

# MATERIAL SAFETY DATA SHEET

# Absolute Protective Coatings

Product Name: UK- 3000, Part B

## SECTION 1: IDENTIFICATION

MANUFACTURER: Absolute Protective Coatings  
ADDRESS: 1265 N Hendrickson DR Kalama WA 98625  
PHONE: 1 (360) 673-6404

CHEMICAL NAME: Isocyanic Acid, Polymethylenepolyphenylene Ester  
COMMON NAME: UK-3000, Part B  
CHEMICAL FAMILY: Isocyanate

H.M.I.S. RATING	
Health	2
Flammability	1
Reactivity	1

## SECTION 2: HAZARDOUS CHEMICALS

COMPONENT	CAS #	EXPOSURE LIMIT
4,4'-Diphenylmethane Diisocyanate (MDI)	101-68-8	OSHA: .02 ppm Ceiling .20 mg/m <sup>3</sup> Ceiling ACGIH: .005 ppm TWA .051 mg/m <sup>3</sup> TWA Upper Bound 32%
Higher Oligomers of MDI	9016-87-9	OSHA: Not established ACGIH: Not established UK OES: 5.00 mg/m <sup>3</sup> TWA 36 - 46%
Diphenylmethane Diisocyanate (MDI)	26447-40-5	OSHA: Not established ACGIH: Not established 24 - 34%

## SECTION 3: HEALTH HAZARDS

ROUTES OF EXPOSURE: Skin contact from liquid and aerosols (spray application). Inhalation: Although MDI is low in volatility an inhalation hazard can exist from MDI aerosols or vapors formed during heating, foaming, spraying or otherwise aerosolizing the material in an inadequately ventilated environment.

Acute Inhalation: MDI vapors or mists at concentrations above the TLV can be irritating (burning sensation) to the mucous membranes in the respiratory tract (nose, throat, lungs). Symptoms may include runny nose, sore throat, coughing, shortness of breath, chest discomfort, and reduced lung function (breathing obstruction). Persons with a preexisting, nonspecific bronchial hyperreactivity can respond to concentrations below the TLV with similar symptoms as well as asthma attack. Exposure well above the TLV may lead to bronchitis, bronchial spasm and pulmonary edema (fluid in the lungs). These effects are usually reversible. Chemical or hypersensitive pneumonitis, with flu-like symptoms (e.g., fever, chills) has also been reported. These symptoms can be delayed up to several hours after exposure.

Chronic Inhalation: As a result of previous repeated overexposures or a single large dose, certain individuals develop isocyanate sensitization (chemical asthma) which will cause them to react to a later exposure to isocyanate at levels well below the TLV.

These symptoms, which can include chest tightness, wheezing, cough, shortness of breath or asthma attack, could be immediate or delayed (up to several hours after exposure). Similar to many non-specific asthmatic responses, there are reports

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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. Overexposure to isocyanates has also been reported to cause lung damage (including decrease in lung function) which may be permanent. Sensitization can either be temporary or permanent.

**Acute Skin Contact:** Isocyanates react with skin protein and moisture and can cause irritation which may include the following symptoms: reddening, swelling, rash, scaling or blistering. Cured material is difficult to remove.

**Chronic Skin Contact:** Prolonged contact can cause reddening, swelling, rash, scaling, blistering, and in some cases, skin sensitization. Individuals who have skin sensitization can develop these symptoms from contact with liquid or vapors. Animal tests have indicated that respiratory sensitization can result from skin contact with MDI. This data reinforces the need to prevent direct skin contact with MDI. (See Toxicological information, SENSITIZATION.)

**Acute Eye Contact:** Liquid, aerosols or vapors are irritating and can cause tearing, reddening and swelling. If left untreated, corneal injury can occur and injury is slow to heal. However, damage is usually reversible. See First Aid Measures for treatment.

**Chronic Eye Contact:** None found.

**Acute Ingestion:** Can result in irritation and corrosive action in the mouth, stomach tissue and digestive tract. Symptoms can include sore throat, abdominal pain, nausea, vomiting and diarrhea.

