Release the potential of silicone performance

Silicone release coatings from Dow
As a global leader in silicone chemistry, Dow innovation has always helped the industry develop the next standard. We’ve been exploring the potential of silicones since 1943. With our extensive global reach, we have the resources to deliver the broadest range of silicone offerings and solutions, along with the knowledge, technical support and service for all your release coating challenges, competitively priced and reliably supplied.

Solutions with silicones
From food and healthcare to graphic arts and labels, SYL-OFF™ brand silicone release coatings from Dow offer a range of technologies to support the right solution for any application.

This brochure will help you discover the many ways Dow can help you overcome your release coating challenges. We are with you throughout every step of your process—from choosing the right silicone release coating formulation and selecting the right equipment and coating technique for your substrate, to achieving success in your end-use applications. Dow will help you release the potential of silicone performance.
Silicone release coatings: from application to end use

Silicone release coatings are applied to substrates or liners. These substrates or liners are then processed by laminators or converters. The processed materials can be used as facestocks, adhesives, or as part of release liners. The end use can vary depending on the application, such as in tapes, labels, or imaging applications.
Release coating delivery systems for different equipment and substrates

SYL-OFF™ silicone release coatings from Dow are applied at extremely low coating weights onto a wide range of substrate surfaces using many different coating techniques. The choice of coating technique is strongly influenced by the type of delivery system for the silicone release coating (solventless, solvent-based or emulsion). Optimal coating of the substrate requires the right coating process. Table 1, below, lists the SYL-OFF™ release coating delivery systems and notes the preferred processing equipment to achieve optimal coating.

Table 1: Preferred Processing Techniques

<table>
<thead>
<tr>
<th>SYL-OFF™ brand Release Coating Delivery System</th>
<th>Metered Coating (Meyer bar/rod coaters, direct gravure, air knife, squeeze roll, reverse roll, slot die extrusion)</th>
<th>Transfer Coating (3-roll differential offset gravure, 5- and 6-roll multi-roll coat)</th>
<th>Size Press (standard size press as well as film-press or metered size-press)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solventless</td>
<td>Secondary</td>
<td>Primary</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Solvent-based</td>
<td>Primary</td>
<td>Not recommended</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Emulsion</td>
<td>Primary</td>
<td>Secondary</td>
<td>Primary</td>
</tr>
</tbody>
</table>

Primary = Preferred coating technique for application
Secondary = May be used, but not ideal

Contact your Dow representative for the coating formulation most suitable for your specific application.

Table 2: Substrate Compatibility

<table>
<thead>
<tr>
<th>Uncoated Papers</th>
<th>Coated Papers</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYL-OFF™ brand Release Coating Family</td>
<td>Uncoated Kraft MG/ MF, etc.</td>
</tr>
<tr>
<td>Solventless Platinum</td>
<td>•</td>
</tr>
<tr>
<td>Solventless Rhodium</td>
<td>•</td>
</tr>
<tr>
<td>Solvent-based Platinum</td>
<td>◊</td>
</tr>
<tr>
<td>Solvent-based Tin</td>
<td>•</td>
</tr>
<tr>
<td>Fluorosilicone</td>
<td>◊</td>
</tr>
<tr>
<td>Emulsion</td>
<td>•</td>
</tr>
</tbody>
</table>

◊ = generally compatible with this group of substrates
• = may be applied, but only on certain grades or within certain limitations
* = PET

Contact your Dow representative for the coating formulation most suitable for your specific application.
Choose the right silicone release coating
The choice of SYL-OFF™ silicone release coating for your specific application depends not only on the available coating equipment and the substrate being used, but also on the desired release characteristics for the end-use application. (See Tables 1 and 2 in this brochure for guidance on the suitability of release coating delivery systems for specific substrate surfaces, equipment and applications.)

The performance characteristics of a laminate made using a silicone release coating can be controlled or modified to some degree through formulation and processing of the silicone. One key performance characteristic is the release profile, which can be influenced by choice of silicone system as depicted in the graph to the right. Other factors to consider are raw materials being used, such as the adhesive and substrates (both base and face substrate, where applicable).

The graph shows how different silicone coatings affect the release force as the laminate is separated at different speeds. (Typical values, not to be construed as specifications. Users should confirm results by their own tests.)
Overview of silicone delivery systems

Each of the SYL-OFF™ silicone release coating delivery systems – solventless, solvent-based, and emulsion – offers particular benefits based on application needs. There are also different families of SYL-OFF™ silicone release coatings within each delivery system that provide distinctive advantages depending on application, substrate or coating equipment. Table 3 compares the technologies.

