the force required to remove a pressure sensitive tape from a substrate at a controlled angle, standard rate and condition.

+ ***Peel Angle*** (standard is 180, 90 degrees)
+ ***Substrate*** (standard is stainless steel)
+ ***Peel Rate*** (standard is 12 inches per minute)
+ ***Residence Time*** (30 minutes, 24 hours, etc.)
+ ***Test Environment*** (standard is 72° F, 50% RH)
+ ***Bonding Procedure*** (must be defined)
+ ***Sample Dimensions*** (standard is 1" wide)

** *Peel adhesion is normally expressed in pounds per inch width.*

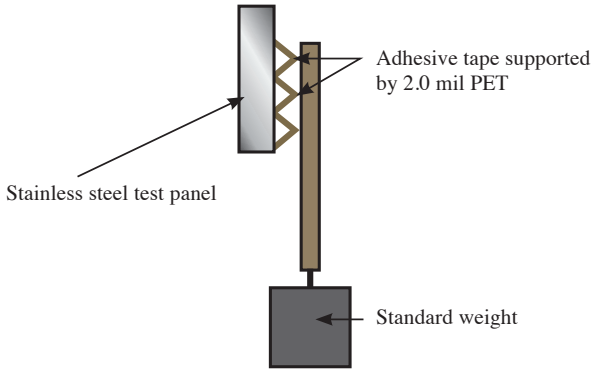


Shear Adhesion

Also referred to as holding power or creep resistance, this test measures the ability of a tape to resist the static forces applied in the same plane as the face or carrier. Restuls are usually expressed in time required for a given weight to cause a given amount of tape to come loose from a vertical panel.

+ ***Substrate*** (standard is stainless steel)
+ ***Bonding Procedure*** (must be defined)
+ ***Sample Dimension*** (dimension of bonded area)
+ ***Test Environment*** (temperature/humidity)
+ ***Shear Direction*** (vertical/horizontal)

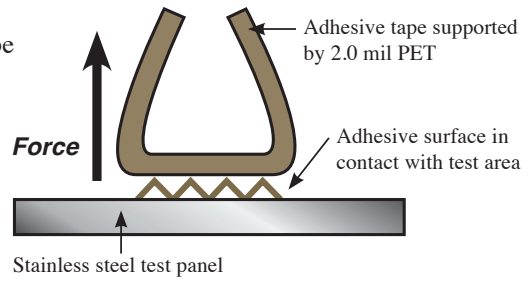
** *Shear is typically expressed in "hours to fail."*



Quick Tack

This refers to the properties that allow a PSA to adhere to a surface under very light pressure. It is determined by the ability of the adhesive to quickly wet the surface contacted.

+ ***Substrate (standard is stainless steel)***
+ ***Type tack test***
  a) Loop Tack
  b) Rolling Ball
  c) Polyken Probe
  d) Finger Tack



Release

A measure of the force per unit width required to break the bond between the PSA and the protective liner, this test incorporates rate of separation, angle of separation and width of the sample. With this test, it is important to consider the separation rate as a speeds may not be consistent between testers.

+ ***Rate of separation***
+ ***Angle of separation***
+ ***Width of sample***

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