Product Safety Assessment

FROTH-PAK™ Two-Component Polyurethane Foam Systems


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Names
- FROTH-PAK™ polyurethane foam system
- FROTH-PAK Foam Sealant
- FROTH-PAK Foam Insulation
- FROTH-PAK foam kit
- FROTH-PAK spray polyurethane foam
- FROTH-PAK 115 high-density foam
- FROTH-PAK 160 slow-rise foam
- FROTH-PAK 12 polyurethane foam
- FROTH-PAK 17 polyurethane foam
- FROTH-PAK 27 polyurethane foam
- FROTH-PAK 60 polyurethane foam
- FROTH-PAK 120 polyurethane foam
- FROTH-PAK 200 polyurethane foam
- FROTH-PAK 350 polyurethane foam
- FROTH-PAK 620 polyurethane foam

Product Overview
- FROTH-PAK™ Foam Sealant and FROTH-PAK™ Foam Insulation kits are two-component, quick-cure polyurethane foam systems marketed by Dow Building Solutions, a business unit of The Dow Chemical Company (“Dow”). When the components are mixed, they react, expand, and cure to form a small-cell foam and are no longer in the original chemical forms. For further details, see Product Description.
- FROTH-PAK Foam Sealant and Foam Insulation are used in residential, commercial, and agricultural applications to fill cavities, cracks, and expansion joints for insulation and air sealing. For further details, see Product Uses.
- FROTH-PAK polyurethane foam systems are typically used by contractors in residential retrofit, new residential, commercial, and agricultural applications, as well as industrial and institutional settings. Respiratory protection and protective clothing are required during application. These products are not marketed to consumers. For further details, see Exposure Potential.
- FROTH-PAK polyurethane foam systems should be sprayed only in well-ventilated areas, with proper respiratory protective equipment and protective clothing.
  - Eye contact with isocyanates may cause moderate eye irritation and slight, temporary corneal injury. Brief skin contact may cause slight irritation with local redness. Prolonged skin contact may stain the skin and cause slight irritation with local redness or an allergic skin reaction, but is not likely to result in absorption of harmful amounts. Inhalation exposure may cause allergic...
respiratory response. Asthma-like symptoms may include coughing, difficult breathing and a feeling of tightness in the chest; occasionally, breathing difficulties may be life threatening.

- Eye contact with polyols may cause moderate eye irritation and slight corneal injury. Brief skin contact may cause slight irritation with local redness. Prolonged skin contact is unlikely to result in absorption of harmful amounts.7
- Both components are sold in pressurized containers. A hydrofluorocarbon (HFC) blowing agent, R-134a (tetrafluoroethane), pressurizes the containers and allows the chemicals to flow properly during use. If released in an enclosed area, HFCs can displace oxygen and present a dangerous situation in which there is not enough oxygen to support life. Overexposure to blowing agents can cause cardiac arrhythmia, dizziness, drowsiness and an anesthetic or narcotic effect.
- FROTH-PAK™ foam will adhere to most surfaces and skin. Wear appropriate protective clothing.8,9
- For further details, see Health Information.

The cured polyurethane foam is expected to slowly degrade in the environment. Due to its high molecular weight, it is not expected to accumulate in the food chain and it is not expected to be toxic to aquatic organisms. The original two components (isocyanate blend and polyol blend) are expected to slowly degrade in the environment. They are not expected to accumulate in the food chain and are expected to be slightly toxic to practically non-toxic to aquatic organisms. If released, the blowing agents tend to rapidly evaporate to the atmosphere, where they are expected to slowly degrade. The blowing agents are not expected to accumulate in the food chain and the risk to aquatic organisms is negligible due to their high volatility and low water solubility.10,11 For further details, see Environmental Information.

These products are typically sold to contractors in complete kits. Contractors and applicators should read and follow the instructions and safe-handling guidelines.