**Chronic Ingestion:** None found.

**Carcinogenicity:** Neither MDI nor polymeric MDI are listed by the NTP, IARC or regulated by OSHA as carcinogens.

**Medical conditions aggravated by exposure:** Asthma, other respiratory disorders (bronchitis, emphysema, bronchial hyper-reactivity), skin allergies, eczema.

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## SECTION 4: FIRST AID

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**Eyes:** Flush with copious amount of clean, lukewarm water (low pressure) for at least 15 minutes, while holding eyelids open. Obtain immediate medical attention.

**Skin:** Remove contaminated clothing. Wash affected areas thoroughly with soap and lukewarm water. Wash contaminated clothing thoroughly before reuse. For severe exposures, get under safety shower after removing clothing, then get medical attention. For lesser exposures, seek medical attention if irritation develops or persists after the area is washed.

**Inhalation:** Move to an area free from risk of further exposure. Administer oxygen or artificial respiration as needed. Obtain medical attention. Asthmatic-type symptoms may develop and may be immediate or delayed up to several hours. Consult physician should this occur.

**Ingestion:** DO NOT INDUCE VOMITING. Wash mouth out with water. DO NOT GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSING PERSON. Consult a physician.

**NOTE TO PHYSICIAN:** **Eyes:** Stain for evidence of corneal injury. If cornea is burned, instill antibiotic steroid preparation frequently. Workplace vapors have produced reversible corneal epithelial edema impairing vision. **Skin:** This compound is a known skin sensitizer. Treat symptomatically as for contact dermatitis or thermal burns. If burned, treat as thermal burn. **Ingestion:** Treat symptomatically. MDI has a very low oral toxicity. There is no specific antidote. Inducing vomiting is contraindicated because of the irritating nature of this compound. **Respiratory:** This compound is a known pulmonary sensitizer.

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Treatment is essentially symptomatic. An individual having a skin or pulmonary sensitization reaction to this material should be removed from exposure to any isocyanate.

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## SECTION 5: FIRE AND EXPLOSION DATA

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Flammable Limits                      Upper explosive limit (UEL) (%): Not established  
Lower explosive limit (UEL) (%): Not established

Flash Point                              428°F (220°C)

Auto-ignition temperature              Greater than 752°F (400°C) - DIN 51794

Extinguishing media: Dry chemical, foam, carbon dioxide and water spray for large fires.

Special fire fighting procedures: Firefighters must wear full emergency equipment with self-contained breathing apparatus and full protective clothing. During a fire, MDI vapors and other irritating, highly toxic gases may be generated from thermal decomposition and combustion. At temperatures greater than 400°F (204°C), polymeric MDI can polymerize and decompose which can cause pressure build-up in closed containers. Explosive rupture is possible. Therefore, use cold water to cool fire-exposed containers.

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## SECTION 6: ACCIDENTAL RELEASE MEASURES

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Leak and Spill Procedure: Evacuate all non-essential personnel. Ventilate the area. Use all applicable personal protective equipment including respiratory equipment during clean-up. Prevent run-off into sewers, storm drains, soil and surface water supplies using dikes and absorbent materials. If temporary control of isocyanate vapor is required, a blanket of protein foam (available at most fire departments) may be placed over the spill. Large quantities may be pumped into closed, but not sealed, container for disposal. For minor spills, absorb isocyanates with sawdust or other absorbent, shovel into suitable unsealed containers, transport to well-ventilated area (outside) and treat with neutralizing solution: mixture of water (80%) with non-ionic surfactant Tergitol TMN-10 (20%) or; water (90%), concentrated ammonia (3-8%) and detergent (2%). Add about 10 parts of neutralizer per part of isocyanate, with mixing. Allow to stand uncovered for 48 hours to let CO<sub>2</sub> escape. Clean-up: Decontaminate floor with decontamination solution letting stand for at least 15 minutes.

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## SECTION 7: HANDLING AND STORAGE

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Storage Temperature (min/max): Not established - similar material 60°F (18°C)/86°F (30°C)

Shelf life: Not established - similar material 6 months.

Special sensitivity: If container is exposed to high heat 400°F (204°C) it can be pressurized and possibly rupture. MDI reacts slowly with water to form CO<sub>2</sub> gas. This gas can cause sealed containers to expand and possibly rupture.

