Product Safety Assessment
One-Component Polyurethane Foam Sealants & Adhesives

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Names
• ENERBOND™ Professional Foam Adhesive
• ENERFOAM™ Professional Foam Sealant
• GREAT STUFF™ Big Gap Filler Insulating Foam Sealant
• GREAT STUFF Gaps & Cracks Insulating Foam Sealant
• GREAT STUFF Fireblock Insulating Foam Sealant
• GREAT STUFF Pond & Stone Sealant
• GREAT STUFF™ Window & Door Insulating Foam Sealant
• GREAT STUFF PRO™ Gaps & Cracks Insulating Foam Sealant
• GREAT STUFF PRO Window & Door Insulating Foam Sealant
• GREAT STUFF PRO Wall & Floor adhesive
• TILE BOND™ Roof Tile Adhesive
• INSTA STIK™ Quik Set Commercial Roofing Adhesive

Product Overview
• Dow Building Solutions (DBS), a business unit within The Dow Chemical Company's Advanced Materials Division, manufactures a family of one-component polyurethane foam sealants and adhesives. The sealants are marketed under numerous trade names including, but not limited to: ENERFOAM™ sealants, GREAT STUFF™ Insulating Foam Sealants, and GREAT STUFF PRO™ Insulating Foam Sealants. These insulating sealants are rigid, water-resistant, and expand to take the shape of gaps or cracks throughout a home or building. Dow's one-component polyurethane foam adhesives are marketed under the trade names ENERBOND™ adhesive, GREAT STUFF PRO adhesive, TILE BOND™ adhesive, and INSTA STIK™ adhesive. These adhesives provide long-term, high-strength bonds. For further details, see Product Description.
• One-component polyurethane foam sealants produced by Dow are used extensively in residential and commercial buildings for air-sealing applications. The use of these foams and sealants can significantly improve the insulation capability of residential and commercial buildings thereby reducing the energy needed to heat and cool the indoor environment. They also function as barriers to insects and rodents and are often used in theatrical and artistic applications. Dow's one-component polyurethane foam adhesives are designed for bonding roofs, walls, and floors. For further details, see Product Uses.
• Workers could be exposed in a facility that manufactures these products or at the many construction sites using them. These products are also used by the general public as well as

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construction professionals, so exposure to these sealants and adhesives is possible for many individuals. For further details, see Exposure Potential.

- Dow’s one-component polyurethane foams are applied as uncured, wet foams that react with moisture in the air (humidity) to cure into rigid, dry foams, usually within 6–12 hours. The hazards associated with Dow’s one-component polyurethane foam products are almost exclusively associated with the uncured wet foam rather than the cured rigid foam.

- Eye contact with uncured foams may cause irritation with slight, temporary corneal injury. Prolonged skin contact may cause moderate irritation with local redness and may stain the skin. Repeated skin exposure may lead to respiratory sensitization (similar to an allergic reaction.) Uncured materials may stick to the skin, causing irritation and will be difficult to remove. Excessive inhalation of vapors during application and curing may irritate the nose, throat, and lungs, injure the lungs, or result in an allergic respiratory response. In confined or poorly ventilated areas, vapor released during the application of the foam can accumulate and cause unconsciousness or in extreme cases, death due to displacement of oxygen. For further details, see Extinguishment Information.

- Once cured, Dow’s one-component foam sealants and adhesives are inert solids that are expected to persist in the location in which they were applied. They do not present a toxicity hazard to animals or pets; however, if ingested, cured foams may present the potential for intestinal blockage. For further details, see Environmental Information.

- Dow’s one-component foam sealants and adhesives are thermally stable at typical use and storage temperatures. Uncured products are not stable at elevated temperatures. These materials are packaged in aerosol cans or cylinders under high pressure. Protect these materials from flames and other high-heat sources. Do not store in direct sunlight. Some of the propellants used in these products are flammable. Vapors released during application can travel long distances and accumulate in low-lying areas creating an explosion or flashback hazard. Extinguish all sources of ignition or open flames during use, including pilot lights, cigarettes, and electrical devices such as cell phones. Cured foams and adhesives are combustible and should not be applied to areas exposed to high temperatures, such as around lighting fixtures and radiators. For further details, see Physical Hazard Information.

