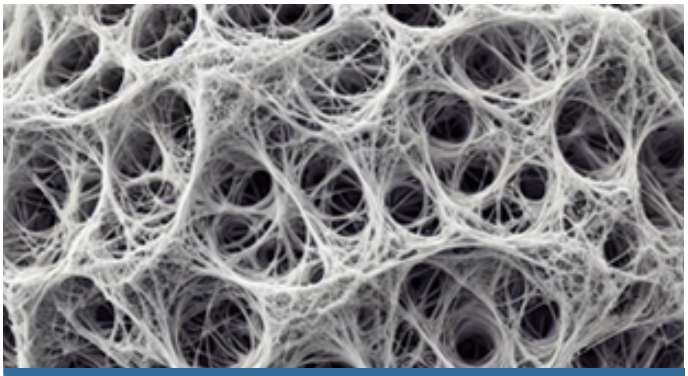
WHITEPAPER

"Nonwovens"... Explained

Why do I keep hearing about nonwovens?

For starters, it is because these materials ("nonwovens"), are commonly used in the medical environment.

WOVEN MATERIAL (MAGNIFIED)



NONWOVEN MATERIAL (MAGNIFIED)

What are nonwovens?

Nonwoven materials are engineered fabrics made from fibers bonded together by chemical, mechanical, heat, or solvent treatments, rather than being woven or knitted. Unlike traditional textiles, which require yarn and weaving processes, nonwoven fabrics are created directly from fibers. This structure gives nonwovens unique properties, including durability, flexibility, absorbency, and sometimes water resistance.

Nonwoven materials are used widely in industries such as healthcare (e.g., surgical masks, gowns), automotive (e.g., insulation, filters), hygiene products (e.g., diapers, wipes), and construction (e.g., geotextiles). The fibers can be natural (like cotton) or synthetic (like polypropylene or polyester), and they're often chosen based on the desired properties of the final product.

WHY WERE NONWOVENS DEVELOPED (AKA WHAT ARE THEIR ADVANTAGES)?

Nonwoven materials were developed to offer a versatile, cost-effective alternative to woven fabrics, serving specific needs across various industries. Here are key reasons behind their development:

1. **Production Speed and Cost Efficiency**: Nonwoven fabrics are faster and cheaper to produce compared to woven textiles, as they don't require yarn production, weaving, or knitting. Fibers are simply bonded together, which reduces production time and costs, making them ideal for single-use or disposable applications.

2. **Customization and Versatility**: Nonwovens can be engineered to have specific properties—such as softness, absorbency, strength, or water resistance—based on their intended use. This versatility makes them suitable for specialized applications, from filtration to medical products, where specific characteristics are essential.

3. **Lightweight and Flexible**: Nonwovens can be made very thin and lightweight while maintaining durability. This is particularly valuable in industries like healthcare and hygiene, where disposable products need to be both effective and easy to wear or use.

4. **Enhanced Performance in Certain Applications**: Nonwovens are often more effective in certain roles, like filtration, where they can be designed with fine fiber structures to trap particles better than woven fabrics. They're also useful for creating water-resistant or breathable barriers, as seen in medical masks and hygiene products.

5. **Environmental and Hygienic Benefits**: Nonwovens support hygiene standards, as they can be used for single-use applications, which helps prevent contamination in medical, food service, and hygiene contexts. Additionally, some nonwovens are biodegradable or recyclable, which helps address environmental concerns associated with single-use products.

These benefits made nonwoven materials an attractive innovation for industries requiring specific performance and affordability, especially where disposable, flexible, or protective materials are critical.

I HEAR A LOT ABOUT SPUNLACE MATERIALS, IS THIS SYNONYMOUS WITH NONWOVEN?

Actually, Spunlace is one of they many types of nonwovens. Spunlace, also known as hydroentanglement, is a method of producing nonwoven fabric by mechanically bonding loose fibers with high-pressure water jets. In this process, the water jets entangle the fibers, creating a web with enhanced strength and flexibility without the need for adhesives or heat. Spunlace fabrics are soft, strong, and have good drapability, making them popular for applications requiring a textile-like feel, such as wet wipes, facial masks, medical bandages, and cleaning cloths. They can be made from various fibers, including polyester, viscose, cotton, or blends, depending on the desired properties of the end product.

FOR REFERENCE, HERE IS AN EXHAUSTIVE LIST OF THE VARIOUS KINDS OF NONWOVENS:

1. Spunbond Nonwovens
- Production: Made by spinning thermoplastic polymers (like polypropylene) into continuous filaments and laying them into a web, then bonding with heat or pressure.
- Properties: Strong, durable, lightweight, and breathable.
- Applications: Medical masks, packaging, disposable hygiene products (e.g., diapers), and agriculture fabrics.

2. Meltblown Nonwovens
- Production: Thermoplastic polymers are melted and extruded through fine nozzles, then blown into a web by hot air, forming extremely fine fibers.
- Properties: High filtration efficiency due to its fine fiber structure, good insulation, and soft texture.
- Applications: Air and liquid filters, medical masks (especially N95 masks), absorbent products, and insulation.

3. Spunlace (Hydroentangled) Nonwovens
- Production: Fibers are entangled into a web using high-pressure water jets, creating a fabric with no need for adhesives or heat bonding.
- Properties: Soft, strong, flexible, and absorbent.
- Applications: Wet wipes, cosmetic wipes, medical gauze, cleaning cloths, and personal care products.

4. Needle-Punched Nonwovens
- Production: Mechanical needles punch fibers through the web, entangling them to create a fabric.
- Properties: Durable, strong, and often dense, with customizable thickness.
- Applications: Carpets, automotive fabrics, geotextiles (for soil stabilization), and insulation.

