ZOTEFOAMS

Technical Information Sheet TIS 15

ADHESIVE BONDING OF ZOTEFOAMS MATERIALS

Adhesives are widely used to bond Zotefoams products to other materials, to form multi-layer structures and complex parts. This document provides some general guidance for adhesive selection. Since there are many factors that determine choice of adhesive, it is recommended to contact an adhesive manufacturer and discuss your needs to gain information for a specific use case.

When bonding our foam products to themselves or each other, we recommend considering use of heat bonding techniques rather than additional adhesives. Please contact *techsupport@zotefoams.com* for more information.

Properties to consider:

Several factors should be considered when selecting the best adhesive product for a particular application:

- The nature of the material to be bonded – their chemical composition, physical characteristics, and surface features.
- The strength of bond required and whether it should be temporary or permanent, flexible or rigid.
- The environment in which the bond will be expected to perform – think about whether the bond will need to be resistant to a wide range of temperatures or humidities, resistant to certain chemicals, or subject to loads.
- Any other requirements for the bond within the finished component, for example, flammability performance, suitable for food contact, low VOC, or conductivity.
- Adhesive cost.
- Access to equipment required to apply certain types of adhesives.
- Potential hazards associated with the use of some adhesives, for example, the fire and health risks that can arise from carrier solvents.

Recommended adhesive types:

Double Sided Tapes

Double sided tapes utilise pressure sensitive adhesives pre-coated onto a roll of release paper. The adhesive can either be supported by a carrier such as tissue or be unsupported as in the case of transfer tapes. It has been found that transfer tapes tend to form stronger bonds with the surface of our foams compared to tissue/carrier tapes, since the adhesive is able to flow and key in more easily to the cellular surface. Likewise, tapes with thicker, tackier adhesives tend to bond well to the cellular surface. Tissue/carrier tapes may be used where handling of transfer tapes is challenging, since the carrier will provide more structure to the tape product.

This bonding method offers a convenient alternative to the use of bulk adhesives without the drying delays or solvent hazards. These tapes are normally applied directly onto one surface with the release liner still attached. To create the final bond the release liner is peeled off and the second substrate mated to the first using light pressure. Small areas can be bonded by manual techniques whereas larger areas often require the use of driver nip-rollers. The materials are bonded as soon as pressure is applied, though bond strength tends to increase over the first 24 hours.

Tapes are most commonly made from synthetic rubber or acrylic. Zotefoams materials tend to adhere best to synthetic rubber or modified acrylic tapes, over pure acrylic tapes. Modified acrylic tapes tend to be chosen where service conditions are more severe.

Hot Melt Adhesives

This type of adhesive is applied through various thermostatically controlled applicators ranging in size from handheld guns for small work pieces to extrusion coaters for roll laminations. These adhesives are solvent free thermoplastic resins that become liquid when heated. They are normally applied to one substrate with the second substrate being applied while the adhesive is still molten. As the adhesive cools it hardens to form a flexible bond which is rapidly developing handling strength. Temperature of melt should be considered compared to the melting point of the foam and the expected operating temperature of the finished part to prevent de-bonding.

Thermoplastic film

Thermoplastic film adhesives are thin layers of solvent free thermoplastic resins coated onto a roll of release paper. To form a bond, it is necessary to activate the film by heating and then applying pressure whilst the film is cooling in contact with the substrate or substrates. Such materials can be used to bond dissimilar substrates and offer the advantage of eliminating solvent hazards and reducing drying delays. The molten films are able to flow into cellular surfaces, providing mechanical interlocking. Film adhesives can also be useful where other conversion processes provide the conditions necessary for bonding, for example, during the compression moulding of laminates.

Alternative adhesives:

The following styles of adhesive can be used to successfully bond crosslinked foam products, however, commonly use hazardous carrier solvents which can post fire and health risks unless appropriate precautions are taken.

Synthetic Rubber Contact Adhesives

This type of adhesive is normally applied to both surfaces to be bonded by spreader, brush, or spray techniques. When carrier solvents have evaporated, and both surfaces are dry to the touch the bonding is achieved by pressing the two surfaces together. Handling strength is usually achieved within seconds. These adhesives are commonly formulated with flammable solvents although some products with non-flammable solvents are available. The less hazardous, water-based contact adhesive systems generally yield a bond with lower strength.

Conventional Pressure Sensitive Adhesives

This type of adhesive is normally applied to one surface using a doctor blade applicator or roller coating equipment and produces a permanently tacky surface after drying. It can be used for the production of self-adhesive items where the coated surface is protected by a temporary layer of release paper. Alternatively, the second substrate can be applied directly to form the final bond. The advantage of these adhesives is that bonding can be carried out at any time after coating since the surface remains permanently tacky. The solvent hazards are often the same as those mentioned for contact adhesives.

Preparing foam for bonding:

Surfaces should be kept clean from grease and any other contaminants. If lubricating agents such as silicone oils have been used in a previous fabrication process, then these can strongly interfere with bond strength.

For most adhesive systems with the exception of double-sided adhesive tapes it is desirable to use a cut cell foam surface to achieve maximum bond strength. This is due to the contribution made by mechanical “keying” to the bond strength. If double-sided tapes are to be used with a cut cell surface, then baseless transfer tapes with high tack and thickness are recommended as the adhesive is able to flow and key in more easily to the cellular surface compared to equivalent tapes with a carrier.

Pre-treatments

Provided the correct type of adhesive is selected it should not be necessary to pretreat the foam surface to achieve adequate adhesion. However, where pre-treatment facilities such as corona discharge or flame treatment are available, they may be used to enhance the bond strength achieved for demanding applications.

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