Table 3: SYL-OFF™ brand silicone release coatings – Comparison of technologies

<table>
<thead>
<tr>
<th>Substrates</th>
<th>Solventless</th>
<th>Solvent-based</th>
<th>Emulsion</th>
<th>Fluorosilicone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platinum Catalyzed</td>
<td>Rhodium Catalyzed</td>
<td>Tin Catalyzed</td>
<td>Platinum Catalyzed</td>
<td></td>
</tr>
<tr>
<td>Least versatile but still suitable for highly calendered papers, some coated papers and films.</td>
<td>Generally applied to many different substrates, good anchorage. Solvent choice may be adapted to specific substrates.</td>
<td>Usable on a broad range of substrates.</td>
<td>Generally applied to many different filmic substrates, good anchorage.</td>
<td></td>
</tr>
<tr>
<td>Typical Application Solids 100% (may be diluted in solvent if needed)</td>
<td>Up to 12%</td>
<td>Up to 6%</td>
<td>5 - 20% (can be extended with thickeners)</td>
<td>20-100% (may be diluted in solvent if needed)</td>
</tr>
<tr>
<td>Typical Coat Weight 1.0 - 2.0 g/m²</td>
<td>0.5 - 1.3 g/m²</td>
<td>0.5 - 1.1 g/m²</td>
<td>0.5 - 1.6 g/m²</td>
<td></td>
</tr>
<tr>
<td>Typical Curing Temperature 80 - 180°C</td>
<td>140 - 200°C</td>
<td>80 - 180°C</td>
<td>70 - 200°C</td>
<td>100 - 180°C</td>
</tr>
<tr>
<td>Cure Time/Dwell Time 2 - 5 sec</td>
<td>5 - 10 sec</td>
<td>5 - 10 sec</td>
<td>10 - 20 sec</td>
<td>5 - 20 sec</td>
</tr>
<tr>
<td>Typical Line Speed 400 - &gt;800 m/min</td>
<td>100 - 400 m/min</td>
<td>50 - 300 m/min</td>
<td>50 - 200 m/min</td>
<td>300 - 600 m/min</td>
</tr>
<tr>
<td>Comments/Features Widest product range selection. May require additives for good anchorage performance on filmic surfaces.</td>
<td>Specifically suitable for release of most aggressive adhesives. Require higher temperatures to cure.</td>
<td>Can be applied at very low coat weight. Line speed may be limited by LEL requirements for solvent. EHS concerns and expensive solvent recovery systems.</td>
<td>Can be applied at very low coat weight. Line speed limited by LEL requirements. Very slow cure speed, but suitable for substrates where platinum can’t be used. Very stable release.</td>
<td>Can be applied at low coat weight on a wide range of substrates (mainly paper-based). Potential issues for buckling/curling or cockling on paper substrates. May be combined with some non-silicone materials.</td>
</tr>
</tbody>
</table>

For more information or specific questions about Dow chemistries, please contact your Dow representative. Typical values, not to be construed as specifications. Users should confirm results by their own tests.
Achieve the right silicone performance for your application

The following charts start with the basic formulation for the specific delivery system and substrate, then provide a range of SYL-OFF™ silicone release coating product options to customize performance based on your specific application needs.

### Platinum solventless coatings for paper

**Basic formulation**
- SYL-OFF™ SL 160 Coating – 100 pbw
- SYL-OFF™ 7048 Crosslinker – 3.8 pbw
- SYL-OFF™ 4000 Catalyst – 1.2 pbw

**Modification**

- **Change release profile/level**
  - SYL-OFF™ SL 181 Coating – Flat release profile for high speed converting
  - SYL-OFF™ SL 200 Coating – Lower release force at lower peel speed
  - SYL-OFF™ SL 351 Coating – Reduces soak-in for porous substrates
  - SYL-OFF™ SL 400 Coating – Intermediate release force at low speed

- **Increase release level**
  - SYL-OFF™ SL 10 Release Modifier – General purpose for low levels of modification
  - SYL-OFF™ SL 25 Release Modifier – Formulated without olefin and designed for flat release
  - SYL-OFF™ SL 40 Release Modifier – High efficiency with good anchorage

- **Change cure performance**
  - SYL-OFF™ SL 11 Crosslinker – Fastest cure at ultra-low platinum levels
  - SYL-OFF™ SL 12 Crosslinker – Fast cure at ultra-low platinum levels with improved anchorage for challenging substrates
  - SYL-OFF™ 7488 Crosslinker – Blended crosslinker for balanced anchorage
  - SYL-OFF™ 7678 Crosslinker – Recommended where optimum cure performance and bath life are required
  - SYL-OFF™ 7682-055 Crosslinker – Improved cure and good anchorage

