PROTECTIVE FLOORINGS & LININGS
A DIVISION OF MILAMAR COATINGS, L.L.C.

Material Safety Data Sheet

Revision Date:	05/12	Print Date:	08/30/12	
Version 2.0		MSDS Identification:	4410FS - Part A	Aromatic Isocyanate, Urethane Hardener

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name : 4410FS - Part A

Product Use Description : Aromatic Isocyanate, Urethane Hardener

Company : Protective Floorings and Linings
A Division of Milamar Coatings, LLC
311 N.W. 122nd St, Suite 100
Oklahoma City, OK 73114

Telephone : 405-755-8448

Emergency Telephone Number: ChemTel 800-255-3924 or 813-248-0585 (International)

2. COMPOSITION / INFORMATION ON INGREDIENTS

Components	CAS Number	Concentration (Weight)
4,4'-Diphenylmethant Diisocyanate (MDI)	101-68-8	> 32%
Higher oligomers of MDI	9016-87-9	36% - 46%
Diphenylmethane Diisocyanate (MDI)	26447-40-5	24% - 34%

Chemical Family: Aromatic Isocyanate

3. HAZARDS INFORMATION

Emergency Overview

WARNING!
May Cause Eye, Skin, And Respiratory Tract Irritation.
Harmful If Inhaled.
May Cause Allergic Respiratory Reaction.
May Cause Allergic Skin Reaction.
May Cause Lung Damage.
Toxic Gasses / Fumes Are Given Off During Burning Or Thermal Decomposition.

Potential Health Effects

Route(s) Of Entry

Skin : Contact from liquid and aerosols (spray application).

Inhalation : Although MDI is low in volatility, and inhalation hazard can exist from MDI aerosols or vapors formed during heating, foaming, spraying or otherwise aerosolizing the material in an inadequately ventilated environment.

Human Effects And Symptoms Of Overexposure

Acute Inhalation	:	MDI vapors or mist at concentrations above the TLV can irritate (burning sensation) mucous membranes in the respiratory tract (nose, throat, lungs) causing runny nose, sore throat, coughing, chest discomfort, shortness of breath and reduced lung function (breathing obstruction). Persons with a preexisting, nonspecific bronchial hyper-reactivity 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 lungs). These effects are usually reversible. Chemical or hypersensitive pneumonitits, 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 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 Isocyanate 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	:	Isocyanate 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 symptom 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 damage 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.
NTP	:	Not listed
IARC	:	Not listed
OSHA	:	Not Regulated
Other	:	See results of two year inhalation study in Toxicological Information, Carcinogenicity.

Aggravated Medical Condition

Aggregated By Exposure : Asthma, other respiratory disorders (bronchitis, emphysema, bronchial, hyper reactivity). Skin allergies, eczema.

4. FIRST AID MEASURES

Eye Contact : Flush with copious amount of water, preferably, lukewarm water for at least 15 minutes, holding eyelids open all the time. Refer individual to physician or ophthalmologist for immediate follow-up.

Skin Contact : Remove contaminated clothing. Wash affected skin thoroughly with soap and 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 a physician should this occur.

Ingestion : DO NOT INDUCE VOMITING. Wash mouth out with water. DO NOT GIVE ANY-THING BY MOUTH TO AN UNCONSCIOUS 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 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. Treatment is essentially symptomatic. An individual having a skin or pulmonary sensitization reaction to this material should be removed from exposure to any Isocyanate.

5. FIRE-FIGHTING MEASURES

Flash Point : 428.0 Degrees F, (220.0 Degrees C)

Flammable Limits
Upper Explosive Limit UEL (%) : not established
Lower Explosive Limit LEL (%) : not established

Auto-ignition Temperature : Greater than 752 degrees F (400 degrees C) - DIN 51794.

Extinguishing Media : Dry Chemical; Carbon Dioxide; Foam; Water spray for large fires.

