SAFETY DATA SHEET
Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS, and the Global Harmonization Standard

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY UNDERTAKING

IDENTIFICATION OF THE MIXTURE

TRADE/MATERIAL NAME: Bosti-Sil 25™
CHEMICAL NAMES: Silicone Mixture
SYNONYMS: None
RELEVANT USE of the SUBSTANCE: Sealant
USES ADVISED AGAINST: Other than Relevant Use

SUPPLIER/MANUFACTURER'S NAME (USA/Canada):
Bostik Inc.
11320 W. Watertown Plank Road
Wauwatosa, Wisconsin 53226 USA
+1 (800) 843-0844 (Domestic), +1 (414) 774-2250 (International)
+1 (800) 227-0332
+1 (414) 774-2250 (Outside U.S.)
msds@bostik.com

NOTE: ALL United States Occupational Safety and Health Administration Standard (29 CFR 1910.1200), U.S. State equivalent Standards, Canadian WHMIS [Controlled Products Regulations], Mexican NOM018-STPS 2000, SPRING Singapore, and Japanese JIS Z7500 required information is included in appropriate sections based on the U.S. ANSI Z400.1-2010 format. This product has been classified in accordance with the hazard criteria of the countries listed above.

2. HAZARD IDENTIFICATION

GLOBAL HARMONIZATION LABELING AND CLASSIFICATION: This product has been classified per UN GHS Standards under U.S. OSHA and other applicable regulations that require Global Harmonization compliance.
Classification: Skin Irritation Cat. 2, Eye Irritation Cat. 2A
Signal Word: Warning
Hazard Symbols: GHS07

EMERGENCY OVERVIEW: Product Description: This product is a white, viscous paste with a characteristic odor of acetic acid. Health Hazards: May be harmful if accidentally ingested. Inhalation of vapors or fume if product is heated may cause headache, nausea and respiratory irritation. Eye contact with vapors or fume may also cause irritation. Brief skin contact is not expected to cause adverse effect. Prolonged skin contact may cause irritation. Flammability Hazards: This product may be combustible if exposed to direct flame or if highly heated for a prolonged period. If involved in a fire, this product will release smoke, acrid vapors and toxic gases (e.g., carbon, silicon oxides, silicon, acetic acid, acetaldehyde, polymethylsiloxanes, acetic anhydride, ethyl acetate, low molecular weight hydrocarbons and ethane). Large fires produce heavy clouds of white smoke due to silicon dioxide. Reactivity Hazards: May react with water or humid air to form combustible and corrosive chemicals such as acetic acid and hydrogen gas. Environmental Hazards: This product has not been tested for potential hazards if released to the environment. All release should be avoided. Emergency Considerations: Emergency responders should wear appropriate protection for the situation to which they respond.

3. COMPOSITION and INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS #</th>
<th>WW%</th>
<th>LABEL ELEMENTS GHS Classification Hazard Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyltriacetoxysilane</td>
<td>17689-77-9</td>
<td>1.0-5.0</td>
<td>SELF CLASSIFICATION Classification: Skin Irritation Cat. 2, Eye Irritation Cat. 2A Hazard Statement Codes: H315, H319</td>
</tr>
<tr>
<td>Methyltriacetoxysilane</td>
<td>4253-34-3</td>
<td>1.0-5.0</td>
<td>SELF CLASSIFICATION Classification: Acute Oral Toxicity Cat. 4, Skin Irritation Cat. 2, Eye Irritation Cat. 2A Hazard Statement Codes: H302, H315, H319</td>
</tr>
<tr>
<td>Other unknown components</td>
<td>Balance</td>
<td></td>
<td>Classification: Not Determined</td>
</tr>
</tbody>
</table>

See Section 16 for full text of Ingredient Hazard and Precautionary Statements

4. FIRST-AID MEASURES

DESCRIPTION OF FIRST AID MEASURES: Contaminated individuals must be taken for medical attention if any adverse effects occur. Remove contaminated clothing and shoes. Take a copy of this SDS to health professional with victim. Wash clothing and thoroughly clean shoes before reuse. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Take a copy of label and SDS to physician or health professional with the contaminated individual.
4. FIRST-AID MEASURES (Continued)

DESCRIPTION OF FIRST AID MEASURES (continued):

Skin Exposure: If adverse skin effects occur, discontinue use and flush contaminated area. Seek medical attention if adverse effect occurs after flushing.

Inhalation: If adverse effects occurs in the event aerosols are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if adverse effect continues after removal to fresh air.

