Dow Home and Personal Care
A Guide to Silicone Emulsifiers for Skin Care, Sun Care and Color Cosmetics

Texture, feel and performance
Create Stable Water-in-Silicone, Water-in-Oil, and Oil-in-Water Emulsions

With a range of silicone emulsifiers and formulation support from Dow, you can formulate skin care, sun care and color cosmetic products that deliver the ideal combination of texture, feel and performance for your application.

Physical Properties of Silicone Emulsifiers1 from Dow for Water-in-Oil and Water-in-Silicone Emulsions

<table>
<thead>
<tr>
<th>INCI Name</th>
<th>Type of Emulsion</th>
<th>Dispersed Material</th>
<th>Carrier</th>
<th>Viscosity at 25°C (77°F)</th>
<th>Closed-Cup Flash Point</th>
<th>Use Level</th>
<th>Processing Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOWSIL™ ES-5226 DM Formulation Aid</td>
<td>Dimethicone (and) PEG/PPG-18/18 Dimethicone</td>
<td>Water-in-silicone</td>
<td>Water-in-silicone plus oil</td>
<td>100-2,600 mm²/s</td>
<td>93°C (199.4°F)</td>
<td>1-6%</td>
<td>High shear Cold or hot processing</td>
</tr>
<tr>
<td>DOWSIL™ ES-5227 DM Formulation Aid</td>
<td>Dimethicone (and) PEG/PPG-18/18 Dimethicone</td>
<td>Water-in-silicone</td>
<td>Water-in-silicone plus oil</td>
<td>100-2,600 mm²/s</td>
<td>93°C (199.4°F)</td>
<td>1-6%</td>
<td>High shear Cold or hot processing</td>
</tr>
<tr>
<td>DOWSIL™ ES-5228 DM Formulation Aid</td>
<td>Dimethicone (and) PEG/PPG-18/18 Dimethicone</td>
<td>Water-in-silicone</td>
<td>Water-in-silicone plus oil</td>
<td>100-2,600 mm²/s</td>
<td>93°C (199.4°F)</td>
<td>1-6%</td>
<td>High shear Cold or hot processing</td>
</tr>
<tr>
<td>DOWSIL™ ES-5229 Fluid</td>
<td>Silicone Glycerol Emulsifier</td>
<td>Water-in-silicone</td>
<td>Water-in-silicone plus oil</td>
<td>100-2,600 mm²/s</td>
<td>93°C (199.4°F)</td>
<td>1-6%</td>
<td>High shear Cold or hot processing</td>
</tr>
</tbody>
</table>

Physical Properties of Silicone Emulsifiers1 from Dow for Oil-in-Water Emulsions

<table>
<thead>
<tr>
<th>INCI Name</th>
<th>Type of Emulsion</th>
<th>Dispersed Material</th>
<th>Carrier</th>
<th>Viscosity at 25°C (77°F)</th>
<th>Closed-Cup Flash Point</th>
<th>Use Level</th>
<th>Processing Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOWSIL™ ES-5373 Formulation Aid Low Odor</td>
<td>PEG-12 Dimethicone</td>
<td>Silicone-in- oil in-water</td>
<td>Oil-in-water</td>
<td>360 mm²/s</td>
<td>76.8°C (169.9°F)</td>
<td>2-5% (optimal 4%)</td>
<td>Cold or hot processing</td>
</tr>
</tbody>
</table>

1 These values are not intended for use in preparing specifications.
2 Use levels are simply suggested starting points and will need to be adjusted based on other formulation ingredients.

For recommended use levels, see page 4.
Silicone Emulsifier Decision Tree

Answer the questions below to determine which silicone emulsifiers are best suited for your water-in-oil and water-in-silicone emulsions.

**Emulsion Success Tips**

Emulsification success is both an art and a science. It may be necessary to adjust key variables, individually or in combination. Here are some tips to help you formulate with silicone emulsifiers from Dow. For specific formulating advice, please contact your Dow representative.

- Define variables:
  - Phase ratio
  - Emulsifier level
  - Silicone/oil viscosity
  - Shear

- Try increasing:
  - Internal phase content
  - Emulsifier level
  - Silicone/oil viscosity
  - Shear

- Did emulsification occur?
  - Yes
    - Is the emulsion stable over time?
      - Yes
        - Is there sedimentation?
          - Yes
            - Emulsion Success
              - (water-in-silicone, water-in-oil, water-in-silicone+oil)
          - No
        - No
      - No
        - Not possible to add the entire aqueous phase
          - Emulsion breaks during process
    - No
  - No

- Try decreasing:
  - Internal phase content
  - Emulsifier level
  - Silicone/oil viscosity
  - Shear
About Dow Home and Personal Care Solutions

Through its Home and Personal Care business, part of the Dow Consumer Solutions Portfolio, Dow offers unique innovations that empower brand owners around the world to create products with exceptional performance and exciting new benefits consumers can see and feel. Our expansive portfolio serves a wide range of applications across home and personal care markets from skin and hair care to fabric care and beyond. Our novel solutions help enable products that are unique and memorable, and meet the growing demands of today’s consumers. We continue to bring forward innovative technologies and formulation solutions that differentiate our customers’ products, enhance the consumer experience and sustain the environment. With business centers, research and development (R&D), manufacturing plants and customer applications centers around the globe, Dow has the expertise and foundation to foster global and local innovations.

Please visit consumer.dow.com for more information.

<table>
<thead>
<tr>
<th>Recommended Use Level, %³</th>
<th>Water/Silicone Oil Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>80/20 70/30 60/40</td>
</tr>
<tr>
<td>DOWSIL™ B200 Formulation Aid</td>
<td>1-2 2-4 3-6</td>
</tr>
<tr>
<td>DOWSIL™ 9011 Silicone Elastomer Blend</td>
<td>6-10 10-16 10-24</td>
</tr>
<tr>
<td>DOWSIL™ B225C Formulation Aid</td>
<td>6-10 10-16 10-24</td>
</tr>
<tr>
<td>DOWSIL™BY 1-030</td>
<td>2-4 2-6 6-8</td>
</tr>
<tr>
<td>DOWSIL™ BY 25-337</td>
<td>2-4 2-6 6-8</td>
</tr>
<tr>
<td>DOWSIL™ ES-5612 Formulation Aid</td>
<td>2-3 3-5 5-8</td>
</tr>
<tr>
<td>DOWSIL™ FZ-2333</td>
<td>1-2 2-4 3-6</td>
</tr>
<tr>
<td>DOWSIL™ ES-5528 DM Formulation Aid</td>
<td>3-5 5-8 5-12</td>
</tr>
<tr>
<td>DOWSIL™ ES-5527 DM Formulation Aid</td>
<td>4-8 8-12 8-16</td>
</tr>
<tr>
<td>DOWSIL™ ES-5300 Formulation Aid</td>
<td>1-3 2-5 2-6</td>
</tr>
<tr>
<td>DOWSIL™ ES-5600 Silicone Glycerol Emulsifier</td>
<td>1-3 3-6 5-8</td>
</tr>
</tbody>
</table>

³Use levels are simply suggested starting points and will need to be adjusted based on other formulation ingredients.

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