

Silicone Adhesive Tapes - Powerful Products for Demanding Applications

By Adhesive Applications

Why Silicone?

Due to its inertness, flexibility, wide temperature range, and ability to withstand extreme conditions, silicone is specified by engineers for the most technically demanding applications. Pressure sensitive adhesives (PSAs) made from silicone polymers maintain these outstanding performance characteristics and are incredibly valuable in bonding, sealing, insulating, masking, and many other high-end applications. Silicone adhesives have:

- **Temperature resistance** (high and low) – silicone has the greatest ability to perform in temperature extremes, ranging from -100F to 500F (-73C to 260C).
- **Silicone / LSE bonding** – good adhesion to difficult to bond to surfaces, such as release liners, silicone foams and rubbers, and other Low Surface Energy materials (LSE).
- **Good wet-out** – very good wetting characteristics to enable the sticking on hard-to-wet surfaces.
- **Repositionable/removable** – can be specially formulated to be initially repositioned, or ultimately removed cleanly if required. They typically have inherently stable adhesion characteristics.
- **Chemical stability and solvent resistance** – an excellent choice if the applications require resistance to chemical or solvent splashes or immersion.
- **Electrical insulation properties** – naturally insulative (dielectric) material, and therefore, tapes made from silicone are good insulators and EMI-RFI shields.
- **Flame retardant** – inherently non-flammable, due to their very high ignition temperature and heat insulative characteristics and pass most fire retardant (FR) rating tests when combined with the appropriate materials.
- **UV resistance** – less prone to UV degradation than other adhesive systems.
- **Moisture resistance** – holds up well to water and other liquids and maintain their bond in wet conditions.
- **Inert** – does not react with reagents, chemicals, blood, etc. in contact situations.

- **Non-growth supporting** – resistant to biological attack (fungus, mildew).
- **Good optical properties** – clear and non-refractive.
- **Conformability** – can drape and conform easily to accommodate complex contouring.

Figure 1 provides a side-by-side comparison of adhesive features to help ascertain the best solution for the application.

Silicone Tape Constructions

To maximize the high performance of the silicone adhesive and to deliver it in an easy-to-use form for the end user, it must be combined with complimentary materials. This is achieved by web coating the adhesive into a tape, and the ideal constructions are developed and produced by a tape coater, like Adhesive Applications.

Common Formats:

- **Single-sided tapes** – adhesive is coated on one side of the carrier or substrate and are useful in masking, covering, protecting, splicing, and a myriad of other applications. (e.g. S9511-2)
- **Double-sided tapes** – Carrier supported products, either silicone adhesive on both sides OR silicone on one side and acrylic on the other. Two sided silicone tapes are typically used to bond silicone/LSE to other silicone/LSE materials, while silicone on one side and acrylic on the other can be used to bond silicone materials to a higher energy surface, such as steel, PMMA, polycarbonate, etc. [e.g. S5005DC (silicone both sides); SA1060 & SA1911 (silicone/acrylic)]
- **Transfer films** – Unsupported tapes are a unique format where a silicone adhesive is supplied on a release liner with no carrier or support. These silicone transfer tapes can be applied to a variety of substrates to effectively act as a bonding and sealing medium. Since they do not have a carrier layer and act as a free film, these are very valuable for creating adhesive versions of customer materials and are the most

conformable type of tape, allowing for flex and stretch around contoured surfaces. (e.g. S1001-1; S1001; S1003; S1005)

Characteristics	Rubber	Acrylic	Silicone
Track	Med/High	Med/Low	Low
Temperature Resistance	Low	High	Very High
Adhesion	Med/High	Med/High	Med/Low
Shear	Med/High	Moderate/High	Excellent
Solvent Resistance	Poor	Good	Excellent
UV Resistance	Poor	Good	Excellent
Plasticizer Resistance	Poor	Moderate/Good	Excellent
Low-surface Energy Materials	Good	Poor/Moderate	Good
High-surface Energy Materials	Excellent	Excellent	Moderate

Figure 1: Comparison Summary
(Typical Unformulated Performance)

Our Common Carriers / Substrates:

- **Polyimide** – High temperature, masking, insulation, splicing (e.g. SP590)
- **Polyester (PET)** – Bonding, masking, splicing, sealing (e.g. S8512-2)
- **Non-Wovens** – Conformable, bonding, sealing, splicing
- **Foils** – Reflective, insulative, high heat

Markets & Applications

Because of their unique range of properties, silicone tapes are found in a wide variety of industries and end uses. These tapes provide high performance in demanding applications:

Electronics

Being dielectric, heat and electrically insulative, extreme high and low temperature resistant, inert from certain chemicals, and inherently stable over long periods of time in a variety of environmental conditions, silicone tapes (e.g. S580; SP590) are an obvious choice for a myriad of electronic applications such as:

- Coil Winding
- Mica Tape / EMI-RFI Shielding
- Masking / Platers Tape
- Surface / Screen Protection

Medical

Certain silicone adhesives are skin / biocompatible (ISO 10993 approved) and also chemical resistant, which makes them suitable for many medical applications (e.g. S1001-1DC11). Their inertness, excellent sealing properties, and fluid resistant characteristics also make them ideal for microfluidic bonding and assembly, as well as microplate and bio-assay tray covers. Uses in medical are wide ranging and include:

- Device Manufacturing
- Wearables
- Wound Care
- Microfluidics
- Microplate / Assay Tray Covers

Aerospace

Due to their ability to perform at extreme high and low temperatures, silicone tapes (e.g. S1001; SP590HT-DC2) are suitable for most aerospace applications. Combining their ability to withstand extreme cold and heat with inherent damping, FR, dielectric, and insulative properties means that silicone PSA coated materials are employed extensively by design engineers in areas such as:

- Noise and Vibration Damping Panels
- Flame Retardant Barriers
- EMI-RFI Shielding
- Heat Shield
- Plasma Flame Spray
- Gasket Bonding
- Seals

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Automotive

Silicone tapes are commonly used in Automotive and Transportation due to their high and low temperature performance, broad damping characteristics, and stability in harsh environments and applications (e.g. SP590-2; SA1911). The growth of electric vehicles, more stringent flame spread and fire requirements, along with higher consumer expectations for comfort, quality, and longevity has increased the usage of silicone tapes in vehicles. High performance silicone tapes are applied throughout the vehicle body, under the hood, and in mechanical components for uses such as:

- Heat Shield
- Noise and Vibration Reduction
- Wire Harness
- Brake Shim
- Foam and Rubber Gasket Bonding and Sealing
- High Temp & Solvent Resistant Labels
- Flame Blockers
- Bus Bar

Industrial

As with the other industries discussed, tapes coated with silicone PSA's are in a myriad of Industrial applications where their unique properties are required (e.g. S3405-2DCSW; S9611-2SL). These applications are countless, and include:

- Silicone Foam and Rubber Bonding
- Release Liner Splicing & Tapping
- Protective Films
- Insulation Products
- Heat Shield
- Bonding and Sealing
- High Temp Gaskets and Sealing

Customer Applications Drive Us

Once the unique properties of silicone PSA's are understood, it is easy to see why silicone tapes are so commonly used. The combination of high-performance silicone PSAs with highly specified carrier materials by experienced tape coaters enables solutions to the most demanding problems for OEMs and upstream manufacturers.

With our experienced R&D and lab personnel focused on customer solutions, Adhesive Applications can formulate adhesives and design constructions to suit customer specific needs, and deliver it in the ideal format for use or downstream conversion.

For more information, visit www.adhesiveapps.com, contact our team at (413) 527-7120, or email info@adhesiveapps.com.

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