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Manufacture of Product

- **Locations** – Dow Building Solutions manufactures one-component polyurethane foam sealants and adhesives at its Wilmington, Illinois (USA), manufacturing facility.

- **Process** – The polyurethane components (isocyanate, polyol blend, and gaseous blowing agents/propellants) are added to the can or cylinder where they partially react to form a prepolymer. When the nozzle on the can or cylinder is opened, the blowing agent and pressure in the can is released when the foam is expelled. The foam reacts with moisture in the air (humidity) to finish curing, usually within 6–12 hours.

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Product Description

Dow’s one-component polyurethane foam sealants are formulated to expand and take the shape of gaps or cracks, forming an airtight moisture-resistant barrier. They bond quickly to common building substrates for a flexible, long-lasting seal.

Dow markets sealant products under numerous trade names including, but not limited to: ENERFOAM™ sealants, GREAT STUFF™ Insulating Foam Sealants, and GREAT STUFF PRO™ Insulating Foam Sealants.

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The elasticity of the cured foam allows for movement or structural shifting from winter to summer. Cured sealants are paintable, stainable, and sandable. Polyurethane foam sealants are an efficient alternative to traditional caulk.

Dow’s one-component polyurethane foam adhesives provide long-term high-strength bonds. These products are packaged in pressurized 12–28 oz (340–794g) cans for use with foam dispensing guns or reusable straws. The roofing adhesives are packaged in 23–30 lb (13.6 kg) canisters with a flexible dispensing hose and wand assembly.

Dow markets one-component polyurethane foam adhesives under numerous trade names including, but not limited to: ENERBOND™ adhesive, GREAT STUFF PRO™ adhesive, TILE BOND™ adhesive, and INSTA STIK™ adhesive.

Product Uses

One-component polyurethane foam sealants are used extensively in residential and commercial buildings for air-sealing and insulation applications. They also function as barriers to insects and rodents, and are often used in theatrical and artistic applications. GREAT STUFF™ sealants and GREAT STUFF PRO™ sealants are used to fill, seal, and insulate gaps and cracks up to 3 inches. Gaps, cracks and holes are some of the biggest causes of home heating and cooling loss. These foam sealant products are specifically designed to fill crevices that contribute to loss of energy. They comply with numerous building code standards.

Other specialized one-component polyurethane foam sealant products include:

- ENERFOAM™ Professional Foam Sealant is a one-component, minimal expanding flexible polyurethane foam used for adhering insulated concrete forms, architectural foam and drywall, as well as sealing cracks and voids such as pipe penetrations. The foam is designed to form a durable, airtight, water-resistant bond to common building substrates such as wood, brick, concrete, foam board and most plastics, and helps to enhance overall insulation of the structure.
- GREAT STUFF Fireblock Insulating Foam Sealant provides fire protection by reducing air movement in homes. By sealing the annular space surrounding pipes, cables and ducts, the rate and speed of flames, deadly gasses and toxic smoke are minimized.
- GREAT STUFF Pond & Stone helps to create beautiful aquascapes and hardscapes. By expanding to fill gaps and cracks, this foam filler helps direct the flow of water in waterfall, pond and streambed construction to the exterior of the water feature, instead of between or behind rocks.
- Dow’s ENERFOAM Professional Foam Sealant is designed to form a durable, airtight, water-resistant bond to common building materials such as wood, brick, concrete, foam board, and most plastics.

One-component polyurethane foam adhesives are designed for bonding roofs, walls, and floors. GREAT STUFF PRO Wall & Floor Adhesive bonds subfloors, drywall, paneling, foam panels, and most construction materials. INSTA STIK™ Quik Set Commercial Roofing Adhesive is used to attach roof insulation boards to roof decks and substrates in new roof and replacement roof applications. These foam adhesives are specifically designed to fill crevices that contribute to loss of energy. They comply with numerous building code standards.
Exposure Potential

Based on the uses for DOW™ one-component polyurethane foam sealants and adhesives, the public could be exposed through:

- **Workplace exposure** – Exposure to polyurethane foam sealants and adhesives is possible for workers in a facility that manufactures these products. Engineering controls and personal protective equipment minimize exposure potential during manufacturing. Workers that use these products in building and construction applications are likely to contact these products. Adequate ventilation, goggles or safety glasses, chemical-resistant gloves, and protective clothing are required. Those using these products are expected to read and follow the exposure controls and personal-protection guidelines stated on the product label and in each product’s Safety Data Sheet. See Health Information.