Eye Exposure: If this product contaminates the eyes, rinse eyes under gently running water. Use sufficient force to open eyelids and then "roll" eyes while flushing. Minimum flushing is for 20 minutes. The contaminated individual must seek medical attention if any adverse effect continues after rinsing.

Ingestion: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, DO NOT INDUCE VOMITING. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow. If victim is convulsing, maintain an open airway and obtain immediate medical attention.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing skin disorders may be aggravated by overexposures to this product.

INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT IF NEEDED: Treat symptoms and eliminate exposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT (closed cup): > 100°C (> 212°F)

AUTOIGNITION TEMPERATURE: Not available.

FLAMMABLE LIMITS (in air by volume, %): Not applicable.

FIRE EXTINGUISHING MEDIA: For small fires, use carbon dioxide, dry chemical powder, water spray, or foam. For large fires, use fine water spray to direct vapors, fog, or foam. Consideration must be made to use extinguishing materials suitable for surrounding materials.

UNSUITABLE FIRE EXTINGUISHING MEDIA: Water should be used with care due to potential formation of extremely flammable hydrogen gas and flammable and corrosive acetic acid.

UNUSUAL FIRE AND EXPLOSION HAZARDS: This product may be combustible if exposed to direct flame or if highly heated for a prolonged period. Large fires produce heavy clouds of white smoke due to silicon dioxide. When involved in a fire, this material may decompose and produce irritating vapors and toxic gases (e.g., carbon, silicon oxides, silicon, acetic acid, acetaldehyde, polymethylsiloxanes, acetic anhydride, ethyl acetate, low molecular weight hydrocarbons and ethane).


Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL PROTECTIVE ACTIONS FOR FIRE-FIGHTERS: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus (SCBA) and full protective equipment. Chemical resistant clothing may be necessary. Move containers from fire area if it can be done without risk to personnel. Water spray can be used to cool fire-exposed containers. Water fog or spray can also be used by trained firefighters to disperse this product's vapors and to protect personnel. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS AND EMERGENCY PROCEDURES: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. Call CHEMTREC (1-800-424-9300) for emergency assistance. Or if in Canada, call CANUTEC (613-996-6666). The atmosphere must at least 19.5 percent Oxygen before non-emergency personnel can be allowed in the area without Self-Contained Breathing Apparatus and fire protection.

PERSONAL PROTECTIVE EQUIPMENT: Proper protective equipment should be used. Use only non-sparking tools and equipment.

Small Spills: Wear rubber gloves, splash goggles, and appropriate body protection.

Large Spills: Minimum Personal Protective Equipment should be rubber gloves, rubber boots, face shield, and Tyvek suit. Minimum level of personal protective equipment for releases in which the level of oxygen is less than 19.5% or is unknown must be Level B: triple-gloves (rubber gloves and nitrile gloves over latex gloves), boots, Tyvek or similar protective clothing, hard hat, and Self-Contained Breathing Apparatus.

METHODS FOR CLEAN-UP AND CONTAINMENT: Spills of this product present minimal hazard.

Small Spills: Small releases can be carefully swept up or cleaned up using a damp sponge or poly pads.

Large Spills: Access to the spill area should be restricted. For large spills, dike or otherwise contain spill and sweep-up or vacuum with non-sparking vacuum.

All Spills: Place all spill residue in a double plastic bag or other containment and seal. Close off sewers and take other measures to protect human health and the environment as necessary. Rinse area with soap and water solution and follow with a water rinse. Decontaminate the area thoroughly. Do not mix with wastes from other materials. Dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations). For spills on water, contain, minimize dispersion and collect. Dispose of recovered material and report spill per regulatory requirements.
6. ACCIDENTAL RELEASE MEASURES (Continued)

ENVIRONMENTAL PRECAUTIONS: Avoid release to the environment. Run-off water may be contaminated by other
materials and should be contained to prevent possible environmental damage.

REFERENCE TO OTHER SECTIONS: See information in Section 8 (Exposure Controls – Personal Protection) and
Section 13 (Disposal Considerations) for additional information.

7. HANDLING and USE

PRECAUTIONS FOR SAFE HANDLING: As with all chemicals, avoid getting this material ON YOU or IN YOU. Do not
eat, drink, smoke, or apply cosmetics while handling this product. Wash hands thoroughly after handling this product
or containers of this product. Avoid breathing fumes or vapors generated by this product. Use in a well-ventilated
location.

