1 Identification

GHS Product Identifier

Ultra-Flex 5000 Part B
Evapliner FRA Part B

Other means of identification

Modified Diisocyanate, MDI
This product is one part of a 2 part product. Read and understand the hazard information on the SDS for Part A before using this product.

Recommended use of the chemical and restriction on use

Crosslinking Catalyst, Component material for use with Ultra-Flex ECO-5000 Part A or Ultra-Flex FRA-5000 Part A.

Supplier's details

Lava-Liner, Ltd.
1550 G Tiburon Blvd. Suite 418
Tiburon, CA 94920
Ph. 415-829-9114 Fax: 415-829-9203
www.lava-liner.com

Emergency phone number

Chemtrec 800-424-9300

2 Hazard(s) identification

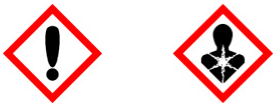
Classification of the substance or mixture

Acute Toxicity: Inhalation	Category 4
Skin Corrosion/Irritation	Category 2
Serious Eye Damage/ Eye Irritation	Category 2B
Respiratory Sensitization	Category 1
Skin Sensitization	Category 1
Specific Target Organ Toxicity (Single Exposure) [Respiratory Tract Irritation]	Category 3

1 =Highest severity 2=High severity 3=Low severity 4=Lowest severity

GHS label elements

Danger



Causes skin and eye irritation

May cause an allergic skin reaction

Causes serious eye damage

Harmful if inhaled

May cause respiratory irritation

If medical advice is needed, have product container or label at hand.

Do not handle until all safety precautions have been read and understood.

Contaminated work clothing should not be allowed out of the workplace.

Wear protective gloves/protective clothing/eye protection/face protection.

Use personal protective equipment as required.

IF ON SKIN: Wash with plenty of soap and water.

IF INHALED: Call a POISON CENTER or doctor/physician if you feel unwell.

IF INHALED: If breathing is diffi cult, remove victim to fresh air and keep at rest in a position comfortable for breathing.

Remove contact lenses, if present and easy to do. Continue rinsing.

Rinse cautiously with water for several minutes.

Take off contaminated clothing and wash it before reuse.

Other hazards which do not result in classification

Emergency overview

CAUTION: CONTAINS DIPHENYLMETHANE DIISOCYANATE (CAS No. 101-68-8). INHALATION OF MDI MISTS OR VAPORS MAY CAUSE RESPIRATORY IRRITATION, BREATHLESSNESS, CHEST DISCOMFORT AND REDUCED PULMONARY FUNCTION. OVEREXPOSURE WELL ABOVE THE PEL MAY RESULT IN BRONCHITIS, BRONCHIAL SPASMS AND PULMONARY EDEMA. LONG-TERM EXPOSURE TO ISOCYANATES HAS BEEN HAS BEEN REPORTED TO CAUSE LUNG DAMAGE, INCLUDING REDUCED LUNG FUNCTION WHICH MAY BE PERMANENT. ACUTE OR CHRONIC OVEREXPOSURE TO ISOCYANATES MAY CAUSE SENSITIZATION IN SOME INDIVIDUALS, RESULTING IN ALLERGIC RESPIRATORY REACTIONS INCLUDING WHEEZING, SHORTNESS OF BREATH AND DIFFICULTY BREATHING. Potential health effects Primary routes of exposure Routes of entry for solids and liquids include eye and skin contact, ingestion and inhalation. Routes of entry for gases include inhalation and eye contact. Skin contact may be a route of entry for liquified gases.

Information on MDI: Inhalation of MDI vapors may cause irritation of the mucous membranes of the nose, throat or trachea, breathlessness, chest discomfort, difficult breathing and reduced pulmonary function. Airborne overexposure well above the PEL may result additionally in eye irritation, headache, chemical bronchitis, asthma-like findings or pulmonary edema. Isocyanates have also been reported to cause hypersensitivity pneumonitis, which is characterized by flu-like symptoms, the onset of which may bedelayed. Gastrointestinal symptoms include nausea, vomiting and abdominal pain. Irritation: **Information on Diisocyanates:** Eye contact with isocyanates may result in conjunctival irritation and mild corneal opacity. Skin contact may result in dermatitis, either irritative or allergic. Repeated dose toxicity: Information on: MDI Results from a lifetime inhalation study in rats indicate that MDI aerosol was carcinogenic at 6 mg/m3, the highest dose tested. This is well above the recommended TLV of 5 ppb (0.05 mg/m3). Only irritation was noted at the lower concentration of 0.2 and 1 mg/m3. No birth defects or teratogenic effects were reported in a teratology study with rats exposed to 1, 4, and 12 mg/m3 polymeric MDI for 6 hr/day on days 6-15 of gestation. Embryotoxicity and fetotoxicity was reported at the top dose in the presence of maternal toxicity.

