

PRODUCT NAME(S): Bonding Agent 1K

SECTION 1 – IDENTIFICATION

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

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

Product name: Bonding Agent 1K
Chemical Name: MDI Prepolymer
Chemical Family: Aromatic Isocyanate
Product Category: Single Component Polyurethane Primer
Recommended use: Adhesive

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.
 CONTAINS LEAD COMPOUNDS.

Classification of the substance or mixture:

Hazard Class	Category	Hazard Statement Codes	Hazard Statements
Acute Toxicity, Oral	4	H302	Harmful if swallowed
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	1	H317	May cause an allergic skin reaction
Carcinogenicity	1A	H350	May cause cancer by inhalation and skin absorption
Reproductive Toxicity	1A	H360	May damage the unborn child
	2	H361	Suspected of damaging fertility
Specific target organ toxicity, single exposure	3	H335	May cause respiratory irritation
Specific target organ toxicity, repeated exposure	2	H373	May cause damage to lungs/respiratory system and olfactory organs through prolonged or repeated exposure by inhalation May cause damage to kidney, liver, blood, central and peripheral nervous system through prolonged or repeated exposure by skin absorption and inhalation
Aquatic Hazard, Acute	3	H402	Harmful to aquatic life
Aquatic Hazard, Chronic	3	H412	Harmful to aquatic life with long lasting effects

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.
	P260	Do not breathe the mist, vapors, spray.
	P271	Use only outdoors or in a well-ventilated area.
	P285	In case of inadequate ventilation wear respiratory protection.
	P270	Do not eat, drink, and smoke when using this product.
	P264	Wash exposed area with plenty of water and soap thoroughly after handling.
	P272	Contaminated work clothing should not be allowed out of the workplace.

	P273	Avoid release to the environment.
Response:	P301 + P330 + P312	IF SWALLOWED: Rinse mouth. Call a POISON CENTER or doctor/physician if you feel unwell.
	P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
	P362	Take off contaminated clothing and wash before reuse.
	P333 + P311	If skin irritation or rash occurs: Call a POISON CENTER or doctor/physician.
	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 + P311	If eye irritation persists: Call a POISON CENTER or doctor/physician.
	P304 + P340	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.
	P308 + P311	IF exposed or concerned: Call a POISON CENTER or doctor/physician.
Storage:	P403 + P233 P405	Store in a well-ventilated place. Keep container tightly closed. 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: Not known.

SECTION 3 – COMPOSITION / INFORMATION ON INGREDIENTS

Components	CAS #	EC #	Concentration, %
MDI/ polypropylene glycol prepolymer	53862-89-8	Not available	30 - 60
4,4'-Diphenylmethane Diisocyanate (MDI)	101-68-8	202-966-0	10 - 30
Confidential Component 1	Trade Secret	Trade Secret	10 - 30
2,4'-Diphenylmethane Diisocyanate (MDI)	5873-54-1	227-534-9	5 - 15
Polymeric Diphenylmethane Diisocyanate	9016-87-9	618-498-9	5 - 15
Confidential Component 2	Trade Secret	Trade Secret	5 - 10
Lead sulfochromate yellow (C.I. Pigment Yellow 34)			
Contains: Lead Chromate, CAS #: 7758-97-6	1344-37-2	215-693-7	0.5 - 2
Lead Sulfate, CAS #: 7446-14-2			

SECTION 4 – FIRST-AID MEASURES

Description of First Aid measures:

- Inhalation:** Remove the exposed person to fresh air and keep at rest in a position comfortable for breathing. If experiencing respiratory symptoms, call a POISON CENTER or doctor/physician. 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. Lead can be absorbed through the skin. For severe exposures, immediately get under safety shower and begin rinsing. If skin irritation or rash occurs: Call a POISON CENTER or doctor/physician.
- 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 recommended.
- Ingestion:** Immediate medical attention required. Remove exposed person to fresh air and keep at rest in a position comfortable for breathing. Remove dentures if any. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. If the exposed person is conscious, rinse mouth thoroughly with water. If hospital is more than 15 minutes away, induce vomiting and give water to drink. The head should be kept low so that vomit does not enter the lungs. Never induce vomiting or give anything by mouth if the victim is unconscious or having convulsions.

