Primerless Heat Seal Coatings for Film Substrates

Ginger Cushing
Business Development Manager
Agenda

- Aqueous heat seal coatings for film
  - Desirable properties
  - Conventional technology
- Primerless coatings
- Other properties
- Summary
Heat Seal Coating for Film: Desirable Properties

- Wide heat seal temperature range
- High hot tack throughout the range
- Good bond strength and adhesion
- Ease of processing
- Appearance
- Food contact compliance
Conventional Technology

- Traditionally double-coating systems
Conventional Technology

- Polyethylene Acrylic Acid (EAA)
- Acrylies
- Polyvinylidene Chloride (PVdC)
EAA

- Good for face-to-face (A/A) seals
- Transparent
- High hot tack
- Low seal initiation temperature (SIT)
- Broad seal window
- Low melt viscosity
  - Facilitates chain mixing during heat seal
- May be heat sensitive at elevated temperatures
Acrylics

- Good for both A/A and A/B heat seals
- Transparent
- Compared to EAA
  - Higher SIT
  - Narrower heat seal range
  - Lower hot tack
PVdC

- Contributes oxygen and moisture barrier
- Compared to EAA and Acrylics
  - A/A seals
  - Higher SIT
  - Lower hot tack
  - Heavier coat weights required (2 – 3x)
  - May discolor over time
Conventional Heat Seal Coatings

- Polyethylene Acrylic Acid (EAA)
- Acrylics
- Polyvinylidene Chloride (PVdC)

these coatings require a primer to adhere to the base film
Primerless Heat Seal Coating
INNOVATION

- Single component
- Lower seal initiation temperature
- Broader heat seal window
- No primer required
Hot Tack Comparison of Aqueous Coatings
Hot Tack Measurement

- Tested to ASTM F1921-98
- Tests immediate bond strength as the bond exits the heat sealer (measured in g force)
- Important in determining packaging speed, sealing conditions, and variety of packaging equipment that can be used
Comparison of Coatings on 29µ BOPP film

![Graph showing force vs. temperature for different coatings on 29µ BOPP film]
### Water Based Heat Seal Coatings Summary (Metric)

<table>
<thead>
<tr>
<th>SAMPLE</th>
<th>Dry Coat Weight g/m²</th>
<th>Minimum Heat Seal Initiation Temp °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOPP/HS-FILM</td>
<td>1</td>
<td>60</td>
</tr>
<tr>
<td>BOPP/Primer/EAA</td>
<td>1</td>
<td>68</td>
</tr>
<tr>
<td>BOPP/Primer/Acrylic</td>
<td>1.5</td>
<td>104</td>
</tr>
<tr>
<td>BOPP/Primer/PVdC</td>
<td>3</td>
<td>114</td>
</tr>
</tbody>
</table>
# Water Based Heat Seal Coatings Summary

<table>
<thead>
<tr>
<th>SAMPLE</th>
<th>Dry Coat Weight</th>
<th>Minimum Heat Seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOPP/HS-FILM</td>
<td>0.6</td>
<td>140</td>
</tr>
<tr>
<td>BOPP/Primer/EAA</td>
<td>0.6</td>
<td>154</td>
</tr>
<tr>
<td>BOPP/Primer/Acrylic</td>
<td>0.9</td>
<td>219</td>
</tr>
<tr>
<td>BOPP/Primer/PVdC</td>
<td>1.9</td>
<td>237</td>
</tr>
</tbody>
</table>
Hot Tack Comparison to (Co-)Extruded Resins
Comparison of Heat Seal Coatings to Extruded Resins

- HS-FILM
- Ionomer
- 18% EVA
- LLDPE

Force, g vs Temp, deg C

Minimum SIT
# Extruded Heat Seal Coatings Summary (Metric)

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<thead>
<tr>
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<th>Dry Coat Weight g/m²</th>
<th>Minimum Heat Seal Initiation Temp °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS-FILM</td>
<td>1</td>
<td>60</td>
</tr>
<tr>
<td>EVA (18%VA)</td>
<td>12</td>
<td>82</td>
</tr>
<tr>
<td>Ionomer</td>
<td>12</td>
<td>97</td>
</tr>
<tr>
<td>LLDPE</td>
<td>12</td>
<td>102</td>
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</tbody>
</table>
### Extruded Heat Seal Coatings Summary

<table>
<thead>
<tr>
<th>SAMPLE</th>
<th>Dry Coat Weight lb/3,000 ft² ream</th>
<th>Minimum Heat Seal Initiation Temp °F</th>
</tr>
</thead>
<tbody>
<tr>
<td>HS-FILM</td>
<td>0.6</td>
<td>140</td>
</tr>
<tr>
<td>EVA (18%VA)</td>
<td>7.5</td>
<td>180</td>
</tr>
<tr>
<td>Ionomer</td>
<td>7.5</td>
<td>207</td>
</tr>
<tr>
<td>LLDPE</td>
<td>7.5</td>
<td>216</td>
</tr>
</tbody>
</table>
Can a thin layer of solution-applied heat seal coating be an alternative to heavier coat weights of sealants applied via (co)-extrusion?

DOWN GAUGING!
SUSTAINABILITY!
Other Properties Exhibited by Primerless Heat Seal Coating
Adhesion

- Excellent adhesion to treated, unprimed:
  - BOPP
  - BOPET
  - BOPA
  - Cellulose
  - PLA
Orientation

- Survives the in-line stretching process

MDO → TDO
And more…

- Optically clear, transparent
- Food compliant
What we say to dogs

Okay, Ginger! I've had it!
You stay out of the garbage!
Understand, Ginger? Stay out of the garbage, or else.

What they hear

Blah blah GINGER blah
blah blah blah blah
blah blah GINGER blah
blah blah blah blah.
Summary – Primerless Heat Seal Coating Characteristics

- Strong substrate adhesion
- Excellent hot tack properties
- Low seal initiation temperature
- Broad heat seal window
- Clarity
- Stretchability
- Food compliance
Thank you.

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