

PRODUCT NAME(S): Battle Jacket® A2300 Isocyanate

SECTION 1 – IDENTIFICATION

Manufacturer's Info:
Rhino Linings Corporation
 9747 Businesspark Avenue
 San Diego, CA, 92131

Product name: Battle Jacket® A2300 Isocyanate
Chemical Name: MDI Prepolymer
Chemical Family: Aromatic Isocyanate

Information phone: (858) 450 0441
Emergency contact: CHEMTREC (800) 424 9300

SECTION 2 – HAZARD(S) IDENTIFICATION

OSHA Hazard Communication Standard:

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

GHS-Label Elements: **Signal Word:**
 DANGER

Pictogram(s):



GHS 08



GHS 07

CONTAINS ISOCYANATES. INHALATION OF ISOCYANATE 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 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. ANIMAL TESTS AND OTHER RESEARCH INDICATE THAT SKIN CONTACT WITH MDI MAY PLAY A ROLE IN CAUSING RESPIRATORY SENSITIZATION.

Classification of the substance or mixture:

Hazard Class	Category	Hazard Statement Codes	Hazard Statements
Acute Toxicity, Inhalation (mist)	4	H332	Harmful if inhaled
Skin corrosion / Irritation	2	H315	Causes skin irritation
Serious eye damage / Eye irritation	2A	H319	Causes serious eye irritation
Respiratory Sensitization	1	H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled
Skin Sensitization	1B	H317	May cause an allergic skin reaction
Carcinogenicity	2	H351	Suspected of causing cancer
Specific target organ toxicity, single exposure	3	H335	May cause respiratory irritation
Specific target organ toxicity, repeated exposure	2	H373	May cause damage to olfactory organs through prolonged or repeated exposure by inhalation

Precautionary Statements:

Prevention:	P201	Obtain special instructions before use.
	P202	Do not handle until all safety precautions have been read and understood.
	P281	Use personal protective equipment as required.
	P285	In case of inadequate ventilation wear respiratory protection.
	P260	Do not breathe mist, vapors, spray.
	P271	Use only outdoors or in a well-ventilated area.
	P264	Wash exposed area with plenty of water and soap thoroughly after handling.
Response:	P272	Contaminated work clothing should not be allowed out of the workplace.
	P304 + P341	IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.
	P342 + P311	If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.
	P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
	P333 + P313	If skin irritation or rash occurs: Get medical advice/attention.
	P362	Take off contaminated clothing and wash before reuse.
	P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313	If eye irritation persists: Get medical advice/attention.	
P308 + P313	IF exposed or concerned: Get medical advice/attention.	

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Storage: P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.

Disposal: P501 Dispose of contents/container to hazardous or special waste collection point in accordance with local/regional/national/international regulations.

Hazards not otherwise classified: No specific dangers known.

SECTION 3 – COMPOSITION / INFORMATION ON INGREDIENTS

Components	CAS #	EC #	Concentration, %
4,4'-Diphenylmethane Diisocyanate (MDI)	101-68-8	202-966-0	40 – 70
Diphenylmethane Diisocyanate, oligomers	25686-28-6	500-040-3	5 – 20

SECTION 4 – FIRST-AID MEASURES

Description of First Aid measures:

Inhalation: Immediate medical attention required. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing.
If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed.
Asthmatic symptoms may develop and may be immediate or delayed up to several hours. Extreme asthmatic reactions can be life threatening.

Skin: Wash material off of the skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes immediately and wash them before reuse. Continue to rinse for at least 10 minutes. An MDI study has demonstrated that a polyglycol-based skin cleanser (such as D-Tam™, PEG-400) or corn oil may be more effective than soap and water. For severe exposures, immediately get under safety shower and begin rinsing.
If irritation develops, consult a physician or dermatologist.

Eye: Rinse cautiously with water for several minutes, especially under the eyelids. Remove contact lenses, if present and easy to do. Continue rinsing for at least 15 minutes. Do not rub eyes in order to prevent cornea injury. Immediate medical attention required.

