

Thin, Absorbent Skin Adhesive

New technology offers improved fluid-handling capacity and strong, skin-friendly adhesion for direct-contact wound treatment, stoma care, and other applications.

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An aging population and accompanying demand for wound dressing and stoma care technologies that provide better treatment than conventional techniques have prompted the medical adhesives industry to produce a new generation of product solutions. One recently proven technology is a highly breathable formulation with superior fluid-handling capacity called Avery Dennison® Thin Absorbent Skin Adhesive, which is poised to shift current market expectations of conventional acrylic adhesives.

The patent-pending technology, which consists of a transparent polyurethane film coated with an advanced acrylic adhesive, represents a breakthrough in acrylic adhesive functionality. Although conventional acrylic adhesives have a high moisture vapor transmission rate (MVTR) and are widely used for securement of dressings, they display no absorbency. In contrast, Thin Absorbent Skin Adhesive technology offers high MVTR and absorbs wound exudates.

The new technology enables medical device manufacturers to offer skin-friendly adhesive solutions in diverse applications including direct-contact wound care, postoperative dressings, multilayer dressings, stoma flanges, and electrode backings.

■ Fluid Management

The advanced performance characteristics of Thin Absorbent Skin Adhesive technology were demonstrated in a two-part study conducted at the Avery Dennison Medical Solutions in-house test facilities. It evaluated fluid management and *in vivo* properties of Thin Absorbent Skin Adhesive technology compared with conventional acrylic-based film dressings and commercial hydrocolloid dressings.

Five commercial acrylic-based film dressings and two commercial hydrocolloid dressings were included in the first phase of the study, which tested Fluid Handling Capacity (FHC) following the European standard EN13726.

According to the test results, the Thin Absorbent Skin Adhesive recorded an MVTR of 1480 g/m²/24h — three times higher than the MVTR of the hydrocolloid dressings tested. The MVTR meas-

ure was comparable to that of the commercial film dressings tested.

the Avery Dennison Medical Research Review Committee per approved protocol. The dressings under evaluation were applied to adjacent sites on the subjects' volar forearms. They were worn for three days and removed with a peel tester. A series of measurements and observations were then made, including peel force, adhesion, pain on removal, and adhesive residue.

Derma average peel force and dermal

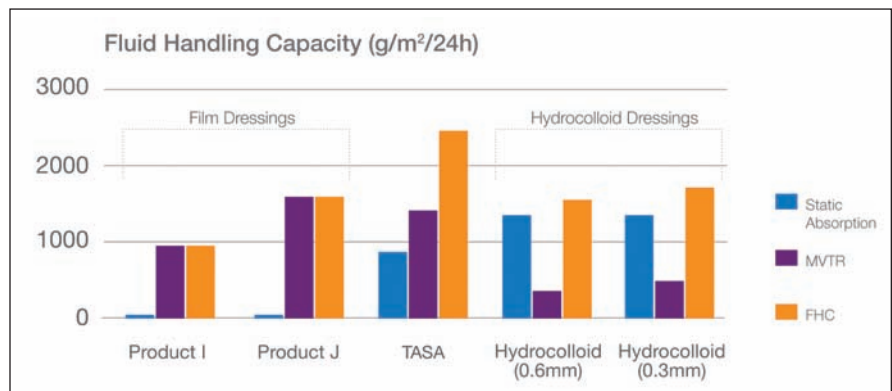


Fig. 1 – Average FHC (n=3) measured using the EN13276 of the Thin Absorbent Skin Adhesive (TASA), 0.1mm thick, sterilized by gamma radiation at 25kGy, compared with two commercial hydrocolloid products 0.3 mm thick and 0.6 mm thick and 2 commercial film dressings.

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The overall FHC was obtained by combining the MVTR and static absorption values. The Thin Absorbent Skin Adhesive had a static absorption measurement of 930 g/m²/24h, giving it a total FHC of 2410 g/m²/24h. This value far exceeded the FHC of both the acrylic-based film dressings and the hydrocolloid dressings.

■ In Vivo Testing

The study's second objective was to evaluate the adhesive properties and effect on skin condition of the Thin Absorbent Skin Adhesive compared with two commercial film dressings. To perform effectively, medical adhesives must provide the right amount of adhesion to secure dressings for the desired period. Too little adhesion can result in adhesive failure, while excessive adhesion can lead to skin stripping and damage on removal.

The *in vivo* testing involved six human subjects, who were aged 21 to 50 and in good health. The study was overseen by

maximum peel force were both measured using the peel tester. Here, the Thin Absorbent Skin Adhesive performed comparably with the two commercial film dressings tested. Moreover, there was less variation between the Thin Absorbent Skin Adhesive's average peel value and maximum peel value, an indicator of smooth dressing removal.

In addition, the Thin Absorbent Skin Adhesive demonstrated adhesion comparable to the commercial dressings. It scored approximately 6 on a 0–7 adhesion scale, with 7 being perfect adhesion. It also scored within the acceptable pain range on removal, as rated by the test subjects, and did not leave residue on the skin. The Thin Absorbent Skin Adhesive also displayed clean edges and minimal edge lift compared with the other dressings.

Transepidermal water loss and skin hydration were measured one hour after dressing removal and compared against a baseline measurement. The Thin Absorbent Skin Adhesive's score on the two tests was nearly 100 percent, showing that the three-day application



Fig. 2 – Left: Thin Absorbent Skin Adhesive on volar forearm. Center: Commercial hydrocolloid dressings on volar forearm. Right: Commercial film dressings on volar forearm. Thin Absorbent Skin Adhesive is as transparent as commercial film dressings.

of the dressing did not disrupt the skin barrier function.

■ Study Conclusions

The study concluded that the Thin Absorbent Skin Adhesive technology demonstrates:

- Advanced fluid-handling capabilities, scoring higher in FHC than selected acrylic-based film dressings and hydrocolloid dressings.
- Excellent adhesion after three days' wear and maintains a good appearance with minimal edge lift.
- No skin damage and no adhesive residue after removal.

■ Major Applications

The superior fluid management and skin-friendly characteristics of Thin Absorbent Skin Adhesive technology offers potential solutions for diverse medical applications, including:

- Postoperative dressings. These dressings usually consist of nonwoven wound pads secured with a secondary

dressing. Clinicians typically change the dressing daily to observe wound healing and check for signs of infection. The Thin Absorbent Skin Adhesive technology, which features a transparent polyurethane film, can eliminate the need for wound pads in some applications. It is designed for extended wear and enables clinicians to view the wound without removing the dressing.

- Direct-contact wound care. Thin Absorbent Skin Adhesive technology offers an innovative alternative to hydrocolloid dressings in direct wound contact applications, such as protective covers for minor wounds, skin graft donor sites or dressings for treatment of pressure ulcers, where it is important to create a moist wound healing environment, while minimizing wound bed disturbance.
- Ostomy flanges. High FHC and ultra-thin design make the Thin Absorbent Skin Adhesive a cost-effective alternative to hydrocolloids in ostomy applica-

tions. It also has potential as caps to cover the stoma, providing more freedom of movement for ostomy patients.

- Electrode attachment. The Thin Absorbent Skin Adhesive offer a more conformable, comfortable backing material for electrodes and other devices than existing options, such as polyethylene foam materials. It can also extend wear time without damaging the skin.
- Consumer applications. Its thin construction and resistance to edge lift qualify Thin Absorbent Skin Adhesive technology for use in consumer applications, such as blister dressings and blister-prevention patches.

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