Most important symptoms/effects, acute and delayed: 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: Treatment should be symptomatic (decontamination, vital functions); administer chelate formers. The presence of Lead in the body can be detected by determining its amount in the blood and/or urine. Medical monitoring is necessary.

- Inhalation: This product is a respiratory sensitizer. An individual having a pulmonary sensitization reaction to this material should be removed from further exposure to any diisocyanate.
- Skin: This product is a skin sensitizer. An individual having a skin sensitization reaction to this material should be removed from further exposure to any diisocyanate. Treat symptomatically as for contact dermatitis or thermal burn.
- 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.
- Ingestion: This product contains Lead Chromate at level < 2%. Acute poisoning can lead to muscle weakness, "lead line" on the gums, metallic taste, loss of appetite, insomnia, dizziness, high lead levels in blood and urine, with shock, coma and death in extreme cases.

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, removed from the danger area. Exposure to heated diisocyanate can be extremely dangerous. Reaction between water and hot isocyanate may be vigorous. In the case of fire, product will decompose to emit toxic and irritating gasses. Hazardous Combustion products: carbon and nitrogen oxides, amines, hydrogen cyanide, lower molecular weight organic molecules, heavy metal oxides.

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.

Prevent entering of spillage into soil, ditches, sewers, waterways and/or groundwater. 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; spilled material may cause a slipping hazard.

Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. Inform the relevant authorities if the product has caused environmental pollution. See Section 12 for more details.

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.

Released: May 18, 2016

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.

For minor spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly with soap and water to remove residual contamination.

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: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Observe good industrial hygiene practices. See Section 8 for additional information on hygiene measures.

Protect chemical from atmospheric moisture. Avoid prolonged exposure to heat and air. Keep away from sources of ignition. Do not resealed if contamination is suspected.

Use adequate ventilation to keep airborne levels below the exposure limits. Do not breathe 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. 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.

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.

SECTION 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION

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

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:

Impervious gloves (nitrile butyl rubber, neoprene and PVC) should be worn always when working with this product. 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.

Released: May 18, 2016

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:	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:	>110°C (>230°F), Closed cup
Evaporation rate:	Negligible
Flammability (solid, gas):	Not available
Upper/ lower flammability or explosive limits:	Not available
Vapor pressure:	~ 0.00001 mmHg @ 25°C (77°F)
Vapor density:	Not applicable
Relative density:	1.10 – 1.20 @ 25°C (77°F)
Solubility (water):	Insoluble
Partition coefficient n-octanol/water:	Not applicable
Auto-ignition temperature:	> 600°C
Decomposition temperature:	Not available
Viscosity:	400 – 600 @ 25°C (77°F)

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 alloys.

Hazardous decomposition products: Under normal conditions of storage and use, hazardous decomposition products should not be produced. In fire conditions, depending on temperature, air supply and presence of other materials, decomposition products can include, but are not limited to carbon and nitrogen oxides, amines, hydrogen cyanide, lower molecular weight organic molecules, heavy metal oxides. 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: Danger of very serious irreversible effects if swallowed. Adverse symptoms may include headache, dizziness, digestive disorders, nausea, vomiting, chest pain, difficulty breathing, lung congestion, effects on the brain, paralysis, convulsions.

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. Lead may be absorbed through skin and affect body vital organs.

Serious eye damage / eye irritation:

Causes serious eye irritation. 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:

May cause sensitization by skin contact and by inhalation.

- 4,4'-Diphenylmethane Diisocyanate (MDI), CAS #: 101-68-8: skin and respiratory sensitizer.
- Chromium (VI) Compounds, CAS #: 18540-29-9: skin sensitizer.

Reported to be a respiratory and skin sensitizer in humans. 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:

Although not classified by GHS as mutagenic, risk to humans is not excluded.

