SECTION 1 - MANUFACTURER IDENTIFICATION

MANUFACTURER'S NAME: Rhino Linings Corporation
ADDRESS: 9151 Rehco Road, San Diego, CA, 92121
INFORMATION PHONE: 858-450-0441
EMERGENCY CONTACT: (CHEMTREC): 800-424-9300

Revised Date: 12/09/09
Supersedes:

SECTION 2 – COMPOSITION & INGREDIENTS

<table>
<thead>
<tr>
<th>Weight Percent</th>
<th>Ingredient</th>
<th>CAS NUMBER</th>
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</thead>
<tbody>
<tr>
<td>&gt;90%</td>
<td>Dicyclohexylmethane-4,4'-Diisocyanate</td>
<td>5124-30-1</td>
</tr>
<tr>
<td>&gt; 30%</td>
<td>Tetrahydroxypropylethylendiamine</td>
<td>102-60-3</td>
</tr>
</tbody>
</table>

SECTION 3 – Hazards Identification

Emergency Overview

Danger Color: Clear Form: liquid Odor: slight inherent odor.

Toxic gases/fumes may be given off during burning or thermal decomposition. Closed container may forcibly rupture under extreme heat or when contents have been contaminated with water. Use cold water spray to cool fire-exposed containers to minimize the risk of rupture. Causes respiratory tract irritation. May cause allergic respiratory reaction. Harmful if inhaled. Respiratory sensitizer. Lung damage and respiratory sensitization may be permanent. Causes skin irritation. May cause allergic skin reaction. Skin sensitizer. Animal tests and other research indicate that skin contact with Diisocyanates can play a role in causing isocyanate sensitization and respiratory reaction. Causes eye irritation. May cause lung damage.

Potential Health Effects

Primary Routes of Entry: Skin Contact, Inhalation, Eye Contact

Medical Conditions Aggravated by Exposure: Skin Allergies, Eczema, Asthma, Respiratory disorders

HUMAN EFFECTS AND SYMPTOMS OF OVEREXPOSURE

Inhalation

Acute Inhalation

For Product: Dicyclohexylmethane-4,4'-Diisocyanate

Diisocyanate vapors or mist at concentrations above the TLV or PEL can irritate (burning sensation) the 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 hyperreactivity can respond to concentrations below the TLV or PEL with similar symptoms as well as asthma attack or asthma-like symptoms. Exposure well above the TLV or PEL may lead to bronchitis, bronchial spasm and pulmonary edema (fluid in lungs). Chemical or hypersensitivity pneumonitis, with flu-like symptoms (e.g., fever, chills), has also been reported. These symptoms can be delayed up to several hours after exposure. These effects are usually reversible.
Chronic Inhalation
For Product: Dicyclohexylmethane-4,4'-Diisocyanate
As a result of previous repeated overexposures or a single large dose, certain individuals may develop sensitization to diisocyanates (asthma or asthma-like symptoms) that may cause them to react to a later exposure to diisocyanates at levels well below the TLV or PEL. These symptoms, which can include chest tightness, wheezing, cough, shortness of breath or asthmatic attack, could be immediate or delayed up to several hours after exposure. Extreme asthmatic reactions can be life threatening. Similar to many nonspecific 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. Sensitization can be permanent. Chronic overexposure to diisocyanates has also been reported to cause lung damage (including fibrosis, decrease in lung function) that may be permanent.

Skin
Acute Skin
For Product: Dicyclohexylmethane-4,4'-Diisocyanate
Causes irritation with symptoms of reddening, itching, and swelling. Can cause sensitization. Persons previously sensitized can experience allergic skin reaction with symptoms of reddening, itching, swelling, and rash. Cured material is difficult to remove.

Chronic Skin
For Product: Dicyclohexylmethane-4,4'-Diisocyanate
Potent skin sensitizer. Once sensitized, an individual may react to direct skin contact or even to airborne levels below the TLV with reddening, swelling, rash and in severe cases blistering and hives. These symptoms may be immediate or delayed several hours. Animal tests and other research indicate that skin contact with diisocyanates can play a role in causing isocyanate sensitization and respiratory reaction. This data reinforces the need to prevent direct skin contact with isocyanates.

Eye
Acute Eye
For Product: Dicyclohexylmethane-4,4'-Diisocyanate
Causes irritation with symptoms of reddening, tearing, stinging, and swelling. May cause temporary corneal injury. Vapor may cause irritation with symptoms of burning and tearing.