- **Control misting**
  - Use SYL-OFF™ SL 161 Coating (includes anti-misting additive) instead of SYL-OFF™ SL 160 Coating
  - Use SYL-OFF™ SL 184 Coating (low misting at very high coating speed) instead of SYL-OFF™ SL 181 Coating
  - Use SYL-OFF™ SL 201 Coating (same release performance but longer thin-film bath life) instead of SYL-OFF™ SL 200 Coating
  - Use SYL-OFF™ SL 411 Coating (optimized cure) instead of SYL-OFF™ SL 400 Coating

- **Improve thin film bathlife**
  - Use SYL-OFF™ SL 560 Coating instead of SYL-OFF™ SL 160 Coating
  - Use SYL-OFF™ SL 581 Coating instead of SYL-OFF™ SL 181 Coating
  - Use SYL-OFF™ SL 600 Coating instead of SYL-OFF™ SL 200 Coating
  - Use SYL-OFF™ SL 800 Coating instead of SYL-OFF™ SL 400 Coating

- **Improve anchorage**
  - SYL-OFF™ 297 Anchorage Additive – General purpose
  - SYL-OFF™ SL 9176 Anchorage Additive – For PET films

Your Dow representative will help you select the coating formulation most suitable for your specific application. Typical values, not to be construed as specification.
Your Dow representative will help you select the coating formulation most suitable for your specific application. Typical values, not to be construed as specification.
### Platinum emulsion coatings for paper

**Modification**

- **Change release profile/level**
  - SYL-OFF™ 7910 Emulsion Coating – Premium (easy) release for all adhesive types
  - SYL-OFF™ 7929 Emulsion Coating – Superior anchorage and bath life
  - SYL-OFF™ 7950 Emulsion Coating – Excellent anchorage
  - SYL-OFF™ 7978 Emulsion Coating – Superior food/bakery release and improved runnability on paper machines

- **Increase release level**
  - SYL-OFF™ EM 7931 Release Modifier – High-efficiency for a full range of modification

- **Change cure performance**
  - SYL-OFF™ 7922 Catalyst Emulsion
  - SYL-OFF™ 7923 Catalyst Emulsion

- **Additives to change performance**
  - DOWSIL™ 67 Additive – Modification of the wetting behavior of the coating bath on the substrate surface
  - SYL-OFF™ EM 7989 Antifoam – Control the build-up of foam during processing of the emulsion formulation

### Basic formulation

- SYL-OFF™ EM 7990 Emulsion Coating – 95 pbw
- SYL-OFF™ EM 7975 Catalyst Emulsion – 5 pbw
- Water – Dilute as needed

pbw = parts by weight

### Platinum emulsion coatings for films

**Modification**

- **Change release profile/level**
  - SYL-OFF™ EM 7946 Emulsion Coating – In-line release coating for film manufacturing process with low and stable release force
  - SYL-OFF™ EM 7958 Emulsion Coating – Off-line release coating for PET films

- **Increase release level**
  - SYL-OFF™ 7921 Release Modifier – Full range of modification
  - SYL-OFF™ EM 7931 Release Modifier – High-efficiency for a full range of modification

- **Additives to change performance**
  - DOWSIL™ 67 Additive – Modification of the wetting behavior of the coating bath on the substrate surface
  - SYL-OFF™ EM 7989 Antifoam – Control the build-up of foam during processing of the emulsion formulation

### Basic formulation

- SYL-OFF™ EM 7934 Emulsion Coating – 90 pbw
- SYL-OFF™ EM 7975 Catalyst Emulsion – 10 pbw
- Water – Dilute as needed

pbw = parts by weight

### Fluorosilicone coatings for films

**Modification**

- **Alternative coating**
  - SYL-OFF™ 7955 Coating – Solventless Coating – Suitable for casting transfer coating of DOWSIL™ Q2-7785 Adhesive, and DOWSIL™ 7657 Adhesive directly onto the release liner
  - SYL-OFF™ 7786 Release Coating – Higher fluorosilicone content for differential release values
  - SYL-OFF™ 7795 Fluorosilicone Release Coating – Low and stable release force

- **Alternative crosslinker**
  - SYL-OFF™ SL 7561 Crosslinker – Solventless Coating system recommended for use with SYL-OFF™ 7555 Coating

**Basic formulation**

- SYL-OFF™ Q2-7785 Release Coating – 100 pbw
- SYL-OFF™ Q2-7560 Crosslinker – 3.2 pbw

pbw = parts by weight

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Your Dow representative will help you select the coating formulation most suitable for your specific application. Typical values, not to be construed as specification.
**Platinum solvent-based coatings for paper and films**