- 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.
- Lead Sulfochromate Yellow, CAS #: 1344-37-2:
Exposure has been reported to cause chromosome aberrations in humans, rats, and monkeys; results of human studies are mixed. Varying results of genotoxicity tests with lead and its compounds may be due to differing solubilities, different specificities of the tests or possible indirect genotoxic mechanisms. The potential genotoxicity of lead remains unclear.

Carcinogenicity:

This product contains components that are reported to be carcinogenic to humans by IARC:

- 4,4'-Diphenylmethane Diisocyanate (MDI), CAS #: 101-68-8: IARC: Group 3 (Not Classifiable as Human Carcinogen)
- Lead Sulfochromate Yellow, CAS #: 1344-37-2: IARC: Group 1 (Carcinogenic to humans)

Reproductive toxicity:

This product contains components which may impair fertility and cause harm to the unborn child.

- Lead Sulfochromate Yellow, CAS #: 1344-37-2: May damage the unborn child. Suspected of damaging fertility. May cause harm to the unborn child. It can affect reproduction in males and females, and affects neurodevelopmental milestones in children with both prenatal and postnatal exposure. May be excreted in breast milk.
- Isocyanates: 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:

- Isocyanates: Respiratory system, lungs, olfactory epithelium after repeated inhalation.
- Lead Sulfochromate Yellow, CAS #: 1344-37-2: Immune system, cardiovascular system, bone marrow, central and peripheral nervous system, kidney, liver.

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 (FEV, FVC as a minimum) are suggested. Lead Sulfochromate Yellow: Cardiovascular disorders (heart disease, anemia), central and peripheral nerve disease, abdominal cramps, convulsions, liver and kidney impairment, respiratory and skin disorders.

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

Components	Test Results
4,4'-Diphenylmethane Diisocyanate (MDI), CAS #: 101-68-8	Acute Toxicity 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) Chronic Toxicity Sensitization (guinea pig): sensitizing (Buehler test)