5. Thermally Bonded Nonwovens
- Production: Synthetic fibers are bonded together by applying heat, often through a patterned roller that partially melts the fibers.
- Properties: Lightweight, durable, and often used where high strength is needed.
- Applications: Hygiene products, medical gowns, interlinings for garments, and filters.

6. Chemical Bonded Nonwovens
- Production: Fibers are bonded using chemical binders (like adhesives or resins) that are applied in specific areas to secure the fibers.
- Properties: Can be tailored for specific applications, with moderate strength and flexibility.
- Applications: Disposable medical fabrics, household wipes, and disposable garments.

7. Air-Laid Nonwovens
- Production: Short fibers are dispersed in an airstream to form a web, which is then bonded using heat, pressure, or adhesive.
- Properties: Soft, thick, and absorbent, with a bulky texture.
- Applications: Absorbent cores in diapers and sanitary pads, napkins, and tissues.

8. Wet-Laid Nonwovens
- Production: Fibers are suspended in water, then deposited on a screen, where they bond together as the water drains.
- Properties: Can closely resemble paper, with moderate strength and uniform thickness.
- Applications: Disposable wipes, tea bags, medical disposables, and filtration materials.

HOW DO I INTERPRET THE TECHNICAL DATA SHEETS (TDS) OF OUR MEDICAL 'ADHESIVE' MANUFACTURERS?

These 'adhesive' (or tapes) are actually composites, coupling adhesive formulas with a carrier (or "backing"). In these instances, the carrier is a "non-woven" material. These materials are referred to as 'single-coated' because the adhesive is applied by coating the carrier. "Single" refers to the fact that it is coated on only one side of the carrier. Like most of the pressure sensitive adhesives we purchase, the manufacturer applies a release liner over the adhesive after it is coated.


TECHNICAL DATA SHEET

MED 5741

Single-Coated Nonwoven

MED 5741 is a single-coated, white polyester nonwoven with an acrylic adhesive designed for long-term wear. This product is soft, conformable, and is highly breathable.

TYPICAL APPLICATION

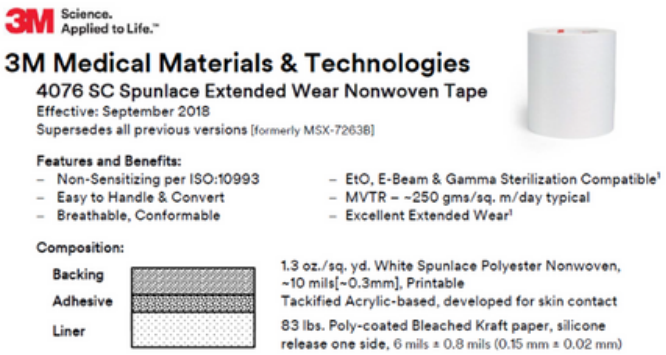
Designed for multi-week wear-time applications, such as glucose monitors, insulin pumps, activity trackers, electrocardiogram monitors and other mobile health and wellness products

MED 5741

LINER

ADHESIVE

CARRIER


3M Science. Applied to Life.™

3M Medical Materials & Technologies

4076 SC Spunlace Extended Wear Nonwoven Tape

Effective: September 2018

Supersedes all previous versions [formerly MSX-7263B]

Features and Benefits:

- Non-Sensitizing per ISO:10993
- Easy to Handle & Convert
- Breathable, Conformable
- EtO, E-Beam & Gamma Sterilization Compatible[1]
- MVTR – ~250 gms/sq. m/day typical
- Excellent Extended Wear[1]

Composition:

Backing

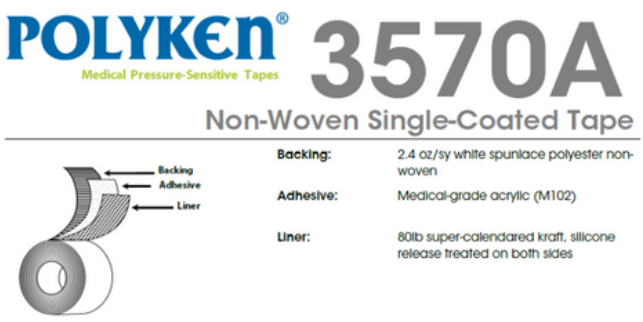
Adhesive

Liner

1.3 oz./sq. yd. White Spunlace Polyester Nonwoven, ~10 mils[~0.3mm], Printable

Tackified Acrylic-based, developed for skin contact

83 lbs. Poly-coated Bleached Kraft paper, silicone release one side, 6 mils ± 0.8 mils (0.15 mm ± 0.02 mm)


POLYKEN®

Medical Pressure-Sensitive Tapes

3570A

Non-Woven Single-Coated Tape

Backing

Adhesive

Liner

Backing:	2.4 oz/sy white spunlace polyester non-woven
Adhesive:	Medical-grade acrylic (M102)
Liner:	80lb super-calendared kraft, silicone release treated on both sides


DermaMed Coatings Company, LLC

Preliminary Data Sheet

DM-2279

Single Coated Elastic PU Nonwoven

White Elastic PU Nonwoven

Medical Grade PSA

78 # Release Liner

CONTENTS

Carrier	N/A
Face	Elastic polyurethane nonwoven
Adhesive	Medical grade, pressure-sensitive acrylic
Backing	Silicone coated one-side, 78 lb. basis weight

PRODUCT DESCRIPTION

DM-2279 is a white, elastic polyurethane nonwoven tape. It is coated on one side with a medical grade, acrylic adhesive and supplied on a paper liner.

SPLICES

Splices on tape and liner are functional in that they are intended for continuous process conditions.