- Isocyanates react with water, releasing carbon dioxide, which can cause sufficient pressure build-up to rupture closed containers. Elevated temperatures accelerate this reaction. Toxic fumes may be released in fire situations. Contents are under pressure. Avoid temperatures above 41°C (106°F) and below 20°C (68°F).12
- Polyols are stable under recommended storage conditions. Contents are under pressure. Avoid temperatures above 50°C (122°F).13
- FROTH-PAK foam is combustible and will burn if exposed to open flame or sparks from high-energy sources. Do not expose to temperatures above 115°C (240°F). Care should be taken to avoid overfilling restricted spaces with foam.14
- For further details, see Physical Hazard Information.

Manufacture of Product

- Locations – Dow manufactures and packages FROTH-PAK™ polyurethane foam system components at facilities in Wilmington, Illinois, in the USA.
- Process – FROTH-PAK two-component, quick cure, foam systems are formulated using an isocyanate and a variety of polyols depending on the requirements of the application. The foam is produced by the reaction of diisocyanate and oligomeric isocyanate with a polyol. A gas or volatile liquid blowing agent that is dissolved in both of the two components vaporizes to expand the reaction mass into a small-cell foam.

Product Description15,16,17,18

FROTH-PAK™ polyurethane foam sealant and insulation systems are marketed by Dow Building Solutions, a business unit of The Dow Chemical Company. They are typically sold as complete kits for contractors, including pressurized ‘A’ (isocyanate) and ‘B’ (polyol) cylinders and dispensing equipment such as a spray gun, hose assembly, and other installation accessories. The A component contains one or more isocyanates and is also referred to as ‘ISO.’ The B component contains one or more polyols and a mixture of catalysts and stabilizers. Both A and B components contain dissolved tetrafluoroethane to pressurize the cylinders and to act as a volatile blowing agent for the foam. The B component also contains pentafluoropropane.

Once mixed in the dispensing equipment, the components react, expand, cure, and become tack-free in a few seconds. The foam skins over in 30 to 40 seconds and is completely cured in minutes. Actual curing time depends on temperature, foam thickness, application nozzle, and other installation factors.
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Product Uses
FROTH-PAK™ polyurethane foam kits are used to fill cavities, penetrations and cracks for insulation and air sealing in a wide range of applications and settings. In exterior settings, a coating must be applied to the cured foam for ultraviolet (UV) protection.

- FROTH-PAK Foam Insulation is used in interior and exterior applications for industrial, commercial, institutional, and residential settings. With a Class-A fire rating (flame spread of 25 or less), FROTH-PAK Foam Insulation can be used in a wide range of residential and commercial building applications, such as stud-wall cavities, rim or band joists, crawl space walls and ceilings, attic ductwork, and plumbing-wall pipe insulation and support.
- FROTH-PAK Foam Sealant can be used in interior or exterior applications for commercial, residential, agricultural, industrial, and institutional settings. Typical commercial applications include spray polyurethane foam roof repair and sealing roof perimeters and parapet walls. In residential applications, FROTH-PAK Foam Sealant is typically used to fill gaps that are larger than 2 inches, such as wall and attic penetrations by electrical, mechanical, and plumbing systems, attic hatches, and around pipes within wall cavities.

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Exposure Potential
Based on the uses for FROTH-PAK™ polyurethane foam systems and products, individuals could be exposed through:

