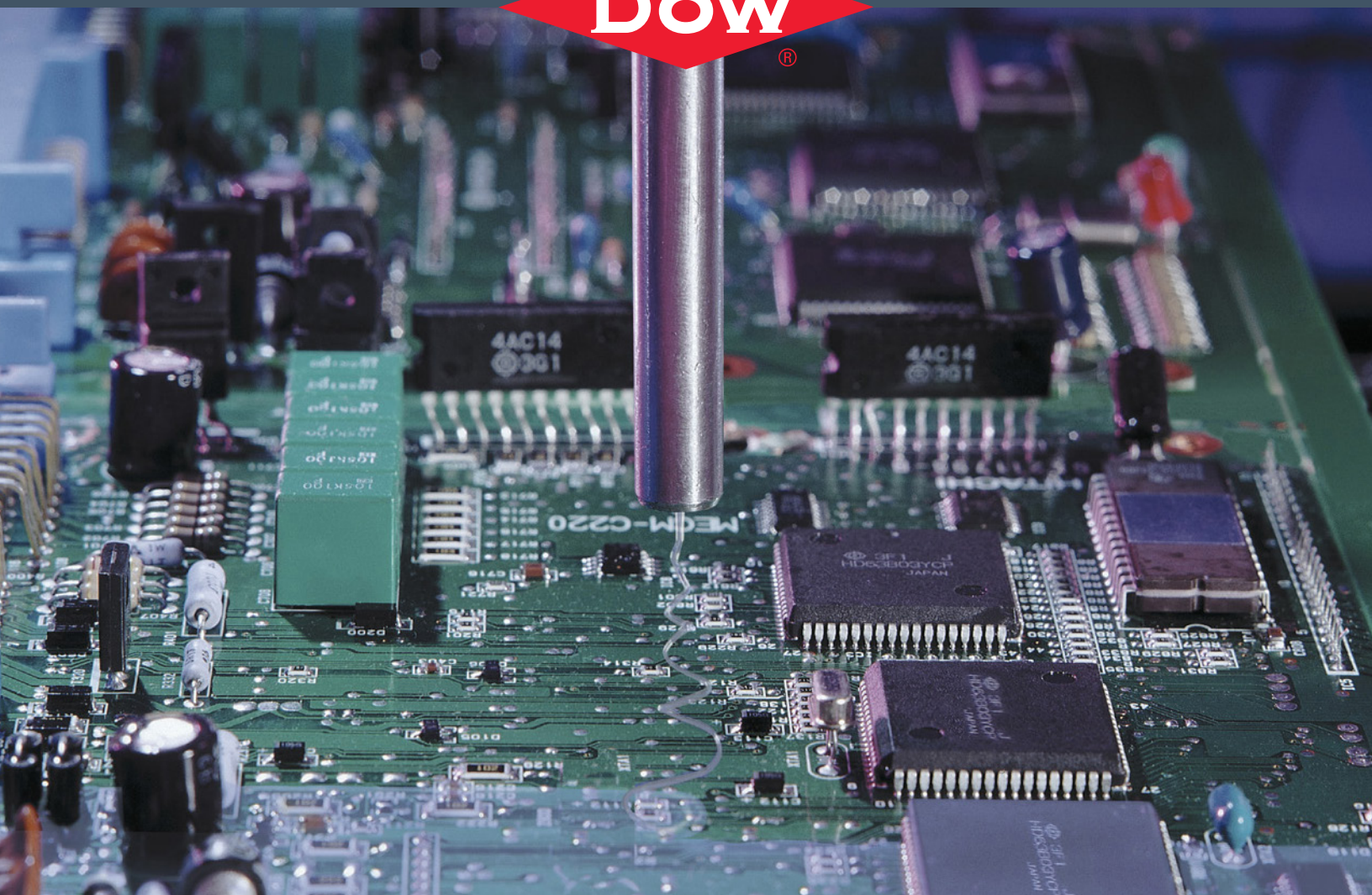
DOWSIL™ primers, prime coats and adhesion promoters



Enhancing adhesion of silicones

Primers, prime coats, and adhesion promoters offer a variety of benefits to users. Robust adhesion maximizes reliability and offers protection across a wider range of environmental conditions. The range of device design options may be expanded by enabling adhesion or providing lower temperature adhesion to a wider variety of substrate materials. Low-temperature or room-temperature adhesion may also reduce energy or capital costs or increase manufacturing flexibility. Direct material costs may also be reduced when adhesion enhancers enable use of primerless silicones.

Many silicones are designed to adhere well to a wide variety of substrates, but some silicone products and some surfaces require adhesion enhancement to achieve adequate bond strength. Surface treatments to improve adhesion can range from simple cleaning to more complex etching, and may require the application of reactive silane coupling agents to achieve optimal bonding.

DOWSIL™ primers, prime coats, and adhesion promoters are dilute solutions of silane coupling agents and other active ingredients. The surface reactive components typically must be applied in a very thin layer for best bonding. The solvents used in these products serve to deliver the active ingredients in a thin, uniform coating, enhance surface cleaning, and, in some cases, aid in the penetration of the active ingredients into the bonding surface.

