1. Identification of the Substance/Preparation and of the Company/Undertaking

**Product Identifier**

**Product name**
EMCRETE A

**Other Means of Identification**

**Product Code**
EMCRETE A

**UN/ID no**
UN3082

None

FOR INDUSTRIAL USE ONLY. This product contains isocyanates. Restrictions on use: Do not use this product for any use other than intended

**Manufacturer Address**
EMSEAL Joint Systems, Ltd.
25 Bridle Lane
Westborough, MA 01581 USA

**Company Phone Number**
508-836-0280 (9AM - 5PM EST) (M-F)

**Emergency Telephone**
Chemetrec 1-800-424-9300 (24 Hours)

**Chemtrec International Phone**
+1 703-527-3887

2. Hazards Identification

**Classification**

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS). This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).

<table>
<thead>
<tr>
<th>Hazard Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute toxicity - Inhalation (Dusts/Mists)</td>
<td>Category 4</td>
</tr>
<tr>
<td>Skin corrosion/irritation</td>
<td>Category 2</td>
</tr>
<tr>
<td>Serious eye damage/eye irritation</td>
<td>Category 2</td>
</tr>
<tr>
<td>Respiratory sensitization</td>
<td>Category 1</td>
</tr>
<tr>
<td>Skin sensitization</td>
<td>Category 1</td>
</tr>
<tr>
<td>Specific target organ toxicity (single exposure)</td>
<td>Category 3</td>
</tr>
<tr>
<td>Specific target organ toxicity (repeated exposure)</td>
<td>Category 2</td>
</tr>
</tbody>
</table>

**EMERGENCY OVERVIEW**

**DANGER**

**Hazard Statements**
Harmful if inhaled
Causes skin irritation
Causes serious eye irritation
May cause allergy or asthma symptoms or breathing difficulties if inhaled
May cause an allergic skin reaction
May cause respiratory irritation
May cause damage to organs through prolonged or repeated exposure

Precautionary Statements - Prevention
Use only outdoors or in a well-ventilated area
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves, protective clothing, eye protection, face protection
In case of inadequate ventilation wear respiratory protection
Contaminated work clothing should not be allowed out of the workplace
Do not breathe dust, fumes, or vapors

Precautionary Statements - Response
Get medical advice/attention if you feel unwell
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
IF ON SKIN: Wash with plenty of soap and water
Take off contaminated clothing and wash before reuse
If skin irritation or rash occurs: Get medical advice/attention
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician

Precautionary Statements - Storage
Store in a well-ventilated place. Keep container tightly closed
Store locked up

Precautionary Statements - Disposal
Dispose of contents/container in accordance with local/regional/international regulations

Hazards Not Otherwise Classified (HNOC)

Other Information
No information available

3. Composition/Information on Ingredients

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No</th>
<th>Weight-%</th>
<th>Trade secret</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polymethylene polyphenyl polyisocyanate</td>
<td>9016-87-9</td>
<td>30 - 70</td>
<td>*</td>
</tr>
<tr>
<td>4,4’-METHYLENEBIS(PHENYL ISOCYANATE)(mixed isomers)</td>
<td>26447-40-5</td>
<td>30 - 70</td>
<td>*</td>
</tr>
</tbody>
</table>

* The exact percentage (concentration) of composition may have been withheld as a trade secret.

4. First Aid Measures
FIRST AID MEASURES

General Advice
In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible).

Eye Contact
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Do not rub affected area. Immediate medical attention is required.

Skin Contact
Remove material from skin immediately. IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. Get medical attention if irritation develops and persists.

Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If symptoms persist, call a physician. If breathing has stopped, give artificial respiration. Get medical attention immediately.

Ingestion
If swallowed, call a poison control center or physician immediately. Do NOT induce vomiting. Never give anything by mouth to an unconscious person.

Self-Protection of the First Aider
First Aider: Pay attention to self-protection. Use personal protective equipment as required. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Avoid contact with skin, eyes or clothing.

Most Important Symptoms and Effects, Both Acute and Delayed

Symptoms
Respiratory tract irritation and mucous membrane irritation. Symptoms include eye and nose irritation, dry or sore throat, runny nose, shortness of breath, wheezing and laryngitis. Coughing and chest pain or tightness may also occur, frequently at night. These symptoms may occur during exposure or may be delayed several hours. Exposure to isocyanates can cause difficulty breathing or asthmatic reaction. Irritation to eye tissue. Tingling, irritation or redness of the skin. If ingested, irritation of the tissues of the mouth, throat and digestive tract. Other symptoms include headache, shortness of breath, nausea, vomiting, burning sensation in the mouth, abdominal pain and vomiting. Onset of symptoms may be delayed.

Indication of Any Immediate Medical Attention and Special Treatment Needed

Note to Physicians
May cause sensitization by inhalation and skin contact. Treat symptomatically. SYMPTOMS MAY BE DELAYED.

5. Fire-Fighting Measures

Suitable Extinguishing Media
Carbon dioxide, dry chemical powder, foam, water fog or fine spray. Alcohol resistant foams are preferred for large fires. Use water spray to cool fire-exposed containers

Unsuitable Extinguishing Media
Exercise caution when using water; water contamination of product will generate CO2 gas.

Specific Hazards Arising From the Chemical
During a fire products of combustion be toxic or irritating. See Section 10 for more information. Reacts vigorously with water above 50°C. Closed containers may rupture when heated. Polymeric MDI decomposes rapidly above 204°C.

Hazardous Combustion Products
Irritating or toxic substances may be emitted upon burning, combustion or decomposition. See Section 10 Hazardous Decomposition Products for additional information.

Explosion Data

Sensitivity to Mechanical Impact
None.

Sensitivity to Static Discharge
None.
Protective Equipment and Precautions for Firefighters

Firefighters should wear full protective gear including self-contained breathing apparatus when fighting chemical fires. Fight fire from protected location or a safe distance. When using water care must be taken since the reaction between water and hot isocyanates can be vigorous.

6. Accidental Release Measures

Personal Precautions, Protective Equipment and Emergency Procedures

Personal Precautions
Use personal protection recommended in Section 8. Do not touch or walk through spilled material. Ensure adequate ventilation, especially in confined areas. Extremely slippery when spilled. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).

Environmental Precautions

Environmental Precautions
Do not allow into any sewer, on the ground or into any body of water. See Section 12 for additional Ecological Information.

Methods and Material for Containment and Cleaning Up

Methods for Containment
Prevent further leakage or spillage if safe to do so.

Methods for cleaning up
Pick up and transfer to properly labeled containers.

7. Handling and Storage

Precautions for Safe Handling

Advice on Safe Handling
Do not breathe dust, fumes, or vapors. Avoid contact with skin and eyes. Handle in accordance with good industrial hygiene and safety practice. Use personal protection recommended in Section 8. Do not use with incompatible materials such as amines, alcohols, acids, bases, metal compounds, surfactants and water which may react vigorously and/or violently. Do not eat, drink or smoke when using this product. Keep away from heat/sparks/open flames/hot surfaces. — No smoking.

Conditions for Safe Storage, Including any Incompatibilities

Storage Conditions
Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity). Protect from direct sunlight. Protect from moisture. Do not reuse container.

Incompatible Materials
Water - Reacts slowly, forming carbon dioxide and inert material comprised of polyureas which could rupture closed containers. Toxic intermediate chemicals can be formed in this reaction. Amines, Alcohols, Acids, Bases, - May react violently with generation of heat. Metal compounds may polymerize with the generation of heat and pressure. Amides, phenols, mercaptans, urethanes, ureas and surface active compounds - May react vigorously or violently with the generation of heat.

8. Exposure Controls/Personal Protection

Control Parameters

Exposure Guidelines
This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACtH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,4'-METHYLENEBIS(PHENYLISOCYANATE)(mixed isomers) 26447-40-5</td>
<td>-</td>
<td>Ceiling: 0.02 ppm Ceiling: 0.2 mg/m³</td>
<td>-</td>
</tr>
</tbody>
</table>

Appropriate Engineering Controls
Engineering Controls

Local exhaust ventilation may be necessary when operations generate airborne concentrations of this material. If engineering controls and work practices are not effective in controlling exposure to this material, then wear suitable personal protective equipment including approved respiratory protection.

Individual Protection Measures, Such As Personal Protective Equipment

Eye/Face Protection
Wear safety glasses with side shields (or goggles). Face protection shield.

Skin and Body Protection
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Wear protective nitrile rubber gloves.

Respiratory Protection
If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

General Hygiene Considerations
Handle in accordance with good industrial hygiene and safety practice. When using do not eat, drink or smoke. Wash face, hands and any exposed skin thoroughly after handling. Take off all contaminated clothing and wash it before reuse.