Ingestion: Immediate medical attention required. Remove victim to fresh air and keep at rest in a position comfortable for breathing. Remove dentures if any.
If the exposed person is conscious, rinse mouth with water and then give plenty of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Do not induce vomiting unless directed to do so by medical personnel.
If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. Never induce vomiting or give anything by mouth if the victim is unconscious or having convulsions.

Most important symptoms/effects, acute and delayed: Eye irritation, skin irritation, allergic symptoms. Symptoms can appear later. See Section 11 for more details.

General advice for First Aid responders: No action should be taken involving any personal risk or without suitable training. If potential for exposure exist refer to Section 8 for specific personal protective equipment. Show this SDS to physician.

Note to physician: Specific antidotes or neutralizers do not exist. Treatment should be supportive and based on the judgment of the physician in response to the reaction of the patient. Recommended medical monitoring for at least 48 hours.

- 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.
- 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.

SECTION 5 – FIRE-FIGHTING MEASURES

Suitable extinguishing media: Water fog or fine spray, alcohol-resistant foam, dry chemical or carbon dioxide fire extinguishers.

Unsuitable extinguishing media: Direct water stream may cause frothing, splattering of burning material and spreading of fire.

Specific hazards arising from the chemical: Material may be ignited only if preheated to high temperatures (such in fire conditions). Fire in vicinity poses risk of pressure build-up and rupture. Containers at risk from fire should be cooled with water and, if possible,

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removed from the danger area. Exposure to heated diisocyanate can be extremely dangerous. Reaction between water and hot isocyanate may be vigorous. Hazardous Combustion products: carbon dioxide, carbon monoxide, nitrogen oxides, amines, hydrogen cyanide, lower molecular weight organic molecules.

Special Protective Equipment and Precautions for fire-fighters: Wear NIOSH or OSHA approved self-contained breathing apparatus in positive pressure mode with full face piece and full protective gear. Isolate the scene by removing all persons from the incident area. No action should be taken involving any personal risk or without suitable training. Dispose of fire debris and contaminated extinguishing water in accordance with official regulations.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: Keep unnecessary and unprotected personnel from entering. Ensure adequate ventilation/exhaust extraction. Avoid breathing vapors or mist during clean up. Use protective equipment as described in Section 8. Do not touch or walk through spilled material.

Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. Inform the relevant authorities if the product has caused environmental pollution.

Methods and materials for containment and cleaning up: Remove mechanically; cover the remainder with non-combustible absorbent material (e.g. sawdust, sand, earth, vermiculite or diatomaceous earth). After approximately one hour, transfer into properly labeled and approved chemical waste containers. Do not fill the container more than 2/3 full to allow for expansion. Cover container, but do not seal, and remove from work area. Keep in a well ventilated area. If necessary, repeat application of absorbent material until all liquid has been removed from the surface. Decontaminate the spill surface area using a neutralization solution. Scrubbing the surface with a broom or brush helps the decontamination solution to penetrate into porous surfaces. Wait at least 15 minutes after first application of the neutralization solution. Cover the area again with absorbent material and shovel this into chemical waste container. Apply lid loosely to the waste container (do not tighten the lid because carbon dioxide gas and heat can be generated from the neutralization process). With the lid still loosely in place, move the container to an isolated, well-ventilated area to allow release of carbon dioxide. After 72 hours, seal the container, and properly dispose of the waste material and any contaminated equipment (i.e., broom or brush) in accordance with existing federal, state and local regulations.

Spill cleaning solutions:

Products or product mixtures that have been shown to be effective neutralization solutions for decontaminating surfaces, tools, or equipment that have been in contact with an isocyanate includes:

Products available through industrial suppliers:

- Spartan Chemical Company: 1-800-537-8990:
 - Spartan® ShineLine Emulsifier Plus
 - Spartan® SC-200 Heavy Duty Cleaner

Products available through retail outlets:

- ZEP® Commercial Heavy-Duty Floor Stripper
- Greased Lightning® Super Strength Cleaner and Degreaser
- EASY OFF® Grill and Oven Cleaner or EASY OFF® Fume Free Oven Cleaner
- A mixture of 50% Simple Green® Pro HD Heavy-Duty Cleaner and 50% household ammonia
- A mixture of 90% Fantastic® Heavy Duty All Purpose Cleaner and 10% household ammonia.