Surface preparation

The active ingredients must thoroughly wet-out and coat the bonding surfaces. Mild abrasion, solvent cleaning, plasma, corona discharge, and other pre-treatments have been used to clean and enhance surface reactivity to bonding. In general, light surface abrasion is recommended whenever possible, because it promotes good cleaning and increases the surface area for bonding. Surfaces should be cleaned and/or degreased with naphtha, mineral spirits, methyl ethyl ketone (MEK), or other suitable solvents that will remove oils and other contaminants that may be present. A final surface wipe with acetone or IPA may also be helpful.

Different cleaning techniques may give better results than others. Users should determine the best technique for their applications. For especially difficult-to-bond-to surfaces, it may be necessary to increase the surface reactivity by chemical etchants or oxidizers, or by exposing the surface to UV, corona, plasma, or flame sources. Allow solvents to completely evaporate before applying the primer.

DOWSIL™ primers, prime coats, and adhesion promoters

Type
Dilute solutions of silane coupling agents and other active ingredients

Physical form
Liquid

Special properties
Enhance the adhesion and bonding of silicones to a variety of substrates

Application

These products should be applied in a very light, even coat by wiping, dipping, or spraying. Excess material should be wiped off to avoid over-application, which generally appears as a white, chalky surface. When dip or spray coating, diluting by a factor of two to four with additional solvent may avoid excessive build-up.

Cure conditions

These products require moisture in the air to cure, and are generally cured at room temperature and in a range of 20 to 90 percent relative humidity for one to two hours. Low humidity and/or low temperature conditions require longer cure times. Mild heat acceleration of the cure rate may be possible but temperatures above 60°C (140°F) are not recommended. During application, the carrier solvent typically evaporates quickly, allowing the active ingredients to begin to react with atmospheric moisture and bonding surfaces. For optimal bonding, different cure times may be required for different temperature and humidity conditions. Users should determine the best cure schedule and conditions for their applications.

The desired silicone elastomer should be applied after the primer, prime coat, or adhesion promoter has fully cured.

Primer selection guide

DOWSIL™ primers, prime coats, and adhesion promoters	Special properties	Substrates
DOWSIL™ 92-023 Primer	Specially formulated for use with addition-cure silicones to mitigate surface cure poisoning. This clear primer is diluted in heptane solvent and enhances the adhesion of many addition-cure silicones to a wide variety of surfaces.	Wide variety of surfaces including FR-4, ceramics and many metals
DOWSIL™ PR 1200 RTV Primecoat	Significantly improves the adhesion of silicone sealants to a wide variety of challenging substrates; Available in clear and red.	Granite, masonry, metal, aluminum, plastic, FR-4 and ceramic
DOWSIL™ 1200 OS Primer Clear	The most versatile of all DOWSIL™ primers for the widest range of silicone types and electronics applications. This clear primer is supplied in a low-VOC diluent for lower environmental impact and exhibits low odor for convenient handling. It enhances the adhesion of many RTV and heat cure silicones to a variety of surfaces. This primer is very similar to DOWSIL™ P5200 Adhesion Promoter and is registered for use in the European Union.	Wide variety of surfaces including FR-4, ceramics and many metals and plastics
DOWSIL™ P5200 Adhesion Promoter	This clear primer is similar to DOWSIL™ 1200 OS Primer. It enhances the adhesion of many RTV heat cure silicones to a wide variety of surfaces. Not registered for use in the European Union.	Wide variety of surfaces including FR-4, ceramics and many metals and some plastics
DOWSIL™ PR 1204 RTV Primecoat	Clear primer used for the bonding and adhesion of RTV and heat cure silicones to many metals, ceramics, glass and masonry.	Glass, metal, aluminum, plastic, FR-4 and ceramic
DOWSIL™ 1205 Prime Coat	Specially formulated to increase adhesion of a wide range of silicones to plastics including more difficult types such as acrylic and polycarbonate. This clear primer is supplied in a mixture of organic solvents. Not recommened for use with addition cure silicones such as Sylgard® 170, 184, 186 Silicone Elastomer Kit, etc.	Most plastics, ceramics and composites
DOWSIL™ 3-6060 Prime Coat	Specifically for addition and peroxide cured rubber adhesion to most plastics, ceramics, composites, and metals. Improves inhibition resistance for addition cured products	Metal, Aluminum, Plastic, FR4, Ceramic
DOWSIL™ PR-2260 Prime Coat	Enhances bonding/adhesion of RTV and heat cure silicones to many metals, ceramics and some plastics.	Glass, metal and ceramic
DOWSIL™ PR-4040 Prime Coat	Enhances adhesion of many moisture curing RTV and heat curing silicones to a variety of surfaces	Many metals glass and plastics

Specification writers: Please contact your local Dow sales office or your Global Dow Connection before writing specifications on these products.