Chronic Eye
For Product: Dicyclohexylmethane-4,4'-Diisocyanate
Prolonged vapor contact may cause conjunctivitis.

Ingestion
Acute Ingestion
For Product: Dicyclohexylmethane-4,4'-Diisocyanate
May cause irritation; Symptoms may include abdominal pain, nausea, vomiting, and diarrhea.

Carcinogenicity:
No Carcinogenic substances as defined by IARC, NTP and/or OSHA

SECTION 4 – FIRST AID MEASURES

Eye contact
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Use lukewarm water if possible. Use fingers to ensure that eyelids are separated and that the eye is being irrigated. Then remove contact lenses, if easily removable, and continue eye irrigation for not less than 15 minutes. Get medical attention.

Skin contact
Immediately remove contaminated clothing and shoes. In case of skin contact, wash affected areas with soap and water. After washing, cover affected skin area with polyethylene glycol (300-500 molecular weight) and wash again immediately with soap and water to thoroughly remove polyethylene glycol and residual isocyanate. Repeat if necessary. Get medical attention immediately. Wash clothing and shoes before reuse. For severe exposures, immediately get under safety shower and begin rinsing.

Inhalation
Move to an area free from further exposure. Get medical attention immediately. Administer oxygen or artificial respiration as needed. Asthmatic symptoms may develop and may be immediate or delayed up to several hours. Extreme asthmatic reactions can be life threatening.

Ingestion
Do NOT induce vomiting. Wash mouth out with water. Do not give anything by mouth to an unconscious person. Get medical attention.
Notes to physician
Eyes: Stain for evidence of corneal injury. If cornea is burned, instill antibiotic/steroid preparation as needed. Workplace vapors could produce reversible corneal epithelial edema impairing vision. Skin: This compound is a skin sensitizer. Treat symptomatically as for contact dermatitis or thermal burn. Ingestion: Treat symptomatically. There is no specific antidote. Inducing vomiting is contraindicated because of the irritating nature of the compound. Inhalation: Treatment is essentially symptomatic. An individual having a dermal or pulmonary sensitization reaction to this material should be removed from further exposure to any diisocyanate.

SECTION 5 – FIRE FIGHTING MEASURES

Suitable extinguishing media: Dry chemical, Carbon dioxide (CO2), Foam, water spray for large fires.
Special Fire Fighting Procedures
Firefighters should wear NFPA compliant structural firefighting protective equipment, including self-contained breathing apparatus and NFPA compliant helmet, hood, boots and gloves. Avoid contact with product. Decontaminate equipment and protective clothing prior to reuse. During a fire, isocyanate vapors and other irritating, highly toxic gases may be generated by thermal decomposition or combustion. Exposure to heated diisocyanate can be extremely dangerous.

Unusual Fire/Explosion Hazards
Closed container may forcibly rupture under extreme heat or when contents are contaminate with water (CO2 formed). Use cold-water spray to cool fire-exposed containers to minimize the risk of rupture. Large fires can be extinguished with large volumes of water applied from a safe distance, since reaction between water and hot diisocyanate can be vigorous.

SECTION 6 – SPILLAGE, ACCIDENTAL RELEASE MEASURES

Spill and Leak Procedures
Evacuate non-emergency personnel. Isolate the area and prevent access. Remove ignition sources. Notify management. Put on protective equipment. Control source of the leak. Ventilate. Contain the spill to prevent spread into drains, sewers, water supplies, or soil. Call Bayer at 412-923-1800 for assistance and advice. Major Spill or Leak (Standing liquid): To minimize vapor, cover the spillage with fire fighting foam (AFFF). Released material may be pumped into closed, but not sealed, metal container for disposal. Process can generate heat. Minor Spill or Leak (Wet surface): Cover spill area with suitable absorbent material (Kitty Litter, Oil-Dri®, etc). Saturate absorbent material with neutralization solution and mix. Wait 15 minutes. Collect material in open-head metal containers. Repeat applications of decontamination solution, with scrubbing, followed by absorbent until the surface is decontaminated. Check for residual surface contamination. Swype® test kits have been used for this purpose. Apply lid loosely and allow containers to vent for 72 hours to let carbon dioxide (CO2) escape.