Note: Always wear proper PPE when cleaning up an isocyanate spill and using a neutralization solution. It may take two or more applications of the neutralization solution to decontaminate the surface. Check for residual surface contamination using a surface wipe method such as the CLI Swype® pad.

For major spills: Stop leak if without risk. Move containers from spill area. Remove ignition sources. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or contain and collect with an absorbent material as described in the previous paragraph.

Residues from spill cleanup may continue to be regulated under provisions of RCRA and require storage and disposal as hazardous waste. For major spills, see Section 1 for the Emergency contact; for further disposal measures, see Section 13.

SECTION 7 – HANDLING AND STORAGE

Precautions for safe handling: Protect chemical from atmospheric moisture. Avoid prolonged exposure to heat and air. Keep away from sources of ignition. Do not reseat if contamination is suspected.

Use adequate ventilation to keep airborne levels below the exposure limits. Do not inhale vapors and mists. Wear respiratory protection if material is heated, mixed, sprayed or used in a confined space. Avoid contact with skin and eyes. Wear appropriate eye and skin protection. Wash hands thoroughly after handling. Hands and/or face should be washed before eating, drinking and smoking and at the end of the shift. Remove contaminated clothing and protective equipment before entering eating areas.

This material can produce asthmatic sensitization upon either single inhalation exposure to a relatively high concentration or upon repeated inhalation exposures to lower concentrations. Individuals with asthma, chronic respiratory disease or prior allergic reactions to isocyanates and those with a history of skin sensitization problems should not be employed in any process in which this product is used. Do not handle until all safety precautions have been read and understood.

Conditions for safe storage, including any incompatibilities: Store in original or approved alternative container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink.

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Suitable containers: Carbon steel (Iron), High density polyethylene (HDPE), Low density polyethylene (LDPE), Stainless steel 1.4301 (V2). Unsuitable containers: Containers made of copper, copper alloys or galvanized surfaces.
 Store locked up. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Protect it against physical damage and moisture. Normal temperature and pressures do not affect the material. Keep liquid away from heat, sparks and flame. Do not cut, drill, grind, weld or perform similar operations on or near containers. Use appropriate containment to avoid environmental contamination. Segregate from acids and acid forming substances. Protect from freezing.

Storage stability: Stable under normal conditions.

Storage temperature: 60 - 90°F (16 - 32°C)

Employee education and training in the safe use and handling of this product are required under the OSHA Hazard Communication Standard 29 CFR 1910.1200. Employees and consumers should be warned of health risks associated with product use. See Section 8 for additional information on hygiene measures.

SECTION 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION

Control Parameters/Occupational exposure limit values: Not available for mixture. Results for components are listed in Section 15.

Advice on system design: Provide process enclosures, local exhaust ventilation or other engineering controls to maintain recommended PEL.

Appropriate engineering controls: Use only with adequate ventilation. Diisocyanates can only be smelled if the occupational exposure limit has been exceeded considerably. Emissions from ventilation or process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Personal protective equipment:

Eye/face protection:

When directly handling liquid product, eye protection is required. Examples of eye protection include safety glasses and goggles or full face shield when there is a greater risk of splash. Contact lenses should not be worn when working with chemicals.

Skin/body protection:

Avoid contact with skin. Impervious gloves (nitrile butyl rubber, neoprene and PVC) should be worn always when working with this product. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact. Dispose contaminated gloves after use in accordance with good laboratory practices. Body should be covered with appropriate clothing (apron, arm covers or full body suit) depending on the task being performed and the risks involved. Protective clothing should be selected and used in accordance with "Guidelines for the Selection of Chemical Protective Clothing" published by ACGIH. Wash contaminated clothing before reuse. Store work clothing separately. Appropriate footwear should be also selected based on the task being performed and the risks involved.