Handling and storage procedures: Keep containers tightly closed when not in use to prevent moisture contamination. Do not reseal if contamination is suspected. Avoid contact with skin and eyes. Do not breathe aerosols or vapors. Warning properties (irritation of the eyes, nose and throat or odor) are not adequate to prevent chronic overexposure from inhalation. This material can produce asthmatic sensitization upon either single inhalation exposure to a relatively high concentration or upon repeated inhalation exposures to lower concentrations. Exposure to vapors of heated MDI can be dangerous. Employee education and training in the safe use and handling of this compound are required under the OSHA Hazard Communication Standard.

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## SECTION 8: PERSONAL PROTECTION AND EXPOSURE CONTROLS

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**Eye Protection:** In a splash hazard environment chemical goggles should be used in combination with a full face-shield.

**Skin Protection:** Permeation resistant gloves (butyl rubber, nitrile rubber, polyvinyl alcohol). However, please note that PVA degrades in water. Cover as much of the exposed skin area as possible with appropriate clothing. If skin creams are used, keep the area protected by the cream to a minimum.

**Ventilation Requirements:** Local exhaust should be used to maintain levels below the TLV whenever MDI is heated, sprayed or aerosolized. Standard reference sources regarding industrial ventilation (i.e., ACGIH Industrial Ventilation Manual) should be consulted for guidance about adequate ventilation.

**Respiratory Protection:** Airborne MDI concentrations greater than the ACGIH TLV-TWA (TLV) or OSHA PEL-C (PEL) can occur in inadequately ventilated environments when MDI is sprayed, aerosolized or heated. In such cases, respiratory protection must be worn. The type of respiratory protection selected must comply with the requirements set forth in OSHA's Respiratory Protection Standard (29 CFR 1910.134). The type of respiratory protection available includes (1) an atmosphere-supplying respirator such as a self-contained breathing apparatus (SCBA) or a supplied air respirator (SAR) in the positive pressure or continuous flow mode or (2) an air-purifying respirator (APR). If an APR is selected, the following conditions must be met: (1) (a) the cartridge must be equipped with an end-of-service life indicator (ESLI) certified by NIOSH, or (1) (b) a change out schedule, based on objective information or data that will ensure that the cartridges are changed out before the end of their service life, must be developed and implemented. The basis for the change out schedule must be described in the written respirator program and (2) the airborne MDI concentration must be no greater than 10 times the TLV or PEL. The recommended APR cartridge is an organic vapor/HEPA combination cartridge (OV/P100).

**Monitoring:** Airborne MDI concentrations should be measured when the potential for overexposure exists, e.g., when the product is sprayed, aerosolized or heated. Monitoring of airborne isocyanates in the breathing zone of individuals should become part of the overall employee exposure characterization program. Sampling and analytical methods have been developed by NIOSH, OSHA, and others.

**Medical Surveillance:** Medical supervision of all employees who handle or come in contact with isocyanates is recommended. These should include preemployment and periodic medical examinations with pulmonary function tests (FEV<sub>1</sub>, FVC as a minimum). History of adult asthma, respiratory allergies such as hay fever, eczema, history of prior isocyanate sensitization or lack of smell (anosmia) are possible reasons for medical exclusion from isocyanate areas. Once a person is accurately diagnosed as sensitized to an isocyanate, no further exposure can be permitted.

**Additional Protective Measures:** Safety showers and eyewash stations should be easily accessible to the work area. Educate and train employees in safe use of product. Follow all label instructions.

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## SECTION 9: TYPICAL PHYSICAL AND CHEMICAL PROPERTIES

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Physical Form	Liquid
Color	Dark Brown to Black
Odor	Slightly musty odor
Odor Threshold	Not established
pH	Not established
Boiling Point	40°F (208°C) at 5 mm Hg for MDI
Melting/Freezing Point	Below 32°F (0°C) for MDI
Viscosity	Approx. 90 mPa.s at 77°F (25°C)
Solubility in Water	Not soluble. Reacts slowly with water to liberate CO <sub>2</sub> gas.

