

# DuPont™ Liveo™ Silicone Film-Formers for topical applications

Flexibility for topical drug delivery



Topical medications containing the right ingredients can make a difference in patient comfort and compliance while providing a long-lasting barrier film to the skin. Safety, efficiency and substantivity are key requirements for formulations and in helping consumer satisfaction.

Formulators look to the aesthetics and pleasant feel of silicones to improve the sensory profile of products. This leads to better patient adherence to treatment regimens, which in turn enhances product efficacy and skin protection benefits.

While film-forming excipients more commonly have been used in oral dosage form (as a tablet coating) and in medical devices (as a liquid bandage), they increasingly are being used in topical applications.

## Formulation benefits

- **Proven silicone technology**
- **Outstanding functional efficacy and safety**
- **Regulatory support and compliance expertise**

## Functional benefits

- Film-forming
- Long-lasting
- Wash-off resistance
- Tunable occlusivity and breathability
- Compatibility with many APIs and commonly used ingredients
- Attractive sensory profile

## Film-forming solutions

DuPont™ Liveo™ offers a range of film-forming topical excipients to be added to liquid or semisolid formulations to produce – upon solvent evaporation – a thin, transparent, flexible and substantive film when applied to the skin surface. In medicated products, the film-forming excipient also acts as a matrix to stabilize and effectively release the drug to and through the skin.

The Liveo™ silicone excipient product line offers unique properties that can enable and enhance the film-forming characteristics of final formulations.



Safe for topical application

- Non-irritating
- Non-sensitizing



Long-lasting, removable & peelable

- Rub-off resistance
- Wash-off resistance
- Non-transfer
- Easy to remove



Uniform & breathable

- Homogeneous spreading
- Continuous film
- Permeable to semi-occlusive



Comfortable to wear

- Easy to spread
- Flexible
- Non-tacky
- Pleasant



Ease of formulation

- Compatible with APIs & skin penetration enhancers

## Medical needs in topical treatment

| Need                                   | Film properties  |
|--|--|
| Efficacy in drug delivery              | <ul style="list-style-type: none"> <li>• Stability of drug; control of release</li> <li>• Enhanced skin penetration</li> <li>• Drug bioavailability</li> </ul> |
| Duration of application                | <ul style="list-style-type: none"> <li>• Film durability</li> <li>• Substantivity</li> </ul>   |
| Comfortable to wear/patient compliance | <ul style="list-style-type: none"> <li>• Film flexibility</li> <li>• Film barrier integrity</li> <li>• Sensorial benefits</li> </ul>                           |
| Level of occlusivity/breathability     | <ul style="list-style-type: none"> <li>• Control of permeability to water vapor</li> </ul>   |

## The new Liveo™ Silicone Film-Former toolbox

As a leading supplier of silicone excipients for healthcare, Liveo™ has built a robust portfolio of proven and new silicone excipients with tunable film-forming properties to address a wide range of formulation requirements. They have excellent compatibility with many drugs and excipients to better meet the needs of pharmaceutical and consumer healthcare topical solutions.

| Liveo™ silicone technology      | Substantivity on skin | Flexibility | Film integrity | Rub-off resistance | Functions  |
|---------------------------------|-----------------------|-------------|----------------|--------------------|--|
| Silicone fluid – low viscosity  | o                     | ++++        | o              | o                  | Breathable, smooth carrier; spreadability; emolliency                  |
| Silicone fluid – high viscosity | +++                   | +++         | +++            | ++                 | Substantivity on skin; flexibility; film integrity; rub-off resistance |
| Silicone gum                    | ++                    | +++         | +              | ++                 | Spreadability; emolliency; substantivity on skin; flexibility          |
| Silicone resin                  | ++                    | o           | +++            | +++                | Substantivity on skin; film integrity; rub-off resistance              |
| Silicone resin crosspolymer     | ++++                  | +++         | +++            | ++++               | Substantivity on skin; flexibility; film integrity; rub-off resistance |