Respiratory protection:

Use local or general ventilation to control exposures below applicable exposure limits. When ventilation is inadequate, use either an atmosphere supplying respirator or NIOSH or OSHA approved air-purifying respirator for organic vapors. Respirator must be properly fitted and its selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Additional Protective Measures: Educate and train employees in safe handling of this product. Follow all label instructions. As a general hygiene practice, wash hands and face after use. Emergency eyewash fountains and safety shower should be in close proximity as a matter of good practice.

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, further exposure cannot be permitted. The Occupational Exposure Limits listed do not apply to previously sensitized individuals. Sensitized individuals should be removed from any further exposure.

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Light yellow Liquid
Odor:	Musty
Odor threshold:	Not applicable
pH:	Not applicable
Melting point/ freezing point:	Not available
Initial boiling point and boiling range:	> 200°C
Flash point:	> 200°C (open cup)
Evaporation rate:	Negligible

Flammability (solid, gas):	Not flammable
Upper/ lower flammability or explosive limits:	Not relevant
Vapor pressure:	~ 0.00001 mmHg @ 25°C (77°F)
Vapor density:	Not applicable
Relative density:	Not available
Solubility (water):	Insoluble
Partition coefficient n-octanol/water:	Not applicable
Auto-ignition temperature:	Not available
Decomposition temperature:	Not available
Viscosity:	Not available

SECTION 10 – STABILITY AND REACTIVITY

Reactivity: MDI is insoluble in and heavier than water and sinks to the bottom but reacts slowly at the interface. A solid water-insoluble layer of polyurea is formed at the interface accompanied by carbon dioxide release. This can lead to container bursting, if tightly closed. There is a risk of 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.

Contact with certain rubbers and plastics can cause brittleness of the product with subsequent loss in strength.

Hazardous Polymerization: Contact with moisture, alcohols, amines, bases and acids or temperatures above 350°F (177°C).

Chemical stability: Stable under recommended storage conditions. Product is hygroscopic; contamination with moisture will negatively affect product performance. Avoid unintended contact with incompatible chemicals; the reaction will generate heat.

Conditions to avoid: Unintentional contact with moisture, excessive heat, open flame and sparks. Avoid mist formation.

Incompatible materials: Strong oxidizing agents. Water, alcohols, amines, bases, acids, copper, aluminum and zinc alloys.

Hazardous decomposition products: Depend upon temperature, air supply and presence of other materials. Can include, but are not limited to carbon dioxide, carbon monoxide, nitrogen oxides, amines, hydrogen cyanide, lower molecular weight organic molecules. Creates dense black smoke in fire conditions.

SECTION 11 – TOXICOLOGICAL INFORMATION

Likely Routes of Exposure: Inhalation, Skin and Eye Contact, Ingestion.

Symptoms of exposure:

Acute toxicity:

Oral: May be harmful if swallowed. Adverse symptoms may include abdominal pain, nausea, vomiting, and diarrhea.

Dermal: May be harmful in contact with skin. Adverse symptoms may include irritation and redness.

Inhalation: Irritating to respiratory system. Inhalation of vapors may cause irritation of the mucous membranes of the nose, throat or trachea, breathlessness, chest discomfort, difficult breathing and reduced pulmonary function. Inhalation exposure 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 be delayed.

Skin corrosion / irritation:

Irritating to skin. Skin contact may result in dermatitis, either irritative or allergic.

Serious eye damage / eye irritation:

Irritating to eyes. Adverse symptoms may include tearing, redness and itching.

Specific target organ toxicity, single exposure:

Causes temporary irritation of the respiratory tract.

Aspiration hazard:

Based on physical properties, not likely to be an aspiration hazard.

Chronic toxicity:

Respiratory and Skin Sensitizer:

This product is a skin and respiratory sensitizer.

- 4,4'-Diphenylmethane Diisocyanate (MDI), CAS #: 101-68-8: skin and respiratory sensitizer.
- Diphenylmethane Diisocyanate, oligomers, CAS #: 25686-28-6: skin and respiratory sensitizer.

