Eastman™ adhesives raw materials technical tip
Resin dispersions for specialty film applications

Introduction
Waterborne contact adhesives are environmentally friendly, nonflammable and can be easily cleaned up with water. Contact adhesive applications include bonding high pressure plastic substrates to particleboard for use in laminates and countertops. These applications require high shear performance combined with postforming ability. Other contact adhesive applications include foam bonding where immediate tack of the adhesive is critical. Resin dispersions are used in waterborne contact adhesives to modify green tack and open time.

Eastman Chemical Company offers several resin dispersions ideal for use in contact adhesive applications. These resin dispersions include:

- **Tacolyn™ 3400 resin dispersion**—Tacolyn 3400 is a high softening point rosin ester dispersion used as a modifier for various types of latexes. Tacolyn 3400 is recommended for adhesive applications requiring higher temperature strength such as in high temperature masking tapes, packaging tapes, and contact adhesives.

- **Tacolyn™ 5003 hydrocarbon resin dispersion**—Tacolyn 5003 is recommended as a single tackifier for anionic polychloroprene latex polymers used in contact adhesive applications. Used as a modifier for contact adhesives, Tacolyn 5003 imparts outstanding high temperature performance, excellent contact adhesion and good moisture resistance without the use of a second, reinforcing tackifier.

- **Tacolyn™ 5002 hydrocarbon resin dispersion**—Tacolyn 5002 is an aromatic modified resin dispersion recommended for use as a modifier for various types of latexes. Tacolyn 5002 is recommended for water-based contact adhesives, where quick grab and fast break properties are desirable such as foam-to-foam bonding applications.

Technical discussion
Several experimental contact adhesives were formulated and evaluated in this study. Their components are shown in Table 1. Contact adhesives with Tacolyn 3400 or Tacolyn 5003 were evaluated for bonding high pressure laminate to particleboard. The contact adhesive with Tacolyn 5002 was evaluated for foam bonding applications.

<table>
<thead>
<tr>
<th>Table 1 Adhesive formulations</th>
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<tr>
<td><strong>Adhesive component (g)</strong></td>
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<tr>
<td>AquaStik™ 1120&lt;sup&gt;b&lt;/sup&gt; nonionic polychloroprene latex</td>
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<tr>
<td>AquaStik™ 2540&lt;sup&gt;b&lt;/sup&gt; anionic polychloroprene latex</td>
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<tr>
<td>Styrene butadiene latex</td>
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<tr>
<td>Tacolyn 3400&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Tacolyn 5003&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Tacolyn 5002&lt;sup&gt;c&lt;/sup&gt;</td>
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<tr>
<td>Zinc oxide</td>
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*On a dry weight basis
<sup>a</sup>DuPont Performance Elastomers L.L.C.
<sup>b</sup>Eastman Chemical Company

Peel performance and hold power—high pressure plastic laminate to particleboard
Figures 1 and 2 show the performance of waterborne contact adhesives used for bonding high pressure plastic laminate to particleboard. The control benchmarked in this study was a commercial waterborne contact adhesive that requires multiple tackifiers to achieve the desired performance. This commercially available adhesive is recommended for bonding polyurethane and latex foams, high pressure plastic laminate and particleboard.
SAFT values for a contact adhesive based on Tacolyn 5003 resulted in 50°C higher SAFT values than the control. This is due to the fact that Tacolyn 5003 is based on a 130°C softening point precursor resin. A contact adhesive based on Tacolyn 3400 is equivalent in performance to the control.

In addition to bonding high pressure laminate to particleboard, waterborne contact adhesives are often used for bonding foam in furniture construction. For this application, the adhesive is spray applied using a coagulating agent such as citric acid, lactic acid, acetic acid, or zinc sulfate. Fast break and immediate contact adhesion are critical performance attributes.

Note: The adhesive was brush applied to both substrates. Approximate coating weight was 0.05 grams dry total per 1” x 1” bond area. Substrates were bonded using a laboratory laminator set at 30 psi and a roll speed of 3 ft/minute. SAFT values were determined in accordance with PSTC-7.
Foam bonding

Figures 4 and 5 show the performance of two commercial waterborne contact adhesives used for foam bonding versus an adhesive with Tacolyn 5002. As shown in Figure 4, the contact adhesive containing Tacolyn 5002 requires a very small volume of citric acid for fast break or coagulation to occur. Figure 5 shows the quick grab performance of the adhesives. Quick grab is the time to usable bond strength. It is apparent that a waterborne contact adhesive based on Tacolyn 5002 results in immediate contactibility.

Conclusion

For waterborne contact adhesives which involve bonding high pressure laminate to particleboard, Tacolyn 5003 may be used as the sole tackifier. Tacolyn 5003 offers excellent high temperature performance as evidenced by 80°C hold power results and SAFT values. In addition, contact adhesives based on Tacolyn 5003 have a broad open time window. Tacolyn 3400 offers good high temperature performance and is recommended for use in nonionic polychloroprene latex. As a modifier for waterborne contact adhesives, Tacolyn 3400 offers a good balance of peel and shear.

For contact adhesives used for foam bonding applications, Tacolyn 5002 gives especially fast break performance as well as immediate contactibility. Tacolyn 5002 may also be used as a tackifier for waterborne contact adhesives based on blends of natural rubber and styrene-butadiene rubber latexes.

For more information on formulation strategies using tackifiers from Eastman, contact us at 1-800-EASTMAN or through the internet at www.tackifier.com

Note: Substrates consisted of polyurethane foam. Adhesives were lightly spray applied to both foam substrates.
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