Information on Isocyanates: As a result of previous repeated overexposures or a single large dose, certain individuals will develop isocyanate sensitization (chemical asthma) which will cause them to react to a later exposure to isocyanate at levels well below the PEL/TLV. These symptoms, which include chest tightness, wheezing, cough, shortness of breath, or asthmatic attack, could be immediate or delayed up to several hours after exposure. Similar to many non-specific asthmatic responses, there are reports that once sensitized an individual can experience these symptoms upon exposure to dust, cold air, or other irritants. This increased lung sensitivity can persist for weeks and in severe cases for several years. Chronic overexposure to isocyanates has also been reported to cause lung damage, including a decrease in lung function, which may be permanent. Sensitization may be either temporary or permanent. Prolonged contact can cause reddening, swelling, rash, scaling, or blistering. In those who have developed a skin sensitization, these symptoms can develop as a result of contact with very small amounts of liquid material, or even as a result of vapor-only exposure. Medical conditions aggravated by overexposure: The isocyanate component is a respiratory sensitizer. It may cause allergic reaction leading to asthma-like spasms of the bronchial tubes and difficulty in breathing. Medical supervision of all employees who handle or come into contact with isocyanates is recommended. Contact may aggravate pulmonary disorders. Persons with history of respiratory disease or hypersensitivity should not be exposed to this product. Preemployment and periodic medical examinations with respiratory function tests (FEV, FVC as a minimum) are suggested. An animal study indicated that MDI may induce respiratory hypersensitivity following dermal exposure. Persons with asthmatic conditions, chronic bronchitis, other chronic respiratory diseases, recurrent eczema or pulmonary sensitization should be excluded from working with isocyanates. Once a person is diagnosed as having pulmonary sensitization (allergic asthma) to isocyanates, further exposure is not recommended.

3 Composition/information on ingredients

Description	CAS Number	EINECS Number	%	Note
Polymeric Diphenylmethane Diisocyanate (PMDI)	9016-87-9		80 - 99	
4,4'-Diphelylmethane Diisocyanate (approximately 65 % of PMDI)	101-68-8		52 - 99	
MDI Homopolymer (Dimers and Trimers)	25686-28-6		0	

4 First-aid measures

Description of necessary first-aid measures

Eyes: IF IN EYES: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.
Skin: IF ON SKIN: After contact with skin, wash immediately with plenty of warm soapy water: Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. An MDI study has demonstrated that a poly glycol-based skin cleanser (such as D-Tam ™, PEG-400) or corn oil may be more effective than soap and water. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.
Inhalation: IF INHALED: Move exposed person to fresh air. Get medical attention immediately. Treatment is symptomatic for primary irritation or bronchospasm. If breathing is labored, oxygen should be administered by qualified personnel.
Ingestion: IF SWALLOWED: Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Provided the patient is conscious, wash out mouth with water. Get medical attention if symptoms appear.
Most important symptoms/effects:
Eyes: Causes eye irritation. Adverse symptoms may include pain or irritation, watering, and redness.
Skin: Causes skin irritation. Adverse symptoms may include irritation and redness. May cause sensitization by skin contact. Animal studies have shown that respiratory sensitization can be induced by skin contact with known respiratory sensitizers including diisocyanates. These results emphasize the need for protective clothing including gloves to be worn at all times when handling these chemicals.
Inhalation: Harmful if inhaled. May cause respiratory irritation. Adverse symptoms may include respiratory tract irritation, coughing, wheezing and breathing difficulties, and asthma. This product is a respiratory irritant and potential respiratory sensitizer. Repeated inhalation of vapor or aerosol at levels above the occupational exposure limit could cause respiratory sensitization. Symptoms may include irritation to the eyes, nose, throat and lungs, possibly combined with dryness of the throat, tightness of chest and difficulty in breathing. The onset of the respiratory symptoms may be delayed for several hours after exposure. A hyper-reactive response to even minimal concentrations of MDI may develop in sensitized persons. LC50 (rat): ca. 490 mg/m3 (4 hours): using experimentally produced respirable aerosol having aerodynamic diameter< 5 microns.
Ingestion: Low oral toxicity, but ingestion may cause irritation of the gastrointestinal tract.