CONDITIONS FOR SAFE STORAGE: Store containers in a cool, dry location, away from direct sunlight, sources of
intense heat. Containers should be grounded and separated from oxidizing materials by a minimum distance of 20 ft. or
by a barrier of non-combustible material at least 5 ft. high having a fire-resistance rating of at least 0.5 hours. Storage
areas should be made of fire resistant materials. Post warning and “NO SMOKING” signs in storage and use areas as
appropriate. Have appropriate extinguishing equipment in the storage area (e.g., sprinkler system, portable fire
extinguishers).

SPECIFIC END USE(S): This product is for use as a sealant. Follow all industry standards for use of this product.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in
Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely, if
necessary. Collect all rinsates and dispose of according to applicable Federal, State, and local procedures.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

EXPOSURE LIMITS/CONTROL PARAMETERS:

<table>
<thead>
<tr>
<th>CHEMICAL NAME</th>
<th>CAS #</th>
<th>EXPOSURE LIMITS IN AIR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ACGIH-TLVs</td>
<td>OSHA-RELs</td>
</tr>
<tr>
<td></td>
<td>TWA mg/m³</td>
<td>STEL mg/m³</td>
</tr>
<tr>
<td>Ethyltriacetoxyxilane</td>
<td>17689-77-9</td>
<td>NE</td>
</tr>
<tr>
<td>Methyltriacetoxyxilane</td>
<td>4253-34-3</td>
<td>NE</td>
</tr>
<tr>
<td>Acetic Acid (main decomposition product)</td>
<td>84-19-7</td>
<td>25</td>
</tr>
</tbody>
</table>

NE = Not Established. See Section 16 for Definitions of Other Terms Used

PROTECTIVE EQUIPMENT: The following information on appropriate Personal Protective Equipment is provided to
assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132, including
(including the Canadian CSA Respiratory Protection Standard Z94.4-93-02, the CSA Eye Protection Standard Z94.3-M1982,
Please reference applicable regulations and standards for relevant details.

Respiratory Protection: Maintain airborne contaminant concentrations below exposure limits listed above, if applicable. For materials
without listed exposure limits, minimize respiratory exposure. If necessary, use only respiratory protection authorized under
appropriate regulations. Oxygen levels below 19.5% are considered IDLH by U.S. OSHA. In such atmospheres, use of a full-
facemask pressure/demand SCBA or a full facemask, supplied air respirator with auxiliary self-contained air supply is required under

Eye Protection: Wear splash goggles or safety glasses as appropriate for the task.

Hand Protection: Wash hands and wrists before putting on and after removing gloves. During manufacture or other similar operations,
wear the appropriate hand protection for the process. Use double gloves for spill response, as stated in Section 6 (Accidental
Release Measures) of this SDS. Because all gloves are to some extent permeable and their permeability increases with time, they
should be changed regularly (hourly is preferable) or immediately if torn or punctured. If necessary refer to appropriate regulations.

Skin Protection: Use appropriate protective clothing for the task (e.g., lab coat, etc.). If necessary, refer to the U.S. OSHA Technical
Manual (Section VII: Personal Protective Equipment) or other appropriate regulations. If a hazard of injury to the feet exists due to
falling objects, rolling objects, where objects may pierce the soles of the feet or where employee’s feet may be exposed to electrical
hazards, use foot protection, as described in U.S. OSHA and Canadian Standards.

8. PHYSICAL and CHEMICAL PROPERTIES

FORM: Paste.

COLOR: White, various colors.

MOLECULAR FORMULA: Mixture.

MOLECULAR WEIGHT: Mixture.

ODOR: Characteristic of acetic acid.

ODOR THRESHOLD: Not available.
9. PHYSICAL and CHEMICAL PROPERTIES (Continued)

FLAMMABLE LIMITS (in air by volume, %): Not applicable.
OXIDIZING PROPERTIES: Not applicable.
DECOMPOSITION TEMPERATURE: Not available.
PERCENT VOLATILE: Not determined.
AUTOIGNITION TEMPERATURE: Not available.
FLASH POINT (closed cup): > 100°C (> 212°F)
FREEZING/MELTING POINT: Not available.
BOILING POINT: Not determined.
VAPOR PRESSURE: Not available.
PH: Not available.
SPECIFIC GRAVITY (water = 1) @ 25°C: 1.007
BULK DENSITY: ~8.93 lbs/gal
VAPOR DENSITY (air = 1): Not available.
EVAPORATION RATE (n-BuAc = 1): > 1
SOLUBILITY IN WATER: Not determined.
SOLUBILITY IN SOLVENTS: Not available.
COEFFICIENT WATER/OIL DISTRIBUTION: Not established.

HOW TO DETECT THIS SUBSTANCE (warning properties in event of accidental release): The appearance may be characteristics to distinguish a release of this product.

