Dow Corning® 52 Additive
The Additive Way to Improve The Slip and Surface Damage Protection for Water-Borne Coatings

Hungarocoat, 26.11. 2014
Power Up Your Formulations

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  - Applications/Systems
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Applications/Systems

*Dow Corning® 52 Additive*

Novel Si technology to deliver high molecular weight silicone

- Waterborne Wood Coatings
- Waterborne Inks
- Waterborne Interior Coatings
- Waterborne Exterior Coatings
- Waterborne OPVs

Compatible with waterborne acrylic, alkyd, polyester, epoxy, polyurethane, and vinyl resin-based coatings

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Enhanced Benefits

*Dow Corning® 52 Additive*

Enhanced formulations at low addition levels

0.1-0.5 wt%

- Slip Customization
- Scratch Resistance
- Abrasion Resistance
- Sandability
- Anti-blocking
- Recoatability
- Easy Incorporation
- No Impact on Water Resistance

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Formulation Options

**Dow Corning® 52 Additive**
- Used alone
  - All benefits with low addition levels

**Dow Corning® 52 Additive**
- Used with waxes (Paraffin, HDPE, PE wax emulsions)
  - Increase slip and abrasion of your current formulation with low addition levels

Enhanced formulations with cost-in-use savings

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# Typical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Dow Corning® 52 Additive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Ultra-high molecular weight silicone dispersion in water</td>
</tr>
<tr>
<td>Reactive group</td>
<td>OH-functional, silanol</td>
</tr>
<tr>
<td>Appearance</td>
<td>Smooth, milky white liquid</td>
</tr>
<tr>
<td>Nonvolatile content</td>
<td>62-67%</td>
</tr>
<tr>
<td>Viscosity at 25°C (77°F)</td>
<td>3,000-5,000 cP</td>
</tr>
<tr>
<td>Regulatory Information</td>
<td>Please see Appendix</td>
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</table>
Silicones orient to the air/polymer interface to form a very thin lubricating layer on the coating surface, which reduces the coefficient of friction.
The Physics of Slip

DEFINITION

- Lubrication at the surface of the dry coating film
- Slip is quantified by measuring the coefficient of friction as both static and dynamic values
  - Static CoF is the force required to start the movement of an object not in motion
  - Dynamic CoF is the force during movement for objects in motion
  - CoF is mainly reduced by lubrication with surface-active additives

TEST METHOD

- Coefficient of friction – the force required to pull a sled of specified weight along the surface of the coating
- Slip angle – the lower the steepness of the incline, the more slippery the surface
Static & Dynamic CoF: WB Wood Coating

*Dow Corning® 52 Additive* has the lowest coefficient of friction values versus competitive silicone polyethers and the wax emulsions.

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Dynamic CoF: WB Acrylic Urethane Paint

*Dow Corning® 52 Additive at 0.3 weight % is 1/10 the level of the wax used. Waxes fail to achieve the very low CoF.*
**Dynamic CoF: WB Acrylate OPV**

*Dow Corning® 52 Additive provides a greater reduction in the dynamic CoF at lower use levels compared to organic and fluorinated waxes.*

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CoF: *Dow Corning® 52 Additive in Combination with Wax Emulsions*

In all cases, *Dow Corning® 52 Additive* when used with wax emulsions showed a significant improvement in slip over the samples containing only the wax emulsion.
Abrasion Resistance

DEFINITION

• Resistance of coating to wear by friction

TEST METHOD

Reciprocating Abrasion Testing

• Reciprocating abrasion testing – generates wear by friction on a coated panel that moves horizontally under a stationary abrasive
• Determine % reduction of gloss after abrasion testing
The results for Dow Corning® 52 Additive at 0.1 weight % are significantly better than the wax emulsions for slip and abrasion resistance.
Cost in Use – Combination

Dow Corning® 52 Additive when used with wax emulsions at levels 1% or 2% showed a significant improvement in slip and abrasion resistance versus the samples containing only the wax emulsion at either percent levels.
Scratch Resistance & Sandability

DEFINITION

Scratch Resistance
• The ability of a coating to resist minor damage or scratching

Sandability
• The ability of a coating to sanded without clogging the sandpaper

TEST METHOD

Scratch Resistance
• Quartant abrasion testing – generates abrasion by both reciprocating and rotary motion similar to processing conditions
• Determine the change in gloss before and after scratch testing