Additional Spill Procedures/Neutralization
Neutralization solution: mix equal amounts of the following to total two times the estimated spill volume: (1) mineral spirits 80%, VM&P naphtha 15% and household detergent 5%; and (2) a 50/50 mixture of monoethanolamine and water. Rhino Linings Corp. Inc. requires that CHEMTREC be immediately notified (800-424-9300) when this product is unintentionally released from its container during its course of distribution, regardless of the amount released. Distribution includes transportation, storage incidental to transportation, loading and unloading. Such notification must be immediate and made by the person having knowledge of the release.

SECTION 7 – HANDLING AND STORAGE

Storage temperature:
Minimum: 25 °C (77 °F)
Maximum: 50 °C (122 °F)
Storage period
12 Months @ 25 °C (77 °F): after receipt of material by customer

Handling/Storage Precautions
Do not breathe vapors, mists, or dusts. Use adequate ventilation to keep airborne isocyanate levels below the exposure limits. Wear respiratory protection if material is heated, sprayed, used in a confined space, or if the exposure limit is exceeded. Warning properties (irritation of the eyes, nose and throat or odor) are not adequate to prevent overexposure from inhalation. This material can produce asthmatic sensitization upon either single inhalation exposure to a relatively high concentration or upon repeated inhalation.
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exposures to lower concentrations. Individuals with lung or breathing problems or prior allergic reactions to isocyanates must not be exposed to vapor or spray mist. Avoid contact with skin and eyes. Wear appropriate eye and skin protection. Wash thoroughly after handling. Do not breathe smoke and gases created by overheating or burning this material. Decomposition products can be highly toxic and irritating. Store in tightly closed containers to prevent moisture contamination. Do not resell if contamination is suspected.

Further Info on Storage Conditions
Ideal storage temperature range is 86 - 104 F (30 - 40 C) If Dicyclohexylmethane-4,4'-Diisocyanate (HMDI) is stored for prolonged periods at or below a temperature of 77 F (25 C), crystallization and settling of the isomer may occur. Storage in a cold warehouse can cause crystals to form. These crystals can settle to the bottom of the container. If crystals do form, they can be melted easily with moderate heat. It is suggested that a container the size of a drum be warmed for 16-24 hours at 104-122 F (40-50 C). When the crystals are melted, the container should be agitated by rolling or stirring, until the contents are homogenous. Since heated Dicyclohexylmethane-4,4'-Diisocyanate (HMDI) (104-122 F (40-50 C)) will generate vapors more rapidly than product stored at 77 F (25 C), be sure to follow the precautions under the Personal Protection section of the MSDS whenever opening a heated Dicyclohexylmethane-4,4'-Diisocyanate (HMDI) container.

SECTION 8 – EXPOSURE CONTROLS AND PROTECTION INFORMATION

Dicyclohexylmethane-4,4'-Diisocyanate (5124-30-1) US. ACGIH Threshold Limit Values Time Weighted Average (TWA): 0.005 ppm

Industrial Hygiene/Ventilation Measures
Rhino strongly urges prevention of skin contact with all materials containing monomeric Dicyclohexylmethane-4,4'-Diisocyanate (HMDI), including adducts, prepolymer formulations and forms based on Dicyclohexylmethane-4,4'-Diisocyanate (HMDI). Since spray application increases the potential for skin contact, stringent precautions must be taken to ensure the safety of the persons involved with the spray application as well as other persons working in the area who have the potential for skin contact with the uncured material. For additional information on Work/Hygiene Procedures, Skin Protection, Ventilation and Respiratory Protection Requirements, see Bayer's booklet "Desmodur W Aliphatic Diisocyanate Health and Safety Information." Local exhaust should be used to maintain levels below the TLV whenever this diisocyanate is heated, sprayed, or aerosolized.

Respiratory protection
Airborne Dicyclohexylmethane-4,4'-Diisocyanate (HMDI) concentrations greater than the appropriate standard/guideline can occur in inadequately ventilated environments when Dicyclohexylmethane-4,4'-Diisocyanate (HMDI) 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 CFR1910.134). 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 Dicyclohexylmethane-4,4'-Diisocyanate (HMDI) concentration must be no greater than 10 times the appropriate standard/guideline. The recommended APR cartridge is an organic vapor/particulate filter combination cartridge (OV/P100).

