Product Safety Assessment  
*BETASEAL™ Urethane Adhesives*  
*BETAMATE™ Urethane Adhesives*  


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**Names**

- BETASEAL™ urethane adhesive  
- BETASEAL Express  
- BETASEAL 0°ne™ adhesive  
- BETAMATE™ urethane adhesive  
- BETASEAL U-400HV adhesive  
- BETASEAL Uni-Wipe system

**Product Overview**

- BETASEAL™ and BETAMATE™ urethane adhesives bond glass permanently. They are black pastes formulated from MDI-based urethane polymer, fillers such as calcium carbonate, clay, and carbon black. (MDI is short for p,p′-methylene diphenyldiisocyanate, a chemical building block used to make urethane polymers). BETASEAL and BETAMATE adhesives are manufactured by Dow Automotive Systems, a business unit of The Dow Chemical Company.¹ For further details, see Product Description.

- BETASEAL and BETAMATE urethane adhesives are used for windshield glass installation in vehicle manufacturing. In addition to windshields, these adhesives are used to bond rear windows, backlites (window systems for convertible roofs), quarter glass, sunroof assemblies, and other stationary auto glass. They are used to attach hardware to glass and for reveal molding or other trim installation. These adhesives are also used in the vehicle aftermarket industry for bonding replacement windshields and other fixed glass.² For further details, see Product Uses.

- Eye contact with these adhesives may cause irritation. Brief skin contact is essentially nonirritating. Adhesives may stick to skin causing irritation upon removal. They may stain skin. Skin contact may cause an allergic reaction. At room temperature, exposure to vapor is minimal. Vapor or mist from materials heated during manufacturing may cause respiratory irritation and other effects.¹,³ For further details, see Health Information.

- The components of these adhesives are not expected to accumulate in the food chain (low bioconcentration potential) and have low acute toxicity to fish and other aquatic organisms. For further details, see Environmental Information.

- BETASEAL and BETAMATE urethane adhesives are for industrial use only. Worker exposure is possible in a manufacturing facility or at facilities using these adhesives.

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Exposure is minimized through the use of personal protective equipment. In vehicle production, these adhesives are applied between the glass and the vehicle body window frame. When cured (set), they are permanently sealed beneath the glass.\textsuperscript{1,3} For further details, see Exposure Potential.

- BETASEAL\textsuperscript{™} and BETAMATE\textsuperscript{™} urethane adhesives are stable at typical storage and use temperatures. Formulations containing diluents such as naphtha or toluene are combustible. Avoid contact with oxidizing materials.\textsuperscript{1,3} For further details, see Physical Hazard Information.

Manufacture of Product

- **Locations** – Dow Automotive Systems manufactures BETASEAL\textsuperscript{™} and BETAMATE\textsuperscript{™} urethane adhesives at facilities in Midland, Michigan, U.S.; Pindamonhangaba, Brazil; and Schkopau, Germany.

- **Process** – BETASEAL and BETAMATE urethane adhesives are formulated using proprietary Dow Automotive Systems materials and technology.

Product Description\textsuperscript{1,3,4,5}

BETASEAL\textsuperscript{™} and BETAMATE\textsuperscript{™} urethane adhesives are blends of components. They are black pastes formulated from MDI-based urethane polymers, fillers such as calcium carbonate, clay, carbon black, and phthalate esters. (MDI is short for p,p'-methylene diphenyldiisocyanate, a chemical building block used to make urethane polymers). Some BETASEAL and BETAMATE adhesive formulations also contain small amounts of diluents such as naphtha or toluene (<1 to ~10%). Formulations vary based on the vehicle production process. Variables include viscosity, application temperature, conductivity, cure time, and temperature.

These adhesives exceed all specified performance and safety standards for all makes and models of vehicles, and provide consumer safety in the event of a crash or roll-over accident. They withstand long-term weather exposure in all climates.

Product Uses\textsuperscript{4,5}

BETASEAL\textsuperscript{™} and BETAMATE\textsuperscript{™} urethane adhesives are used in automotive manufacturing windshield installation to permanently bond the glass in passenger vehicles, trucks, buses, rail coaches, recreational vehicles, agricultural and industrial equipment, and other off-road vehicles. They are used in 98% of the vehicles produced in North America, and 70% of vehicles manufactured worldwide. In addition to windshields, BETASEAL and BETAMATE urethane adhesives are used to bond rear windows, backlites (window systems for convertible roofs), quarter glass, sunroofs, and other stationary vehicle glass panels. They are used to attach hardware to glass and also for reveal moldings or other trim installation. These adhesives are applied either robotically or manually. BETASEAL and BETAMATE urethane adhesives are also used extensively in the vehicle aftermarket industry for bonding replacement windshields and other fixed glass.
Exposure Potential
BETASEAL™ and BETAMATE™ urethane adhesives are used in the production of vehicles and in the vehicle aftermarket industry. Based on the uses for these adhesives, the public could be exposed through:

- **Workplace exposure** – Exposure can occur in a manufacturing facility. Those working with these adhesives in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. Worker exposure is also possible at other industrial or commercial facilities using these adhesives. Each facility should have a thorough training program for employees and appropriate work processes and safety equipment in place to limit exposure. See *Health Information*.

- **Consumer exposure to BETASEAL™ and BETAMATE™ urethane adhesives** – Dow Automotive Systems does not sell these adhesives for home use. Based on their widespread use in vehicle production, it is likely that consumers will operate a vehicle manufactured with them. By the time the vehicle reaches the consumer, the adhesive has cured (hardened) and exposure risks to the individual components are very low. See *Health Information*.