	<p>(mouse): Can cause skin sensitization (Mouse Local Lymph Node Assay) Germ cell mutagenicity: 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/m³: Lung tumors (OECD Guideline 453) Reproductive toxicity: Teratogenicity: (rat, inhalation) at 0, 1, 4, 12 mg/m³: NOAEL (Maternal): 4 mg/m³, NOAEL (Teratogenicity): 4 mg/m³ (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. STOT, RE: Experimental/calculated data: (rat, inhalation) 2 yrs, 6 hr/day at 0, 0.2, 1, 6 mg/m³: olfactory epithelium; NOAEL: 0.2 mg/m³, LOAEL: 1 mg/m³</p>
Confidential Component 1, CAS #: Trade secret	<p><u>Acute Toxicity</u> Oral LD50 (Rat): >5,000 mg/kg (OECD Test Guideline 401) Dermal LD50 (rabbit): >2,000 mg/kg (OECD Test Guideline 402) Skin corrosion/irritation (Rabbit): not irritant (Draize test) Serious eye damage/eye irritation (Rabbit): irritating (OECD Test Guideline 405) (Draize test) STOT, SE: not classified as specific target organ toxicant <u>Chronic toxicity</u> Respiratory or skin sensitization: not sensitizing (Patch test on human volunteers) Germ cell mutagenicity: Did not show mutagenic effects in animal experiments. Carcinogenicity: Did not show carcinogenic effects in animal experiments. Dermal (mouse, male), 104 weeks/2 times a week, dose: 0, 50 ul/application NOAEL: 50 ul/application Reproductive toxicity: Did not show teratogenic effects in animal experiments. Effects on fertility: No data available; Effects on fetal development: Oral (Rat), Duration of Single Treatment: 10 days: Dose: 0, 1000, 3000, 5000 mg/kg/day; General Toxicity: Maternal: NOAEL: 1,000 mg/kg body weight; Teratogenicity: NOAEL: > 5,000 mg/kg body weight; Developmental Toxicity: NOAEL: > 5,000 mg/kg body weight; Symptoms: Maternal toxicity, Reduced body weight. No teratogenic effects. STOT, RE: Inhalation (Rat, male and female) 13weeks /5days a week /6hrs a day: Dose: 0, 100, 500, 1000 mg/m³; NOAEL: 100 mg/m³. Symptoms: eye irregularities, causes serious eye irritation.</p>
Lead Sulfochromate Yellow (C.I. Pigment Yellow 34), CAS #: 1344-37-2	<p>Considering that contains both, lead and hexavalent chromium, lead chromate is very toxic. <u>Acute toxicity</u> Oral LD50 (Mouse): >12,000 mg/kg Dermal LD50: No data available; Inhalation LC50: No data available Intraperitoneal LD75 (Guinea pig): 156 mg/kg Skin corrosion/irritation: mild irritation Serious eye damage/eye irritation: mild irritation STOT, SE: Based on the available information there is no specific target organ toxicity to be expected after a single exposure. Aspiration hazard: Not an aspiration hazard <u>Chronic toxicity</u> Sensitization: No data available for product itself, however, Chromium (VI) Compounds are considered to be a skin sensitizer. Germ cell mutagenicity: The substance was mutagenic in various test systems with microorganisms and cell cultures; however, these results could not be confirmed in tests with mammals. Carcinogenicity: IARC: Group 1 (Carcinogenic to Humans); NTP: Known Human Carcinogen; ACGIH: Group A2 (Suspected Human Carcinogen) Evidence for carcinogenicity in several studies with rats after subcutaneous and intramuscular administration. Lead chromate induced both benign and malignant tumours at the site of injection and, in one study, renal carcinomas. The animal studies are supported by epidemiological studies demonstrating an increased frequency of lung cancer among workers involved in production of chromate pigments. Results of epidemiologic studies of chromium-exposed workers are consistent across investigators and study populations. Dose-response relationships have been established for chromium exposure and lung cancer. Sufficient animal and human data. Reproductive toxicity: The results of animal studies suggest a fertility impairing effect. The substance caused malformations/developmental toxicity in laboratory animals. Lead salts have been reported to cross the placenta and to induce embryo- and feto- mortality. No teratogenic effects have been reported with exposure to organometallic lead compounds. STOT, RE: Excessive exposure may cause damage to the kidney, liver, blood, central and peripheral nervous system and digestive system. Information on: lead compounds: The substance can accumulate in the body. Proportions of the substance dissolve in hydrochloric acid at gastric acid concentration. Long term exposure to high concentrations of heavy metals can lead to an inhibition of hemoglobin biosynthesis which results in anemia, as well as to other effects. If left untreated, neuromuscular dysfunction, possible paralysis, and encephalopathy can result. Additional symptoms of exposure include: joint and muscle pain, weakness of the extensor muscles (frequently the hand and wrist), headache, dizziness, abdominal pain, diarrhea, constipation, nausea, vomiting, blue line on the gums, insomnia, and metallic taste. High body levels produce increased cerebrospinal pressure, brain damage, and stupor leading to coma and often death. Oral (Dog): 11,250 mg/kg/90days; Effects: involuntary movements; kidney, ureter, bladder; death Administration of lead chromate to rats via whole body inhalation (5.3 ± 0.8 mg CrVI /m³, 4 hours per day for 1 to 4 days) led to the accumulation of both chromium and lead chromate in the lungs. The chromium concentration in urine and feces were significantly increased following administration, whereas both chromium and lead concentrations in blood were only slightly elevated (above 5 µg/L for chromium) (Bragt et al. 1990). In addition, a short-term study in male rats showed that lead did not migrate from polypropylene plastic coloured with lead chromate-molybdate following oral administration (Gage and Litchfield 1967). Investigations employing other routes of administration, including intratracheal injection, instillation and infusion to the tracheal lobe bronchus, of lead chromate or lead paint resulted in increased lead and chromium levels in various tissues and retention in the lungs. It was recently shown that the particulate forms of Cr(VI), rather than the water soluble ones, were the potent carcinogens. Workers in a plastic production plant exposed to dust containing various chemicals, including lead and lead chromate, had significantly increased chromium levels in their urine samples. Their blood lead levels were also significantly increased, but not their serum chromium levels. Limited data from the bioavailability studies in experimental animals and observations in occupationally exposed humans suggest that lead chromate and its derived pigments have some level of bioavailability and absorption after exposure. In addition, although genotoxicity of the pigment or lead chromate is generally more pronounced after dissolution in acid or base, positive results were also obtained in aqueous media. However, encapsulation of the pigment has been shown to reduce bioavailability and genotoxicity in some studies.</p>