- Workplace exposure – FROTH-PAK polyurethane foam systems are manufactured in closed systems using engineering controls to prevent the escape of liquid or vapors and to minimize release to the environment. The chance of exposure is further reduced by proper use of personal protective equipment. Occupational exposure limits have been established for the components of FROTH-PAK foam systems, including the isocyanate, the blowing agent, and the polyol blend. Facilities that manufacture or use these products should have a thorough training program for employees and appropriate work processes and safety equipment in place to limit exposure. See Health Information.
- Applicators – FROTH-PAK polyurethane foam systems are typically sold to building contractors in kits. Contractors must carefully read and follow use instructions for the specific product being applied. Personal protective equipment and clothing must be used, including chemically resistant gloves, long sleeves, pants, and goggles or safety glasses. Plastic sheeting should be used to protect from overspray. If the potential exists to exceed occupational exposure limits, properly fitted respiratory protection, ventilation, and other engineering controls must be used. Section off the work area to keep nonessential workers and other people out of the spray area. See Health Information.
- Consumer exposure – These products are not sold directly to consumers. Consumers could come into contact with the cured foams, which do not present a potential health hazard under normal conditions. See Health Information.
- Environmental releases – The cured polyurethane foam, if released to the environment, will tend to float in water and is expected to be removed in biological wastewater treatment plants by adsorption to biosolids. The original isocyanates and polyols components, if released to the environment, will tend to remain in the water or bind to soil and sediment. Some of them are expected to be removed from water and soil environments by biodegradation, while others are expected to be removed in biological wastewater treatment plants by adsorption to biosolids. The blowing agents, if released to the environment, will rapidly volatilize to the atmosphere, where they are expected to slowly degrade by physiochemical reactions. See Environmental, Health, and Physical Hazard Information.
- Large release – Industrial spills or releases are infrequent and generally contained. If a release does occur, consult the Safety Data Sheet for further instructions.
  - Isocyanate release – Contain the material if possible. Isolate the area. Evacuate personnel, keeping upwind of the spill and out of low-lying areas. Ventilate the area. Use appropriate safety equipment. Absorb material with dirt, vermiculite, sand, clay, or cob grit. Do not use cement powder. Collect in suitable and properly labeled open containers. Do not place in sealed containers.
  - Polyol release – Contain the material if possible. Isolate the area and use appropriate safety equipment. Absorb material with dirt, sand, or sawdust. Collect recovered material in suitable and properly labeled containers.
  - Polyurethane foam release – Scoop up hardened foam and dispose of according to city, state, country, or other geographic regulations.

See Environmental, Health, and Physical Hazard Information.

- In case of fire – Keep people away and deny unnecessary entry. Stay upwind, keeping out of low areas where vapors can accumulate. Use water fog or fine spray, dry-chemical or carbon-dioxide fire extinguishers, or foam. Alcohol-resistant ATC foams are preferred. Do not use a direct water stream as it may spread the fire. Wear positive-pressure, self-contained breathing apparatus (SCBA) and protective fire-fighting clothing. Avoid contact with these materials during fire-fighting operations. If contact is...
Health Information

**FROTH-PAK™ Polyurethane Foam – Isocyanates Blend – Component A**

**Eye and skin contact** – Eye contact may cause moderate irritation with slight, temporary corneal injury. Prolonged skin contact may stain the skin and cause slight irritation with local redness. Prolonged skin contact is unlikely to result in absorption of harmful amounts. Skin contact may cause an allergic reaction. Animal studies have shown that skin contact with isocyanates may play a role in respiratory sensitization.

**Inhalation** – In confined or poorly ventilated areas, vapor can accumulate and cause unconsciousness and death due to displacement of oxygen. Excessive exposure may cause irritation to the upper respiratory tract (nose and throat) and lungs, including pulmonary edema (fluid in the lungs). Effects may be delayed. Decreased lung function has been associated with overexposure to isocyanates. Excessive exposure may increase sensitivity to epinephrine and increase myocardial irritability (irregular heartbeats). May cause central nervous systems effects. Symptoms of excessive exposure may be anesthetic or narcotic effects; dizziness and drowsiness may be observed.

**Respiratory sensitization** – May cause an allergic respiratory response. Isocyanate concentrations below exposure guidelines may cause allergic respiratory reactions in individuals who are already sensitized. Asthma-like symptoms may include coughing, difficulty breathing, and a feeling of tightness in the chest. Occasionally, breathing difficulties may be life-threatening.

**Ingestion** – Isocyanates have low toxicity if swallowed, but are not intended for human consumption. Harmful effects are not anticipated from swallowing amounts incidental to normal handling operations. Swallowing larger amounts may cause injury. Gastrointestinal irritation has been observed in animals.

**Repeated exposure** – Tissue injury in the upper respiratory tract and lungs has been observed in laboratory animals after repeated excessive exposures to similar materials.

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**FROTH-PAK™ Polyurethane Foam – Polyol Blend – Component B**

**Eye and skin contact** – Polyols may cause moderate eye irritation with slight corneal injury. Brief skin contact may cause slight irritation with local redness. Prolonged skin contact is unlikely to result in absorption of harmful amounts.

