Low Foam Surfactants for Metal Cleaning
Improved Oil Removal with Reduced Foaming

ECOSURF™ LFE Low Foam Surfactants

Dow has introduced a new low foam surfactant product family to enable improved performance in metal cleaning applications. ECOSURF™ LFE-635 offers efficient oil removal from metal surfaces and low foam generation under circulating use conditions.

ECOSURF™ LFE Series Surfactants are readily biodegradable, low foam surfactants with very low aquatic toxicity, which meet or exceed existing environmental regulations. These surfactants meet the criteria for the U.S. EPA’s Safer Choice program.

Key features include:
• Excellent removal of oil from metal surfaces
• Low foam generation in cleaning process

Table 1: Typical Product Properties

<table>
<thead>
<tr>
<th>SURFACTANT</th>
<th>% ACTIVES</th>
<th>CLOUD POINT (°C)</th>
<th>CMC(b)</th>
<th>SURFACE TENSION(3)</th>
<th>HL8</th>
<th>DRAVES WETTING (SEC)</th>
<th>READILY BIODEGRADABLE</th>
<th>MEETS US EPA SAFER CHOICE CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECOSURF™ LFE-635</td>
<td>100</td>
<td>35</td>
<td>315</td>
<td>32</td>
<td>9.9</td>
<td>17</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

(1) These are typical properties, not to be construed as specifications.
(2) Critical Micelle Concentration: ppm at 25°C
(3) Equilibrium Surface Tension: dynes/cm at 1% actives, 25°C
Comparison to Industry Benchmark
Metal Cleaning Surfactants

Excellent Oil Removal Efficiency
ECOSURF™ LFE-635 Surfactant enhances oil removal from stainless steel when cleaned at high temperatures as compared to industry benchmark surfactants. ECOSURF™ LFE-635 Surfactant delivers comparable oil removal performance at low temperatures.

Reduced Foam in Application
ECOSURF™ LFE-635 Surfactant generates less foam during continuous or circulating process conditions as compared with an industry benchmark surfactant.

Table 2: Cleaning Time (sec) by Surfactant (1, 2)

<table>
<thead>
<tr>
<th>CLEANING TEMPERATURE (°C)</th>
<th>ECOSURF™ LFE-635 SURFANT</th>
<th>BENCHMARK SURFANT</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-25</td>
<td>~150</td>
<td>~120</td>
</tr>
<tr>
<td>35-40</td>
<td>~40</td>
<td>&gt;40</td>
</tr>
</tbody>
</table>

(2) These are typical properties, not to be construed as specifications.

For more information on how ECOSURF™ LFE Low Foam Surfactants can improve performance in metal cleaning applications, contact your Dow representative or visit dow.com.

Figure 1: Circulation Foam Testing at 35°C (3, 4)

Figure 2: Circulation Foam Testing at 40°C (3, 4)

Table 2: Cleaning Time (sec) by Surfactant (1, 2)

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