- **Consumer exposure to DOW one-component polyurethane foam sealants and adhesives** – In “do-it-yourself” construction applications, there is the potential for consumers to be exposed to polyurethane foam sealants and adhesives. Consumers should follow the same precautions noted above for workers using these products in building and construction applications. Ventilate the working area, wear gloves, goggles or safety glasses, and protective clothing. The uncured wet foam will bond to the skin in a matter of minutes. Once the foam has begun to cure (4–5 minutes), it cannot be removed with solvent or cleanser. Cured foam that adheres to skin or other solid surfaces must be mechanically removed or allowed to wear off in time. Frequent application of petroleum jelly or vegetable oil may be helpful. See Health Information.

- **Environmental releases** – Blowing agents and propellants used in these products are released into the air upon use. Cured resins will remain in the location in which they were applied unless mechanically removed. Most of these products are sold in aerosol cans, therefore most spills are likely to be caused by accidentally puncturing a relatively small number of cans. In case of a spill, eliminate all sources of ignition, ensure good ventilation, wear protective clothing, gloves and eye protection. If the foam is expelling uncontrollably from the can, direct the foam into a disposable box or bag to minimize the amount of foam sprayed onto other surfaces and to help contain the spill. Once cured, the solid foam can be disposed of in accordance with all local, state and federal regulations. See Environmental Information.

- **Large release** – Accidental release of large quantities of the finished product is unlikely due to packaging in cans or cylinders. However, if a large spill should occur, evacuate the area. Contain the spilled material if possible. Eliminate all sources of ignition. Ventilate the area. Collect in suitable and properly labeled, open containers. Do not place in sealed containers. Wash the spill site with large quantities of water. GREAT STUFF™ and GREAT STUFF PRO™ sealants and ENERBOND™ adhesives can create vapor explosion hazards. In case of spill, eliminate all sources of ignition immediately. Only trained and properly protected personnel must be involved in clean-up operations. Ventilate the area. Vapors are heavier than air and can travel long distances and accumulate in low-lying areas. For large spills, warn the public of any downwind explosion hazard. Check the area with a combustible gas detector before reentry. Ground and bond all containers and handling equipment. Consult the product Safety Data Sheet for specific clean-up instructions or call Dow’s 24-hour emergency phone number: (989) 636-4400. See Environmental, Health, and Physical Hazard Information.

- **In case of fire** – These products are packaged in pressurized containers. Several of these materials contain flammable propellants that may result in a fireball. Aerosol cans exposed to fire can rupture and become flaming projectiles. To extinguish fire, use water fog or fine spray, dry-chemical or carbon-dioxide fire extinguishers, or foam. Alcohol-resistant foams are preferred. A direct water stream may spread the fire. Keep people away and deny unnecessary entry. Firefighters should wear self-contained breathing apparatus (SCBA) and protective firefighting clothing. Keep upwind and out of low areas where fumes can accumulate. Dense smoke is produced when polyurethane foam burns. See Environmental, Health, and Physical Hazard Information.
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**Eye and skin contact** – Eye contact with uncured products may cause irritation with slight, temporary corneal injury. Prolonged skin contact with the wet, uncured foam, may cause moderate irritation with local redness and may stain the skin. Prolonged skin contact is unlikely to result in absorption of harmful amounts. Skin contact may cause an allergic skin reaction. Animal studies have shown that skin contact with isocyanates may play a role in respiratory sensitization. One-component polyurethane products may stick to the skin, causing irritation upon removal. Isocyanates are chemicals used to make one-component polyurethane foam and are used up in the curing process; however, it is possible (although unlikely) that some small, residual amount of isocyanate remains in the cured foam. The majority of the residual isocyanate would be entrapped in the foam.

**Inhalation** – In confined or poorly ventilated areas, vapor from uncured products can easily accumulate and cause unconsciousness, or in extreme cases death, due to displacement of oxygen. Excessive inhalation may cause irritation to the upper respiratory tract (nose and throat) and lungs. Pulmonary edema (fluid in the lungs) is also possible. Effects may be delayed. Symptoms of excessive inhalation may be anesthetic or narcotic effects, dizziness, or drowsiness. The isocyanate components of the foam formulations are not extremely volatile. However, exposure to any remaining isocyanates that evaporate from the foam during curing may cause an allergic respiratory response. Decreased lung function has been associated with overexposure to isocyanates.