Special Fire Fighting Procedures : Full emergency equipment with self-contained breathing apparatus and full protective clothing should be worn by firefighters. During a fire, MDI vapors and other irritating,

highly toxic gases may be generated by thermal decomposition or combustion. (See Reactivity and Stability Section). At temperatures greater than 400 degrees F (204 degrees 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.

6. ACCIDENTAL RELEASE MEASURES

Spill Or Leak Procedures	:	Evacuate and ventilate spill area; dike spill to prevent entry into water system; wear full protective equipment including respiratory equipment during clean-up. (See employee protection recommendations). 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. Minor Spill: 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 neutralizer per part of Isocyanate, with mixing. Allow to stand uncovered for 48 hours to let CO2 escape. Clean-up: Decontaminate floor with decontamination solution letting stand for at least 15 minutes.

7. HANDLING AND STORAGE

Storage Temperature (MIN / MAX)	:	Not Established - similar material 64 degrees F (18 degrees C) / 86 degrees F (30 degrees C).
Shelf Life	:	Not Established - similar material 6 months minimum.
Special Sensitivity	:	If container is exposed to high heat, 400 F (204 degrees C) it can be pressurized and possibly rupture. MDI reacts slowly with water to form CO2 gas. This gas can cause sealed containers to expand and possibly rupture.
Handling And Storage Precautions	:	Store in tightly closed containers 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.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Eye Protection Requirements	:	Chemical goggles should be used in a splash hazard environment. For additional protection, chemical goggles should be used in combination with a full face shield.
Skin Protection Requirements	:	Permeation resistant gloves (butyl rubber, nitrile rubber, polyvinyl alcohol). However, please note that PAVE degrades in water. Cover as much of the exposed skin area as

possible with appropriate clothing. If skin creams are used, keep the area covered 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 industria ventilation (I.e., ACGIH Industrial Ventilation Manual) should be consulted for guidance about adequate ventilation.
Respirator Requirements	:	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 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, bases 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 Isocyanate in the breathing zone of individuals should become part of the overall exposure characterization program. Sampling and analytical methods have been developed by NIOSH, OSHA, PF&L, 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, FVC as a minimum). History of adult asthma, respiratory allergies such as hay fever, eczma, 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 available. Educate and train employees in safe use of product. Follow all label instructions. For additional information, contact PF&L Inc., Safety Department.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form	:	Liquid
Color	:	Dark Brown to Black
Odor	:	Slightly Musty Odor
Odor Threshold	:	Not Established

pH	:	Not Established
Boiling Point	:	406 degrees F (208 degrees C) at 5 mm Hg for MDI.
Melting / Freezing Point	:	Below 32 degrees F (0 degrees C) for MDI.
Viscosity	:	Approx. 90 mPa.s @ 77 degrees F (25 degrees C).
Solubility In Water	:	Not Soluble. Reacts slowly with water to liberate CO2 gas.
Specific Gravity	:	1.24 @ 77 degrees F (25 degrees C).
Bulk Density	:	10.3 lbs/gal.
% Volatile By Volume	:	Negligible
Vapor Pressure	:	Less than 0.00001 mm Hg @ 77 degrees F (25 degrees C) for MDI.
Vapor Density	:	8.5 (MDI) (Air =1).

10. STABILITY AND REACTIVITY

Stability	:	Stable under normal conditions.
Hazardous Polymerization	:	May occur; Contact moisture, other materials which react with Isocyanates, or temperatures above 400 degrees F (204 degrees C), may cause polymerization.
Incompatibles	:	Water, amines, strong bases, alcohols. Will cause some corrosion to copper alloys and aluminum.
Instability Conditions	:	Contamination with water and high temperatures (above 400 degrees F (204 degrees C)).
Decomposition Products	:	By high heat and fire: carbon monoxide, oxides of nitrogen, traces of HCN, MDI vapors or aerosols.