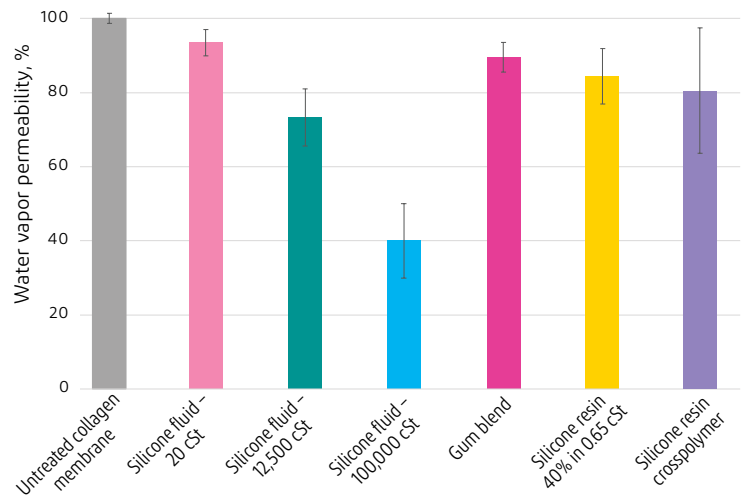
+ = level of benefit. | o = no benefit.

Liveo™ has developed proprietary test methods for film property characterization and generated data to support the above performance claims. For more detailed information and data, contact your DuPont technical representative.



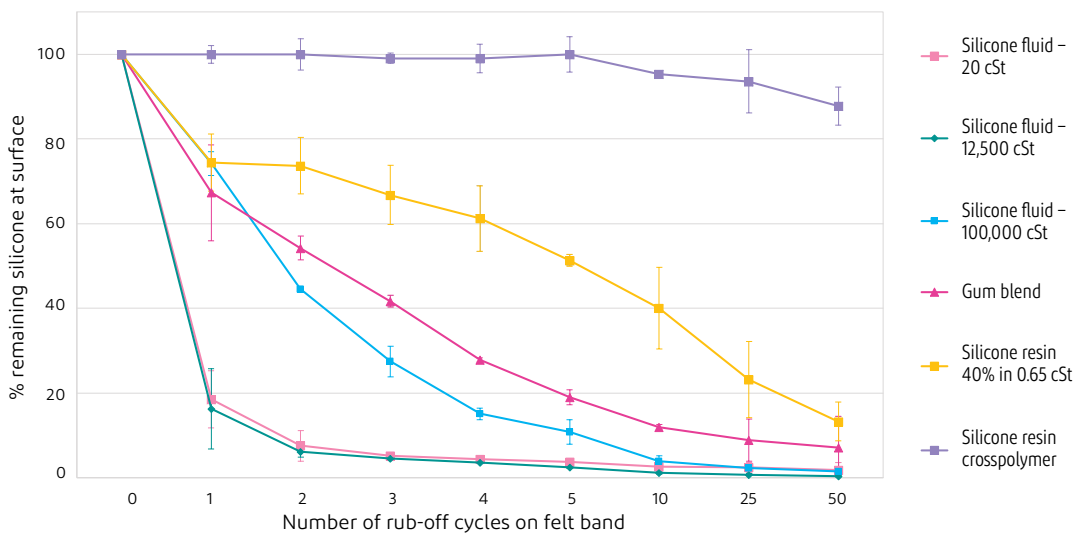
## Film occlusivity

Most silicone film-forming technologies are materials that are **non-occlusive** to water vapor and preserve skin health and breathability. Silicone technologies form films that can be tuned to be non-occlusive to semi-occlusive.

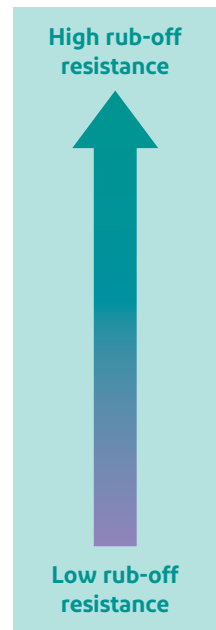


Test method: Film thickness is 12.5  $\mu\text{m}$  dry film. Untreated non-occlusive membrane is fixed at 100%.