Sandability
• Ranking of the ability of the coating to powder and not clog the sandpaper
Scratch Resistance: WB Wood Coating

Dow Corning® 52 Additive at 0.3% and 0.6% performed well versus the competitive silicone polyether and wax emulsions.
# Sandability Ranking

**Best Sandability**  
**Best Ranking = 1**

<table>
<thead>
<tr>
<th>Ranking</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>0.6% <em>Dow Corning</em>® 52 Additive</td>
</tr>
<tr>
<td>2</td>
<td>0.3% <em>Dow Corning</em>® 52 Additive</td>
</tr>
<tr>
<td>3</td>
<td>3% Paraffin Wax Emulsion</td>
</tr>
<tr>
<td>4</td>
<td>3% HDPE Wax Emulsion (1)</td>
</tr>
<tr>
<td>5</td>
<td>1.5% Paraffin Wax Emulsion (1)</td>
</tr>
<tr>
<td>6</td>
<td>0.4% Competitive Silicone Polyether (2)</td>
</tr>
<tr>
<td>7</td>
<td>1.5% HDPE Wax Emulsion (1)</td>
</tr>
<tr>
<td>8</td>
<td>0.2% Competitive Silicone Polyether (2)</td>
</tr>
<tr>
<td>9</td>
<td>Control</td>
</tr>
</tbody>
</table>

**Worst Sandability**  
**Worst Ranking = 9**
Dow Corning® 52 Additive: The Positive Effects

• Significantly improves slip, scratch and abrasion resistance, sandability, recoatability and anti-blocking without negatively impacting current properties.
• Ease of incorporation and very low addition levels differentiates formulation performance providing competitive advantages in the market.
• Use in combination with current wax additives at very low concentrations for low cost-in-use.
Target Markets

Industrial Wood

Inks and OPVs

Wood Trim

Interior and Exterior Paints

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Power Up Your Coatings

Superior Performance

Dow Corning®
52 Additive

Good Cost
In Use

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Learn More and Request a Sample

• Formulate the best for less
  – Learn how to power up your coatings, view our product guide
• The advantages are in the details
  – Download a technical data sheet to learn more
• Feel the difference for yourself
  – Order a sample to test in your formulation
• Bring us your formulation challenges
  – Contact a coatings expert today
• Or visit us for more information

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APPENDIX
Regulatory Information

• Compliant with U.S. FDA 21 CFR 176.210 – “Defoaming agents used in the manufacture of paper and paperboard”
• Please contact your local Dow Corning Customer Center to receive the EU Food Profile.
• APEO-free
• VOC
  – Exclude value is 7 g/l (U.S.)
  – *Dow Corning® 52 Additive contains about 1.9% of components considered VOC following European Council Directive 1999/13/EC and 2004/42/EC criteria*

*This assessment is based on the *theoretical* evaluation of the information provided by our suppliers and the knowledge of our materials. Since we do not specifically *analyze* our products for total VOC content, we cannot guarantee specific limits.
# Competitive Materials

<table>
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<th>Material</th>
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<tr>
<td>Competitor silicone polyether (1)</td>
<td>Polyether siloxane copolymer</td>
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<tr>
<td>Competitor silicone polyether (2)</td>
<td>Polyether modified polydimethylsiloxane</td>
</tr>
<tr>
<td>HDPE wax emulsion (1)</td>
<td>35% solids nonionic emulsion based on an oxidized HD polyethylene wax</td>
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<tr>
<td>PE wax emulsion (1)</td>
<td>26% solids polyethylene wax emulsion</td>
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<tr>
<td>PE wax emulsion (2)</td>
<td>42% solids nonionic polyethylene emulsion</td>
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<tr>
<td>Polyethylene wax emulsion (3)</td>
<td>27% solids nonionic polyethylene dispersion</td>
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<tr>
<td>Paraffin wax emulsion</td>
<td>35% solids nonionic emulsion based on a modified paraffin wax</td>
</tr>
<tr>
<td>PTFE wax emulsion</td>
<td>42% solids nonionic polytetrafluoroethylene dispersion</td>
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## Competitive Materials: Benefits Comparison

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<tr>
<td>Dow Corning® 52 Additive</td>
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<td>Competitor silicone polyether (2)</td>
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<td>HDPE wax emulsion (1)</td>
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<td>PE wax emulsion (1)</td>
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<td>PE wax emulsion (2)</td>
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<td>Polyethylene wax emulsion (3)</td>
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