Sensitization possible after skin contact. The substance may cause sensitization of the respiratory tract. 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 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. 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. Animal tests indicate that skin contact may play a role in causing respiratory sensitization. However, the relevance of this result for humans is unclear.

Germ cell mutagenicity:

Risk to humans is not expected from exposure to this product.

- 4,4'-Diphenylmethane Diisocyanate (MDI), CAS #: 101-68-8: The substance was mutagenic in various bacterial test systems; however, these results could not be confirmed in tests with mammals.

Carcinogenicity:

This product contains component suspected to be carcinogenic by IARC.

- 4,4'-Diphenylmethane Diisocyanate (MDI), CAS #: 101-68-8: IARC: Group 3 (Not classifiable as to its carcinogenicity to humans). A carcinogenic potential cannot be excluded after prolonged exposure to severely irritating concentrations. These effects are not relevant to humans at occupational levels of exposure.

Reproductive toxicity:

Risk to humans is not expected from exposure to this product.

- Repeated inhalative uptake of the substance did not cause damage to the reproductive organs. Birth defects were not 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.

Specific target organ toxicity, repeated exposure:

Respiratory system, lungs, olfactory epithelium after repeated inhalation.

Medical conditions aggravated by overexposure:

The isocyanate component is a respiratory sensitizer. Respiratory sensitization may result in allergic (asthma-like) signs in the lower respiratory tract including wheezing, shortness of breath and difficulty breathing, the onset of which may be delayed. Repeated inhalation of high concentrations may cause lung damage, including reduced lung function, which may be permanent.

Medical supervision of all employees who handle or come into contact with isocyanates is recommended. Persons with history of respiratory disease or hypersensitivity should not be exposed to this product. 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.

Pre-employment and periodic medical examinations with respiratory function tests (FEV₁, FVC as a minimum) are suggested.

Toxicity test results: Not available for mixture. Results for components:

Components	Test Results
4,4'-Diphenylmethane Diisocyanate (MDI), CAS #: 101-68-8	<u>Acute Toxicity</u> Oral LD50 (Rat): >2,000 mg/kg (Directive 84/449/EEC, B.1) Dermal LD50 (Rabbit): >9,400 mg/kg Inhalation LC50 (Rat), 1hr: 2.0 mg/L (OECD Guideline 403) An aerosol was tested. Skin corrosion/irritation (Rabbit): irritating (Draize test) Serious eye damage/eye irritation (Rabbit): irritating (Draize test) Sensitization (guinea pig): sensitizing (Buehler test) (mouse): Can cause skin sensitization (Mouse Local Lymph Node Assay) <u>Chronic Toxicity</u> Repeated dose toxicity: Experimental/calculated data: (rat, inhalation) 2 yrs, 6 hr/day at 0, 0.2, 1, 6 mg/m ³ : olfactory epithelium; NOAEL: 0.2 mg/m ³ , LOAEL: 1 mg/m ³ Genetic toxicity: in vitro (Salmonella typhimurium): with and without metabolic activation ambiguous (OECD Guideline 471 Ames-test) / in vivo (rat): Inhalation negative (OECD Guideline 474 Micronucleus assay) Carcinogenicity: Experimental/calculated data (rat, inhalation) at 0, 0.2, 1, 6 mg/m ³ : Lung tumors (OECD Guideline 453) Teratogenicity: (rat, inhalation) at 0, 1, 4, 12 mg/m ³ : NOAEL Mat.: 4 mg/m ³ , NOAEL Teratog.: 4 mg/m ³ (OECD Guideline 414) - The substance did not cause malformations in animal studies; however, toxicity to development was observed at high doses that were toxic to the parental animals.

SECTION 12 – ECOLOGICAL INFORMATION

Ecotoxicity: By considering the production and use of the substance, it is unlikely that product is harmful to aquatic organisms, neither acutely nor chronically. Immiscible with water, but will react with water to produce inert and non-biodegradable solids. Conversion to soluble products, including diamino-diphenylmethane (MDA), is very low under the optimal laboratory conditions of good dispersion and low concentration. In air, the predominant degradation process is predicted to be a relatively rapid OH radical attack, based on calculation and analogy with related diisocyanates.

