

THE ANATOMY OF A
**MEDICAL-GRADE
PRESSURE-SENSITIVE
ADHESIVE TAPE**

AND WHY IT MATTERS WHEN DESIGNING A WEARABLE DEVICE



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INTRODUCTION

While many materials make up a medical wearable, pressure-sensitive adhesive (PSA) tapes are the “glue” that holds everything together.

Medical-grade PSA tapes serve many purposes, from trendy retail applications such as mouth tapes, nose strips and breast lift tapes, to specialized use cases like diagnostic strips in pregnancy tests and attachment and construction layers in remote patient monitoring devices. As an integral part of a medical device, PSA tapes can determine the success (or failure) of a product or part, as well as the overall comfort of end-users.

But medical-grade PSAs are not a “one-size fits all” product. There are many options—from nonwoven, breathable silicone tapes that comfortably conform to human skin to non-irritating acrylic tapes designed to attach component parts. Selecting the wrong tape can have negative repercussions to the manufacturing process and the functionality of the component or product.

Choosing the right tape involves a deep understanding of tape construction, performance requirements, careful analysis of available options and their attributes, and knowledge of how different combinations of tapes, adhesives, and substrates can be manufactured effectively.



KEY COMPONENTS OF A PSA TAPE

Pressure sensitive adhesive tapes are typically single or double-coated. They are constructed of a carrier or backing material (with or without a release coating), an adhesive, and a liner—all three of which can vary widely depending on adhesive chemistry and material composition.

The materials that make up the different layers of the tape can have a significant impact on the structural integrity, breathability, and conformability of the tape, directly determining suitability for certain medical applications.

1. The Carrier

The term “carrier” refers to the main structural layer or backing material that provides support and stability to a PSA tape. The carrier plays a direct role in a tape’s strength, flexibility, and suitability for a given application. [Carriers](#) can be made from materials as diverse as foams, elastomers, films, paper, wovens, and nonwovens, each of which will affect MVTR (moisture vapor transmission rate).

Why it matters:

The carrier of medical adhesive tape is crucial for performance factors like moisture vapor transmission rate (MVTR), conformability, biocompatibility, and flexibility. For instance, materials like polyesters, polyolefins, and PVC restrict airflow and typically have low MVTR, making them unsuitable for long-term wear. In contrast, polyurethane films and nonwovens are better choices for breathable, long-term applications.



2. The Pressure Sensitive Adhesive

The term pressure sensitive adhesive (PSA), refers to an adhesive that forms a bond upon application of pressure. Like your basic wrapping paper tape, it needs no solvents, heat or water to activate its adhesive properties, making it ideal for skin-contact and medical device construction layer applications.

While medical-grade PSA tapes are very similar in construction to “traditional” PSAs, they are also biocompatible.

Stick-to-skin adhesives must achieve a balance of adhesion and ease of removal, while also meeting specific conformability, breathability, and moisture resistance specifications. Formulation and coat weight are two key factors that will impact the adhesive’s ability to do that.

- **Adhesive Formulation** – Different adhesive formulations offer varying levels of tack (initial and over time), peel adhesion, cohesion, and breathability (the ability for skin to “breathe.”) These factors affect device performance, ease of manufacturing, as well as whether your wearable device is truly skin-safe. The three most common PSAs for medical applications are synthetic rubber adhesives, acrylate adhesives, and silicone adhesives.
- **Adhesive Coat Weight** – Coat weight can influence how “sticky” an adhesive tape is. Adhesives with a higher coat weight provide better flow on uneven surfaces. Adhesives with lower coat weights provide good flow on smooth surfaces. Depending on the application and adhesive properties, a heavier adhesive coat weight may be necessary to extend the wear time of a device. A heavier coat weight of adhesive can increase the overall adhesion to the skin but may not be the best answer for applications focused on low trauma or delicate skin.

Why it matters:

Designers must consider multiple factors when selecting an adhesive, including skin adhesion and the manufacturing process. Variables such as demographics, use cases, on-body placement, and moisture exposure can influence performance. For example, gentle acrylics and silicone PSAs start with low adhesion but strengthen over time, making them suitable for devices needing repositionability or gentle removal. Conversely, acrylic and latex-free synthetic rubber PSAs with lower coat weights are better for short-term wear applications.

3. The Liner

A release liner or release paper is a thin, protective paper or plastic-based film sheet (usually applied during the manufacturing process) that covers an adhesive and prevents the sticky surface from prematurely adhering to other surfaces. It is coated on one or both sides with a release agent, which acts as a barrier between the adhesive and liner, facilitating easy release and application. Release liners serve as a barrier to protect the adhesive side of products during manufacturing, converting, storage, and transportation. Some liners are also printable.

Liners are typically made from paper or film. Paper liners are economical and suitable for standard applications, while film liners offer better dimensional stability and are often used for more demanding applications.

The release coating on the liner affects how easily the adhesive separates from the liner. Options include silicone-based coatings for easy release and non-silicone coatings for specific applications where silicone contamination is a concern.

Why it matters:

Some liners are designed for manual application, while others are optimized for high-speed automated application processes, so, the next stage in your supply chain may dictate your liner requirements. You'll want to share that information with your converter so they can balance the performance requirements with the overall cost of the liner and adhesive system. Sometimes a higher initial cost can be justified by improved performance or reduced downtime in production.



Putting the Parts Together: TAPE CONSTRUCTIONS

The term “tape construction” refers to the way the adhesives, carriers, and liners stack up:

Single-Coated Tapes are constructed of a liner, an adhesive and a carrier/backing. Common stick-to-skin applications for single-coated tapes include: breast lift tapes, adhesive bras, mouth tapes, hair tapes, nipple covers, and pulse oximetry bandages.