9. Physical and Chemical Properties

<table>
<thead>
<tr>
<th>Information on Basic Physical and Chemical Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Property</strong></td>
</tr>
<tr>
<td>Physical State</td>
</tr>
<tr>
<td>Appearance</td>
</tr>
<tr>
<td>Color</td>
</tr>
<tr>
<td>Odor</td>
</tr>
<tr>
<td>Odor Threshold</td>
</tr>
<tr>
<td><strong>Property</strong></td>
</tr>
<tr>
<td>pH</td>
</tr>
<tr>
<td>Melting Point/Freezing Point</td>
</tr>
<tr>
<td>Boiling Point/Boiling Range</td>
</tr>
<tr>
<td>Flash Point</td>
</tr>
<tr>
<td>Evaporation Rate</td>
</tr>
<tr>
<td>Flammability (Solid, Gas)</td>
</tr>
<tr>
<td>Flammability Limits in Air</td>
</tr>
<tr>
<td>Upper Flammability Limits</td>
</tr>
<tr>
<td>Lower Flammability Limit</td>
</tr>
<tr>
<td>Vapor Pressure</td>
</tr>
<tr>
<td>Vapor Density</td>
</tr>
<tr>
<td>Specific Gravity</td>
</tr>
<tr>
<td>Water Solubility</td>
</tr>
<tr>
<td>Solubility in Other Solvents</td>
</tr>
<tr>
<td>Partition Coefficient</td>
</tr>
<tr>
<td>Autoignition Temperature</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
</tr>
<tr>
<td>Kinematic Viscosity</td>
</tr>
<tr>
<td>Dynamic Viscosity</td>
</tr>
<tr>
<td>Explosive Properties</td>
</tr>
<tr>
<td>Oxidizing Properties</td>
</tr>
</tbody>
</table>

10. Stability and Reactivity
Reactivity
No data available.

Chemical Stability
Stable under recommended storage conditions.

Possibility of Hazardous Reactions
Polymeric MDI may undergo uncontrolled exothermic polymerization upon contact with incompatible materials of if heated above 170-204°C. The resulting pressure build up could rupture closed containers. May cause some corrosion to copper alloys and aluminum.

Conditions to Avoid

Incompatible Materials
Water - Reacts slowly, forming carbon dioxide and inert material comprised of polyureas which could rupture closed containers. Toxic intermediate chemicals can be formed in this reaction. Amines, Alcohols, Acids, Bases. - May react violently with generation of heat. Metal compounds may polymerize with the generation of heat and pressure. Amides, phenols, mercaptans, urethanes, ureas and surface active compounds - May react vigorously or violently with the generation of heat.

Hazardous Decomposition Products
Carbon monoxide, Carbon Dioxide (CO2), Nitrogen oxides (NOx), Hydrogen cyanide, 4,4'-Methylene dianiline can be formed by reaction of MDI with water. Thermal decomposition can lead to release of toxic/corrosive gases and vapors.

11. Toxicological Information

Information on Likely Routes of Exposure

Inhalation
Airborne exposures are unlikely to occur unless product is heated or forms an aerosol or mist during pouring, frothing or spraying operations. Polymeric MDI has an extremely low vapor pressure and it is difficult to achieve vapor concentrations necessary for inhalation toxicity testing. The desired vapor concentrations can only be obtained by heating the Polymeric MDI source. Some people may become sensitized to MDI, causing allergy or asthma symptoms or breathing difficulties if inhaled. High aerosol concentrations could cause inflammation of the lung tissue (chemical pneumonitis), chemical bronchitis with severe asthma-like wheezing, severe coughing spasms and accumulation of fluid in the lungs (pulmonary edema), which could be fatal. Symptoms of pulmonary edema may not appear until several hours after exposure and are aggravated by physical exertion.

Eye Contact
May cause irritation.

Skin Contact
May cause irritation. Isocyanates can cause skin discoloration (staining) and hardening of the skin after repeated exposures. Skin sensitization, resulting in dermatitis, may occur in some individuals. Cured material may be difficult to remove from skin.

Ingestion
Not an expected route of exposure. Swallowing may result in irritation and corrosion of the mouth, throat and digestive tract.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Oral LD50 (Rat)</th>
<th>Dermal LD50 (Rabbit)</th>
<th>Inhalation LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyurethane</td>
<td>49 g/kg (Rat)</td>
<td>&gt;9400 mg/kg (Rabbit)</td>
<td>= 490 mg/m³ (Rat) 4 h</td>
</tr>
<tr>
<td>Polyisocyanate</td>
<td>9016-87-9</td>
<td>&gt;7400 mg/kg (Rat)</td>
<td>= 0.369 mg/L (Rat) 4 h</td>
</tr>
<tr>
<td>4,4'-METHYLENEDIISOPHENYL</td>
<td>26447-40-5</td>
<td>&gt;6200 mg/kg (Rabbit)</td>
<td></td>
</tr>
</tbody>
</table>

Information on toxicological effects
No information available.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Sensitization
May cause sensitization by inhalation and skin contact. Isocyanates are known to be strong sensitizers.
Germ Cell Mutagenicity
No information available.

Carcinogenicity
This material does not contain any component that is considered a human carcinogen by IARC (International Agency for Research on Cancer), ACGIH (American Conference of Governmental Industrial Hygienists), OSHA or NTP (National Toxicology Program). IARC has concluded that Polymeric MDI and MDI are not classifiable as to their carcinogenicity to humans (Group 3).

Chemical Name | ACGIH | IARC | NTP | OSHA
--- | --- | --- | --- | ---
Polyurethane 9016-87-9 | | Group 3 | | |
4,4’-METHYLENEBIS(PHENYL ISOCYANATE)(mixed isomers) 26447-40-5 | | Group 3 | | |

**IARC (International Agency for Research on Cancer)**
Group 3 - Not classifiable as to its carcinogenicity to humans

**Reproductive Toxicity**
No information available.

**STOT - Single Exposure**
No information available.

**STOT - Repeated Exposure**
Causes damage to organs through prolonged or repeated exposure if inhaled. May cause disorder and damage to the Respiratory System.

**Chronic Toxicity**
Polymeric MDI is a severe respiratory irritant. Long-term, low-level exposure could cause severe, permanent respiratory impairment. Respiratory sensitization can develop in people working with Polymeric MDI or its main component Methylene diphenyl diisocyanate (MDI). Sensitized people react to very low levels of MDI (as low as 0.0014 ppm) that have no effect on unsensitized people. Symptoms mimic a cold, hay fever or the flu and may occur immediately upon exposure or may be delayed. MDI and other isocyanates may also cause hypersensitivity pneumonitis, another allergic lung disease, which is characterized by symptoms such as shortness of breath, fever, tiredness, non-productive cough, and chills.

**Target Organ Effects**
Respiratory System, Long-term, low-level exposure may cause severe, permanent respiratory impairment.

**Aspiration Hazard**
No information available.

**Numerical Measures of Toxicity - Product Information**

The following values are calculated based on chapter 3.1 of the GHS document

- ATEmix (oral) 18253 mg/kg
- ATEmix (dermal) 8148 mg/kg
- ATEmix (inhalation-dust/mist) 0.1 mg/l
- ATEmix (inhalation-vapor) 0.446 mg/l

**Inhalation LC50**
NOTE: The substance was tested in a form (i.e. specific particle size distribution) that is different from the forms in which the substance is placed on the market and in which it can reasonably be expected to be used. Therefore a modified classification for acute inhalation toxicity is justified.

---

### 12. Ecological Information

**Ecotoxicity**
No information available

100% of the mixture consists of components(s) of unknown hazards to the aquatic environment

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Algae/aquatic plants</th>
<th>Fish</th>
<th>Toxicity to Microorganisms</th>
<th>Crustacea</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,4’-METHYLENEBIS(PHENYL ISOCYANATE)(mixed isomers) 26447-40-5</td>
<td>3230: 96 h Skeletonema costatum mg/L EC50</td>
<td></td>
<td></td>
<td>1000: 24 h Daphnia magna mg/L EC50</td>
</tr>
</tbody>
</table>

**Persistence and Degradability**
No information available

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Partition Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,4’-METHYLENEBIS(PHENYL ISOCYANATE)(mixed isomers) 26447-40-5</td>
<td>4.5</td>
</tr>
</tbody>
</table>

---
Other Adverse Effects
No information available

13. Disposal Considerations

Waste Treatment Methods

Disposal of Wastes
Disposal should be in accordance with applicable regional, national and local laws and regulations.

Contaminated Packaging
Do not reuse container.

14. Transport Information

DOT
Not regulated (If shipped in NON BULK packaging by ground transport)

UN/ID no
UN3082

Proper Shipping Name
Environmentally Hazardous Substances, Liquid, N.O.S. (Methylene Diphenyl Diisocyanate)

Hazard Class
9

Packing group
III

ICAO (air)
Not regulated

IATA
Not regulated

IMDG
Not regulated

Special precautions
Bulk containers (>5000 lbs)

15. Regulatory Information

International Inventories
TSCA
All components of this product are either exempt or included on the TSCA Inventory in compliance with the Toxic Substances Control Act.