Persistence and degradability: Poorly biodegradable by OECD criteria. In contact with water the substance will hydrolyze slowly. After evaporation or exposure to the air, the product will be rapidly degraded by photochemical processes.

Bioaccumulative potential: No significant accumulation in organisms is expected.

Mobility in soil: Not expected.

Other adverse effects: No known significant effects or critical hazards.

Ecotoxicity test results: Not available for the mixture. Results for components:

Components	Test Results
4,4'-Diphenylmethane Diisocyanate (MDI) CAS #: 101-68-8	<u>Acute Toxicity</u> Fish: LC50, 96hrs: > 1,000 mg/L (OECD Guideline 203, static) LC50, 96hrs: 772.14mg/L (OECD Guideline 203, static) Aquatic invertebrates: EC50, 24hrs: > 1,000 mg/L (OECD Guideline 202, part 1, static) Aquatic plants: EC50, 72hrs: 1,640 mg/L (growth rate) (OECD Guideline 201, static) <u>Ecological Data</u> Activated sludge (EC50 aerobic bacteria from a domestic water treatment plant), 3hrs: >100 mg/L (OECD Guideline 209)

Elimination data
 Aerobic, activated sludge, 28days: 0 % BOD of the ThOD; Poorly biodegradable (OECD Guideline 302 C);
 Stability in Water (Hydrolysis): t_{1/2}: 20 hours (25 °C)
 Bioconcentration factor (common carp), 28days: 200 (OECD Guideline 305 E)

SECTION 13 – DISPOSAL CONSIDERATIONS

Product Disposal: The generation of waste should be avoided or minimized wherever possible. If product becomes a waste, it does not meet criteria of hazardous waste as defined in 40 CFR 261, Subpart C and D. Do not discharge into sewer system. Spill cleanup residues may still be subject to RCRA storage and disposal requirements. Dispose waste in compliance with local, state and federal regulations via licensed waste disposal contractor.

Container disposal: Even after emptying, container may retain residues. Empty containers should be completely drained and safely stored until appropriately reconditioned or disposed through licensed contractor in accordance with government regulations. This material and its container must be disposed of in a safe way.

SECTION 14 – TRANSPORT INFORMATION

Non-bulk:

Land transport, U.S. DOT: Non-regulated
 Sea transport, IMDG: Non-regulated
 Air transport, IATA/ICAO: Non-regulated

Bulk:

This product is regulated if the amount in an individual container exceeds the Product Reportable Quantity. 4,4'-Diphenylmethane Diisocyanate (MDI), RQ: 5,000 lbs; Product RQ: > 5,000 lbs

UN number: UN 3082
 UN proper shipping name: Other regulated substances, liquid, n.o.s. (contains 4,4'-Diphenylmethane Diisocyanate (MDI))
 Transport hazard classes: 9
 Packing group: III

Hazard Label



SECTION 15 – REGULATORY INFORMATION

U.S. Regulations:

OSHA HCS: This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29CFR 1910.1200.

TSCA Regulations:

All components of this product are listed or are exempt from TSCA Inventory requirements under 40 CFR 720.30.

EPCRA Section 302 (40 CFR Part 355) (Emergency Response Planning, Extremely Hazardous Substance):

No components are subject to the reporting.

EPCRA Section 304 (40 CFR Part 355) (Emergency Release Notification Requirements):

No components are subject to the reporting.