Symptomatic and supportive therapy as indicated. Following severe exposure, medical follow-up should be monitored for at least 48 hours

Most important symptoms/effects, acute and delayed

H315	Causes skin irritation.
H317	May cause an allergic skin reaction
H318	Causes serious eye irritation.
H335	May cause respiratory irritation.

Indication of immediate medical attention and special treatment needed, if necessary

P301+P312	IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
P337 + P313	If eye irritation persists: Get medical advice/ attention.

5 Fire-fighting measures

Suitable extinguishing media

Foam, carbon dioxide, or dry powder.

Specific hazards arising from the chemical

Containers may burst under intense heat. Due to reaction with water, a hazardous build-up of pressure could result if contaminated containers are re-sealed.
Containers with residual chemical may burst under intense heat or pressure. Due to reaction with water, a hazardous build-up of pressure could result if
containers contaminated with moisture are sealed.

Special protective actions for fire-fighters

Use Self Contained breathing apparatus and full protective clothing (bunker gear).

Unsuitable Extinguishing Media:
Water may be used in large quantities. Reaction between water and hot isocyanate may be vigorous. Contain run-off water with temporary barriers and keep fire exposed containers cool by spraying with water.

6 Accidental release measures

Personal precautions, protective equipment and emergency procedures

Clean-up should only be performed by trained personnel. People dealing with major spillages should wear full protective clothing including respiratory protection. Evacuate the area. Prevent further leakage, spillage or entry into drains.

Environmental precautions

P501	Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Methods and materials for containment and cleaning up

Contain and absorb large spillages onto an inert, non-flammable adsorbent carrier (such as earth or sand). Shovel into open-top drums or plastic bags for further decontamination, if necessary. Wash the spillage area clean with liquid decontaminant. Test atmosphere for MDI vapor. Neutralize small spillages with decontaminant. Remove and dispose of residues. Notify applicable government authorities if release is reportable. The CERCLA RQ for MDI is 5,000 lbs. (see CERCLA in Section 15).

Decontamination: Preparation of Decontamination Solution: Prepare a decontamination solution of 0.2-0.5% liquid detergent and 3-8% concentrated ammonium hydroxide in water (5-10% sodium carbonate may be substituted for the ammonium hydroxide). Follow the precautions in Section 3, and Section 5 in material safety data sheets when preparing and using solution.

Use of Decontamination Solution: Allow deactivated material to stand for at least 30 minutes before shoveling into drums. Do not tighten the bungs. Mixing with wet earth is also effective, but slower

7 Handling and storage

Precautions for safe handling

Avoid personal contact with the product or reaction mixture. Use only with adequate ventilation to ensure that the defined occupational exposure limit is not exceeded. The efficiency of the ventilation must be monitored regularly because of the possibility of blockage. Avoid breathing aerosols, mists and vapors. When the product is sprayed or heated, an approved MSHA/NIOSH positive-pressure, supplied-air respirator may be required.

Conditions for safe storage, including any incompatibilities

Keep containers properly sealed and when stored indoors, in a well ventilated area. Keep contents away from moisture. Due to

reaction with water, producing CO2-gas, a hazardous build-up of pressure could result if contaminated containers are re-sealed. Do not reseal contaminated containers. Uncontaminated containers, free of moisture, may be resealed only after placing under a nitrogen blanket. Ideal storage temperature is 16-38^{0}C (60-100^{0}F). Isocyanates react quickly with bases, secondary or primary amines, acids, and alcohols. They should not be stored near these chemicals. Isocyanates may also react with water to produce a water-insoluble urea and carbon dioxide. Isocyanates should, therefore, be stored in closed containers to prevent water from entering because the water-isocyanate reaction can generate enough pressure to rupture containers. Stored isocyanates should also be protected from heat and direct sunlight because breakdown of the product may occur in such conditions.

Incompatible Materials: Copper, copper alloys or galvanized surfaces

8 Exposure controls/personal protection

Control parameters

Use a NIOSH/MSHA-approved positive pressure air-supplied respirator equipped with a full face piece, or an air-supplied hood, if airborne concentrations exceed or are expected to exceed the TLV. Air purifying (cartridge type) respirators are not approved for protection against Diisocyanate.

Medical supervision of all employees who handle or come in contact with respiratory sensitizers is recommended. Persons with asthmatic-type conditions, chronic bronchitis, other chronic respiratory diseases or recurrent skin eczema or sensitization should be excluded from working with this product. Once a person is diagnosed as sensitized, no further exposure to the material that caused the sensitization should be permitted.