Hand protection
Gloves should be worn, Nitrile rubber gloves., Butyl rubber gloves., Neoprene gloves

Eye protection
When directly handling liquid product, eye protection is required. Examples of eye protection include a chemical safety goggle, or chemical safety goggle in combination with a full face shield when there is a greater risk of splash.

Skin and body protection
Any area of skin that could potentially come in contact with this diisocyanate, or a formulation containing this diisocyanate, must be covered by a permeation resistant barrier (e.g., butyl or nitrile rubber gloves, neoprene apron, chemical suit, etc.). When there is potential for a major splash directly onto the skin, such as when breaking into lines, a full chemical suit is required. When the
application results in airborne vapor or mist, a full permeation resistant suit, including head covering, faceshield, gloves and overshoes, is required.

**Medical Surveillance**
All applicants who are assigned to an isocyanate work area should undergo a pre-placement medical evaluation. A history of eczema or respiratory allergies such as hay fever, are possible reasons for medical exclusion from isocyanate areas. Applicants who have a history of adult asthma should be restricted from work with isocyanates. Applicants with a history of prior isocyanate sensitization should be excluded from further work with isocyanates. A comprehensive annual medical surveillance program should be instituted for all employees who are potentially exposed to diisocyanates. Once a worker has been diagnosed as sensitized to any isocyanate, no further exposure can be permitted. Refer to the Bayer pamphlet (Medical Surveillance Program for Isocyanate Workers) for additional guidance.

**Additional Protective Measures**
Emergency showers and eye wash stations should be available. Educate and train employees in the safe use and handling of this product. Follow all label instructions.

### SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

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<th>Value</th>
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<td>Form</td>
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<td>Color</td>
<td>Clear</td>
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<td>Odor</td>
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<td>pH</td>
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<tr>
<td>Boiling point/boiling range</td>
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<td>Flash point</td>
<td>200 °C (392 °F) (Pensky-Martens Closed Cup (ASTM D-93))</td>
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<td>Upper explosion limit</td>
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<td>Vapor pressure</td>
<td>0.000015 mmHg @ 25 °C (77 °F)</td>
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<td>Specific Gravity</td>
<td>Approximately 1.07 @ 25 °C (77 °F)</td>
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<td>Solubility in Water</td>
<td>Insoluble - Reacts slowly with water to liberate CO2 gas</td>
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<td>Autoignition temperature</td>
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<td>Viscosity, dynamic</td>
<td>ca. 30 mPa.s @ 25 °C (77 °F) (DIN EN ISO 3219/A.3)</td>
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<td>Bulk density</td>
<td>1,066.55 kg/m3 @ 25 °C (77 °F)</td>
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### SECTION 10 – STABILITY AND REACTIVITY

**Hazardous Reactions**
Contact with moisture, other materials that react with isocyanates, or temperatures above 350 F (177 C), may cause polymerization.

**Materials to avoid**
Water, Amines, Strong bases, Alcohols, Copper alloys

**Conditions to avoid**
Avoid extreme heat or cold.

**Hazardous decomposition products**
By Fire and High Heat: Carbon dioxide (CO2), carbon monoxide (CO), oxides of nitrogen (NOx), dense black smoke., Hydrogen cyanide, Isocyanate, Isocyanic Acid, Other undetermined compounds.

### SECTION 11 – TOXICOLOGICAL INFORMATION

**Toxicity Data for Dicyclohexylmethane-4,4'-Diisocyanate**

**Acute oral toxicity**
LD50: 9,900 mg/kg (rat)

**Acute inhalation toxicity**
LC50: 434 mg/m³, 4 h (Rat)
LC50: 510 mg/m³, 1 h (Guinea pig)

**Acute dermal toxicity**
PRODUCT NAME: SOLARMAX® 21-90-25 ISO

LD50: > 10,000 mg/kg (rabbit)

**Skin irritation**
rabbit, Draize Test, Exposure Time: 24 h, Moderately irritating

**Eye irritation**
rabbit, OECD Test Guideline 405, slight irritant

**Sensitisation**
inhalation: sensitizer (Guinea pig)
dermal: sensitizer (mouse, Mouse ear swelling test)

**Repeated dose toxicity**
2 weeks, inhalation: NOAEL: < 0.04 mg/l, (Rat, )
4 weeks, inhalation: NOAEL: 1.06 mg/m3, (Rat, Male/Female, 6 hrs/day 5 days/week)