EPCRA Sections 311 & 312 (Hazardous Chemical Inventory Reporting, Hazard Categories):

Acute Health Hazard, Chronic Health Hazard

EPCRA Section 313 (40 CFR Part 372) (Toxic Chemical Release Inventory Reporting):

The following components are subject to the reporting:

- 4,4'-Diphenylmethane Diisocyanate (MDI), CAS #: 101-68-8: in Product: 40-70%; De Minimis: 1.0%

CERCLA Sections 102-103 (40 CFR Part 302) (Hazardous Substances Release Notification):

The following components are subject to the reporting:

- 4,4'-Diphenylmethane Diisocyanate (MDI): RQ: 5,000 lbs / Product RQ: >5,000 lbs

Clean Air Act:

- Ozone Depleting Substances (ODS): This product does not contain and is not manufactured with ozone depleting substances.
- Hazardous Air Pollutants, OSHA, Section 112(b), Table Z-1:

Substance	Regulatory Limits			Recommended Limits	
	OSHA PEL ppm	Cal/OSHA PEL mg/m ³	Cal/OSHA PEL 8-hour TWA, mg/m ³	NIOSH REL Up to 10-hour TWA, mg/m ³	ACGIH® 2015 TLV® 8-hour TWA, mg/m ³
4,4'-Diphenylmethane Diisocyanate, CAS #: 101-68-8	(C) 0.02	(C) 0.2	0.005 ppm	0.05 mg/m ³ (C) 0.2 mg/m ³ [10-min]	0.005 ppm

(C) Ceiling, (ST) STEL, ppm-parts per million

Clean Water Act:

- Section 307(a): (Priority Toxic Pollutants 40 CFR 401.15): No components are listed.
- Section 311(b)(2): Table 116.4A (Hazardous chemicals) / Table 117.3 (RQ): No components are listed.

NFPA rating: Health: 2 Fire: 1 Reactivity: 1 Special: ~~W~~
HMIS rating: Health: 2 Flammability: 1 Physical hazard: 1

State Regulations:

California Prop. 65 Components:

This product does not contain chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

Instruction: for regulatory information on components of this mixture, check the appropriate state websites.

International Regulations/Inventories:

Canada: All components of this product are listed or are exempt from the DSL.

WHMIS Classification (Controlled Products Regulations): Class D2A: Material causing other toxic effects (Very toxic).

WHMIS Label Information: Class D2B: Material causing other toxic effects (Toxic).



Europe, European Inventory of Existing Commercial Chemical Substances (EINECS): All components are listed or exempted.

Australia inventory (AICS): All components are listed or exempted.

China inventory (IECSC): All components are listed or exempted.

Japan inventory: All components are listed or exempted.

Korea inventory: All components are listed or exempted.

Malaysia Inventory (EHS Register): All components are listed or exempted.

New Zealand Inventory of Chemicals (NZIoC): All components are listed or exempted.

Philippines inventory (PICCS): All components are listed or exempted.

Taiwan inventory (CSNN): All components are listed or exempted

Brazil Regulations Classification system used: Norma ABNT-NBR 14725-2:2012

SECTION 16 – OTHER INFORMATION

LEGEND

GHS	Globally Harmonized System
CAS	Chemical Abstracts Services
EC	European Community
EPA	Environmental Protection Agency
OSHA	Occupational Safety and Health Administration
ACGIH	American Conference of Governmental Industrial Hygienists
NIOSH	National Institute of Occupational Safety and Health
PEL	Permissible Exposure Limits
TLV	Threshold Limit Value
REL	Recommended Exposure Limit
TWA	Time-Weighted Average
STEL	Short-term exposure limit
IARC	International Agency for Research on Cancer
NTP	National Toxicology Program
COD / BOD	Chemical Oxygen Demand / Biological Oxygen Demand
STOT, SE	Specific Target Organ Toxicity following Single Exposure
STOT, RE	Specific Target Organ Toxicity following Repeated Exposure
DOT	Department of Transportation
IMDG	International maritime dangerous goods code
IATA, ICAO	International Air Transport Association, International Civil Aviation Organization
TSCA	Toxic Substances Control Act
EPCRA	Emergency Planning and Community Right-to-Know Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
RQ	Reportable Quantity
DSL	Domestic Substance List
WHMIS	Workplace Hazardous Materials Information System

Latest revision date: May 13, 2016

Date of the previous revision: May 20, 2015 – Preparation of SDS in accordance to the GHS requirements

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 thereof.