Legend:
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

US Federal Regulations
SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No</th>
<th>Weight-%</th>
<th>SARA 313 - Threshold Values %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polymethylene polyphenyl polyisocyanate - 9016-87-9</td>
<td>9016-87-9</td>
<td>30 - 70</td>
<td>1.0</td>
</tr>
<tr>
<td>4,4’-METHYLENEBIS(PHENYL ISOCYANATE)(mixed isomers) - 26447-40-5</td>
<td>26447-40-5</td>
<td>30 - 70</td>
<td>1.0</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazard Categories

Acute Health Hazard
Yes
Chronic Health Hazard: Yes
Fire Hazard: No
Sudden Release of Pressure Hazard: No
Reactive Hazard: Yes

CWA (Clean Water Act)
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

US State Regulations

U.S. State Right-to-Know Regulations

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>New Jersey</th>
<th>Massachusetts</th>
<th>Pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polymethylenepolyphenyl polyisocyanate 9016-87-9</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4,4’-METHYLENEBIS(PHENYL ISOCYANATE)(mixed isomers) 26447-40-5</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

U.S. EPA Label Information

EPA Pesticide Registration Number: Not applicable

16. Other Information

HMIS Health Hazards 2* Flammability 1 Physical Hazards 1 Personal Protection X

Chronic Hazard Star Legend * = Chronic Health Hazard

Prepared by: EMSEAL Compliance KP/sp
Issue Date: 19-Jan-2015
Revision Date: 31-Jul-2015

Revision note: No information available

Disclaimer: The information provided in this Material Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Safety Data Sheet
MATERIAL SAFETY DATA SHEET

PRODUCT: EMCRETE PART B

MSDS DATE: 2014/05/13

TRADE NAME: POLYURETHANE

HMIS CODES:
0 = NONE ... 4 = EXTREME
HEALTH : 2
CHRONIC INDICATOR: *
FIRE : 1
REACTIVITY: 1
PERSONAL PROTECTION: B

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Product Name: EMCRETE B
Manufacturer: EMSEAL JOINT SYSTEMS LTD
Address: 25 Bridle Lane
Westborough, MA 01581

Phone: 508-836-0280
Fax: 508-836-0281
CHEMTREC EMERGENCY PHONE: 800-424-9300
CHEMTREC INTERNATIONAL PHONE: 703-527-3887

SECTION 2: HAZARDOUS INGREDIENTS / SARA III INFORMATION

REPORTABLE COMPONENTS:

AMINE POLYOL MIXTURE
CAS NUMBER PROPRIETARY
WEIGHT PERCENTAGE >85

1, 4 - BUTANEDIOL
CAS NUMBER 110-63-4
VAPOR PRESSURE <0.76 mm HG @ 20° C
WEIGHT PERCENTAGE 1.0 to 5.0

SARA 313: * Indicates toxic chemical(s) subject to the reporting requirements of section 313 of Title III and of 40 CFR 372 are present.

SECTION 3: PHYSICAL / CHEMICAL CHARACTERISTICS

APPEARANCE AND ODOR: Black Liquid Mild Odor
SOLIDS IN WEIGHT %: 100
WEIGHT PER GALLON: 8.84 lb/gl
SPECIFIC GRAVITY (H2O=1): 1.062
BOILING RANGE: >300° F
EVAPORATION RATE: Nil
VAPOR DENSITY: No Data
Section 3 continued:

VOLATILE ORGANIC COMPOUND (V.O.C.): 0 grams/liter (Part-B only)*

*Note: Part-B constitutes 13% of an as-applied unit of EMCRETE by weight. EMCRETE per as-applied unit, including resins, aggregates and primer, contains 35.35 grams/liter of V.O.C.

SECTION 4: FIRE AND EXPLOSION HAZARD

OSHA FLAMMABILITY CLASS: Not regulated, Class IIIB
FLASH POINT: >390° F  METHOD USED: NA
FLAMMABLE LIMITS IN AIR BY VOLUME- LOWER (LEL): No Data UPPER (UEL): No Data

EXTINGUISHING MEDIA: Foam, Carbon Dioxide or Dry Chemical

SPECIAL FIREFIGHTING PROCEDURES: Wear positive pressure self-contained NOISH approved breathing equipment.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Sealed container may rupture. Keep cool with water.

SECTION 5: REACTIVITY DATA

STABILITY: Stable

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Mixture with or exposure to incompatible materials (see below.)

INCOMPATIBILITY (MATERIALS TO AVOID): Strong oxidizing agents Strong acids

HAZARDOUS DECOMPOSITION BYPRODUCTS: Carbon monoxide Carbon dioxide Oxides of nitrogen

SECTION 6: HEALTH HAZARD DATA

HEALTH HAZARDS (ACUTE AND CHRONIC): Liquid contact with eyes or skin may cause irritation. Vapors/mists may cause eye and respiratory irritation.

EMERGENCY AND FIRST AID PROCEDURES:

INHALATION: Remove to fresh air.

EYE CONTACT: Flush with water for 15 minutes with lids open. Seek medical attention.

SKIN CONTACT: Remove contaminated clothing. Wash affected area with soap and water.

CARCINOGENICS: No carcinogenic substances as defined by IARC, NTP, or OSHA.

NTP CARCINOGEN: No  IARC MONOGRAPHS: No  OSHA REGULATED: No
SECTION 7: PROCEDURES FOR SAFE HANDLING AND USE / SPILLS / DISPOSAL

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Store in a cool, dry place with adequate ventilation. Do not breathe vapors or mists. Do not get liquid in eyes, on skin or on clothing.

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Ventilate area. Spill area will be slippery. Contain spill. Recover as much as possible for reuse. Spread commercial absorbant over remainder and place into sealed containers for disposal.

WASTE DISPOSAL METHOD: Dispose in accordance with local, state and federal regulations. Most states prohibit disposal of liquids in landfills.

OTHER PRECAUTIONS: As with all chemicals, good industrial hygiene and proper work habits should be observed.

SECTION 8: PERSONAL PROTECTION RECOMMENDATIONS

RESPIRATORY PROTECTION: For confined areas or areas with poor ventilation, use a organic vapors cartridge type respirator. Avoid inhaling the vapors in the headspace of containers.

VENTILATION: Mechanically exhaust vapors at point(s) of application. If applicable, maintain airborne contaminant levels of chemicals below their recommended TLV's. (See Section 2)

PROTECTIVE GLOVES: Impervious.

EYE PROTECTION: Splash Goggles.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: No Data

WORK/HYGIENIC PRACTICES: Wash thoroughly before eating or smoking.

SECTION 9: DISCLAIMER

It is a violation of federal law to use this product in a manner inconsistent with its labeling. The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof.

Since the use of this information, these opinions and the conditions of use of the product are not within the control of the EMSEAL, it is the user's obligation to determine the conditions of safe use of the product.

TRANSPORTATION INFORMATION
MATERIAL SAFETY DATA SHEET

PRODUCT: EMCRETE PART B

MSDS DATE: 2014/05/13

US DOT: UN3082, Environmentally Hazardous Substances, LIQUID, N.O.I. (Contains dimethylthiotoluediamine), 9, III, LTD QTY
1. Identification of the Substance/Preparation and of the Company/Undertaking

**Product Identifier**

**Product name**
EMPRIME

**Other Means of Identification**

**Product Code**
EMPRIME

**UN/ID no**
UN1123

Restrictions on use: Do not use this product for any use other than intended

**Manufacturer Address**
EMSEL Joint Systems, Ltd.
25 Bridal Lane
Westborough, MA 01581 USA

**Company Phone Number**
508-836-0280 (9AM - 5PM EST) (M-F)

**Emergency Telephone**
Chemtrec 1-800-424-9300 (24 Hours)

2. Hazards Identification

**Classification**

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS). This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).

<table>
<thead>
<tr>
<th>Hazard Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute toxicity - Inhalation (Dusts/Mists)</td>
<td>Category 4</td>
</tr>
<tr>
<td>Skin corrosion/irritation</td>
<td>Category 2</td>
</tr>
<tr>
<td>Serious eye damage/eye irritation</td>
<td>Category 2</td>
</tr>
<tr>
<td>Respiratory sensitization</td>
<td>Category 1</td>
</tr>
<tr>
<td>Skin sensitization</td>
<td>Category 1</td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>Category 2</td>
</tr>
<tr>
<td>Specific target organ toxicity (single exposure)</td>
<td>Category 3</td>
</tr>
<tr>
<td>Specific target organ toxicity (repeated exposure)</td>
<td>Category 2</td>
</tr>
<tr>
<td>Flammable Liquids</td>
<td>Category 2</td>
</tr>
</tbody>
</table>

**EMERGENCY OVERVIEW**

DANGER
Hazard Statements
Causes skin irritation
Causes serious eye irritation
May cause allergy or asthma symptoms or breathing difficulties if inhaled
May cause an allergic skin reaction
Suspected of causing cancer
May cause damage to organs through prolonged or repeated exposure
(lungs, skin)
Harmful if inhaled
May cause respiratory irritation
Highly flammable liquid and vapor

Appearance Viscous Clear Amber
Physical State Liquid
Odor Musty/earthy Solvent

Precautionary Statements - Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use only outdoors or in a well-ventilated area
Wear respiratory protection
Wash face, hands and any exposed skin thoroughly after handling
Contaminated work clothing should not be allowed out of the workplace
Keep away from heat/sparks/open flames/hot surfaces. — No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Keep cool
Wear protective gloves, protective clothing, eye protection, face protection
Do not breathe dust, fumes, or vapors
Do not eat, drink or smoke when using this product
Use explosion-proof electrical/ventilating/lighting/equipment