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Specific Gravity (water=1)	1.24 at 77°F (25°C)
Bulk Density	10.3 lbs/gal
% Volatile by Volume	Negligible
Vapor Pressure	Less than 0.00001 @ 77°F (25°C) for MDI
Vapor Density (Air=1)	8.5 (MDI)

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## SECTION 10: STABILITY AND REACTIVITY

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Stability: This is a stable material.

Hazardous Polymerization: May occur. Contact with moisture, other materials which react with isocyanates or temperatures above 400°F (204°C) may cause polymerization.

Incompatibilities (Materials to avoid): Water, amines, strong bases, alcohols. Will cause some corrosion to copper alloys and aluminum.

Instability Conditions: Contamination with water and high temperatures above 400°F (204°C).

Hazardous Decomposition Products: By high heat and fire - carbon monoxide, oxides of nitrogen traces of HCN, MDI vapors or aerosols.

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## SECTION 11: TOXICOLOGICAL PROPERTIES

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Toxicity Data for Diphenylmethane Diisocyanate (Monomeric and Polymeric):

Acute Toxicity

Oral LD50: Greater than 10,000 mg/kg (Rat)

Dermal LC50: Greater 6,200 mg/kg (rabbit)

Inhalation LC50: The 4-hour LC50 for polymeric MDI in rats range from 370 to 490 mg/m<sup>3</sup>. The 4-hour LC50 for monomeric MDI in rats was estimated to be between 172 and 187 mg/m<sup>3</sup>. The 1-hour LC50 for monomeric MDI aerosol was greater than 2,240 mg/m<sup>3</sup> (Rat).

Eye Effects: Slight to moderate irritation (Rabbit).

Skin Effects: Slight to moderate irritation (Rabbit).

Sensitization: MDI has been shown to produce dermal sensitization in laboratory animals. Evidence of respiratory sensitization has also been observed in guinea pigs. In addition, there is some evidence suggestive of cross-sensitization between different types of diisocyanates.

Chronic Toxicity: In a combined chronic inhalation toxicity/oncogenicity study, rats were exposed to an aerosol of polymeric MDI for 6 hours per day, 5 days per week for one or two years. The exposure concentrations were 0, 0.2, 1.0 and 6.0 mg/m<sup>3</sup>. Microscopic examination of tissues revealed the effects of irritation to the nasal cavity and lungs in animals exposed to 1.0 and 6.0 mg/m<sup>3</sup>. The No Observable Effect Level (NOEL) was 0.2 mg/m<sup>3</sup>.

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**Carcinogenicity:** In the study described above, the occurrence of pulmonary adenomas and a single pulmonary adenocarcinoma was considered to be related to MDI. These tumors were observed only in rats exposed to the high concentration of 6.0 mg/m<sup>3</sup>.

**Mutagenicity:** Positive (Salmonella microsome test with metabolic activation; cell transformation assay) as well as negative (mouse lymphoma specific locus mutation test with or without metabolic activation) results have been observed "in vitro". The use of certain solvents which rapidly hydrolyze MDI is suspected of producing mutagenicity in some of these studies. MDI was negative in an "in vivo" (mouse micronucleus) assay.

**Developmental Toxicity:** Rats were exposed to polymeric MDI at air concentrations of 0, 1, 4 and 12 mg/m<sup>3</sup> during days 6-15 of gestation. Maternal Toxicity (including mortality) was observed at the highest concentration of 12 mg/m<sup>3</sup> accompanied by embryo and fetal toxicity. However, no teratogenic effects were observed even at this lethal concentration.

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## SECTION 12: ECOLOGICAL INFORMATION

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Ecology Data for Diphenylmethane Diisocyanate (Monomeric and Polymeric):

**Aquatic Toxicity:** LC50 - 24 hour (static): Greater than 500 mg/liter for Daphnia magna, Limnea Stagnalis, and Zebra fish (Brachydanio rerio) for both polymeric and monomeric MDI.

**Fish Toxicity:** LCO = Greater than 1000 mg/l; Test species: Brachydanio rerio; Duration of test: 96 hours.

**Inhibition Bacteria:** EC50 = Greater than 100 mg/l; Tested on activated sludge microorganism. Duration of test: 3 hours.