**Ingestion** – These products are not intended for ingestion. Toxicity of ingested uncured products vary based on the formulation components. Small amounts of cured foam swallowed incidental to normal handling operations are not likely to cause injury; however, swallowing larger amounts of cured rigid foam may cause injury.

**Repeated exposure** – Tissue injury in the upper respiratory tract and lungs has been observed in laboratory animals after repeated excessive exposures to isocyanates. When used according to product directions in properly ventilated areas, exposure to isocyanates from these one-component foams is low.

For more information, see the relevant Safety Data Sheet.

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One-component polyurethane foam sealants and adhesives are blends of components. What follows is an overview of the environmental impact of the major components in these products. More detailed information is available on the relevant Safety Data Sheet.

**Diphenylmethane diisocyanate, isomers and homologues** –

**Isocyanic acid, polymethylenepolyphenylene ester, polymer with ω,ω',ω''-1,2,3-propanetriyltris-[Ω-hydroxy(poly[methyl1,2-ethanediyl])]** –

**4,4'-Methylene diphenyl diisocyanate** –

**Polymethylenepolyphenyl polyisocyanate, polypropylene glycol copolymer** –

In water and soil, these materials are expected to react with water (or moisture) forming predominantly insoluble polyureas, which appear to be stable (not biodegradable). In the atmospheric environment, these materials are expected to biodegrade readily based on calculations and by analogy with related diisocyanates. These materials, in hydrolyzed form, are practically nontoxic to fish and other aquatic organisms on an acute basis (single exposure to a high concentration).
Paraffin waxes and hydrocarbon waxes, chlorinated – These waxes are expected to be relatively immobile in soil, and to degrade only slowly in the environment. These waxes are practically nontoxic to fish on an acute basis, yet are very highly toxic to aquatic invertebrates.

Isobutane – Isobutane has a low bioconcentration potential (tendency to accumulate in the food chain). Biodegradation may occur in the presence of oxygen.

Methyl ether – The bioconcentration potential is low and potential for mobility in soil is high. Methyl ether is practically nontoxic to aquatic organisms on an acute basis.

Tris(1-chloro-2-propyl) phosphate – The bioconcentration potential for this material is low, and it is expected to biodegrade very slowly. This material is slightly toxic to fish and other aquatic organisms on an acute basis (exposure to a single, high concentration).

1,1,1,2-Tetrafluoroethane (HFC-134a) – The bioconcentration potential for this material is low, and its potential for mobility in soil is high. Tetrafluoroethane has a stratospheric ozone depletion potential (ODP) of zero relative to CFC12 (ODP=1). It is expected to degrade very slowly in the environment. Tetrafluoroethane is practically nontoxic to aquatic organisms on an acute basis.

For more information, see the relevant Safety Data Sheet.

Physical Hazard Information

Dow’s one-component foam sealants and adhesives are thermally stable at typical use and storage temperatures. Uncured products are not stable at elevated temperatures. These materials are packaged in aerosol cans or cylinders under high pressure. Protect these materials from flames and other high-heat sources. Avoid temperatures above 49°C (120°F) and do not store them in direct sunlight. Aerosol cans exposed to fire can rupture and become flaming projectiles.

Some of the propellants used in these products are flammable and may result in a fireball when exposed to fire. Vapors released during application of the foams can travel long distances and accumulate in low-lying areas creating an explosion or flashback hazard. Extinguish all sources of ignition or open flames during use, including pilot lights, cigarettes, and electrical devices such as cell phones.

Cured foams and adhesives are combustible and should not be applied to areas exposed to high temperatures, such as around lighting fixtures and radiators. When the cured foam is burned, toxic gases are released.

For more information, see the relevant Safety Data Sheet.

Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of polyurethane foam sealants and adhesives. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant Safety Data Sheet, Technical Data Sheet, or Contact Us.
Additional Information

- Safety Data Sheet (http://www.dow.com/webapps/msds/msdssearch.aspx)
- Contact Us (http://building.dow.com/na/en/tools/contactus)

For more business information about Dow Building Solutions’s polyurethane foam sealants and adhesives, visit the Dow Building Solutions website at www.building.dow.com.

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