10. STABILITY and REACTIVITY

CHEMICAL STABILITY: Stable when properly stored at recommended temperature (see Section 7, Handling and Storage). When heated to temperatures above 150°C (300°F) in the presence of air, product can form formaldehyde vapors.

DECOMPOSITION PRODUCTS: Combustion: If exposed to extremely high temperatures, thermal decomposition may generate irritating fumes and toxic gases (e.g., carbon, silicon oxides, silicon, acetic acid, acetaldehyde, polymethylsiloxanes, acetic anhydride, ethyl acetate, low molecular weight hydrocarbons and ethane). Hydrolysis: Acetic acid, hydrogen gas.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: This product is incompatible with strong oxidizers.

POSSIBILITY OF HAZARDOUS POLYMERIZATION OR REACTION: Will not occur.

CONDITIONS TO AVOID: Avoid exposure to or contact with extreme temperatures and incompatible chemicals.

11. TOXICOLOGICAL INFORMATION

SYMPTOMS OF EXPOSURE BY ROUTE OF EXPOSURE: The health hazard information provided below is pertinent to employees using this product in an occupational setting. The following paragraphs describe the symptoms of exposure by route of exposure.

Inhalation: Due to viscosity, inhalation is not a significant route of exposure. Vapors or fumes when used in an enclosed space, if heated or during curing may cause irritation of the respiratory system. Symptoms include nose irritation, dry or sore or burning throat, runny nose, shortness of breath.

Contact with Skin or Eyes: Direct eye contact may cause irritation, redness, and tearing from mechanical irritation. Prolonged or repeated skin exposures may cause dermatitis (dry red skin).

Ingestion: Ingestion is not a significant route of occupational exposure and is unlikely to occur. If this product is swallowed, irritation of the mouth, throat, esophagus and other tissues of the digestive system may occur. Symptoms of ingestion may include nausea, vomiting, and diarrhea.

Injection: Accidental injection of this product, via laceration or puncture by a contaminated object can cause redness at the site of injection.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Exposure to this product may cause the following health effects:

Acute: Inhalation of fumes or vapors may cause irritation of respiratory system. Eye contact may cause irritation.

Chronic: Prolonged or repeated skin exposure may cause dermatitis (dry red skin).

TARGET ORGANS: Acute: Skin, eyes, respiratory system. Chronic: Skin.

TOXICITY DATA: Currently, the following toxicological data are available for some components of 1% or more concentration.

METHYLTRACETOXYSILANE:
LD₅₀ (Oral-Rat) 2060 mg/kg

IRRITANTY OF PRODUCT: Inhalation of fumes if product if heated or if applied in confined space may cause respiratory irritation. Eye contact may cause irritation. Prolonged skin contact may cause irritation.

SENSITIZATION OF PRODUCT: No component is known to cause skin or respiratory sensitization.

CARCINOGENIC POTENTIAL OF COMPONENTS: The components are not found on the following lists: U.S. EPA, U.S. NTP, U.S. OSHA, U.S. NIOSH, GERMAN MAK, IARC, or ACGIH and therefore is neither considered to be nor suspected to be a cancer-causing agent by these agencies.

REPRODUCTIVE TOXICITY INFORMATION: Components of this product have no reported mutagenic, embryotoxic, teratogenic or reproductive toxicity.

ACGIH BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, there are no ACGIH Biological Exposure Indices (BEIs) determined for this material.
12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

MOBILITY: This product has not been tested for mobility in soil.

PERSISTENCE AND BIODEGRADABILITY: This product has not been tested for persistence or biodegradability.

BIO-ACCUMULATION POTENTIAL: This product has not been tested for bio-accumulation potential.

ECOTOXICITY: This product has not been tested for aquatic or animal toxicity. All releases to terrestrial, atmospheric and aquatic environments should be avoided. No aquatic toxicity data are available for the product or components in 1% concentration or more.

OTHER ADVERSE EFFECTS: This material is not listed as having ozone depletion potential.

ENVIRONMENTAL EXPOSURE CONTROLS: Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHODS: It is the responsibility of the generator to determine at the time of disposal whether the product meets the criteria of a hazardous waste per regulations of the area in which the waste is generated and/or disposed of. Waste disposal must be in accordance with appropriate Federal, State, and local regulations. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority. Shipment of wastes must be done with appropriately permitted and registered transporters.

DISPOSAL CONTAINERS: Waste materials must be placed in and shipped in appropriate 5-gallon or 55-gallon poly or metal waste pails or drums. Permeable cardboard containers are not appropriate and should not be used. Ensure that any required marking or labeling of the containers be done to all applicable regulations.