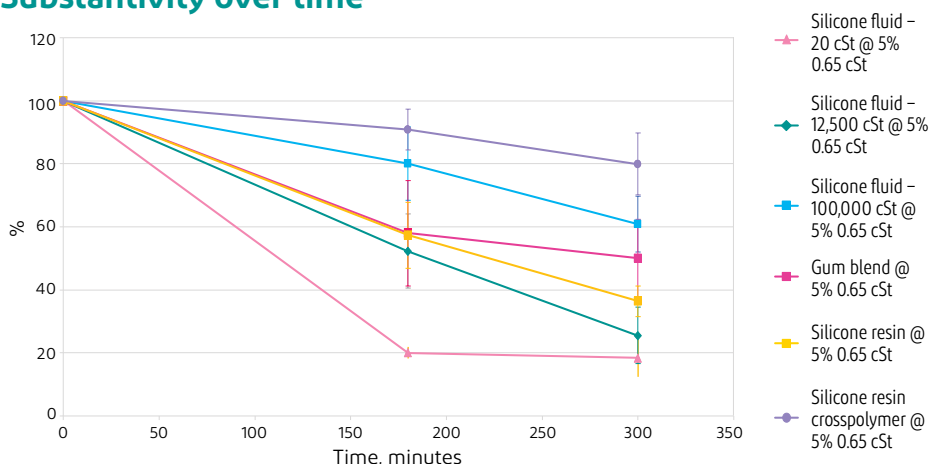
## Rub-off resistance



Test method: Resistance to rub-off of a film coated on collagen. Resistance measured by XRF after friction cycles using washability tester/felt band. Material is used pure (undiluted) for this test.



## Substantivity over time



Test method: Substantivity of silicone on skin is evaluated versus time to assess the long-lasting effect of formulations or products. Test is performed using an ATR-Fourier transform infrared spectrophotometer equipped with a skin analyzer device allowing direct measurement on panelist's forearm. Material is diluted at 5% in a solvent to avoid saturation of the spectra.

## Silicone film-former applications

DuPont™ Liveo™ Silicone Film-Formers are compatible with silicones and organic carriers and can be incorporated easily into many product forms:

- Creams for skin barrier applications
- Sprays that offer ease of application
- Gels for novel forms in challenging skin conditions

These film-formers can be used in several key topical applications:

- **Ostomy care** – Protection and barrier film against the adhesives of dressings. Protection of intact, damaged or inflamed skin. Prevention of irritation or dermatitis linked to body fluids. Barrier to urine, feces and exudate.

- **Wound and scar care** – Liquid bandages for small cuts; hard-to-cover cuts; scrapes; calluses; cold sores; and dry, cracked skin. Scar management. Skin barrier against the adhesives of dressings and surgical tapes.
- **Dermal care** – Drug delivery film for therapy of warts and calluses. Antifungal. Pain relief. Analgesic effect. After-bite. Anti-itching.
- **Pain management** – Drug delivery film for pain therapy for joints or muscles. Topical local analgesia for superficial dermatological procedures.
- **Nail care** – Drug delivery film for therapy of onychomycosis.
- **Skin care** – Anti-aging, skin protection, skin hydration film when loaded with suitable active. Anti-itch. Protection of skin affected by eczema and related dry skin conditions. Insect bites.
- **Hair care** – Hair and scalp protection. Lice treatment.

## Make DuPont your innovation partner

With more than 70 years of healthcare market experience in the design of silicone-based systems, you can rely on DuPont™ Liveo™ Healthcare Solutions for:

- A reliable global supply of reputable, cost-effective silicone-based topical ingredients manufactured specifically for healthcare applications
- Proven aesthetics and functional film characteristics, such as breathability and substantivity
- Formulation, regulatory and product development expertise and support
- A regulatory information package aligned with the requirements of the consumer healthcare market



To learn more about DuPont™ Liveo™ Healthcare Solutions, visit [liveo.dupont.com](https://liveo.dupont.com).



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Positive Patient Outcomes.

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