Exposure Limits:

4, 4'-Diphenylmethane Diisocyanate:

ACGIH TLV	0.005 ppm (8-hour, 40 hours/week)
OSHA PEL CEILING	0.02 ppm
NIOSH REL TWA	0.005 ppm (10-hour, 40 hours/week)
NIOSH REL/CEILING	0.02 ppm (10-minute)

Appropriate engineering controls

Under normal use, no special ventilation is required. Use local exhaust ventilation where the product is heated, sprayed, or vapor may be generated.

Individual protection measures

Protective Clothing: Avoid prolonged or repeated contact with skin. Wear chemical-resistant gloves and other clothing as required to minimize contact. Test data from published literature and/or glove and clothing manufacturers indicate the best protection is provided by nitrile, neoprene and natural rubber gloves.

Eye Protection: Avoid contact with eyes. Wear chemical goggles if there is likelihood of contact with eyes. Maintain eye wash fountain and quick-drench facilities in work area.

Other Protective Clothing or Equipment: Use explosion-proof ventilation as required to control vapor concentrations. Eye wash fountains and safety showers should be available for emergency use.

Work/Hygienic Practices: Wash with soap and water before eating, drinking, smoking or using toilet facilities. Launder contaminated clothing before reuse.

9 Physical and chemical properties

Physical and chemical properties

Appearance/Odor:	Yellow to Amber Liquid, slight odor.
Physical Sate:	Liquid
Color:	Amberto dark brown
pH:	N/A
Melting Point:	N/A
Vapor Pressure (mmHg):	Approx. 4 x 10^{-6}

Vapor Density (Air=1):	8.5 approx.
Boiling Point:	406°F (208°C)
Solubility in Water:	(Reacts with water)
Solubility (Other):	Soluble in most organic solvents
Specific Gravity (Water=1):	1.24
Evaporation (N-Butyl Acetate=1):	N/A
VOC's:	0 g/l
Flash Point:	390°F (199°C)
Auto-Ignition temperature:	>600°C
Decomposition temperature:	Not available
Viscosity:	Not available

10 Stability and reactivity

Reactivity

No specific test data related to reactivity available for this product or its ingredients.

Chemical stability

Stable at Room Temperature

Possibility of hazardous reactions

Polymerization may occur at elevated temperatures (450°F) and in the presence of alkalis, tertiary amines and metal compounds. Reaction with water (moisture) produces C02 gas. Exothermic reaction with materials containing active hydrogen groups. The reaction becomes progressively more vigorous and can be violent at higher temperatures if the miscibility of the reaction partners is good or is supported by stirring or by the presence of solvents. PMDI is insoluble with and heavier than water and sinks to the bottom reacting slowly at the
interface. A solid water-insoluble layer of polyurea is formed at the interface by liberating $C0^2$ gas.

Conditions to avoid

Avoid high temperatures. Avoid freezing.

Incompatible materials

This product will react with any materials containing active hydrogens such as water, alcohol, amines, bases and acids. The reaction with water is very slow under 50° C (122° F) but is accelerated at higher temperatures.

Hazardous decomposition products

Highly unlikely under normal industrial use. Exposure to fire or extreme heat may generate oxides of carbon, oxides of nitrogen, and traces of hydrogen cyanide.

11 Toxicological information

Toxicological (health) effects

Inhalation: This product is a respiratory irritant and potential respiratory sensitizer. Repeated inhalation of vapor or aerosol at levels above the occupational exposure limit could cause respiratory sensitization. Symptoms may include irritation to the eyes, nose, throat and lungs, possibly combined with dryness of the throat, tightness of chest and difficulty in breathing. The onset of the respiratory symptoms may be delayed for several hours after exposure. A hyper-reactive response to even minimal concentrations of MDI may develop in sensitized persons.

Skin Contact: Moderate irritant. Repeated and/or prolonged contact may cause skin sensitization. Animal studies have shown that respiratory sensitization can be induced by skin contact with known respiratory sensitizers including diisocyanates. These results emphasize the need for protective clothing including gloves to be worn at all times when handling these chemicals or in maintenance work.

Eye Contact: The aerosol, vapor or liquid will irritate human eyes following contact.

Ingestion: Ingestion may cause irritation of the gastrointestinal tract. Based on the oral LD5O, this product

is considered practically non-toxic by ingestion.

