Hydrocolloids Provide Skin-Friendly Adhesion For Wound Dressing

Hydrocolloid adhesives provide new alternatives to traditional dressings with fluid absorption, skin-friendliness, and durable adhesion.

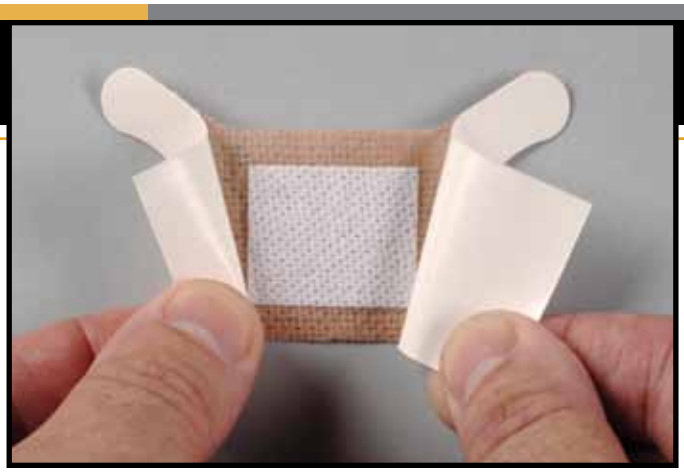
Advances in adhesive formulations are providing design engineers working with medical products the ability to deliver skin-friendly solutions for short- and long-term wound care, surgical dressings, and ostomy applications. Hydrocolloid adhesives provide new alternatives to traditional dressings where characteristics such as fluid absorption, skin-friendliness, and durable adhesion over multiple days, are critical.

Matching the right hydrocolloid adhesive formulation and substrate for a medical device application requires addressing the following issues:

- Device use
- Size, shape, and weight
- Short- or long-term skin contact
- Cushioning/pressure
- Compatibility with sterilization
- Absorbency

What are hydrocolloid dressings and why are they popular?

Hydrocolloids are popular in wound dressings. They contain agents, such as sodium carboxymethylcellulose (NaCMC), combined with elastomers and adhesives, and are applied to a carrier that might be polyurethane foam or film. Hydrocolloid dressings are usually absorbent and self-adhesive.



The ability of a hydrocolloid to provide good "stick-to-skin" characteristics can depend on the condition of the skin as well as the material used to create the hydrocolloid dressing.

Hydrocolloid dressings are impermeable to water vapor when applied, but become progressively more permeable, enhancing the ability of a hydrocolloid dressing to cope with wound exudate production. Hydrocolloids provide the following advantages:

- Ease-of-use
- Lasts for 3-5 days
- Low trauma upon removal
- Minimal skin sensitivity
- Good wet tack for application to a moist or dry site

Good Skin Adhesion

The ability of an adhesive to provide good "stick-to-skin" characteristics can depend on the condition of the skin as well as the formulation of the adhesive. Cleanliness, roughness, moisture, hair/no hair, race, age, diet, general health, and climate all affect skin adhesion and are uncontrollable variables. There are also variables such as breathability, conformability, and thickness that can be controlled through the formulation and fabrication of the hydrocolloid dressing.

Adhesive breathability, conformability, and thickness can be controlled through formulation and fabrication of the hydrocolloid dressing.

In addition to adhesion, advanced adhesive formulations also consider:

- Toxicity/regulatory requirements
- Adhesion to both organic and inorganic materials
- Optimization for wetting and gap filling
- Design for high volume manufacturability
- Compatibility with gamma radiation sterilization
- Anti-microbial characteristics

Two general families of pressure sensitive adhesives are commonly used – acrylics and synthetic-based rubber. Acrylic adhesives are often the best choice for long wear times and are very adaptable for converting operations. Synthetic-based rubber adhesives are the best choice for low surface energy (LSE) substrates, such as low density polyethylene, but may be too aggressive for fragile skin types. Natural rubber-based adhesives are usually avoided due to potential allergic reactions.