Precautionary Statements - Response
IF exposed or concerned: Get medical advice/attention
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
If skin irritation or rash occurs: Get medical advice/attention
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Immediately call a POISON CENTER or doctor/physician
In case of fire: Use CO2, dry chemical, or foam for extinction

Precautionary Statements - Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed

Precautionary Statements - Disposal
Dispose of contents/container in accordance with local/regional/international regulations

Hazards Not Otherwise Classified (HNOC)
Other Information

May be harmful in contact with skin
No information available

1. Composition/Information on Ingredients

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No</th>
<th>Weight-%</th>
<th>Trade secret</th>
</tr>
</thead>
<tbody>
<tr>
<td>tert-Butyl acetate</td>
<td>540-88-5</td>
<td>50 - 85</td>
<td>*</td>
</tr>
<tr>
<td>Polymethylene polyphenyl polyisocyanate</td>
<td>9016-87-9</td>
<td>15 - 50</td>
<td>*</td>
</tr>
<tr>
<td>4,4'-METHYLENEBIS(PHENYL ISOXYANATE)(mixed isomers)</td>
<td>26447-40-5</td>
<td>15 - 50</td>
<td>*</td>
</tr>
</tbody>
</table>

* The exact percentage (concentration) of composition may have been withheld as a trade secret.

2. First Aid Measures

FIRST AID MEASURES

General Advice
In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible).

Eye Contact
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Do not rub affected area. Immediate medical attention is required.

Skin Contact
Remove material from skin immediately. IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. Get medical attention if irritation develops and persists.

Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If symptoms persist, call a physician. If breathing has stopped, give artificial respiration. Get medical attention immediately.

Ingestion
If swallowed, call a poison control center or physician immediately. Do NOT induce vomiting. Never give anything by mouth to an unconscious person.

Self-Protection of the First Aider
First Aider: Pay attention to self-protection. Use personal protective equipment as required. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Avoid contact with skin, eyes or clothing.

Most Important Symptoms and Effects, Both Acute and Delayed

Symptoms
Respiratory tract irritation and mucous membrane irritation. Symptoms include eye and nose irritation, dry or sore throat, runny nose, shortness of breath, wheezing and laryngitis. Coughing and chest pain or tightness may also occur, frequently at night. These symptoms may occur during exposure or may be delayed several hours. Exposure to isocyanates can cause difficulty breathing or asthmatic reaction. Irritation to eye tissue. Tingling, irritation or redness of the skin. If ingested, irritation of the tissues of the mouth, throat and digestive tract. Other symptoms include headache, shortness of breath, nausea, vomiting, burning sensation in the mouth, abdominal pain and vomiting. Onset of symptoms may be delayed.

Indication of Any Immediate Medical Attention and Special Treatment Needed

Note to Physicians
May cause sensitization by inhalation and skin contact. Treat symptomatically. SYMPTOMS MAY BE DELAYED.

3. Fire-Fighting Measures

Suitable Extinguishing Media
Carbon dioxide, dry chemical powder, foam, water fog or fine spray. Alcohol resistant foams are preferred for large fires. Use water spray to cool fire-exposed containers.

**Unsuitable Extinguishing Media**

Exercise caution when using water; water contamination of product will generate CO2 gas.

**Specific Hazards Arising From the Chemical**

During a fire products of combustion be toxic or irritating. See Section 10 for more information. Reacts vigorously with water above 50°C. Closed containers may rupture when heated. Polymeric MDI decomposes rapidly above 204°C.

**Hazardous Combustion Products**

Irritating or toxic substances may be emitted upon burning, combustion or decomposition. See Section 10 Hazardous Decomposition Products for additional information.

**Explosion Data**

- **Sensitivity to Mechanical Impact**: None.
- **Sensitivity to Static Discharge**: None.

**Protective Equipment and Precautions for Firefighters**

Firefighters should wear full protective gear including self-contained breathing apparatus when fighting chemical fires. Fight fire from protected location or a safe distance. When using water care must be taken since the reaction between water and hot Polymeric MDI can be vigorous.

### 4. Accidental Release Measures

**Personal Precautions, Protective Equipment and Emergency Procedures**

**Personal Precautions**

Use personal protection recommended in Section 8. Do not touch or walk through spilled material. Ensure adequate ventilation, especially in confined areas. Extremely slippery when spilled. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).

**For Emergency Responders**

Remove all sources of ignition.

**Environmental Precautions**

Do not allow into any sewer, on the ground or into any body of water. See Section 12 for additional Ecological Information.

**Methods and Material for Containment and Cleaning Up**

**Methods for Containment**

A vapor suppressing foam may be used to reduce vapors. Prevent further leakage or spillage if safe to do so.

**Methods for cleaning up**

Use only non-sparking tools.

**Prevention of Secondary Hazards**

Clean contaminated objects and areas thoroughly observing environmental regulations.

### 5. Handling and Storage

**Precautions for Safe Handling**

Do not breathe dust, fumes, or vapors. Avoid contact with skin and eyes. Handle in accordance with good industrial hygiene and safety practice. Use personal protection recommended in Section 8. Do not use with incompatible materials such as amines, alcohols, acids, bases, metal compounds, surfactants and water which may react vigorously and/or violently. Do not eat, drink or smoke when using this product. Keep away from heat/sparks/open flames/hot surfaces. — No smoking.
Conditions for Safe Storage, Including any Incompatibilities

Storage Conditions
Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity). Protect from direct sunlight. Protect from moisture. Do not reuse container.

Incompatible Materials
Water - Reacts slowly, forming carbon dioxide and inert material comprised of polyureas which could rupture closed containers. Toxic intermediate chemicals can be formed in this reaction. Amines, Alcohols, Acids, Bases, - May react violently with generation of heat. Metal compounds may polymerize with the generation of heat and pressure. Amides, phenols, mercaptans, urethanes, ureas and surface active compounds - May react vigorously or violently with the generation of heat.

6. Exposure Controls/Personal Protection

Control Parameters

Exposure Guidelines
This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>tert-Butyl acetate 540-88-5</td>
<td>TWA: 200 ppm</td>
<td>TWA: 200 ppm</td>
<td>IDLH: 1500 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA: 950 mg/m³</td>
<td>TWA: 200 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(vacated) TWA: 200 ppm</td>
<td>TWA: 950 mg/m³</td>
</tr>
<tr>
<td>4,4'-METHYLENEBIS(PHENYL ISOCYANATE)(mixed isomers)</td>
<td>-</td>
<td>Ceiling: 0.02 ppm</td>
<td>-</td>
</tr>
<tr>
<td>26447-40-5</td>
<td></td>
<td>Ceiling: 0.2 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

Appropriate Engineering Controls

Engineering Controls
Local exhaust ventilation may be necessary when operations generate airborne concentrations of this material. If engineering controls and work practices are not effective in controlling exposure to this material, then wear suitable personal protective equipment including approved respiratory protection.

Individual Protection Measures, Such As Personal Protective Equipment

Eye/Face Protection
Wear safety glasses with side shields (or goggles). Face protection shield.

Skin and Body Protection
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Wear protective nitrile rubber gloves.

Respiratory Protection
If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

General Hygiene Considerations
Handle in accordance with good industrial hygiene and safety practice. When using do not eat, drink or smoke. Wash face, hands and any exposed skin thoroughly after handling. Take off all contaminated clothing and wash it before reuse.

7. Physical and Chemical Properties

Information on Basic Physical and Chemical Properties

Physical State
Liquid

Appearance
Viscous Clear

Color
Amber

Property
Values
Remarks • Method
pH
No information available
Melting Point/Freezing Point
No information available
Boiling Point/Boiling Range
98 °C
Flash Point
16.7 °C
CC (closed cup)
Evaporation Rate  No information available  
Flammability (Solid, Gas)  No information available  
Flammability Limits in Air  
  Upper Flammability Limit  No information available  
  Lower Flammability Limit  1.5%  
Vapor Pressure  No information available  
Vapor Density  4.01  
Specific Gravity  1.047  
Water Solubility  partially soluble  
Solubility in Other Solvents  No information available  
Partition Coefficient  No information available  
Autoignition Temperature  No information available  
Decomposition Temperature  No information available  
Kinematic Viscosity  No information available  
Dynamic Viscosity  No information available  
Explosive Properties  No information available  
Oxidizing Properties  No information available  

Other Information  
Softening Point  No information available  
Molecular Weight  No information available  
VOC Content (%)  No information available  
Density  8.715 pounds/gallon  
Bulk Density  No information available  

8. Stability and Reactivity  

Reactivity  
No data available  

Chemical Stability  
Stable under recommended storage conditions.  

Possibility of Hazardous Reactions  
Polymeric MDI may undergo uncontrolled exothermic polymerization upon contact with incompatible materials if heated above 170-204°C. The resulting pressure build up could rupture closed containers. May cause some corrosion to copper alloys and aluminum.  