SECTION 12 – ECOLOGICAL INFORMATION

Ecotoxicity: Harmful to aquatic life with long lasting effects.

Isocyanates are 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.

Lead Sulfochromate Yellow is very toxic to aquatic life with long lasting effects.

Released: May 18, 2016

Persistence and degradability: Not readily 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. Lead Sulfochromate Yellow is insoluble in water and it can be separated mechanically in suitable effluent treatment plants. Heavy metals are eliminated from water by chemical flocculation.

Bioaccumulative potential: Contains heavy metals. Prevent release into environment. Special treatment required.

Mobility in soil: Not expected.

Other adverse effects: Not available.

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

Components	Test Results
Diphenylmethane-4,4'-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) <u>Elimination data</u> 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)
Confidential Component 1, CAS #: Trade secret	<u>Acute Toxicity</u> Fish: (Carp), LC50, 96hrs: >1,000 mg/L (OECD Guideline 203, semi-static) Aquatic invertebrates (daphnia magna), EC50, 48hrs: >1,000 mg/L (OECD Guideline 202) Aquatic plants (algae), EC50, 72hrs: >900 mg/L (growth rate) (OECD Guideline 201, static) Microorganisms (bacteria), EC10, 16hrs: 7,400 mg/L (DIN 38 412 Part 8) 12.2 <u>Ecological Data</u> Persistence and degradability: (Activated sludge, domestic), at 20 mg/L Biodegradation: >90% in 29days (aerobic): Readily biodegradable Bioaccumulation: Bioconcentration factor (BCF): 3.0; Remarks: Bioaccumulation is unlikely. Partition coefficient: n-octanol/water: log Pow: -0.41 Mobility in soil: Not expected to adsorb on soil.
Lead Sulfochromate Yellow (C.I. Pigment Yellow 34), CAS #: 1344-37-2	<u>Acute Toxicity</u> Fish: LC50 (Rainbow Trout), 96hrs: 1,000 mg/L Aquatic invertebrates: EC50 (Daphnia magna), 48hrs: >100 mg/L Aquatic Plants: EC50 (algae), 72hrs: >100 mg/L <u>Chronic toxicity:</u> The product has not been tested. The statement has been derived from substances/products of a similar structure or composition. Fish (fathead minnow): NOEC: 1 mg/L (Flow through). Aquatic invertebrates (Daphnia magna), 21days: NOEC: 0.7 mg/L (OECD Test Guideline 211, semistatic). <u>Ecological Data:</u> Persistence: considered persistent because both, the lead and the chromate ions are considered infinitely persistent (cannot degrade any further). Biodegradability: The product is virtually insoluble in water and can thus be separated from water mechanically in suitable effluent treatment plants. Heavy metals can be dissolved by liquids containing acids or alkalies. Must be eliminated from water by chemical flocculation. Inorganic product which cannot be eliminated from water by biological purification processes. Bioaccumulative potential: Significant accumulation in organisms is not to be expected. The product contains heavy metals: Lead, Chromium(VI). Prevent release into the environment. Special pretreatment required. Mobility in soil: Adsorption to solid soil phase is expected. Results of PBT and vPvB assessment: Not applicable for inorganic substances.

SECTION 13 – DISPOSAL CONSIDERATIONS

Product Disposal: The generation of waste should be avoided or minimized wherever possible. If product becomes a waste, it meets 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.

Unlisted hazardous wastes characteristic of toxicity: Chromium: RCRA Code: D007. RQ: 10 lbs
 Lead: RCRA Code: D008. RQ: 10 lbs


Additional Instructions for D007 and D008: Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level (5.0 mg/L).