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## SECTION 13: DISPOSAL INFORMATION

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**Waste Disposal Method:** Waste must be disposed of in accordance with federal, state and local environmental control regulations. Incineration is the preferred method.

**Empty Container Precautions:** Empty containers retain product residue (liquid and/or vapor) and can be dangerous. Decontaminate containers prior to disposal. Empty decontaminated containers should be crushed to prevent reuse. DO NOT HEAT OR CUT EMPTY CONTAINER WITH ELECTRIC OR GAS TORCH. Gases may be highly toxic.

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## SECTION 14: TRANSPORT INFORMATION

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Technical Shipping Name:	Methylene diphenyl diisocyanate
Freight Class Bulk:	Methylene diphenyl diisocyanate
Freight Class Package:	Chemicals, NOI (Isocyanate), NMFC 60000
Product Label:	Product Label Established

DOT (Domestic Surface)	
Proper Shipping Name:	Other Regulated Substance, Liquid, N.O.S. "SEE NOTE BELOW"
Hazard Class or Division: 9	
UN/NA Number:	NA3082
Packing Group:	III
Hazardous Substance	MDI, (Methylene diphenyl diisocyanate)
DOT Product RQ lbs (kgs):	15,625 lbs (7,087.5 kgs)
Hazard Label (s):	Class 9

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Hazard Placard (s): Class 9

\* When in individual containers of less than the Product RQ, this material ships as non-regulated.

IMO / IMDG Code (Ocean)

Hazard Class or Division: Non-Regulated

ICAO / IATA Code (Air)

Hazard Class or Division: Non-Regulated

## SECTION 15: REGULATORY INFORMATION

OSHA Status: This product is hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200.

TSCA Status: On TSCA Inventory

CERCLA Reportable Quantity: 5000 lbs for 4,4'-Diphenylmethane Diisocyanate, CSA #101-68-8

SARA Title III: Section 302 Extremely Hazardous Substances - None

Section 311/312 Hazard Categories - Immediate Health Hazard; Delayed Health

Hazard

Section 313 Toxic Chemicals - Polymeric Diphenylmethane Diisocyanate, CAS #9016-87-9, 100%; Contained in this polymeric MDI product is 4,4'- Diphenylmethane Diisocyanate, CSA #101-68-8, Upper Bound 32%.

RCRA Status MDI is not listed as a hazardous waste. To the best of our knowledge, MDI does not meet the criteria of a hazardous waste if discarded in its purchased form. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a product meets any of the criteria for a hazardous waste. This is because product uses, transformations, mixtures, processes, etc., may render the resulting material hazardous, under the criteria of ignitability, corrosivity, reactivity and toxicity characteristics under the new Toxicity Characteristics Leaching Procedure (TCLP) 40 CFR 261.20-24.

The following chemicals are specifically listed by individual states: other product specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

Component Name/CAS Number	Concentration	State Code
4,4'-Diphenylmethane Diisocyanate (MDI) 101-68-8	Upper Bound 32%	PA1, PA4, FL, IL, MA, RI, NJ1, NJ4, CN2

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Higher Oligomers of MDI 9016-87-9	36 - 46 %	PA3, NJ4
Diphenylmethane Diisocyanate (MDI) 26447-40-5	24 - 34 %	PA3, NJ4
Phenyl Isocyanate 103-71-9	Trace - ppm	MA

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FL = Florida Substance List  
IL = Illinois Toxic Substances List  
MA = Massachusetts Hazardous Substance List.  
NJ1 = New Jersey Hazardous Substance List.  
NJ4 = New Jersey Other - included in 5 predominant ingredients > 1%  
PA1 = Pennsylvania Hazardous Substance List  
PA3 = Pennsylvania Non-Hazardous present at 3% or greater.  
PA4 = Pennsylvania Environmental Hazardous Substance List.  
RI = Rhode Island List of Designated Substances  
CN = Canada WHMIS Ingredient Disclosure List over 0.1%.

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**SECTION 16: OTHER INFORMATION**

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DISCLAIMER: The information contained herein is based on data believed to be accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable regarding all current regulations.