Conditions to Avoid  

Incompatible Materials  
Water - Reacts slowly, forming carbon dioxide and inert material comprised of polyureas which could rupture closed containers. Toxic intermediate chemicals can be formed in this reaction. Amines, Alcohols, Acids, Bases, - May react violently with generation of heat. Metal compounds may polymerize with the generation of heat and pressure. Amides, phenols, mercaptans, urethanes, ureas and surface active compounds - May react vigorously or violently with the generation of heat.  

Hazardous Decomposition Products  
Carbon monoxide, Carbon Dioxide (CO2), Nitrogen oxides (NOx), Hydrogen cyanide, 4,4'-Methylene dianiline can be formed by reaction of MDI with water. Thermal decomposition can lead to release of toxic/corrosive gases and vapors.  

9. Toxicological Information  

Information on Likely Routes of Exposure  

Inhalation  
Airborne exposures are unlikely to occur unless product is heated or forms an aerosol or mist during pouring, frothing or spraying operations. Polymeric MDI has an extremely low vapor pressure and it is difficult to achieve vapor concentrations necessary for inhalation toxicity testing. The desired vapor concentrations can only be obtained by heating the Polymeric MDI source. Some people may become sensitized to MDI, causing allergy or asthma symptoms or breathing difficulties if inhaled. High aerosol concentrations could cause inflammation of the lung tissue (chemical pneumonitis), chemical bronchitis with severe asthma-like wheezing, severe coughing spasms and accumulation of fluid in the lungs (pulmonary edema), which could be fatal. Symptoms of pulmonary edema may not
appear until several hours after exposure and are aggravated by physical exertion.

**Eye Contact**
May cause irritation.

**Skin Contact**
May cause irritation. Isocyanates can cause skin discoloration (staining) and hardening of the skin after repeated exposures. Skin sensitization, resulting in dermatitis, may occur in some individuals. Cured material may be difficult to remove from skin.

**Ingestion**
Not an expected route of exposure. Swallowing may result in irritation and corrosion of the mouth, throat and digestive tract.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Oral LD50 (Rat)</th>
<th>Dermal LD50 (Rabbit)</th>
<th>Inhalation LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>tert-Butyl acetate 540-88-5</td>
<td>= 4100 mg/kg (Rat)</td>
<td>&gt; 2 g/kg (Rabbit)</td>
<td>&gt; 2230 mg/m³ (Rat) 4 h</td>
</tr>
<tr>
<td>Polymethylene polyphenyl polyisocyanate 9016-87-9</td>
<td>= 49 g/kg (Rat)</td>
<td>&gt; 9400 mg/kg (Rabbit)</td>
<td>= 490 mg/m³ (Rat) 4 h</td>
</tr>
<tr>
<td>4,4'-METHYLENEBIS(PHENYL ISOCYANATE)(mixed isomers) 26447-40-5</td>
<td>&gt; 7400 mg/kg (Rat)</td>
<td>&gt; 6200 mg/kg (Rabbit)</td>
<td>= 0.369 mg/L (Rat) 4 h</td>
</tr>
</tbody>
</table>

**Information on toxicological effects**
No information available.

**Delayed and immediate effects as well as chronic effects from short and long-term exposure**

**Skin corrosion/irritation**
Irritating to skin.

**Serious eye damage/eye irritation**
Risk of serious damage to eyes.

**Irritation**
Irritating to eyes, respiratory system and skin.

**Sensitization**
May cause sensitization by inhalation and skin contact. Isocyanates are known to be strong sensitizers.

**Germ Cell Mutagenicity**
No information available.

**Carcinogenicity**
No information available.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>IARC</th>
<th>NTP</th>
<th>OSHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polymethylene polyphenyl polyisocyanate 9016-87-9</td>
<td>Group 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4,4'-METHYLENEBIS(PHENYL ISOCYANATE)(mixed isomers) 26447-40-5</td>
<td>Group 3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**IARC (International Agency for Research on Cancer)**
Group 3 - Not classifiable as to its carcinogenicity to humans

**Reproductive Toxicity**
No information available.

**STOT - Single Exposure**
May cause disorder and damage to the Respiratory System.

**STOT - Repeated Exposure**
Causes damage to organs through prolonged or repeated exposure if inhaled. May cause disorder and damage to the Respiratory System.

**Target Organ Effects**
Respiratory System.

**Aspiration Hazard**
No information available.

**Numerical Measures of Toxicity - Product Information**

The following values are calculated based on chapter 3.1 of the GHS document

| ATEmix (oral)       | 6723 mg/kg |
| ATEmix (dermal)     | 3227 mg/kg |
| ATEmix (inhalation-dust/mist) | 0.2 mg/l |

**10. Ecological Information**

**Ecotoxicity**
No information available
50% of the mixture consists of components(s) of unknown hazards to the aquatic environment

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Algae/aquatic plants</th>
<th>Fish</th>
<th>Toxicity to Microorganisms</th>
<th>Crustacea</th>
</tr>
</thead>
<tbody>
<tr>
<td>tert-Butyl acetate 540-88-5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4,4'-METHYLENEBIS(phenyl isocyanate)(mixed isomers) 26447-40-5</td>
<td>3230: 96 h Skeletonema costatum mg/L EC50</td>
<td>1000: 24 h Daphnia magna mg/L EC50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Persistence and Degradability
No information available

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Partition Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>tert-Butyl acetate 540-88-5</td>
<td>1.38</td>
</tr>
<tr>
<td>4,4'-METHYLENEBIS(phenyl isocyanate)(mixed isomers) 26447-40-5</td>
<td>4.5</td>
</tr>
</tbody>
</table>

Other Adverse Effects
No information available

11. Disposal Considerations

Waste Treatment Methods
Disposal of Wastes
Disposal should be in accordance with applicable regional, national and local laws and regulations.

Contaminated Packaging
Do not reuse container.

12. Transport Information

DOT

UN/ID no: UN1123
Proper Shipping Name: Butyl acetate solution
Hazard Class: 3
Packing group: II

ICAO (air)

IATA

IMDG

13. Regulatory Information

International Inventories

TSCA
All components of this product are either exempt or included on the TSCA Inventory in compliance with the Toxic Substances Control Act.

Legend:

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
US Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No</th>
<th>Weight-%</th>
<th>SARA 313 - Threshold Values %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polymethylene polyphenyl polyisocyanate - 9016-87-9</td>
<td>9016-87-9</td>
<td>15 - 50</td>
<td>1.0</td>
</tr>
<tr>
<td>4,4’-METHYLENEBIS(PHENYL ISOCYANATE)(mixed isomers) - 26447-40-5</td>
<td>26447-40-5</td>
<td>15 - 50</td>
<td>1.0</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazard Categories

- Acute Health Hazard: Yes
- Chronic Health Hazard: Yes
- Fire Hazard: Yes
- Sudden Release of Pressure Hazard: No
- Reactive Hazard: Yes

CWA (Clean Water Act)
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CWA - Reportable Quantities</th>
<th>CWA - Toxic Pollutants</th>
<th>CWA - Priority Pollutants</th>
<th>CWA - Hazardous Substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>tert-Butyl acetate 540-88-5</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Hazardous Substances RQs</th>
<th>CERCLA/SARA RQ</th>
<th>Reportable Quantity (RQ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>tert-Butyl acetate 540-88-5</td>
<td>5000 lb</td>
<td></td>
<td>RQ 5000 lb final RQ</td>
</tr>
</tbody>
</table>

US State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>New Jersey</th>
<th>Massachusetts</th>
<th>Pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>tert-Butyl acetate 540-88-5</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Polymethylene polyphenyl polyisocyanate 9016-87-9</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4,4’-METHYLENEBIS(PHENYL ISOCYANATE)(mixed isomers) 26447-40-5</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

U.S. EPA Label Information

EPA Pesticide Registration Number: Not applicable
End of Safety Data Sheet
SECTION 0. GENERAL INFORMATION

This item meets the definition of article in the OSHA Hazard Communication Standard, 29 CFR 1910.1200. Johns Manville has committed to communicate to its customers the appropriate information for assuring the safe handling and use of its products.

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Trade name: Chop-Pak® - DuraCore® - DuraChop® - Kytex® - MultiStar® - StarRov® - StarStran® - ThermoFlow®

Manufacturer or supplier's details
Company: Johns Manville
Address: P.O. Box 5108
Denver, CO USA 80127
Telephone: 303-978-2000   8:00AM-5:00PM M-F
Emergency telephone number: 1-800-424-9300 (Chemtrec, in English)

Prepared by: productsafety@jm.com

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification
Not a hazardous substance or mixture.

GHS Label element
Not a hazardous substance or mixture.

Other hazards
Temporary mechanical abrasion (itching) of skin, eyes and respiratory tract may occur upon exposure to particles during handling of this product and cannot occur unless there is direct contact. Abrasion effects should subside after cessation of exposure.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical nature
CFGF products are typically made of an endless E-glass filament with a diameter of more than 8 µm and of parallel orientation. A surface treatment (sizing) is applied to the filaments which are gathered to form a strand. The strand is further processed into a specific product design. The sizing is a polymer based mixture consisting of i.e. film former(s), coupling agent(s) and other processing aids. The sizing content is generally below 2%.