11. TOXICOLOGICAL INFORMATION

Toxicity Data For	:	Diphenylmethane Diisocyanate (Monomeric and Polymeric)
Acute Toxicity		
Oral LD50	:	Greater than 10,000 mg/kg (Rat).
Dermal LD50	:	Greater than 6,200 mg/kg (Rabbit).
Inhalation LC50	:	The 4-hour LC50 for polymeric MDI in rats ranges from 370 to 490 mg/m3. The 4-hour LC50 for monomeric MDI in rats was estimated to be between 172 and 187 mg/m3. The 1-hour LC50 for monomeric MDI aerosol was greater than 2240 mg/m3 (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 Diisocyanate.
Chronic Toxicity	:	In combined chronic inhalation toxicity / oncoenicity 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/m3. 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 / m3. The No Observable Effects Level (NOEL) was 0.2 mg / m3.
Carcinogenicity	:	In the study described above (See Chronic Toxicity), the occurrence of pulmonary adenocarcinoma as considered to be related to MDI. These tumors were observed only in rats exposed to the high concentration of 6.9 mg / m3.
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 hydrolize MDI is suspected of producing mutagenicity in some of these studies. MDI was negative in an "in vitro" (mouse micronucleus) assay.
Developmental Toxicity	:	Rats were exposed to polymeric MDI at air concentrations of 0, 1, 4 and 12 mg/m3 during days 6 - 15 of gestation. Maternal Toxicity (including mortality) was observed at the highest concentration of 12 mg/m3 accompanied by embryo and fetal toxicity. However, no teratogenic effects were observed even at this lethal concentration.

12. ECOLOGICAL INFORMATION

Ecology Data For	:	Dephenylmethane Diisocyanate (Monomeric and Polymeric).
Aquatic Toxicity	:	LC50 - 24 hr. (static): Greater than 500 mg/liter for Daphnia magna, Limnea Stagnalis and Zebra fish (Brachydanio rerio) for both polymeric and monomeric MDI.
Fish Toxicity	:	LC0 = Greater than 1000 mg/1; Test species: Brachydanio rerio; Duration of test: 96hr.
Inhibition Bacteria	:	EC50 = Greater than 100 mg/l; Tested on activated sludge microorganism. Duration of test: 3 hours.

13. DISPOSAL CONSIDERATIONS

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 must be handled with care due to product residur. 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. (See Fire Fighting Measures with Stability and Reactivity). Gases may be highly toxic.

14. TRANSPORT INFORMATION

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	:	
Proper Shipping Name	:	Other Regulated Substances, Liquid, N.O.S. (*See Note Below)

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

Hazard Class Or Division	:	9
UN / NA Number	:	NA3082
Packing Group	:	III
Hazardous Substance	:	MDI, (Methylene diphenyl diisocyanate)
DOT Product RQ lbs (kgs)	:	15625 lbs (7087.5 kgs)
Hazard Label(s)	:	Class 9
Hazard Placard(s)	:	Class 9
Hazard Class Division Number	:	not regulated, (IMO / IMDG Code (Ocean)).
Hazard Class Division Number:		not regulated, (IACO / IATA (Air)).

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, CAS# 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 Diisocyante,

CAS 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 hazardous waste if discarded in its purchased form. However, under RCRA, it is the responsibility of the user of products 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 Code of Federal Regulations 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
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

FL = Florida Substance List
IL = Illinois Toxic Substances List
MA = Massachusetts Hazardous Substance List
NJ1 = New Jersey Hazardous Substance List
nNJ4 = 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.
CN2 = Canada WHMIS Ingredient Disclosure List over 0.1%.

16. OTHER INFORMATION

NFPA 704M Ratings

Health : 2
Flammability : 1
Physical Hazard : 1

HMIS Ratings

Health : 2*
Flammability : 1

Physical Hazard : 1

0 = Minimal, 1 = Slight, 2 = Moderate, 3 = High, 4 = Extreme, * = Chronic.

Prepared By : Protective Floorings and Linings. EH&S Product Safety Department