Double-Coated Tapes are constructed of a liner, an adhesive, a carrier, a second adhesive and (sometimes) another liner. These tapes are ideal for medical designs or applications that involve joining two substrates. Medical Device applications range from wound care, surgical drapes, medical device assembly (diagnostic devices, test strips, and medical equipment), bandage applications, medical machinery, and diagnostic devices (blood glucose monitors, blood pressure monitors.)

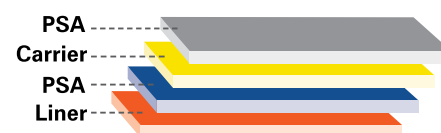
Differential Double-Coated Tapes are identical in construction to a double-coated tape, with one key difference: there is a different adhesive on either side of the carrier/backing. You might opt for a differential pressure-sensitive adhesive tape when you need to bond two materials with significantly different physical properties.

Transfer Tapes are a highly conformable, usually invisible solution that have no carrier. The adhesive is coated onto a removable release liner, typically made of film or paper. Due to the absence of a carrier, transfer tapes are thinner and more conformable than other types of tape. Applications range from medical device assembly, to bandage and wound care solutions, medical drapes, and more.

SINGLE-SIDED TAPE



DOUBLE-SIDED TAPE



TRANSFER TAPE



Why it matters:

Selecting the right tape construction is crucial for any project, no matter the industry. Without basic understanding of the breadth of tape styles that are available to you, you aren't able to make informed decisions about what adhesive will contribute to the overall success of your project. Selecting the right type of tape can have big implications on durability, manufacturing efficiency, and cost effectiveness.

Transforming Rolls of Tapes into Functional Components: **PARTNERING WITH AN EXPERIENCED CONVERTER**

Now that we've covered the anatomy of the tape, it's time to focus on what we do best at JBC Technologies: converting those tapes into functional components.

Adhesive tape manufacturers, often referred to as "coaters," run big coating lines to lay the adhesive down on the carrier. The resulting product is a full log of material. There are times that these full logs can be used in their native form, but more often than not some form of converting is required before they can be effective at the next stage of production.

Converters take these big logs, laminate them to other functional materials, slit them to custom widths, and cut out discrete shapes.

Partnering with the right converter plays a major role in setting the stage for a successful launch of your medical wearable device. When evaluating converters, be sure to look for providers that offer:

- Process engineering expertise
- A wide base of strategic material suppliers
- Vertically-integrated converting capabilities
- Clean room environments



Medical Converting Capabilities

- Cleanroom Converting
- High-Speed Rotary & Flatbed Die-Cutting
- Digital Cutting
- Laminating, Slitting, Sheeting, Perforating, Scoring
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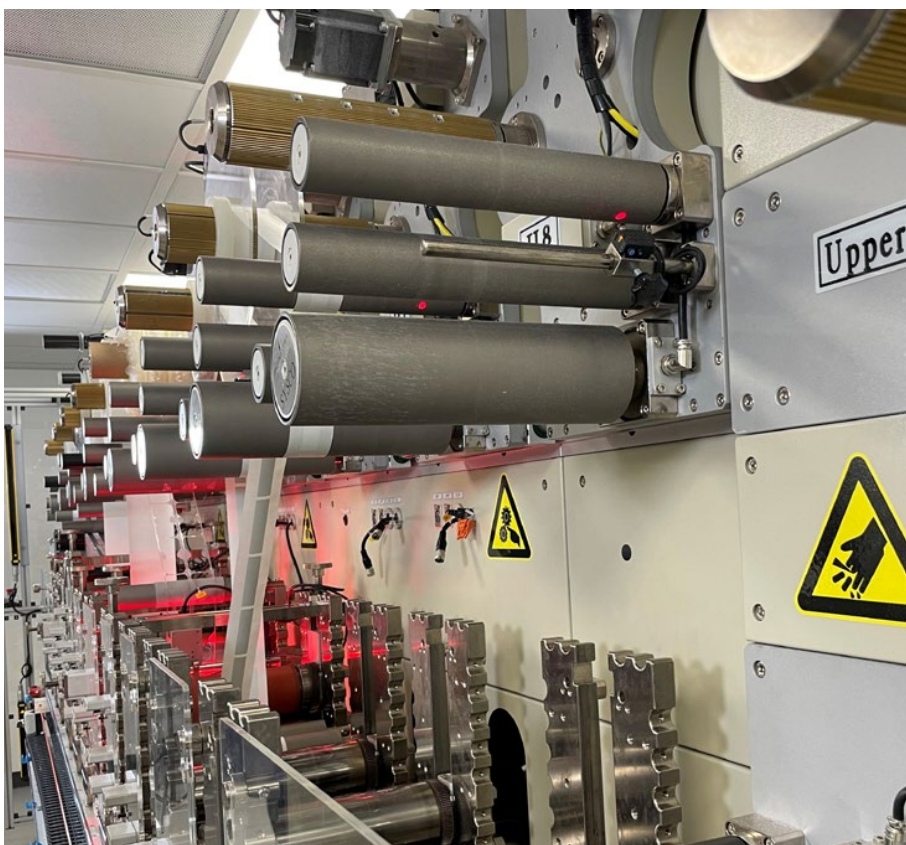


CONCLUSION

JBC Technologies has the quality systems, industry-leading converting equipment, clean rooms and technical know-how necessary to manage the complex part geometries, tight tolerances, cleanliness requirements and multi-layered constructions required by medical device manufacturers.

When you work with JBC, you gain access to a medical die cutter and medical tape converter that brings the ideal combination of quality, service, and innovation to every stage of design and development.

Visit www.jbc-tech.com to learn more.



JBC is proud to work with leading medical adhesive manufacturers such as



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