**Mutagenicity**
Genetic Toxicity in Vitro:
Ames: negative (Salmonella typhimurium, Metabolic Activation: with/without)

**Toxicity to Reproduction/Fertility**
inhalation, 6 hrs/day 7 days/week, (Rat, Male/Female) NOAEL (parental): 1.00 mg/m3, NOAEL (F2): 6.00 mg/m3

**Developmental Toxicity/Teratogenicity**
Rat, Female, inhalation, 6 hrs/day 7 days/week, NOAEL (teratogenicity): 6 mg/cbm, NOAEL (maternal): 1 mg/cbm

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**SECTION 12 – ECOLOGICAL INFORMATION**

Ecological Data for DESMODUR W
Ecological Data for Dicyclohexylmethane-4,4′-Diisocyanate

**Biodegradation**
aerobic, 0 %, Exposure time: 28 Days, Not readily biodegradable.

**Theoretical Biological Oxygen Demand (ThBOD)**
2,195 mg/g

**Acute and Prolonged Toxicity to Fish**
LC50: 1.2 mg/l (Zebra fish (Brachydanio rerio), 96 h)

**Acute Toxicity to Aquatic Invertebrates**
EC0: > 8.3 mg/l (Water flea (Daphnia magna), 48 h)

**Toxicity to Aquatic Plants**
EC50: > 5 mg/l, End Point: growth (Green algae (Scenedesmus subspicatus), 72 h)

**Toxicity to Microorganisms**
EC50: 19 mg/l, (Activated sludge microorganisms, 3 h)

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**SECTION 13 – DISPOSAL CONSIDERATIONS**

**Waste Disposal Method**
Waste disposal should be in accordance with existing federal, state and local environmental control laws. Incineration is the preferred method.

**Empty Container Precautions**
Empty containers retain product residue; observe all precautions for product. Do not heat or cut empty container with electric or gas torch because highly toxic vapors and gases are formed. Do not reuse without thorough commercial cleaning and reconditioning. If container is to be disposed, ensure all product residues are removed prior to disposal.
SECTION 14 – TRANSPORTATION INFORMATION

Proper shipping name: Other regulated substances, liquid, n.o.s. (contains Dicyclohexylmethane-4,4'-Diisocyanate)
Hazard Class or Division: 9
UN/NA Number: NA3082
Packaging group: III
Hazard Label(s): Class 9
Sea transport (IMDG)
Non-Regulated

Air transport (ICAO/IATA)
Proper shipping name: Aviation regulated liquid, n.o.s. (contains Dicyclohexylmethane-4,4'-Diisocyanate)
Hazard Class or Division: 9
UN-Number: UN3334
Packaging group: MISCELLANEOUS

SECTION 15 – NATIONAL REGULATIONS AND REFERENCES

United States Federal Regulations
OSHA Hazcom Standard Rating: Hazardous
US. Toxic Substances Control Act: Listed on the TSCA Inventory.
US. EPA CERCLA Hazardous Substances (40 CFR 302):
Components
None
SARA Section 311/312 Hazard Categories:
Acute Health Hazard, Chronic Health Hazard
Material Name: DESMODUR W Article Number: 5907551
Page: 9 of 10 Report version: 1.4
US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III
Section 302 Extremely Hazardous Substance (40 CFR 355, Appendix A):
Components
None
US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III
Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required:
Components
Dicyclohexylmethane-4,4'-Diisocyanate
US. EPA Resource Conservation and Recovery Act (RCRA) Composite List of Hazardous Wastes
and Appendix VIII Hazardous Constituents (40 CFR 261):
Under RCRA, it is the responsibility of the person who generates a solid waste, as defined in 40 CFR 261.2, to determine if that waste is a hazardous waste.

State Right-To-Know Information
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.
Massachusetts, New Jersey or Pennsylvania Right to Know Substance Lists:
Weight % Components CAS-No.
<=100% Dicyclohexylmethane-4,4'-Diisocyanate 5124-30-1

California Prop. 65:
This product contains a chemical(s) known to the state of California to cause cancer.

SECTION 16 – DISCLAIMER

Disclaimer: The data set forth in this sheet are based on information provided by the suppliers of the raw materials and chemicals used in the manufacture of the aforementioned product. Rhino Linings Corporation makes no warranty with respect to the accuracy of the information provided by their suppliers, and disclaims all liability of reliance thereon.