Hazardous components
Non-hazardous according to 29 CFR 1910.1200, when used as intended.

SECTION 4. FIRST AID MEASURES

General advice: Get medical attention if symptoms occur.
If inhaled:
Move to fresh air.
If symptoms persist, call a physician.

In case of skin contact:
Take off all contaminated clothing immediately.
If on skin, rinse well with water.
Get medical attention if irritation develops and persists.

In case of eye contact:
In case of eye contact, remove contact lens and rinse
immediately with plenty of water, also under the eyelids, for at
least 15 minutes.
If eye irritation persists, consult a specialist.

If swallowed:
If symptoms persist, call a physician.
Rinse mouth with water to remove dust or fibers and drink
plenty of water to help reduce irritation.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media:
Use extinguishing measures that are appropriate to local
circumstances and the surrounding environment.

Special protective equipment for firefighters:
Wear self-contained breathing apparatus for firefighting if
necessary.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures:
Avoid dust formation.

Methods and materials for containment and cleaning up:
Take up mechanically.
Pick up and arrange disposal without creating dust.

SECTION 7. HANDLING AND STORAGE

Advice on safe handling:
For personal protection see section 8.
Smoking, eating and drinking should be prohibited in the
application area.

Conditions for safe storage:
Keep in a dry, cool place.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value type (Form of exposure)</th>
<th>Control parameters / Permissible concentration</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuisance dust</td>
<td>Not Assigned</td>
<td>TWA (Total particulate)</td>
<td>15 mg/m³</td>
<td>OSHA</td>
</tr>
</tbody>
</table>

Continuous Filament Glass Fiber Products

<table>
<thead>
<tr>
<th>TWA (Respirable fraction)</th>
<th>OSHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 mg/m3</td>
<td></td>
</tr>
</tbody>
</table>

Personal protective equipment

Respiratory protection: No personal respiratory protective equipment normally required. When workers are facing concentrations above the exposure limit, they must use appropriate certified respirators.

Hand protection

Remarks: For prolonged or repeated contact use protective gloves.

Eye protection

Skin and body protection

Hygiene measures: Handle in accordance with good industrial hygiene and safety practice.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: solid

Odour: slight

SECTION 10. STABILITY AND REACTIVITY

Reactivity: No decomposition if stored and applied as directed.

Chemical stability: No decomposition if stored and applied as directed.

Possibility of hazardous reactions: Stable under recommended storage conditions. No hazards to be specially mentioned.

Conditions to avoid: No data available

SECTION 11. TOXICOLOGICAL INFORMATION

Further information

During cutting, milling or other processing of these products, particles may be generated that does not represent a health hazard if below the recommended exposure limits for particles not otherwise regulated (PNOR) (inhalable and respirable fraction). Temporary mechanical abrasion (itching) of skin, eyes and respiratory tract may occur upon exposure to particles during handling of this product and cannot occur unless there is direct contact. Abrasion effects should subside after cessation of exposure. Continuous filament glass fibers do not possess cleavage planes which would allow them to split length-wise into fibers with smaller diameter; rather they break across the fiber, resulting in fibers which are of the same diameter as the original fiber. Microscopic examination of dust from highly chopped and pulverised glass demonstrated the presence of small amounts of respirable dust particles. Among these respirable particles, some
were fiber-like in terms of length/diameter ratio (so-called "shards"). It can be clearly observed, however, that they are not regular shaped fibers but irregular shaped particles with fiber-like dimensions. To the best of our knowledge, the exposure levels of these fiber-like dust particles measured at our manufacturing plants are, on an order of magnitude, between 50 to 1000 times below existing occupational exposure limits. Exposures will vary according to environmental and process conditions and exposure duration.

SECTION 12. ECOLOGICAL INFORMATION

Further information
Due to the properties of the product, a hazard to the environment may not be expected.

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods
Disposal of residual product : In accordance with local and national regulations.

SECTION 14. TRANSPORT INFORMATION

International transport regulations
These products are not classified as dangerous goods according to international transport regulations.

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know Act
CERCLA Reportable Quantity
This material does not contain any components with a CERCLA RQ.

SARA 304 Extremely Hazardous Substances Reportable Quantity
This material does not contain any components with a section 304 EHS RQ.
This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 12 (40 CFR 61).
This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).

California Prop 65
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

The components of this product are reported in the following inventories:
TSCA : All chemical substances in this product are either listed on the TSCA Inventory or are in compliance with a TSCA Inventory exemption.

DSL : All components of this product are on the Canadian DSL.
Other regulations
These products are considered articles under both U.S. and international products and as such, these products do not require registration or notification on the various country-specific inventories.

SECTION 16. OTHER INFORMATION

Further information

Prepared by productsafety@jm.com

The information provided in this Safe Use Instruction is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.
1. IDENTIFICATION

**Product identifier:** Silica Sand or Ground Silica; crystalline silica (quartz)

**Product Name/Trade Names:**
Sand and Ground Silica Sand (sold under various names: ASTM TESTING SANDS • GLASS SAND • FILPRO® • FLINT SILICA • DM-SERIES • F-SERIES • FOUNDRY SANDS • FJ-SERIES H-SERIES • L-SERIES • N-SERIES • NJ SERIES • OK-SERIES • P-SERIES • T-SERIES • hydraulic fracturing sand, all sizes • frac sand, all sizes • MIN-U-SIL® Fine Ground Silica • MYSTIC WHITE® • #1 DRY • #1 SPECIAL • PENN SAND® • PRO WHITE® • SILURIAN® • Q-ROK® • SIL-CO-SIL® Ground Silica • MICROSI® • SUPERSIL® • MASON SAND • GS SERIES • PERSPEC • proppant, all sizes • SHALE FRAC® - SERIES • KOSSE WHITE® • OTTAWA WHITE® • OPTIJUMP® • LIGHTHOUSE™

**Chemical Name or Synonym:**
Crystalline Silica (Quartz), Sand, Silica Sand, Flint, Ground Silica, Fine Ground Silica, Silica Flour.

**Recommended use of the chemical and restrictions on use:** (non-exhaustive list): brick, ceramics, foundry castings, glass, grout, hydraulic fracturing sand, frac sand, proppant, mortar, paint and coatings, silicate chemistry, silicone rubber, thermoset plastics.

**DO NOT USE U.S. SILICA COMPANY SAND OR GROUND SILICA FOR SAND BLASTING**

**Manufacturer:**
U.S. Silica Company
8490 Progress Drive, Suite 300
Frederick, MD 21701
U.S.A.

**Phone:** 800-243-7500
**Emergency Phone:** 301-682-0600
**Fax:** 301-682-0690

2. HAZARD(S) IDENTIFICATION

**Classification:**

<table>
<thead>
<tr>
<th>Physical</th>
<th>Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Hazardous</td>
<td>Carcinogen Category 1A</td>
</tr>
<tr>
<td></td>
<td>Specific Target Organ Toxicity – Repeated Exposure Category 1</td>
</tr>
</tbody>
</table>

**DANGER**
May cause cancer by inhalation.
Causes damage to lungs through prolonged or repeated exposure by inhalation.

**Response:**
If exposed or concerned: Get medical advice.

**Disposal:**
Dispose of contents/containers in accordance with local regulation

**Prevention**
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Do not breathe dust.
Do not eat, drink or smoke when using this product.
Wear protective gloves and safety glasses or goggles.
In case of inadequate ventilation wear respiratory protection.
3. COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS No.</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crystalline Silica (quartz)</td>
<td>14808-60-7</td>
<td>95-99.9</td>
</tr>
</tbody>
</table>

4. FIRST-AID MEASURES

**Inhalation:** First aid is not generally required. If irritation develops from breathing dust, move the person from the overexposure and seek medical attention if needed.

**Skin contact:** First aid is not required.

**Eye contact:** Wash immediately with plenty of water. Do not rub eyes. If irritation persists, seek medical attention.

**Ingestion:** First aid is not required.

**Most important symptoms/effects, acute and delayed:** Particulates may cause abrasive eye injury. Inhalation of dust may cause respiratory tract irritation. Symptoms of exposure may include cough, sore throat, nasal congestion, sneezing, wheezing and shortness of breath. Prolonged inhalation of respirable crystalline silica above certain concentrations may cause lung diseases, including silicosis and lung cancer.

**Indication of immediate medical attention and special treatment, if necessary:** Immediate medical attention is not required.

5. FIRE-FIGHTING MEASURES

**Suitable (and unsuitable) extinguishing media:** Use extinguishing media appropriate for surrounding fire.

**Specific hazards arising from the chemical:** Product is not flammable, combustible or explosive.

**Special protective equipment and precautions for fire-fighters:** None required.

6. ACCIDENTAL RELEASE MEASURES

**Personal precautions, protective equipment, and emergency procedures:** Wear appropriate protective clothing and respiratory protection (see Section 8). Avoid generating airborne dust during clean-up.

**Environmental precautions:** No specific precautions. Report releases to regulatory authorities if required by local, state and federal regulations.

**Methods and materials for containment and cleaning up:** Avoid dry sweeping. Do not use compressed air to clean spilled sand or ground silica. Use water spraying/flushing or ventilated or HEPA filtered vacuum cleaning system, or wet before sweeping. Dispose of in closed containers.

