SilGrip™ PSA590LD-X-NT Low-Dusting Silicone Pressure Sensitive Adhesive

Product Description

SilGrip PSA590LD-X-NT methyl-silicone pressure-sensitive-adhesive (PSA) is supplied as a solution of 60% silicone solids in xylenes. It may be further diluted with aromatic or aliphatic solvents. To obtain specific performance properties, SilGrip™ PSA590LD-X-NT may be blended with Momentive CR523A silicone resin solution in xylenes, Momentive SR545 silicone resin solution in toluene, or with other Momentive methyl-silicone PSA solutions.

Key Features and Typical Benefits

- Performance over a wide temperature range; maintains good shear and tack properties at intermittent temperatures up to 260 °C (500 °F).
- Adheres to a wide variety of surfaces including low-energy surfaces such as silicones release liners.
- Resistant to moisture, weathering, many chemicals, and biological attacks.
- Accepts fillers.
- Low dusting.

Physical Properties of SilGrip PSA590LD-X-NT Adhesive Solution

Physical Property	Typical Value
Silicone solids	60 wt%
Density	0.98 g/cm3 (8.18 lbs/gal)
Viscosity at 23 °C (73 °F)	18 000 cP
Color	Light Straw
Flash Point	27.2 °C (81.0 °F)
Solvent	Xylenes

Typical properties are average data and are not to be used as or to develop product specifications.

Performance Properties of Cured SilGrip PSA590LD-X-NT Adhesive

Performance Property	Typical Value
Peel adhesion[(1)]	1100 gf/25 mm (40 oz/inch)
Probe tack[(2)]	870 gf

[(1)] Peel adhesion test conditions: Samples prepared by formulating a PSA solution with 1.5 wt% benzoyl peroxide (BPO) and casting onto 1 mil (25 µm) polyester film. The coated film was dried for 2 minutes at 85 °C (185 °F) and cured for 2 minutes at 177 °C (350 °F) to give a final adhesive thickness of 2.0 mil (50 µm). Adhesive films were cut into 25 mm tapes and peeled from stainless steel at an angle of 180° and a rate of 300 mm/minute (12 inches/minute).

[(2)] Tack test conditions: Samples prepared by formulating a PSA solution with 1.5 wt% benzoyl peroxide (BPO) and casting onto 1 mil (25 µm) polyester film. The coated film was dried for 2 minutes at 85 °C (185 °F) and cured for 2 minutes at 177 °C (350 °F) to give a final adhesive thickness of 2.0 mil (50 µm). Tack was measured per ASTM D2979 with a 196 g (9.79 kPa) annular weight, 0.5 cm/sec probe speed, and weight,0.5 sec dwell time.

The properties of a cured silicone adhesive are affected by several factors such as the type and amount of peroxide added, cure cycle, adhesive thickness, backing type, and backing thickness. Higher loading of BPO can increase the PSA's cohesive strength and shear strength, but can also reduce its adhesive strength, resulting in lower tack and peel values.

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Potential Applications

SilGrip PSA590LD-X-NT pressure-sensitive-adhesive has been selected by many customers for coating film and fabric substrates for manufacturing industrial adhesive tapes. It is an excellent candidate to consider for splicing tapes designed to adhere to siliconized release liners.

Processing Considerations

Coating

SilGrip™ PSA590LD-X-NT silicone pressure-sensitive-adhesive solution is supplied at a viscosity that is ready for use in conventional tape coating equipment. If necessary, it may be thinned with xylene, toluene, naphtha, or other compatible solvents. The adhesive may be cured by addition of benzoyl peroxide (BPO) or another suitable peroxide to the adhesive solution. After the adhesive solution has been applied to the backing, it must undergo a two-stage process consisting of a drying stage (solvent removal) immediately followed by a curing stage (optional peroxide crosslinking).

Solvent Removal

To achieve consistent, high performance adhesive films, it is essential to optimize the drying stage of the process to remove all solvent from the dried adhesive film before it enters the curing stage. Incomplete drying will leave residual solvent trapped within the adhesive and interfere with the curing process. If residual solvent is present during the curing stage, the peroxide will react with the solvent instead of the siloxane, inhibiting cure.

The temperature of the drying stage is typically from 80 to 90 °C (176 to 194 °F). The temperature generally should not exceed 93 °C (200 °F) to prevent premature initiation of the BPO curing process. A typical drying cycle is approximately 2 minutes at 90 °C (194 °F). The exact conditions required to achieve complete solvent removal will depend on oven length, oven efficiency, solvent, and substrate type; and should be established through experimental trials on the coating machine.

Curing Process

The curing stage should begin immediately after the solvent has been completely removed from the adhesive film. Curing is initiated by increasing the temperature of the adhesive film to decompose the peroxide to free radicals. The radicals react with siloxane polymers and cure the adhesive. The required temperature and duration of the curing stage will depend on the chosen peroxide.