- **Environmental releases** – In the event of a spill, the focus is on containing the spill to prevent contamination of soil, ditches, sewers, waterways, or groundwater. See *Environmental, Health*, and *Physical Hazard Information*.

- **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, isolate the area and dike to contain spilled material. Ventilate the area. Some formulations are combustible. Eliminate all sources of ignition and ground and bond all containers and handling equipment. Absorb with materials such as cat litter or sand and collect in suitable and properly labeled containers. See *Environmental* 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. Avoid contact with this material during fire-fighting operations. If contact is likely, wear positive-pressure, self-contained breathing apparatus (SCBA) and protective fire-fighting clothing. Follow emergency procedures carefully. See *Health* and *Physical Hazard Information*.

For more information, request the relevant Safety Data Sheet using *Contact Us*.

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**Health Information**

*Eye and skin contact* – Eye contact with these adhesives may cause irritation. Brief skin contact is essentially nonirritating. Prolonged skin contact may stain the skin and cause product to stick to the skin. Prolonged skin contact may cause an allergic reaction in some individuals, but is unlikely to result in absorption of harmful amounts. In animal studies, skin contact with isocyanates, a component of these adhesives, has sometimes played a role in respiratory sensitization.

*Inhalation* – At room temperature, exposure to vapor is minimal due to low volatility. However, vapor or mist from heated material may cause respiratory irritation and other effects. For the minor component MDI (an isocyanate), excessive exposure may cause irritation to the nose, throat, and lungs. Overexposure to MDI may also cause fluid in the lungs and decreased lung function. Another component, phthalate esters, may cause nausea or vomiting. MDI concentrations below the exposure guidelines may cause an allergic respiratory response in individuals already sensitized to it. Symptoms may be asthma-like such as coughing, difficulty breathing, and tightness in the chest.

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Some formulations contain diluents, such as toluene. Excessive toluene inhalation may cause respiratory irritation and central nervous system depression. Symptoms of overexposure are headache, dizziness, and drowsiness, progressing to lack of coordination and unconsciousness.

**Ingestion** – This material has low toxicity if swallowed. Swallowing small amounts incidental to normal handling operations is not likely to cause injury; however, swallowing larger amounts 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 MDI/polymeric MDI aerosols. Excessive chronic exposure to toluene may cause irritation to the nose and throat, as well as central nervous system effects. Toluene has caused hearing loss in animals exposed to high concentrations.

For more information, request the relevant Safety Data Sheet using **Contact Us**.

**Environmental Information**¹,³

Each BETASEAL™ and BETAMATE™ urethane adhesive is a blend of components. What follows is an overview of the environmental impact of components found in these adhesives. Detailed information for specific components is available on the relevant Safety Data Sheet (request using **Contact Us**).

**MDI-based urethane polymers** – These polymers are not expected to accumulate in the food chain due to their high molecular weight and are not expected to be biodegradable. They are not expected to be acutely toxic (exposure to a single, high concentration) to fish or other aquatic organisms.

**Branched and linear phthalate esters** – The phthalate esters used in these adhesives are inherently biodegradable with a low bioconcentration potential (tendency to accumulate in the food chain). They are not expected to be acutely toxic to aquatic organisms and most are considered practically nontoxic.

**Carbon black** – Carbon black is practically nontoxic to aquatic organisms on an acute basis.

**4,4’-Methylenehexylenyl diisocyanate (MDI)** – MDI is a minor component in these systems. It reacts with water to form predominantly insoluble polyureas, which appear to be stable. It is practically nontoxic to aquatic organisms on an acute basis.

**Toluene** – Toluene is readily biodegradable with a low bioconcentration potential. Toluene is moderately toxic to aquatic organisms on an acute basis (single exposure to a high concentration).

For more information, request the relevant Safety Data Sheet using **Contact Us**.

**Physical Hazard Information**¹,³

BETASEAL™ and BETAMATE™ urethane adhesives are stable at typical storage and use temperatures. Store in tightly closed, properly vented containers. Some formulations containing diluents such as naphtha or toluene are combustible and are labeled as such. Store these products away from heat, sparks, or flame. BETASEAL and BETAMATE urethane adhesives are incompatible with oxidizing materials and contact should be avoided.

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For more information, request the relevant Safety Data Sheet using Contact Us.

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Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of BETASEAL™ and BETAMATE™ urethane adhesives. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant Safety Data Sheet available by using Contact Us.

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Additional Information

- Safety Data Sheet (request using Contact Us)
- Contact Us (www.dowautomotive.com/contact/)
- BETASEAL™ Glass Bonding Systems, Dow Automotive, Form No. 299-50657-304 HMC/GG500, March 2004
  (http://www.dow.com/PublishedLiterature/dh_005b/0901b8038005b8a9.pdf?filepath=automotive/pdfs/noreg/299-50657.pdf&fromPage=GetDoc)
- BETASEAL Uni-Wipe System, Dow Automotive, Form No. 299-50658-304 HMC/GG500, March 2004
- BETASEAL Express Advanced Cure Auto Glass Urethane Adhesive, Dow Automotive, Form No. 299-50753, September 2007 (request using Contact Us)

For more business information about BETASEAL and BETAMATE™ urethane adhesives, visit the Dow Automotive Systems web site at www.automotive.dow.com.

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References

1 BETASEAL™ 16050 Urethane Adhesive Material Safety Data Sheet, The Dow Chemical Company, ID No. 1001864/0000
3 BETASEAL U-428 Urethane Adhesive Material Safety Data Sheet, The Dow Chemical Company, ID No. 51010/1001
4 Dow Automotive website – BETASEAL™ Aftermarket Products
5 BETASEAL Glass Bonding Systems, Dow Automotive, Form No. 299-50657-304 HMC/GG500, page 1.

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