7. HANDLING AND STORAGE

**Precautions for safe handling:** Avoid generating dust. Do not breathe dust. Do not rely on your sight to determine if dust is in the air. Respirable crystalline silica dust may be in the air without a visible dust cloud. Use adequate exhaust
ventilation and dust collection to reduce respirable crystalline silica dust levels to below the permissible exposure limit (“PEL”). Maintain and test ventilation and dust collection equipment. Use all available work practices to control dust exposures, such as water sprays. Practice good housekeeping. Do not permit dust to collect on walls, floors, sills, ledges, machinery, or equipment. Keep airborne dust concentrations below permissible exposure limits.

Where necessary to reduce exposures below the PEL or other applicable limit (if lower than the PEL), wear a respirator approved for silica containing dust when using, handling, storing or disposing of this product or bag. See Section 8, for further information on respirators. Do not alter the respirator. Do not wear a tight-fitting respirator with facial hair such as a beard or mustache that prevents a good face to face piece seal between the respirator and face. Maintain, clean, and fit test respirators in accordance with applicable standards. Wash or vacuum clothing that has become dusty.

Participate in training, exposure monitoring, and health surveillance programs to monitor any potential adverse health effects that may be caused by breathing respirable crystalline silica. The OSHA Hazard Communication Standard, 29 CFR Sections 1910.1200, 1915.1200, 1917.28, 1918.90, 1926.59 and 1928.21, and state and local worker or community "right-to-know" laws and regulations should be strictly followed.

**DO NOT USE U.S. SILICA COMPANY SAND OR GROUND SILICA FOR SAND BLASTING**

**Conditions for safe storage, including any incompatibilities:** Use dust collection to trap dust produced during loading and unloading. Keep containers closed and store bags to avoid accidental tearing, breaking, or bursting.

### 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**Exposure guidelines:**

<table>
<thead>
<tr>
<th>Component</th>
<th>OSHA PEL</th>
<th>ACGIH TLV</th>
<th>NIOSH REL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crystalline Silica (quartz)</td>
<td>10 mg/m³ TWA</td>
<td>0.025 mg/m³ TWA</td>
<td>0.05 mg/m³ TWA</td>
</tr>
<tr>
<td></td>
<td>%SiO₂ + 2 TWA (respirable dust)</td>
<td>(respirable dust)</td>
<td>(respirable dust)</td>
</tr>
<tr>
<td></td>
<td>30 mg/m³ TWA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>%SiO₂ + 2 TWA (total dust)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If crystalline silica (quartz) is heated to more than 870°C, quartz can change to a form of crystalline silica known as tridymite; if crystalline silica (quartz) is heated to more than 1470°C, quartz can change to a form of crystalline silica known as cristobalite. The OSHA PEL for crystalline silica as tridymite or cristobalite is one-half of the OSHA PEL for crystalline silica (quartz).

**Appropriate engineering controls:** Use adequate general or local exhaust ventilation to maintain concentrations in the workplace below the applicable exposure limits listed above.

**Respiratory protection:** If it is not possible to reduce airborne exposure levels to below the OSHA PEL or other applicable limit with ventilation, use the table below to assist you in selecting respirators that will reduce personal exposures to below the OSHA PEL. This table is part of the NIOSH Respirator Selection Logic, 2004, Chapter III, Table 1, “Particulate Respirators”. The full document can be found at [www.cdc.gov/niosh/npptl/topics/respirators](http://www.cdc.gov/niosh/npptl/topics/respirators); the user of this MSDS is directed to that site for information concerning respirator selection and use. The assigned protection factor (APF) is the maximum anticipated level
of protection provided by each type of respirator worn in accordance with an adequate respiratory protection program. For example, an APF of 10 means that the respirator should reduce the airborne concentration of a particulate by a factor of 10, so that if the workplace concentration of a particulate was 150 ug/m³, then a respirator with an APF of 10 should reduce the concentration of particulate to 15 ug/m³. In using chemical cartridges, consideration must be given to selection of the correct cartridge for the chemical exposure and the maximum use concentration for the cartridge. In addition a cartridge change-out schedule must be developed based on the concentrations in the workplace.

<table>
<thead>
<tr>
<th>Assigned protection factor</th>
<th>Type of Respirator</th>
<th>(Use only NIOSH-certified respirators)</th>
</tr>
</thead>
</table>
| 10                           | Any air-purifying elastomeric half-mask respirator equipped with appropriate type of particulate filter. | Any air-purifying elastomeric half-mask respirator equipped with appropriate type of particulate filter. 2  
Appropriate filtering facepiece respirator. 2,3  
Any air-purifying full facepiece respirator equipped with appropriate type of particulate filter. 2  
Any negative pressure (demand) supplied-air respirator equipped with a half-mask. |
| 25                           | Any powered air-purifying respirator equipped with a hood or helmet and a high efficiency (HEPA) filter. | Any powered air-purifying respirator equipped with a hood or helmet and a high efficiency (HEPA) filter.  
Any continuous flow supplied-air respirator equipped with a half-mask. |
| 50                           | Any air-purifying full facepiece respirator equipped with N-100, R-100, or P-100 filter(s).  
Any powered air-purifying respirator equipped with a tight-fitting facepiece (half or full facepiece) and a high-efficiency filter.  
Any negative pressure (demand) supplied-air respirator equipped with a half facepiece.  
Any continuous flow supplied-air respirator equipped with a tight-fitting facepiece (half or full facepiece).  
Any negative pressure (demand) self-contained respirator equipped with a full facepiece. |
| 1,000                        | pressure-demand supplied-air respirator equipped with a half-mask. | pressure-demand supplied-air respirator equipped with a half-mask. |

1. The protection offered by a given respirator is contingent upon (1) the respirator user adhering to complete program requirements (such as the ones required by OSHA in 29CFR1910.134), (2) the use of NIOSH-certified respirators in their approved configuration, and (3) individual fit testing to rule out those respirators that cannot achieve a good fit on individual workers.
2. Appropriate means that the filter medium will provide protection against the particulate in question.
3. An APF of 10 can only be achieved if the respirator is qualitatively or quantitatively fit tested on individual workers.

**Skin protection:** Maintain good industrial hygiene. Protection recommended for workers suffering from dermatitis or sensitive skin.

**Eye protection:** Safety glasses with side shields or goggles recommended if eye contact is anticipated.

**Other:** None known.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance (physical state, color, etc.):** White or tan sand: granular, crushed or ground to a powder.  
**Odor:** None.

<table>
<thead>
<tr>
<th>Odor threshold</th>
<th>Not determined</th>
<th>pH: 6-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting point/freezing point:</td>
<td>3110°F/1710°C</td>
<td>Boiling point/range: 4046°F/2230°C</td>
</tr>
<tr>
<td>Flash point</td>
<td>Not applicable</td>
<td>Evaporation rate: Not applicable</td>
</tr>
<tr>
<td>Flammable limits: LEL:</td>
<td>Not applicable</td>
<td>UEL: Not applicable</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>Not applicable</td>
<td>Vapor density: Not applicable</td>
</tr>
<tr>
<td>Relative density</td>
<td>2.65</td>
<td>Solubility(ies): Insoluble in water</td>
</tr>
</tbody>
</table>
10. STABILITY AND REACTIVITY

Reactivity: Not reactive under normal conditions of use.
Chemical stability: Stable
Possibility of hazardous reactions: Contact with powerful oxidizing agents, such as fluorine, chlorine trifluoride and oxygen difluoride, may cause fires.
Conditions to avoid: Avoid generation of dust in handling and use.
Incompatible materials: Powerful oxidizers such as fluorine, chlorine trifluoride, and oxygen difluoride and hydrofluoric acid.
Hazardous decomposition products: Silica will dissolve in hydrofluoric acid and produce a corrosive gas, silicon tetrafluoride.

11. TOXICOLOGICAL INFORMATION

Acute effects of exposure:
Inhalation: Inhalation of dust may cause respiratory tract irritation. Symptoms of exposure may include cough, sore throat, nasal congestion, sneezing, wheezing and shortness of breath.
Ingestion: Ingestion in an unlikely route of exposure. If dust is swallowed, it may irritate the mouth and throat.
Skin contact: No adverse effects are expected.
Eye contact: Particulates may cause abrasive injury.

Chronic effects: Prolonged inhalation of respirable crystalline silica may cause lung disease, silicosis, lung cancer and other effects as indicated below.

The method of exposure that can lead to the adverse health effects described below is inhalation.

A. SILICOSIS
Silicosis can exist in several forms, chronic (or ordinary), accelerated, or acute:

Chronic or Ordinary Silicosis is the most common form of silicosis, and can occur after many years (10 to 20 or more) of prolonged repeated inhalation of relatively low levels of airborne respirable crystalline silica dust. It is further defined as either simple or complicated silicosis. Simple silicosis is characterized by lung lesions (shown as radiographic opacities) less than 1 centimeter in diameter, primarily in the upper lung zones. Often, simple silicosis is not associated with symptoms, detectable changes in lung function or disability. Simple silicosis may be progressive and may develop into complicated silicosis or progressive massive fibrosis (PMF). Complicated silicosis or PMF is characterized by lung lesions (shown as radiographic opacities) greater than 1 centimeter in diameter. Complicated silicosis or PMF symptoms, if present, are shortness of breath and cough. Complicated silicosis or PMF may be associated with decreased lung function and may be disabling. Advanced complicated silicosis or PMF may lead to death. Advanced complicated silicosis or PMF can result in heart disease secondary to the lung disease (cor pumonale).