When using BPO, a typical curing cycle is approximately 2 minutes at 165 to 180 °C (329 to 356 °F).The exact conditions required to achieve complete cure will depend on oven length, oven efficiency, peroxide type, and substrate type; and should be established through experimental trials on the coating machine.

Peroxide Selection

Benzoyl peroxide (BPO) at a loading of 1 to 3 wt% BPO solids vs. silicone solids has been found to give the most consistent results for curing silicone pressure sensitive adhesives. BPO cure is typically activated at a temperature of 165 °C (329 °F) or above. In applications requiring lower-temperature cure, 2,4-dichlorobenzoyl peroxide, which is activated at 132 °C (270 °F), can be used. It should be noted that 2,4-dichlorobenzoyl peroxide may generate polychlorinated biphenyls during the curing process. Please refer to applicable law (in the United States, 40 CFR) regarding incidental PCB byproducts if 2,4-dichlorobenzoyl peroxide is utilized.

The peroxide should be dissolved in a suitable solvent before it is mixed with the adhesive. If the BPO source consists of BPO with water, such as 75% BPO granules or a 50% BPO paste, the water will phase separate when added to organic solvents such as xylenes, toluene, and naphtha. It is advisable to remove this water phase before adding the BPO solution to the adhesive. To achieve consistent performance, it is essential to thoroughly mix the peroxide and adhesive solutions to produce a homogenous dispersion.

Priming

In some applications, the anchorage of the adhesive to the backing may be insufficient and it will be necessary to coat the backing with a primer prior to coating the adhesive. A sample formulation for a primer may be found below. The formulation may need to be adjusted depending on the required bath life, coating equipment, and backing material. The primer may be coated by direct gravure, wire wound rod, or other coating technique suitable for solvent based coatings, and must be cured prior to adhesive application. The curing conditions will depend on equipment capabilities, substrate type and formulation used, and should be established during experimental trials on the coating machine.

Sample Primer Formulation[3]

Component	Parts by Weight
SS4191A gum solution	13.30
SS4191B methyl hydrogen crosslinker	0.16
SS4192C catalyst	0.50
SS4259C accelerator	0.30
Solvent[4]	85.74

[3] Refer to Momentive SilForce™ SS4191A silicone release coating system, for more information.

[4] Typical solvents are toluene, heptane, toluene/heptane mixtures.

Product formulations are included as illustrative examples only. Momentive makes no representation or warranty of any kind with regard to any such formulations, including, without limitation, concerning the efficacy or safety of any product manufactured using such formulations.

Packaging

SilGrip PSA590LD-X-NT pressure-sensitive-adhesive solution is available in 5-gallon pails (18.16 kg/ 40.0 lbs) and 55-gallon drums (180 kg/397 lbs).

Patent Status

Nothing contained herein shall be construed to imply the nonexistence of any relevant patents or to constitute the permission, inducement, or recommendation to practice any invention covered by any patent, without authority from the owner of the patent.

Product Safety, Handling and Storage

Customers should review the latest Safety Data Sheet (SDS) and label for product safety information, safe handling instructions, personal protective equipment, if necessary, emergency service contact information, and any special storage conditions required for safety. Momentive Performance Materials (MPM) maintains an around-the-clock emergency service for its products. SDS are available at www.momentive.com or, upon request, from any MPM representative. For product storage and handling procedures to maintain the product quality within our stated specifications, please review Certificates of Analysis, which are available in the Order Center. Use of other materials in conjunction with MPM products (for example, primers) may require additional precautions. Please review and follow the safety information provided by the manufacturer of such other materials.

Limitations

Customers must evaluate Momentive Performance Materials products and make their own determination as to fitness of use in their particular application(s).

Contact Information

Email
commercial.services@momentive.com

To speak with a Customer Service Representative (CSR) in your region, please refer to the contact numbers below.

North America
+1 800 295 2392 Toll free
*America , Canada

LATIN AMERICA

BRAZIL

+55 11 5128-4222 Direct Number

MEXICO
+52 55 2169 7670 Direct Number

EMEIA - EUROPE, MIDDLE EAST, INDIA & AFRICA

EUROPE
+39 0875 758888 Direct Number

INDIA, MIDDLE EAST & AFRICA
+ 91 44 71212207 Direct Number*
*All Middle Eastern countries, Africa, India, Pakistan, Bangladesh, Sri Lanka

ASIA PACIFIC - APAC

CHINA
800 820 0202 Toll free
+86 21 3860 4928 Direct Number

JAPAN
Sales-JP.Silicones@momentive.com

SOUTHKOREA
+82 2 3495 2141 Direct Number

SOUTH EAST ASIA, AUSTRALIA & NEW ZEALAND
+60 3 8309 8088 Direct Number*
*South East Asia countries (Malaysia, Singapore, Thailand, Indonesia, Vietnam, Philippines, Cambodia, Myanmar / other countries located in Pacific region).

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2750 Balltown Road,
Niskayuna, NY 12309, USA
momentive.com

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