**Inhalation** – Prolonged, excessive exposure to polyols may cause adverse effects. In confined or poorly ventilated areas, vapor can accumulate and cause unconsciousness and death due to displacement of oxygen. May cause respiratory irritation and central nervous system depression. Excessive exposure may increase sensitivity to epinephrine and increase myocardial irritability (irregular heartbeats). Symptoms of excessive exposure may be anesthetic or narcotic effects; dizziness and drowsiness may be observed.

**Ingestion** – These polyols have low toxicity if swallowed. Injury is not likely if amounts incidental to normal handling operations are swallowed. However, swallowing larger amounts may cause gastrointestinal irritation or injury.

**Repeated exposure** – These polyols contain components that have been reported to be weak organophosphate-type cholinesterase inhibitors. Signs and symptoms of excessive exposure may include headache, dizziness, lack of coordination, muscle twitching, tremors, nausea, abdominal cramps, diarrhea, sweating, pinpoint pupils, blurred vision, salivation, watery eyes, tightness in the chest, excessive urination, and convulsions. These polyols contain components that have been reported to cause adverse effects to the liver, bone marrow, and kidney in animals. For ethylene glycol, effects have been reported on the central nervous system in humans, causing involuntary eye movement.
FROTH-PAK™ Polyurethane Foam

FROTH-PAK foam will adhere to most surfaces and skin. Do not get foam on skin. Wear protective clothing, including long sleeves, gloves, and goggles or safety glasses. For more information, review the relevant Safety Data Sheets.

For more information, request the relevant Safety Data Sheet from the Dow Customer Information Group.

Environmental Information
Cured FROTH-PAK™ Polyurethane Foam

Cured FROTH-PAK Polyurethane Foam is insoluble in water and will tend to float in water and bind to soil, suspended particles, or sediment.

Although it is essentially non-biodegradable, it will be expected to slowly degrade in the environment, including degradation by physical action or by exposure to sunlight. The cured polyurethane foam will likely be removed in biological wastewater treatment plants by adsorption to biosolids.

The cured polyurethane foam is not expected to accumulate in the food chain due to its high molecular weight, and it is not expected to be toxic to fish or other aquatic organisms.

FROTH-PAK™ Polyurethane Foam – Isocyanate Blend – Component A

FROTH-PAK Polyurethane Foam Isocyanate component contains one or more isocyanates. Release of these isocyanates to the atmosphere is unlikely due to their low volatility. If released to the aquatic or terrestrial environment, these isocyanates react rapidly with water forming insoluble polyureas, which have limited mobility in soil and water.

Although the polyureas are essentially non-biodegradable, they are expected to slowly degrade in the environment, including degradation by physical action or by exposure to sunlight. The polyureas will likely be removed in wastewater treatment facilities by adsorption to biosolids.

Due to their high molecular weight, the polyureas do not accumulate in the food chain and are practically non-toxic to aquatic organisms on an acute basis (LC\textsubscript{50}/EC\textsubscript{50} > 100 mg/L in the most sensitive species tested).

For more information, request the Safety Data Sheet from the Dow Customer Information Group.

FROTH-PAK™ Polyurethane Foam – Polyol Blend – Component B

FROTH-PAK Polyurethane Foam Polyol compartment contains a blend of components. Following is an overview of the environmental impact of these components. For more information, request the Safety Data Sheet from the Dow Customer Information Group.

Phthalic anhydride, diethylene glycol polyester – Although these materials are essentially non-biodegradable, they will be expected to slowly degrade in the environment, including degradation by physical action or by exposure to sunlight. These materials would likely be removed in biological wastewater treatment plants by adsorption to biosolids. These materials are not expected to accumulate in the food chain, and they are expected to be non-toxic to fish or other aquatic organisms.

Sucrose propoxylated polyols – These materials are considered inherently biodegradable but are expected to biodegrade very slowly in the environment. Because of their relatively high water solubility, they are expected to accumulate in the food chain. They are considered practically non-toxic to fish (LC\textsubscript{50}/EC\textsubscript{50} > 100 mg/L in the most sensitive species tested).