PRECAUTIONS TO BE FOLLOWED DURING WASTE HANDLING: Wear proper protective equipment when handling waste materials.

U.S. EPA WASTE NUMBER: Not applicable.

14. TRANSPORTATION INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION REGULATIONS: This product is not classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This product is not classified as Dangerous Goods, per regulations of Transport Canada.

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA): This product is not classified as dangerous goods under rules of IATA.

15. REGULATORY INFORMATION

UNITED STATES REGULATIONS:

U.S. SARA Reporting Requirements: This product is not subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act.

U.S. SARA Hazard Categories (Section 311/312, 40 CFR 370-21): ACUTE: Yes; CHRONIC: No; FIRE: No; REACTIVE: No; SUDDEN RELEASE: No

U.S. SARA Threshold Planning Quantity (TPQ): There are no specific Threshold Planning Quantities for components. The default Federal SDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply, per 40 CFR 370.20.

U.S. CERCLA Reportable Quantity (RQ): Not applicable.

U.S. TSCA Inventory Status: Components of this product are listed on the TSCA Inventory.

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65): No component is on the California Proposition 65 lists.

CANADIAN REGULATIONS:

Canadian DSL/NDSL Inventory Status: Components are on the DSL or NDSL Inventories.

Canadian Environmental Protection Act (CEPA) Priorities Substances Lists: Components are not on the CEPA Priorities Substances Lists.

Canadian WHMIS Classification and Symbols: This product would be categorized as a Controlled Product, D2B (Other Toxic Effects-Irritation) as per the Controlled Product Regulations.

16. OTHER INFORMATION

LABELING (Precautionary Statements) ANSI LABELING (Z129.1): CAUTION! MAY CAUSE IRRITATION BY INHALATION AND EYE CONTACT. PROLONGED SKIN CONTACT MAY CAUSE IRRITATION. Avoid breathing fumes or vapors. Do not taste or swallow. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Wear appropriate eye, hand, and body protection. Avoid exposure to elevated temperatures. FIRST-AID: In case of contact, immediately flush skin or eyes with plenty of water for at least 20 minutes while removing contaminated clothing and shoes. Get medical attention if irritation develops or persists. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, do not induce vomiting. Get medical attention. IN CASE OF FIRE: Use water fog, foam, dry chemical, or CO₂. IN CASE OF SPILL: Sweep or vacuum spilled material, avoiding generation of dusts and place in suitable container. Place residual in appropriate container and seal. Dispose of in accordance with U.S. Federal, State, and local hazardous waste disposal regulations. Consult Safety Data Sheet for additional information.
GLOBAL HARMONIZATION AND JAPANESE JIS Z7253 LABELING AND CLASSIFICATION: This product has been classified per UN GS Standards under U.S. applicable regulations that require Global Harmonization compliance.

Classification: Skin Irritation Category 2, Eye Irritation Category 2A

Signal Word: Warning

Hazard Statements: H315: Causes skin irritation. H319: Causes serious eye irritation.

Precautionary Statements:


Storage: None.

Disposal: P501: Dispose of contents/containers in accordance with all local, regional, national and international regulations.

Hazard Symbols: GHS07

COMPONENT CLASSIFICATION:

Labeling and Classification Full Text under GHS:

Ethyltriacectoxysilane: This is a self-classification.

Classification: Skin Irritation Category 2, Eye Irritation Category 2A

Hazard Statements: H315: Causes skin irritation. H319: Causes serious eye irritation.

Methyltriacectoxysilane: This is a self-classification.

Classification: Acute Oral Toxicity Category 4, Skin Irritation Category 2, Eye Irritation Category 2A


DEFINITION OF TERMS

A large number of abbreviations and acronyms appear on a SDS. Some of these, which are commonly used, include the following:

CAS #: This is the Chemical Abstract Service Number that uniquely identifies each constituent.

EXPOSURE LIMITS DEFINITIONS:

CEILING LEVEL: The concentration that shall not be exceeded during any part of the working day.

DFG MAKs: Federal Republic of Germany Maximum Concentration Values in the workplace. Exposure limits are given as TWA (Time-Weighted Average) or PEAK (short-term exposure) values.