Applying the silicone

Keeping the primed surface clean may allow application of the silicone elastomer to be delayed, but in some cases lower adhesion can result if too much time elapses; users are encouraged to determine the optimal cure conditions for their specific applications and the effects of any hold times imposed between applications of the primer and elastomer. In some cases it may be recommended to reprime surfaces if 8 to 24 hours elapse before the silicone elastomer can be applied.

Storage and shelf life

For best results, DOWSIL™ primers, prime coats, and adhesion promoters should be stored below 32°C (90°F). Special precautions must be taken to prevent moisture from contacting these materials before use. Containers should be kept tightly closed and head or air space minimized. Partially filled containers should be purged with dry air or other gases such as nitrogen to maximize shelf life. Small amounts for immediate use should be poured into clean, dry containers and discarded when finished.

Material should not be used once it takes on a milky appearance or a large amount of white precipitate is observed, indicating moisture contamination. Repeated opening of the container can cause a small amount of white precipitate to form inside the container cap area, which does not affect the bulk material. Store primers in areas appropriate for flammable materials.

Packaging

In general, DOWSIL™ primers, prime coats, and adhesion promoters are supplied in nominal 1-gallon (3.8-L) and 13.5-fl oz (400-mL) or 1-pint (473-mL) containers, net volume. Not all products may be available in all packages and some additional packages may be available for certain products.

Typical properties

DOWSIL™ primers, prime coats, and adhesion promoters	Color	Solvent	Shelf life from date of manufacture, months	Flash point[1] °C (°F)	Volatile Organic Content (VOC)[2], grams/liter
DOWSIL™ 92-023 Primer	Clear	Heptane	18	-13 (9)	681
DOWSIL™ PR 1200 RTV Primecoat	Clear, Red	Naphtha	18	13 (55)	748
DOWSIL™ 1200 OS Primer Clear	Clear	OS-20 3	18	27 (81)	76/508
DOWSIL™ P5200 Adhesion Promoter	Clear, Red	OS-20 3	18	31 (87)	77/517
DOWSIL™ PR 1204 RTV Primecoat	Clear	Naphtha	18	8 (46)	774
DOWSIL™ 1205 Prime Coat	Clear	Mixture	12	13 (55)	862
DOWSIL™ 3-6060 Prime Coat	Clear, yellow	Methyl isobutyl ketone	12	15 (59)	780
DOWSIL™ PR-2260 Prime Coat	Light straw	Heptane	24	9 (48)	729
DOWSIL™ PR-4040 Prime Coat	Clear, yellow	Heptane	24	-12.8 (9)	---

[1]Closed cup, tested to Dow Corporate Test Method 0917, based on ASTM D 3278.
[2]The lower VOC value is for states and air quality management districts that have recognized the solvent as VOC exempt.
[3]DOWSIL™ OS-20 Fluid is a 1-cSt ozone-safe volatile methylsiloxane fluid.

Recommended steps for priming

1. Before using, verify the primer is within its stated shelf life. The primer should be clear and water-like in appearance. If the primer is milky white in appearance, do not use the primer.
2. Surfaces must first be clean and dry. Priming should begin within several hours after the cleaning step. If there is a greater time delay, surfaces must be re-cleaned prior to priming.
3. Pour a small amount of primer into a clean, dry container. Do not pour more than a 10-minute supply of primer into the working container. Replace and tighten the cap on the container immediately after dispensing the primer. Excessive exposure of the primer to atmospheric moisture will cause it to deteriorate and turn milky white in the container.
4. Pour a small amount of primer from the working container onto a clean, dry, lint-free cloth and gently wipe a thin film on all joint surfaces requiring primer. Primer can also be applied by dipping, brushing or spraying. Apply only enough primer to lightly wet the surface. Over-priming can cause adhesion loss between the silicone and the substrate or negatively impact end result. If too much primer is applied, a powdery white film will form on the substrate. Over-primed surfaces should be cleaned and re-primed in a proper manner.
5. Allow the solvent to evaporate and the primer to cure. These products require moisture in the air to cure, and are generally cured at room temperature and in a range of 20 to 90 percent relative humidity for 1 to 2 hours. (Consult data sheet for specific cure conditions).
6. Inspect the surface for cure and for the appearance of over-priming. A primed nonporous surface may have a slight haze. Best practice; The desired silicone elastomer should be applied to the cured primed surface within several hours after cure. If the silicone elastomer is not applied within several hours after the primer has been applied and cured, the surface should be cleaned and potentially primed again. Cure and application times can be solution dependent, test to verify.

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HANDLING PRECAUTIONS

PRODUCT SAFETY INFORMATION REQUIRED FOR SAFE USE IS NOT INCLUDED IN THIS DOCUMENT. BEFORE HANDLING, READ PRODUCT AND SAFETY DATA SHEETS AND CONTAINER LABELS FOR SAFE USE, PHYSICAL AND HEALTH HAZARD INFORMATION. THE SAFETY DATA SHEET IS AVAILABLE ON THE DOW WEBSITE AT WWW.CONSUMER.DOW.COM, OR FROM YOUR DOW SALES APPLICATION ENGINEER, OR DISTRIBUTOR, OR BY CALLING DOW CUSTOMER SERVICE.

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