Tris (1-chloro-2-propyl) phosphate – This material is slightly water soluble and is expected to have low volatility. If released to the environment, it is expected to have low tendency to volatilize from water and high tendency to bind to soil and sediment.
This material is unlikely to persist in the environment. It is susceptible to biodegradation, which suggests that it will be removed from water and soil environments including biological wastewater treatment facilities. It would also likely be removed in biological wastewater treatment plants by adsorption to biosolids.

This material is unlikely to accumulate in the food chain (bioconcentration potential is low) and is slightly toxic to aquatic organisms on an acute basis (LC₅₀/EC₅₀ between 10 and 100 mg/L in the most sensitive species tested).

**Ethylene glycol (minor component)** – This material is miscible in water and has low volatility. If released to the environment, it has low tendency to volatilize from water and low tendency to bind to soil and sediment.

This material will not persist in the environment. It is readily biodegradable and it will be removed from water and soil environments including biological wastewater treatment facilities.

This material will not accumulate in the food chain (bioconcentration potential is low) and is practically non-toxic to aquatic organisms on an acute basis (LC₅₀/EC₅₀ >100 mg/L in the most sensitive species tested).

**FROTH-PAK™ Polyurethane Foam – Blowing agents**

FROTH-PAK Polyurethane Foam contains two blowing agents: 1,1,1,2-tetrafluoroethane and 1,1,1,3,3-pentafluoropropane. These materials are insoluble in water and have high volatility. When introduced to the environment, they will rapidly evaporate from water, soil or sediment to the atmosphere, where they are expected to slowly degrade by physiochemical reactions. These materials are not expected to accumulate in the food chain. They are expected to be slightly toxic to non-toxic to aquatic organisms on an acute basis. Due to their high volatility and low water solubility, the risk to aquatic organisms is negligible.

For more information, request the relevant Safety Data Sheet from the Dow Customer Information Group.

**Physical Hazard Information**

**FROTH-PAK™ Polyurethane Foam – Isocyanates**

Isocyanates are highly reactive chemicals that must be handled only by trained personnel. Store isocyanates under cover in a dry, clean, cool, well-ventilated place away from sunlight. Avoid temperatures above 106°C (320°F) and below 20°C (68°F). Avoid contact with moisture. Isocyanates react slowly with water-releasing carbon dioxide, which can cause pressure build-up in closed systems. Elevated temperatures accelerate this process. Also avoid contact with acids, alcohols, amines, bases, ammonia, metal compounds, and strong oxidizers. Avoid unintended contact with polyols.

**FROTH-PAK™ Polyurethane Foam – Polyols**

Polyols are thermally stable at typical use temperatures. Store under cover in a dry, clean, cool and well-ventilated place away from sunlight. Avoid temperatures above 50°C (122°F). Generation of gas during decomposition can cause pressure in closed systems. Product can oxidize at elevated temperatures. Avoid contact with strong acids. Avoid unintended contact with amines and isocyanates.

**Cured FROTH-PAK™ Polyurethane Foam**

Cured FROTH-PAK foam is combustible and will burn if exposed to open flame or sparks from high-energy sources. Do not expose to temperatures above 115°C (240°F). Avoid contact with strong oxidizers.

For more information, request the relevant Safety Data Sheet from the Dow Customer Information Group.
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Regulatory Information
Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of FROTH-PAK™ two-component polyurethane foam systems. 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.

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Additional Information
- Safety Data Sheet (http://building.dow.com/na/en/literature/index.htm) or request the Safety Data Sheet from the Dow Customer Information Group
- Contact Us (http://building.dow.com/contact/contact.htm)

For more information about FROTH-PAK polyurethane foam systems, visit the Dow Building Solutions web site at http://www.dowbuildingsolutions.com/.

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References
7 FROTH-PAK 115 HFC Polyurethane Foam Spray System Polyol Material Safety Data Sheet, The Dow Chemical Company, April 14, 2008, Hazards Identification, Toxicological Information.

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