DFG MAK Germ Cell Mutagen Categories: 1: Germ cell mutations that have been shown to increase the frequency of mutant frequencies in the progeny of exposed humans. 2: Germ cell mutations that have been shown to increase the mutant frequency in the progeny of exposed mammals. 3A: Substances that have been shown to induce genetic damage in germ cells of human animals, or which produce mutagenic effects in somatic cells of mammals in vivo and have been shown to reach the germ cells in an active form. 3B: Substances that are suspected of being germ cell mutagens because of their genotoxic effects in mammalian somatic cell in vivo; in exceptional cases, substances for which there are no in vivo data, but that are clearly mutagenic in vitro and structurally related to known in vivo mutagens. 4: Not applicable (Category 4 carcinogenic substances are those with non-genotoxic mechanisms of action. By definition, germ cell mutagens are genotoxic. Therefore, a Category 4 for germ cell mutagens cannot apply. At some time in the future, it is conceivable that a Category 4 could be established for genotoxic substances that are primary targets other than DNA [e.g., purely aneugenic substances] if research results make this seem sensible.). 5: Germ cell mutagens, the potency of which is considered to be too low that, provided the MAK value is observed, their contribution to genetic risk for humans is expected to be insignificant.

DFG MAK Pregnancy Risk Group Classification: Group A: A risk of damage to the developing embryo or fetus has been unequivocally demonstrated. Exposure of pregnant women can lead to damage of the developing organism, even when MAK and BAT (Biological Tolerance Value for Working Materials) values are observed. Group B: Currently available information indicates a risk of damage to the developing embryo or fetus but MAK and BAT values are observed. Group C: There is no fear to a risk of damage to the developing embryo or fetus when MAK and BAT values are observed. Group D: Classification in one of the groups A-C is not yet possible because, although the data available may indicate a trend, they are not sufficient for final evaluation.

DOLAM: Important Data on Life and Health. This level represents a concentration from which one can escape within 30 minutes without suffering escape-preventing or permanent injury.

LQ: Limit of Quantitation.

NE: Not Established. When no exposure guidelines are established, an entry of NE is made for reference.

NIC: Notice of Intended Change.

NIOSH: An agency of the United States Department of Health and Human Services that identifies and evaluates occupational exposures. The NIOSH recommended Exposure Limits are based in the 1989 NHEAs and the 1991 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current NHEAs and the vacated NHEAs are indicated. The phrase, Vacated 1989 NHEA, is placed next to the PEL that was vacated by Court Order.

Skin: Used when there is a danger of cutaneous absorption.

STEEL: Short Term Exposure Limit, usually a 15-minute time-weighted-average (TWA) exposure that should not be exceeded at any time during a workday, even if the 8-hr TWA is within the TLV-TWA, PEL-TWA or REL-TWA.

TLV: Threshold Limit Value. An airborne concentration of a substance that represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour.

TWA: Time Weighted Average exposure concentration for a conventional 8-hr (TLV, PEL) or up to a 10-hr (REL) workday and a 40-hr-weekwork.

WEEL: Workplace Environmental Exposure Limits from the AIHA.

Hazardous Materials Identification System Category

This rating system was developed by the National Paint and Coating Association and has been adopted by industry to identify the hazards of their chemicals.

HAZARD MATERIALS:

Acute Oral Toxicity Category 1:

LD50 Rat: > 2000 mg/kg.

LD50 Rat or Rabbit: > 2000 mg/kg.

Inhalation Toxicity 4-hrs LC50 Rat: > 20 mg/L.

Moderate Hazard: Temporary or transitory injury may occur; prolonged exposure may affect the CNS. Skin Irritation: Moderately irritating; primary irritant, sensitizer. PII or Draize ≥ 5, with no destruction of tissue. Eye Irritation: Moderately to severely irritating; reversible corneal opacity; corneal involvement or irritation clearing in 8–21 days. Draize = 26–100, with reversible effects. Oral Toxicity LD50, Rat: > 50–500 mg/kg. Dermal Toxicity LD50, Rat or Rabbit: > 200–1000 mg/kg.

Acute Oral Toxicity Category 2:

LD50 Rat: 1–10 mg/kg.

LD50 Rat or Rabbit: 20–200 mg/kg.

Inhalation Toxicity LC50 4-hrs Rat: 0.05–0.5 mg/L.

Severe Hazard: Life-threatening; major or permanent damage may result from single or repeated exposures; extremely toxic; irreversible injury may result from brief contact. Skin Irritation: Not appropriate. Do not rate as a 4, based on skin irritation alone. Eye Irritation: Not appropriate. Do not rate as a 4, based on eye irritation alone. Oral Toxicity LD50, Rat ≤ 1 mg/kg. Dermal Toxicity LD50, Rat or Rabbit ≤ 20 mg/kg. Inhalation Toxicity LC50, 4-hrs Rat ≤ 0.05 mg/L.

Acute Oral Toxicity Category 3:

LD50 Rat: 0.05–1 mg/kg.

LD50 Rat or Rabbit: 0.5–5 mg/kg.