Accelerated Silicosis can occur with prolonged repeated inhalation of high concentrations of respirable crystalline silica over a relatively short period; the lung lesions can appear within five (5) years of initial exposure. Progression can be rapid. Accelerated silicosis is similar to chronic or ordinary silicosis, except
that lung lesions appear earlier and progression is more rapid.

Acute Silicosis can occur after the repeated inhalation of very high concentrations of respirable crystalline silica over a short time period, sometimes as short as a few months. The symptoms of acute silicosis include progressive shortness of breath, fever, cough, weakness and weight loss. Acute silicosis is fatal.

B. CANCER
IARC - The International Agency for Research on Cancer ("IARC") concluded that “crystalline silica in the form of quartz or cristobalite dust is carcinogenic to humans (Group 1)”. For further information on the IARC evaluation, see IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Volume 100C, "A Review of Human Carcinogens: Arsenic, Metals, Fibres and Dusts " (2011).

NTP classifies “Silica, Crystalline (respirable size)” as Known to be a human carcinogen.

C. AUTOIMMUNE DISEASES
Several studies have reported excess cases of several autoimmune disorders -- scleroderma, systemic lupus erythematosus, rheumatoid arthritis -- among silica-exposed workers.

D. TUBERCULOSIS
Individuals with silicosis are at increased risk to develop pulmonary tuberculosis, if exposed to tuberculosis bacteria. Individuals with chronic silicosis have a three-fold higher risk of contracting tuberculosis than similar individuals without silicosis.

E. KIDNEY DISEASE
Several studies have reported excess cases of kidney diseases, including end stage renal disease, among silica-exposed workers. For additional information on the subject, the following may be consulted: "Kidney Disease and Silicosis”, Nephron, Volume 85, pp. 14-19 (2000).

F. NON-MALIGNANT RESPIRATORY DISEASES
The reader is referred to Section 3.5 of the NIOSH Special Hazard Review cited below for information concerning the association between exposure to crystalline silica and chronic bronchitis, emphysema and small airways disease. There are studies that disclose an association between dusts found in various mining occupations and non-malignant respiratory diseases, particularly among smokers. It is unclear whether the observed associations exist only with underlying silicosis, only among smokers, or result from exposure to mineral dusts generally (independent of the presence or absence of crystalline silica, or the level of crystalline silica in the dust).

Sources of information:
The NIOSH Hazard Review - Occupational Effects of Occupational Exposure to Respirable Crystalline Silica published in April 2002 summarizes and discusses the medical and epidemiological literature on the health risks and diseases associated with occupational exposures to respirable crystalline silica. The NIOSH Hazard Review is available from NIOSH - Publications Dissemination, 4676 Columbia Parkway, Cincinnati, OH 45226, or through the NIOSH web site, www.cdc.gov/niosh/topics/silica, then click on the link “NIOSH Hazard Review: Health Effects of Occupational Exposure to Respirable Crystalline Silica”.

For a more recent review of the health effects of respirable crystalline silica, the reader may consult Fishman’s Pulmonary Diseases and Disorders, Fourth Edition, Chapter 57. “Coal Workers’ Lung Diseases and Silicosis”.

Finally, the US Occupational Safety and Health Administration (OSHA) published a summary of respirable crystalline silica health effects in connection with OSHA’s Proposed Rule regarding occupational exposure to
Numerical measures of toxicity:
Crystalline Silica (quartz): LD50 oral rat >22,500 mg/kg

12. ECOLOGICAL INFORMATION

Ecotoxicity: Crystalline silica (quartz) is not known to be ecotoxic.
Persistence and degradability: Silica is not degradable.
Bioaccumulative potential: Silica is not bioaccumulative.
Mobility in soil: Silica is not mobile in soil.
Other adverse effects: No data available

13. DISPOSAL CONSIDERATIONS

Discard any product, residue, disposable container or liner in full compliance with national regulations.

14. TRANSPORT INFORMATION

UN number: None
UN proper shipping name: Not regulated
Transport hazard classes(es): None
Packing group, if applicable: None
Environmental hazards: None

Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code): Not determined
Special precautions: None known.

15. REGULATORY INFORMATION

UNITED STATES (FEDERAL AND STATE)

TSCA Status: Crystalline silica (quartz) appears on the EPA TSCA inventory under the CAS No. 14808-60-7.

RCRA: This product is not classified as a hazardous waste under the Resource Conservation and Recovery Act, or its regulations, 40 CFR §261 et seq.

CERCLA: Crystalline silica (quartz) is not classified as a hazardous substance under regulations of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), 40 CFR §302.

Emergency Planning and Community Right to Know Act (SARA Title III): This product contains the following chemicals subject to SARA 302 or SARA 313 reporting: None above the de minimus concentrations.

Clean Air Act: Crystalline silica (quartz) mined and processed by U.S. Silica Company is not processed with or does not contain any Class I or Class II ozone depleting substances.
FDA: Silica is included in the list of substances that may be included in coatings used in food contact surfaces, 21 CFR §175.300(b)(3)(xxvi).

California Proposition 65: Crystalline silica (airborne particles of respirable size) is classified as a substance known to the State of California to be a carcinogen.

California Inhalation Reference Exposure Level (REL): California established a chronic non-cancer effect REL of 3 μg for silica (crystalline, respirable). A chronic REL is an airborne level of a substance at or below which no non-cancer health effects are anticipated in individuals indefinitely exposed to the substance at that level.

Massachusetts Toxic Use Reduction Act: Silica, crystalline (respirable size, <10 microns) is “toxic” for purposes of the Massachusetts Toxic Use Reduction Act.

Pennsylvania Worker and Community Right to Know Act: Quartz is a hazardous substance under the Act, but it is not a special hazardous substance or an environmental hazardous substance.

Texas Commission on Environmental Quality: The Texas CEQ has established chronic and acute Reference Values and short term and long term Effects Screening Levels for crystalline silica (quartz). The information can be accessed through [www.tceq.texas.gov](http://www.tceq.texas.gov).

CANADA

Domestic Substances List: U. S. Silica Company products, as naturally occurring substances, are on the Canadian DSL.

WHMIS Classification: D2A

OTHER NATIONAL INVENTORIES

Australian Inventory of Chemical Substances (AICS): All of the components of this product are listed on the AICS inventory or exempt from notification requirements.

China: Silica is listed on the IECSC inventory or exempt from notification requirements.

Japan Ministry of International Trade and Industry (MITI): All of the components of this product are existing chemical substances as defined in the Chemical Substance Control Law Registry Number 1-548.

Korea Existing Chemicals Inventory (KECI) (set up under the Toxic Chemical Control Law): Listed on the ECL with registry number 9212-5667.

New Zealand: Silica is listed on the HSNO inventory or exempt from notification requirements.

Philippines Inventory of Chemicals and Chemical Substances (PICCS): Listed for PICCS.

Taiwan: Silica is listed on the CSNN inventory or exempt from notification requirements.
16. OTHER INFORMATION

Date of preparation/revision: February 10, 2015

Hazardous Material Information System (HMIS):
  Health *
  Flammability 0
  Physical Hazard 0
  Protective Equipment E
  * For further information on health effects, see Sections 2, 8 and 11 of this MSDS.

National Fire Protection Association (NFPA):
  Health 0
  Flammability 0
  Instability 0

Web Sites with Information about Effects of Crystalline Silica Exposure:

The U. S. Silica Company web site will provide updated links to OSHA and NIOSH web sites addressing crystalline silica issues: www.ussilica.com, click on “Info Center”, then click on “Health & Safety”.

The U.S. National Institute for Occupational Safety and Health (NIOSH) and Occupational Safety and Health Administration (OSHA) maintain sites with information about crystalline silica and its potential health effects. For NIOSH, http://www.cdc.gov/niosh/topics/silica; for OSHA, http://www.osha.gov/dsg/topics/silicacrystalline/index.

The IARC Monograph that includes crystalline silica, Volume 100C, can be accessed in PDF form at the IARC web site, http://monographs.iarc.fr/ENG/Monographs/PDFs/index.php.

U. S. Silica Company Disclaimer

The information and recommendations contained herein are based upon data believed to be up to-date and correct. However, no guarantee or warranty of any kind, express or implied, is made with respect to the information contained herein. We accept no responsibility and disclaim all liability for any harmful effects that may be caused by purchase, resale, use or exposure to our silica. Customers and users of silica must comply with all applicable health and safety laws, regulations, and orders. In particular, they are under an obligation to carry out a risk assessment for the particular work places and to take adequate risk management measures in accordance with the national implementation legislation of EU Directives 89/391 and 98/24.