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 regulation. 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) and Lead sulfochromate yellow)
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.

Note: Contains TSCA Flag S Substance (Identified in a Proposed or Final SNUR (Significant New use Rule) under TSCA)

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 the subject for reporting:

○ 4,4'-Diphenylmethane Diisocyanate (MDI), CAS #: 101-68-8:	in Product: 10-30%	DeMinimis: 1.0%
○ Polymeric Diphenylmethane Diisocyanate (pMDI), CAS #: 9016-87-9:	in Product: 5-15%	DeMinimis: 1.0%
○ Chromium Compounds, N090, Chromium (VI) Compounds:	in Product: 0.5-2%	DeMinimis: 0.1%
○ Lead Compounds, N420:	in Product: 0.5-2%	DeMinimis: *

* - There are no DeMinimis levels for PBT chemicals, except for supplier notification purposes.

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

The following components are subject to the reporting if reportable quantity is reached:

○ 4,4'-Diphenylmethane Diisocyanate (MDI), CAS #: 101-68-8:	RQ: 5,000 lbs	Product RQ: >5,000 lbs
○ Chromium Compounds, N090	RQ: Not assigned.	
○ Lead Compounds, N420	RQ: Not assigned.	

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: The following components are listed:

Substance	Regulatory Limits			Recommended Limits	
	OSHA PEL	Cal/OSHA PEL	NIOSH REL	ACGIH® 2015 TLV [®]	
	ppm	mg/m ³	8-hour TWA, mg/m ³	Up to 10-hour TWA, mg/m ³	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
Chromium (VI) Compounds, CAS #: 18540-29-9	-	-	0.005 as Cr (C) 0.1	Ca; 0.001 See Appendix A & C	0.05 water soluble (includes chromic acid & chromates)
Lead Inorganic (as Pb), CAS #: 7439-92-1	-	-	0.05 See Section 5198	0.05; See Appendix C	0.05

ppm-parts per million; (C) – Ceiling; Ca - Potential occupational carcinogens; Appendix A, C and D refers to Appendixes of HAP List, Section 112(b) of Clean Air Act

Clean Water Act:

- Section 307(a): (Priority Toxic Pollutants 40 CFR 401.15)
 - Chromium and Compounds
 - Lead and Compounds
- Section 311(b)(2): Table 116.4A (Hazardous chemicals) / Table 117.3 (RQ):
 - Lead Sulfate, CAS #: 7446-14-2
- Safe Drinking Water Act:
 - Lead Compounds (N420)

Resource Conservation and Recovery Act (RCRA):

○ Chromium Compounds	D007	RQ: 10 lbs
○ Lead Compounds	D008	RQ: 10 lbs

NFPA rating: Health: 3 Fire: 1 Reactivity: 1 Special: ~~W~~
HMIS rating: Health: 3* Flammability: 1 Physical hazard: 1

Released: May 18, 2016

Preparations with more than 0.15% total lead content must include "Contains lead. Should not be used on surfaces liable to be chewed or sucked by children" on classification, packaging and labeling documents. C.I. Pigment Red 104 and Yellow 34 are not permitted for use in toys or children's products.

State Regulations:

California Prop. 65 Components:

This product contains chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

- Chromium (VI) Compounds, CAS #: 18540-29-9
 - causes cancer; Date listed: February 27, 1987
 - developmental (female, male); Date listed: December 19, 2008
- Lead and Lead compounds, CAS #: -
 - causes cancer; Date listed: October 1, 1992

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.

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
PACs / PAH	Polycyclic Aromatic Compounds / Polycyclic Aromatic Hydrocarbon Content
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
TQ	Threshold Quantity
TPQ	Threshold Planning Quantity
EHS	Extremely Hazardous Substances
DSL	Domestic Substance List
WHMIS	Workplace Hazardous Materials Information System

Latest revision date: May 18, 2016

Date of the previous revision: April 21, 2016 – 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.