Inhalation Toxicity LC50 4-hrs Rat ≤ 0.05 mg/L.

Moderate Hazard: Materials that will burn in air when exposure to a temperature of 93.3°C (200°F) for a period of 5 minutes. 1. Slight Hazard: Materials that must be pre-heated before ignition can occur. Material requires considerable pre-heating, under all ambient temperature and conditions before ignition and combustion can occur. This usually includes the following: Materials that will burn in air to a temperature of 815.5°C (1500°F) for a period of 5 minutes or less. Liquids, solids and semisolids having a flash point at or above 69.3°C (200°F) (i.e. OSHA Class IIB); and Most ordinary combustible materials (e.g. wood, paper, etc.)

Acute Oral Toxicity Category 4:

LD50 Rat: 0.001–0.05 mg/kg.

LD50 Rat or Rabbit: 0.001–0.05 mg/kg.

Inhalation Toxicity LC50, 4-hrs Rat ≤ 0.001 mg/L.

Slight Hazard: Materials that will burn in air when exposed to a temperature of 815.5°C (1500°F) for a period of 5 minutes or less. Liquids, solids and semisolids having a flash point at or above 69.3°C (200°F) (i.e. OSHA Class IIB); and Most ordinary combustible materials (e.g. wood, paper, etc.). Flammability Hazard: Materials that will not burn in air when exposed to a temperature of 815.5°C (1500°F) for a period of 5 minutes or less. Liquids, solids and semisolids having a flash point at or above 69.3°C (200°F) (i.e. OSHA Class IIB); and Most ordinary combustible materials (e.g. wood, paper, etc.). 2. Moderate Hazard: Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not, under normal conditions, form hazardous atmospheres in air, but under high ambient temperatures or moderate heating may release vapor in sufficient quantities to produce hazardous atmospheres with air. This usually includes the following: Liquids having a flash-point at or above 37.8°C (100°F) (i.e. OSHA Class III); and Most ordinary combustible materials (e.g. viscous and slow flowing as asphalt) that readily give off flammable vapors. 3. Serious Hazard: Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures, or, unaffected by ambient temperature, are readily ignited under almost all conditions. This usually includes the following: Liquids having a flash point below 22.8°C (73°F) and having a boiling point at or above 38°C (100°F) and those liquids having a flash point at or above 22.8°C (73°F) and below 37.8°C (100°F) (i.e. OSHA Class II and I); Materials that on account of their physical form or environmental conditions can form explosive mixtures with air and are readily dispersed in air (e.g., dusts of combustible solids, mists or droplets of flammable liquids); and Materials that burn extremely rapidly, usually by reason of self-contained oxygen (e.g. dry nitrocellulose and many organic peroxides).
HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

4 Severe Hazard—Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air, and that will burn readily. This usually includes Flammable; gases; Flammable; organic peroxides; Flammable; pyrophoric; Flammable; organic mercury compounds; or any materials that are liquid under pressure that will decompose spontaneously at a flash point below 22.8°C (73°F) and a boiling point below 37.8°C (100°F) (i.e. OSHA Class IA); or that will decompose spontaneously when exposed to air at a temperature of 54.4°C (130°F) or below (by pyrophoric).

5 Pyrophoric—Materials that do not react with water. Organic Peroxides: Materials that, in themselves, are normally stable but, when exposed to air or water, may decompose spontaneously and may cause significant heat generation or explosion hazard.

6 Flammable—Materials that may react violently with water. Explosives: Division 1.4 explosives. Explosive substances where the explosive effects are limited by the package and no projection or explosion hazard.

7 Health Hazard—Substances or materials that may emit noxious or toxic vapors or gases or, upon exposure to moisture, may cause serious or permanent injury. Gases with an LC50 for acute inhalation toxicity greater than 10 mg/L but less than or equal to 200 mg/L. Materials with an LC50 for acute dermal toxicity greater than 10 mg/kg but less than or equal to 200 mg/kg. Materials that cause severe, but reversible injury to the eyes or are respiratory irritants. Materials that cause severe, but reversible injury to the eyes or are respiratory irritants. Materials that cause severe, but reversible injury to the eyes or are respiratory irritants. Materials that are primary skin irritants or sensitizers. Materials whose LD50 for acute oral toxicity is less than or equal to 40 mg/kg. Materials whose LD50 for acute oral toxicity is less than or equal to 5 mg/kg.