Hydrocolloids are usually provided as roll goods for converting. They could be double-coated tapes and transfer adhesives for construction or attachment, with the hydrocolloid formulation on one side and an industrial strength formulation on the other. They can be single-coated tapes that use plastic films, foams, or fabrics, secondary or insertion release liners for handling, or additional materials to build specialty devices for wound care or surgery.

Hydrocolloid adhesives can be applied to many different substrates, including polyethylene foam, PVC foam, and polyurethane foam or film.

Working with an experienced converter for medical applications is critical to successful implementation of hydrocolloids for wound dressings and related applications.

Hydrocolloid adhesives can be applied to many different substrates, including polyethylene foam, PVC foam, and polyurethane foam or film. Many new formulations make hydrocolloids more suitable for use in a diverse range of applications, including:

- Wound care
- Acute and chronic wound care
- Ostomy applications
- Foot care/cushioning

Biocompatibility

Materials and adhesives undergo physical testing for adhesive and materials strength, tensile strength, liner release, elongation, and porosity. Medical grade adhesives, including hydrocolloids, undergo rigorous testing for biocompatibility to meet the recommended International Standard: ISO 10993, Biological Evaluation of Medical Devices Part 1: Evaluation Testing.

Role of the Materials Converter

Working with an experienced converter for medical applications is critical to successful implementation of hydrocolloids for wound dressing and related applications. Fabrico delivers the expertise and experience to select the right hydrocolloid adhesive formulation and substrate material for the application.

When working with customers who are designing for medical devices, finding the right adhesives and materials is often a process of elimination. The more knowledge of how the device is used, expected duration of wear, prospective end-user population, and other details, the shorter the process of selecting and matching appropriate adhesives and materials.

Medical contract manufacturers and OEMs are looking to Fabrico to provide:

- Precision die-cutting, multi-layer laminating, and slitting to tight tolerances;
- Clean room capabilities, including converting and packaging;
- Access to medical grade adhesives;
- Testing capabilities.

Fabrico can select from servo driven rotary die-cutting, CNC die-cutting, laser die-cutting, and water jet die-cutting to meet the complex specifications of medical components. For example, our Delta servo driven rotary die-cutter features tight tolerances ranging from 0.015” to +/-0.005” at speeds up to 500 fpm. It is ideal for complex, multi-layer die-cutting and lamination.

Hydrocolloids can be provided as roll goods for converting and can include double-coated tapes, transfer adhesives, single-coated tapes with release liners, or additional materials for specialty devices.

Fabrico provides medical contract manufacturers and OEMs with the expertise to use hydrocolloid adhesives to full advantage in wound care and dressing applications.

For complex foam tape die-cutting, water jet technology provides clean edges with no distortion. Laser die-cutting, kiss-cutting, slitting, and laminating can also be used in converting for medical applications.

With a fully equipped test laboratory, Fabrico ensures that customer materials meet designed-in specifications before they move to the factory floor, often eliminating the need to test materials at the customer's facility. Testing capabilities include:

- Accurate and precise part dimension measurement and verification;
- Adhesive/release liner testing to determine converting properties and high speed application characteristics;
- Material strength measured to ensure that material meets application requirements;
- Static shear testing to measure the cohesive strength of the adhesive to withstand a fixed load over time;
- Material weight measurement to determine adhesive coating weight;
- Microscopic imaging to determine differences between adhesive and material over time;
- Dielectric testing to determine material's electrical insulation properties;
- Resistance and voltage testing to provide a complete profile of the electrical properties of an adhesive.

Material Partners

Fabrico has strategic relationships with world-class materials suppliers, such as 3M, Loctite®, and Adhesives Research to assist its customers in selecting the best material for the intended use and to expedite materials sourcing. Whether adhesive films or liquids, all critical material properties are considered in every Fabrico project, including chemical, thermal, and moisture resistance.

With more than 30 years of materials experience, Fabrico engineers also understand the impact of a material selection on the overall manufacturing process, and design material systems that optimize production efficiency and improve overall cost-effectiveness.

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