

Medical Tapes Wear Duration The Difference Between Short and Long-Term Wear

Whether designing a medical device, wearable sensor, wound care dressing or other skin contact application, it is important to know how long the adhesive is needed to adhere to the skin; from a few hours to multiple days or even weeks. When deciding on what tape to choose for your application, wear duration and body placement plays a big role. There are many factors that affect the duration and performance of the pressure sensitive adhesive (PSA). Each tape manufacturer offers many PSA wear options. To the layman, it can be confusing as to what is considered a short term or long-term adhesive and how best to select the right adhesive for the application.

Skin Factors

For a medical device to stick to the skin, one must understand that the skin constantly changes, essentially rejuvenating every 14 days, which in turn, affects the wear time. Designers need to consider the skin type and condition, as well as the age and ethnicity of the target population. Other factors to consider include, global location of the device being used (climate factors), is the skin healthy or is it a wound area, is it an oily part of the body, will a person's weight be a factor, will clothing disrupt the device while being worn, is the person active or passive, and so many other nuances for fit and function. The placement of the device on the skin, conformability, breathability and water resistance also will help narrow down the choices for the pressure sensitive adhesive.

Construction of Medical Device

When designing a skin friendly medical device, an engineer must make sure that all components work together, including the skin adhesive, the substrate and the Tie Layer (layer of PSA between skin and device) adhesive. Some types of adhesives might be better at holding a device and some might be better at adhering to the skin, and others offer gentle and easy removal. The wrong adhesive and backing could damage the skin, so it is important to know the desired time for attachment. Though all FDA medical grade adhesives are biocompatible, different properties can be obtained by varying the backing material and the type of adhesive used.

Carrier Material

Typically, the construction of the tape consists of nonwoven, film or foam backings coated with acrylic, rubber or silicone adhesives. Carrier materials commonly used in carriers include Polyester, Polyethylene, Polyurethane and Silicone. Polyester is easy to adhere, but less flexible whereas polyethylene is more conformable and soft. Polyurethane is very flexible, soft and breathable and can withstand sterilization. Silicone is soft, but can be difficult to stick to.

Adhesives

Devices intended for a few minutes to several hours benefit from choosing acrylic adhesives that have good initial stick, but don't build adhesion to skin quickly, which minimizes discomfort during removal. A slow build of adhesion level typically happens with many acrylic based adhesives - lower adhesion initially but increasing then stabilizing over time allowing for longer term attachment.

Many synthetic rubber-based adhesives have excellent quick stick properties to low energy surfaces and skin, but can be irritating when removed. These same adhesives are very good for devices requiring 24 hours to 3 days wear since the adhesion to most skin types tends to decline over time resulting in less irritation.

New formulations of silicone adhesives, hydrocolloids and hydrogels are becoming widely used for wearable devices and wound care. These silicone and non-silicone formulations allow for repositioning, painless removal and attach securely to the skin for long-term wear duration.

Testing Wear Duration

Since there are many factors that contribute to how long an adhesive will stick to the skin, it is unrealistic to set industry standards for wear duration. Therefore, each manufacturer determines approximate wear time according to their own criteria. 3M, Adhesives Research, DermaMed and Vancive studied wear times on human subjects using criteria such as breathability, edge lift, irritation, removability and adhesive residue. To best match the adhesive with the requirements of the application, a wide variety of products are needed. Thankfully, there are lots of options available today, each offering unique features with various wear times.

The Role of the Tape Converter

Through partnership and collaboration with adhesive tape manufacturers, MBK Tape Solutions helps design medical devices that meet specific requirements for the skin-friendly application. Selecting the right materials reflect a balance between desired wear time, body placement, skin conditions and the ease of adhesive removal. Being on the cautious side, medical grade adhesives tend to be grouped as short-term wear adhesive tapes from 1-4 days and long-term wear adhesive tapes from 5+ days. From prototype to large-scale production, MBK delivers quality adhesive backed component parts and finished goods for the medical and consumer industries.

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