Numerical measures of toxicity (such as acute toxicity estimates)

Oral LD5O (rat) > 5,000 mg/kg
Dermal LD5O (rabbit) > 5,000 mg/kg
Inhalation LD50 (rat) =490 mg/m3 (respirable aerosol)

Delayed and immediate effects and also chronic effects from short and long term exposure

Chronic Effects: A study was conducted where groups of rats were exposed for 6 hours/day, 5 days/week for a lifetime to atmospheres of respirable polymeric MDI aerosol. Overall, the tumor incidence, both benign and malignant, and the number of animals with tumors were not different from controls. Only at the top level (6 mg/m3), there was a significant incidence of a benign tumor of the lung (adenoma) and one malignant tumor (adenocarcinoma). There were no lung tumors at 1 mg/m3 and no effects at 0.2 mg/m3. The increased incidence of lung tumors is associated with prolonged respiratory irritation and the concurrent accumulation of yellow material in the lung, which occurred throughout the study. In the absence of prolonged exposure to high concentrations leading to chronic irritation and lung damage, it is highly unlikely that tumor formation will occur.

There are reports that chronic exposure may result in permanent decrease in lung function.

Carcinogenicity: The ingredients of this product are not classified as carcinogenic by ADGIH or IARC, not regulated as carcinogens by OSHA, and not listed as carcinogens by NW.

Mutagenicity: There is no substantial evidence of mutagenic potential.

Reproductive Effects: No adverse reproductive effects are anticipated.

Teratogenicity and Fetotoxicity: No birth defects were seen in two independent animal (rat) studies. Fetotoxicity was observed at doses that were extremely toxic (including lethal) to the mother. Fetotoxicity was not observed at doses that were not maternally toxic. The doses used in these studies were maximal, respirable concentrations well in excess of the defined occupational limits.

12 Ecological information

Toxicity

Polymeric MDI.

LCO (Zebra Fish) > 1000 g/I
EC50 (Daphnia magna) (24 hour) > 1000 mg/I
EC50 (E. Cali) > 100 mg/I

Persistence and degradability

Immiscible with water, but will react with water to produce inert and non- biodegradable solids.

Bioaccumulative potential

It is unlikely that significant environmental exposure in the air or water will arise; based on consideration of the normal industrial use of this product Lava-Liner, Ltd. has not conducted ecological studies on this product. However the following information on similar mixtures was found in a search of scientific literature.

Mobility in soil

No information available.

13 Disposal considerations

Disposal methods

The generation of waste should be avoided or minimized wherever possible. Disposal should be in accordance with local, state, provincial or national regulations. This material is not a hazardous waste under RCRA 40 CFR 261. Small quantities should be treated with a decontaminant solution (See Section 6). The treated waste is not a hazardous material under RCRA 40 CFR 261. Chemical waste, even small quantities, should never be poured down drains, sewers or waterways.

Empty containers should be decontaminated and either passed to an approved drum recycler or destroyed.

14 Transport information

Transport hazard class(es)

Not classified as a dangerous good under transport regulations

Packing group, if applicable

Not classified as a dangerous good under transport regulations

Environmental hazards

Not classified as a dangerous good under transport regulations

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Reportable Quantity: See Section 15 CERCLA RQ

15 Regulatory information

Safety, health and environmental regulations specific for the product in question

Federal Regulations Registration status:
Chemical TSCA, US released / listed

EPCRA 311/312 (Hazard categories): Acute; Chronic
EPCRA 313:

CAS Number	Chemical name
101-68-8	Diphenylmethane-4,4'-diisocyanate (MDI)
9016-87-9	P-MDI

CERCLA RQ	CAS Number	Chemical name
5000 LBS	101-68-8; 9016- 87-9	Diphenylmethane-4,4'-diisocyanate (MDI); P-MDI

State regulations:

State RTK	CAS Number	Chemical name
NJ	101-68-8	Diphenylmethane-4,4'-diisocyanate (MDI)
	9016-87-9	P-MDI
	26447-40-5	Methylenediphenyl diisocyanate
PA	101-68-8	Diphenylmethane-4,4'-diisocyanate (MDI)
	9016-87-9	P-MDI

NFPA Hazard codes:	Health : 2	Fire: 1	Reactivity: 1	Special: 0
HMIS III rating	Health: 2	Flammability: 1	Physical hazard:1	

16 Other information

Other information

Some of the information presented and conclusions drawn herein are from sources other than direct test data on the product itself.

The information in this SDS was obtained from sources which we believe are reliable. However, the information is provided without any warranty, express or implied, regarding its correctness. The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product. If the product is used as a component in another product other than that provided by Lava-Liner, Ltd. this MSDS information may not be applicable. This SDS has been prepared in accordance with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).