**Basic formulation**
- SYL-OFF™ 7362 Coating – 99 pbw
- SYL-OFF™ 7215 Crosslinker – 1 pbw
- Toluene solvent – dilute as needed

**Modification**
- Change cure performance
- Change release profile/level
- SYL-OFF™ 7450 Release Coating – Lower release force
- SYL-OFF™ SB 7458 Coating – Faster cure with low release force; particularly suitable for filmic substrates

**Increase release level**
- SYL-OFF™ 7200 Low Release Force Additive – High-efficiency for low release force range of modification
- SYL-OFF™ 7210 Release Modifier – High-efficiency for high release force range of modification

**Additives to change performance**
- SYL-OFF™ 7450 Release Coating – Lower release force
- SYL-OFF™ SB 7458 Coating – Faster cure with low release force; particularly suitable for filmic substrates
- SYL-OFF™ 2792* Coating – Easier release
- SYL-OFF™ 7075 Coating – Tighter release

*Contact your local Dow representative for availability of this material in your area

**Tin solvent-based coatings for paper and films**

**Basic formulation**
- SYL-OFF™ 2794 Coating* – 94.4 pbw
- SYL-OFF™ 7048 Crosslinker – 2.9 pbw
- SYL-OFF™ 2700 Catalyst** – 2.7 pbw
- Heptane solvent – dilute as needed

**Modification**
- Change cure performance
- Change release profile/level
- SYL-OFF™ SB 2792 Coating – Easier release
- SYL-OFF™ 7075 Coating – Tighter release

**Increase release level**
- SYL-OFF™ C2-2109 Release Additive – High-efficiency for a full range of modifications

**Additives to change performance**
- SYL-OFF™ 2797 Anchorage Additive – Increases anchorage to filmic surfaces
- SYL-OFF™ 7-131 Fast-Cure Additive – Accelerates cure speed
- Acetic acid may be added to improve bath life

*Contact your local Dow representative for availability of this material in your area

**For coating polar surfaces (PET, PC), petroleum solvent can be replaced with a combination of ethyl acetate, methyl ethyl ketone
For coating non-polar surfaces (LDPE, HDPE, OPP), petroleum solvent can be replaced with pure heptane and hexane for better wetting**

For coating polar surfaces (PET, PC), toluene and IPA solvent can be added (replacing heptane)
For coating non-polar surfaces (LDPE, HDPE, OPP), petroleum solvent can be replaced with pure heptane and hexane for better wetting
For coating other non-polar surfaces (LDPE, HDPE, OPP), a combination of heptane and hexane may be used for better wetting

* Certain organotin catalysts are less suitable for the European Union due to their REACH status.
Please contact your Dow representative for information on the use of organotin catalysts in the EU.

Your Dow representative will help you select the coating formulation most suitable for your specific application.
Typical values, not to be construed as specification.
Select the right delivery system

SYL-OFF™ silicone release coatings from Dow are used in many different applications and require specific silicone delivery systems to achieve optimal results. The following table lists a variety of typical SYL-OFF™ silicone release coating applications and the recommended delivery systems for each application.

Table 4: Applications and Delivery Systems

<table>
<thead>
<tr>
<th>Application</th>
<th>Solventless</th>
<th>Solvent-based</th>
<th>Emulsion</th>
<th>Fluorosilicone release</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Platinum Catalyzed</td>
<td>Rhodium Catalyzed</td>
<td>Tin Catalyzed</td>
<td>Platinum Catalyzed</td>
</tr>
<tr>
<td>Label release</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>◊</td>
</tr>
<tr>
<td>Tapes with Release Liners</td>
<td>●</td>
<td>● ●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Graphic Arts</td>
<td>●</td>
<td>◊</td>
<td></td>
<td></td>
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<tr>
<td>Hygiene Release</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Composite Release</td>
<td>◊</td>
<td>● ●</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Envelope Release</td>
<td>◊</td>
<td>●</td>
<td></td>
<td></td>
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<tr>
<td>Baking and food release</td>
<td>◊</td>
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<td></td>
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<tr>
<td>Roofing (Self-Adhesive)</td>
<td>●</td>
<td>● ● ●</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Medical Tapes/Labels</td>
<td>●</td>
<td>◊</td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>Silicone-based PSA (tapes/labels)</td>
<td>●</td>
<td></td>
<td></td>
<td>●</td>
</tr>
</tbody>
</table>

● = this delivery system is recommended and typically used for this application
◊ = this delivery system can be used, but may not achieve optimal results

Your Dow representative will help you select the coating formulation most suitable for your specific application.