

SHELF LIFE OF ADHESIVE TAPES

What Factors Impact the Shelf Life

Typically, a manufacturer's **shelf life** for a PSA **Pressure Sensitive Adhesive** is one to two years when stored out of direct sunlight, in ideal temperatures of 60 to 80 degrees Fahrenheit and relative humidity at 40 to 50 percent. However, there are many factors that play into the life of your product. Depending on the type of adhesive, substrate, release liner, application, manufacturer and storage conditions, these factors will shorten or lengthen the time you will be able to use the product effectively.

What is the Expiration Date of a Tape?

Pressure Sensitive Adhesive Tapes have a shelf life to help ensure usability and adhesive performance. PSA peel and strength performance characteristics vary depending on the surface type, liner coating, lamination tension, cleanliness and storage conditions. Over time, some adhesives can become dry, brittle and lose their original performance properties while rolls of tapes can deform, ooze and be difficult to apply. In both cases, it is helpful to have a date from the adhesive supplier to guarantee the adhesive will convert without issues.

Once the converter, in this case MBK Tape Solutions, die cuts, laminates or replaces the liner or packaging, a **warranty part date** replaces the **manufacturer shelf life date**. When the converted product is stored in ideal conditions, it should continue to perform as prescribed by the manufacturer. It is up to the customer to test and validate that the PSA will adhere for the life of the product. It is important to note that once a pressure sensitive adhesive tape is unwound and successfully attached to one or more surfaces, its stability greatly increases and is less susceptible to usability and performance issues.

Material Chemistry & Construction Impact on Shelf Life

Shelf life of a PSA tape is dependent on the chemistry of the adhesive, substrate and the liner used in the product construction.

Acrylic-based PSA Tapes

Known for its exceptional durability, UV stability, and long life, the acrylic adhesive chemistry allows tapes to work well in a wide variety of applications. Tackifiers are generally used in modified acrylic adhesives to increase adhesion, however, they often contribute to the adhesive drying and softening which increases edge picking and oozing during storage. Pure acrylic adhesives, which do not contain the additive, tend to exhibit a longer shelf life. Acrylic adhesive systems generally last anywhere from one to two years, depending on the manufacturer.

Rubber-based PSA Tapes

Rubber-based tapes are commonly used in short-term applications, such as masking and packaging. These tapes are sensitive to oxygen, heat, and ultraviolet (UV) exposure, as they can oxidize, thus, losing adhesive performance and becoming dry and brittle. Synthetic rubber-based tapes tend to be less sensitive to environmental exposure than those made with natural rubber, therefore, more forgiving in storage conditions.

Silicone-based PSA Tapes

Silicone-based tapes are frequently used when either bonding to silicone substrates or when high-temperature resistance is required 300°F - 500°F. Depending on whether the silicone material is self-wound or comes with a release liner, the material can last anywhere from 6 months to a year. As silicone adhesive ages, the strength of the bond between the adhesive and liner increases, making it difficult to separate.

Paper Release Liners

Release liner selection can directly impact a PSA's usability and performance. Basic paper liners, such as Super Calendered Kraft (SCK) and Densified Kraft (DK), are often very susceptible to moisture, which absorbs into the paper and can cause the paper to expand and buckle. Moisture-related issues can shorten the liners usability; however, this can be prevented by controlling the humidity while in storage. For maximum effectiveness, liner papers should be stored in a moisture resistant bag along with a desiccant (e.g., silica gel).

In addition, liner thickness can also have a direct impact on usability. When comparing liner thickness, thinner caliper liners often exhibit a greater tendency to deform than thicker liners. Thicker liners tend to provide easier release over time, lower levels of liner tear as well as improved dimensional stability. Thicker liners can also provide more separation between adhesive layers, reducing the tendency of layers to bond together caused when adhesive flows out the edge of a roll.

Storage and Handling Impact on Shelf Life

During storage, the environmental conditions such as temperature and humidity can determine the shelf life of a tape.

Temperature Impact

Storage at Low Temperatures

Due to the viscoelastic nature of the adhesive, as the ambient temperature drops then so does the instant adhesion, in other words, the tack of the tape. Therefore, if the tape has been stored at low temperatures, it is recommended to return the tape to the suggested storage conditions for a period of no less than 24 hours. This generally returns the properties to the tape.

Storage at High Temperatures

Storage of tapes in high temperatures can affect the adhesive polymer, causing adhesive oozing at the roll edges. In addition, the roll unwind strength of the tape may also increase. This can, in extreme cases, cause adhesive delamination and / or adhesive transfer on the roll. Returning the tape to ideal conditions after excessive heat exposure will not return their properties in many cases.

Humidity Impact

Though many tape products are resistant to water, some are sensitive to moisture exposure. Some examples are listed below:

- Certain types of metal foils may discolor, tarnish or oxidize.
- Paper Tapes and tapes with paper liners exposed to excess moisture may lead to deformation or wrinkling.

To limit the potential for any negative effect during transportation and storage, MBK packs most of the products in a sealable polyethylene bag. Please do not remove these products from their bags until needed for use and return to the bags if partially used. If a tape should become wet or damp through incorrect storage or transportation, then please allow the tape to dry out fully before use. Contact us for further guidance as heating the tapes to drive moisture out is not always an option.

UV Exposure Impact

MBK recommends that all of our products are stored in their original packaging and away from direct sunlight. This recommendation is made because some of our products (typically rubber based adhesives) are sensitive to UV light exposure. If exposure to excessive UV light, these tapes can discolor (yellowing) or even lose their adhesion properties completely.

Proper Storage & Handling

Proper storage and handling can lead to fewer usability issues and maximize usability over the recommended shelf life.

Proper storage and handling recommendations include:

- Storage temperature of 60°F - 80°F (15°C - 26°C), the cooler the better
- Keep it dry, relative humidity (RH) levels between 40% and 60%
- Store away from direct light, particularly windows
- Minimize impacts to the edges of a roll when unloading from protective packaging
- Store unused rolls in the packaging they were shipped in
- Store in a vertical position with the end plugs and plastic wrap in place

In summary, **shelf life is about the usability of the product and not the durability**. It is important to check the shelf life of the material, often found on the manufacturer's data page, but also consider the requirements of the application. Tape performance is not expected to alter even after the shelf life expires but we do suggest that tapes are used prior to the date.

If you have specific questions, please don't hesitate to contact MBK Tape Solutions at info@mbktape.com or call our sales representatives at 818-998-1477.

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