8 Flammability Limit in Air—Materials that may react violently with water.

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS:

1 Flammable—Materials that may cause instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) of 2000 W/m² but less than or equal to 200,000 W/m². Materials with an LC50 for acute inhalation toxicity greater than 10 mg/kg but less than or equal to 200 mg/kg. Materials with an LC50 for acute dermal toxicity greater than 10 mg/kg but less than or equal to 200 mg/kg. Materials that cause severe, but reversible injury to the eyes or are respiratory irritants. Materials that cause severe, but reversible injury to the eyes or are respiratory irritants. Materials that cause severe, but reversible injury to the eyes or are respiratory irritants. Materials that are primary skin irritants or sensitizers. Materials whose LD50 for acute oral toxicity is less than or equal to 40 mg/kg. Materials whose LD50 for acute oral toxicity is less than or equal to 5 mg/kg.

2 Flammable—Materials that may cause instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) of greater than 2000 W/m² but less than or equal to 200,000 W/m². Materials with an LC50 for acute inhalation toxicity greater than 100 mg/kg but less than or equal to 500 mg/kg. Materials that cause severe, but reversible injury to the eyes or are respiratory irritants. Materials that cause severe, but reversible injury to the eyes or are respiratory irritants. Materials that cause severe, but reversible injury to the eyes or are respiratory irritants. Materials that are primary skin irritants or sensitizers. Materials whose LD50 for acute oral toxicity is less than or equal to 40 mg/kg. Materials whose LD50 for acute oral toxicity is less than or equal to 5 mg/kg.

3 Flammable—Materials that may cause instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) of greater than 200,000 W/m². Materials with an LC50 for acute inhalation toxicity greater than 1000 mg/kg but less than or equal to 5000 mg/kg. Materials that cause severe, but reversible injury to the eyes or are respiratory irritants. Materials that cause severe, but reversible injury to the eyes or are respiratory irritants. Materials that cause severe, but reversible injury to the eyes or are respiratory irritants. Materials that are primary skin irritants or sensitizers. Materials whose LD50 for acute oral toxicity is less than or equal to 40 mg/kg. Materials whose LD50 for acute oral toxicity is less than or equal to 5 mg/kg.

DEFINITION OF TERMS (Continued):

FLAMMABILITY LIMITS IN AIR—Much of the information related to fire and explosion is derived from the National Fire Protection Association (NFPA). Flash Point: Minimum temperature at which a liquid gives off sufficient vapor to form an ignitable mixture with air or oxygen under normal conditions. Ignition Temperature: Minimum temperature of a solid, liquid, or gas required to initiate or cause self-sustained combustion in air with no other source of ignition. LEL—Lowest concentration of a flammable vapor or gas in air or mixture of air and gas that will burn and sustain combustion. UEL—Upper explosible limit of a flammable vapor or gas in air or mixture of air and gas that will burn and cause explosion.
DEFINITION OF TERMS (Continued)

TOXICOLOGICAL INFORMATION:
Human and Animal Toxicology: Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. LD₅₀: Lethal Dose (solids & liquids) that kills 50% of the exposed animals. LC₅₀: Lethal Concentration (gases) that kills 50% of the exposed animals. ppm: Concentration expressed in parts of material per million parts of air or water. mg/ml: Concentration expressed in weight of substance per volume of air. mg/kg: Quantity of material, by weight, administered to a test subject, based on their body weight in kg. TD₅₀, LD₅₀, or TC, TCₐ, LC₅₀, and LCₐ: Lowest dose (or concentration) to cause lethal or toxic effects. Cancer Information: IARC: International Agency for Research on Cancer. NTP: National Toxicology Program. RTECS: Registry of Toxic Effects of Chemical Substances. ACGIH and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Other Information: BEI: ACGIH Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

ECOLOGICAL INFORMATION:
EC: Effect concentration in water. BCF: Bioconcentration Factor, which is used to determine if a substance will concentrate in life forms that consume contaminated plant or animal matter. TLₐ: Median threshold limit. log Kow or log Koc: Coefficient of Oil/Water Distribution is used to assess a substance’s behavior in the environment.

REGULATORY INFORMATION:
U.S.:
EPA: U.S. Environmental Protection Agency. ACGIH: American Conference of Governmental Industrial Hygienists, a professional association that establishes exposure limits. OSHA: U.S. Occupational Safety and Health Administration. NIOSH: National Institute of Occupational Safety and Health, which is the research arm of OSHA. DOT: U.S. Department of Transportation. TC: Transport Canada. SARA: Superfund Amendments and Reauthorization Act. TSCA: U.S. Toxic Substance Control Act. CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act. Marine Pollutant status according to the DOT; CERCLA or Superfund; and various state regulations. This section also includes information on the precautionary warnings that appear on the material’s package label.

CANADA: