



jb martin

MATERIAL SAFETY DATA SHEET

SECTION I: PRODUCT IDENTIFICATION

Product Name:	19.8 oz/yd ² Glass/Kevlar® (Aramid) hybrid fabric – TH-20-E
Weaver:	<i>jb martin ltée</i> 445 St-Jacques Québec, Canada J3B 2M1 Tel.: (450) 346-6853
Raw material:	CertainTeed Corporation (Glass) P.O. Box 860 Valley Forge PA 19482-0101 Tel.: (610) 341-7137 9 am – 5 pm (Eastern Time – USA)
Emergency Telephone::	CHEMTREC (800) 424-9300
	DuPont Canada, Inc. (Kevlar) P.O. Box 2200 Streetsville Mississauga, Ontario L5M 2H3
Emergency Telephone:	(613) 348-3616 (24 hours)
General Telephone:	(800) 387-2122

SECTION II: COMPOSITION/INFORMATION ON INGREDIENTS

GLASS

Chemical Name : Glass, oxide, chemicals
CAS No: 65997-17-3
Common Name: Textile Fiber Glass: Continuous Filament Glass Fibers
Percent in products: Approx. 98% by
LD₅₀: N/A
LC₅₀: N/A

Exposure Limits:	<u>OSHA PEL</u>	<u>ACGIH TLV TWA</u>	<u>NIOSH REL</u>
	Total Nuisance Dust: 15 mg/m ³	Total Glass Dust: 10 mg/m ³	Total Glass Dust: 5mg/m ³
	Respirable Nuisance Dust 5 mg/m ³		Respirable Fibers 3 f/cc

Chemical Name: Organic Polymer Solids (cured)
CAS No: None Assigned
Common Name: Size-materials-cured
LD₅₀: N/A
LC₅₀: N/A

Exposure Limits:	<u>OSHA PEL TWA</u>	<u>ACGIH TLV TWA</u>	<u>NIOSH REL</u>
	None	None	None

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Components

<u>Material</u>	<u>CAS RN</u>	<u>%</u>
Poly (terephthaloylchloride/p-phenylenediamine) (Para-aramid polymer)	26125-61-1	>89 WT%
Water, absorbed	7732-18-5	0-7 WT%
Pulp wet-lap		35-50 WT%
Sodium sulfate in KEVLAR® pulp:	7757-82-6	<0,1 WT%
In other forms:		<2 WT%
Finish:	NONE	<5 WT%

SECTION III: HAZARDS IDENTIFICATION

GLASS

EMERGENCY OVERVIEW

	Health	Fire	Reactivity	<u>Degree of Hazard</u>
NFPA Rating:	0	0	0	0- Minimal (insignificant) 1- Slight
NMIS Rating:	1	0	0	2- Moderate 3- Serious (High) 4- Severe (Extreme) *- Chronic Health Effect(s)

(see section XVI for acronyms)

POTENTIAL HEALTH EFFECTS

Primary Routes of Entry : Inhalation, skin and eye contact.

Acute Inhalation: Temporary upper respiratory irritation.

Chronic Inhalation: None Known

Acute skin Contact and sensitization: Temporary skin irritation seen in certain individuals.

Chronic skin Contact : None Known

Skin Absorption: None

Acute Eye Contact: Temporary eye irritation.

Chronic eye Contact : None Known

Acute Ingestion: Unlikely. Contact physician if unusual reaction is noted.

Chronic Ingestion: None Known.

Medical Conditions which may be aggravated: Pre-existing conditions which may be aggravated by mechanical irritants upon inhalation or skin contact.

Carcinogenicity:

Ingredients: Textile or continuous fibrous glass

NTP: Not listed

IARC:Not classifiable – Group 3

OSHA:Not listed

Mutagenicity: None

Teratogenicity : None

Reproductive Toxicity: None

Toxicological Synergistic Products: None

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Emergency Overview

Kevlar® aramid fiber is a golden yarn, staple, flock, pulp, or fabric. As shipped these products pose no immediate hazard. Processing and handling can produce airborne respirable fibrils (subfibers). Animal studies indicate that prolonged overexposure to such fibrils has the potential for lasting lung damage. Use ventilation or a respirator to minimize fibril inhalation.

During a fire, these Kevlar® products are unlikely to release many respirable fibers, but may release toxic and irritating gases, much like wool. Kevlar® will burn only with added heat, but pulp and dust may smolder. Kevlar® pulp and dust do not present an explosion hazard.

Kevlar® fibers are nonbiodegradable and nontoxic to aquatic life; they pose no unusual environmental hazard in a spill or fire.

Potential Health Effects

Eye: Fiber fly and dust may cause slight mechanical irritation.

Skin: Continual rubbing of fibers and fiber pieces on the skin (as when trapped under cuffs or collar, or when constantly handling fabrics) may cause irritation. Based on animal tests, the fibers do not cause sensitization (allergic reaction).

Ingestion: Based on animal studies, Kevlar® is nontoxic when eaten.

Inhalation: Kevlar® fiber is too big to inhale into the lungs, but fiber dust and fly from processing may be breathed into the nose and throat. Working unprotected in dusty conditions may cause upper respiratory irritation and cold-like symptoms.

Chronic effects: Processing Kevlar® or machining materials containing Kevlar®, may create fiber dust in the air small enough to be breathed into the lungs. Based on animal tests, breathing this dust at very high concentration repeatedly over a long time may cause lung injury (fibrosis).

Cancer: Kevlar® fibrous dust did not cause cancer in long term animal inhalation studies. [See the Toxicology section and references contained in the “**section XVI: Other information**” of this msds.

Carcinogenicity information: None of the components present in this material at concentrations equal to or greater than 0,1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

SECTION IV: FIRST AID MEASURES

GLASS

- Inhalation:** Remove from exposure. Get medical help if irritation persists.
- Eye contact:** Flush well with running water for at least 15 minutes. Get medical help if irritation persists.
- Skin contact:** Clean with soap and warm water. Get medical help if irritation persists.
- Ingestion:** Unlikely. Consult physician if unusual reaction is noted.
- Fires:** Remove to fresh air. Administer oxygen and get medical help.
- Information for Medical Practitioners:** Skin irritation responds well to mild hydrocortisone cream.

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Eye contact: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician, if irritation persists or develops later.

Inhalation: If large amounts of fumes, dust or fibers are inhaled, remove to fresh air. If breathing is difficult, give oxygen and call a physician. If persistent cough or other symptoms develop, get medical attention.

Skin contact: If fibers irritate the skin, wash with soap and water. Wash contaminated clothing before reuse. Use hand cream to soothe and moisten irritated skin. Get medical attention if irritation persists after contact stops.

Ingestion: Not a probable route. However, in case of gastro-intestinal distress following accidental ingestion, call a physician.

SECTION V: FIRE FIGHTING MEASURES

GLASS

Flash Point (°F) and Method: Does not support combustion.

Flammable limits: LEL: N/A UEL: N/A

Autoignition temperature: Does not support combustion.

Extinguishing media: Use that which is applicable to surrounding fire.

Special fire fighting procedures: Fire fighters must wear full protective gear including eye protection and self-containing breathing apparatus.

Unusual fire and explosion hazard: Size materials may thermally decompose or burn emitting toxic fumes and smokes including carbon dioxide and carbon monoxide.

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Flammable properties:

Flash point: Not applicable.

Autoignition: Not applicable

Explosive limits: Not applicable

Kevlar® fiber is inherently flame resistant, but can be ignited (limiting oxygen index = 29). Burning normally stops when the ignition source is removed. Pulp and dust accumulations may continue to smolder if once ignited. Kevlar® fiber dust does not present an explosion hazard.

Fire and explosion hazards: Burning Kevlar® produces hazardous gases similar to those from wool. These are mostly carbon dioxide, nitrogen oxides and small amounts of hydrogen cyanide, ammonia, aldehydes, aliphatic hydrocarbons and other toxic gases, depending on conditions of burning.

Extinguishing media: Water, foam, dry chemical, CO₂.

Fire fighting instructions: Wear self-contained breathing apparatus. Keep personnel removed and upwind of fire. Wear full protective equipment (full Bunker gear).

SECTION VI: ACCIDENTAL RELEASE MEASURES

Review “section V: fire fighting measures” and “section VII: handling” before proceeding with clean-up.

Use appropriate personal protective equipment during clean-up.

SECTION VII: HANDLING AND STORAGE

GLASS

Handling: When handling and/or applying this product:

Wear long sleeves, gloves and caps.

Wear eye protection (goggles, safety glasses or face mask).

Use a NIOSH/MSHA-approved dust respirator such as a 3M model #8710 or #9900 or equivalent.

After handling and/or applying this product:

Bathe with soap and warm water.

Wash work clothes separately and rinse washer after use.

Storage: Store under cover to protect product.

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Handling (personnel): Do not touch moving threadlines of Kevlar®. Entanglement with this high strength fiber can severely cut or even sever fingers.

Storage: Kevlar® is degraded by ultraviolet light. Do not store in direct sunlight. Fluorescent lighting will cause discoloration, but will not affect fiber mechanical properties.

SECTION VIII: EXPOSURE CONTROLS/PERSONAL PROTECTION

GLASS

Personal protective equipment:

Respirators: Wear NIOSH/MSHA approved respirators when handling and applying fiber glass products in accordance with the following NIOSH based exposure guidelines:

Exposure

Less than 10 times NIOSH REL

Less than 50 times NIOSH REL

Respirator (or equivalent)

3M 8710 or 3M 9900

MSA Ultra Twin Full-Face Respirator with type H filter (HEPA)

Product Package Label:

CAUTION:

Skin irritation: Fiber glass may cause temporary skin irritation. Wear long sleeves, gloves and eye protection when handling and applying material. Cleanse skin with soap and warm water after handling. Wash work clothes separately and rinse washer.

Dust irritation: A disposable mask designed for nuisance type dusts must be used when handling and applying material in order to prevent irritation to the nose or throat due to dust and airborne particles.

Work practice and engineering controls: Avoid spread of fiber glass dust. For some fabrication operations where dust is generated, provide general and/or local exhaust ventilation to control airborne dust levels below exposure limits.

Other: When glass fiber is used as a reinforcement in plastic materials, caution must also be exercised with the resin and curing catalysts employed and the mixing process used to disperse the fiber in the resin. When the glass fiber reinforced material is abraded or machined, control of the released dust must be established.

Additional respiratory protection may be necessary for protection from vapors and mists emitted from these resins and catalysts.

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Generally applicable control measures and precaution: Use only with adequate ventilation. Avoid dust generation. Do not consume food, drink or tobacco in the areas where they may become contaminated with this.

Engineering controls: If fumes fiber fly or dusts are generated, use engineering controls (where technically feasible) whenever necessary to control exposures below applicable limits. Isolation, enclosures, exhausts and ventilation, wetting and dust collection systems may be used.

If ventilation and exhaust air is recirculated, it should be filtered and conditioned to eliminate respirable fibers, dust and fumes. While HEPA filters are effective for dust removal from local exhausts, they have high pressure drops and require frequent maintenance. Larger air flows can be effectively cleaned of nonrespirable fibers and particles by screens and coarse filter media. However, respirable particles can be removed only by secondary filtration equipment designed for fine particles (less than 10 micrometers aerodynamic diameter) or water curtains. Where respirable fibrils may be generated, recirculated air should be periodically measured to determine if they are being adequately removed. Air monitoring should be done using the standard asbestos test method, NIOSH 7400 (B).

Fumes and smoke from laser cutting or machining of fabrics and composites of Kevlar® should be well exhausted or removed by ventilation.

Water jet cutting of fabric of composite of Kevlar® produces respirable size fibrils in the cutting waste. If dried, this waste can become a source of airborne respirable fibers. Rinse or wipe waste from floors, work surfaces and parts before it dries.

Respiration protection: Respirator use must be in accordance with OSHA Standard CFR 1910.134 (the "Respirator Standard").

Where airborne dust and fibril concentrations are expected to exceed applicable exposure limits, or where there is potential for irritation of the nasal passage by the mechanical action of the fibers, NIOSH/MSHA-approved respirators should be used.

An air purifying respirator with a dust/mist/fume cartridge or canister may be used under circumstances meeting the Respirator Standard.

Disposable dust masks equivalent to 3M model 8710 or equivalent may also be used.

Eye protection: Wear safety glasses or coverall goggles when cutting or mechanically working this product, or where airborne dust and fly is present.

Skin protection: When repeated forceful contact with Kevlar® fiber structures is anticipated, wear protective gloves and sleeves to minimize skin abrasion and drying.

If repeated handling of Kevlar® leads to dry skin, use non-greasy moisturizing skin cream. (Barrier creams are not recommended, as they may actually cause fiber dust to stick to the skin.)

Applicable exposure limits:

Poly(terephthaloylchloride/p-phenylenediamine) (para-aramid polymer)

PEL (OSHA): None Established

TLV (ACGIH): None Established

AEL* (DuPont): 2 fibers/cc, 8 Hr. TWA, respirable fibers

Fibrils < 3 u in diameter, > 5 u in length, and with an aspect ratio > 3:1.

5mg/m³, 8 Hr. TWA, total dust for non-respirable fibers or non-fibrous particulate

* AEL is a DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

SECTION IX: PHYSICAL AND CHEMICAL PROPERTIES

GLASS

Physical state:	Solid	Vapor density (Air = 1):	Not measurable
Boiling point (°F):	>1600°F	Specific gravity (H₂O = 1):	Glass = 2,6
Melting point (°F):	>1600°F	Evaporative rate (ethyl ether = 1):	Does not have vapor pressure
Softening point (°F):	Approx. 1550°F	Vapor pressure:	Does not have vapor pressure
Freezing point:	None	% volatile by volume (mmHg@20°C):	Not volatile
Odor:	None	% solubility (in water):	Small
Odor threshold:	None	pH:	Neutral
Color:	White	Coefficient of water to oil distribution:	None
Appearance:	Fibers assembled into fabrics.		

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Melting point:	Does not melt
Solubility in water:	Insoluble in water
Odor:	Odorless
Specific Gravity:	1,45 g/cc
Color:	Golden
Form:	Solid; yarn, fabric, (felt, paper, pulp, floc, staple)
% Volatiles:	< 9%, water and finish (wet-lap pulp has <50% water)

SECTION X: STABILITY AND REACTIVITY INFORMATION

GLASS

Stability:	Chemically stable.
Corrosivity:	Not corrosive.
Reactivity:	Not reactive.
Reactivity with water:	Not reactive.
Incompatible substance:	Hydrofluoric acid.

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Chemical stability:	Stable at normal temperatures and storage conditions
Incompatibility with other materials:	None reasonably foreseeable
Decomposition:	Fiber decomposition temperature > 400°C. At lower temperatures finish may boil off as a fume which should be vented.
Polymerization:	Polymerization will not occur

SECTION XI: TOXICOLOGICAL INFORMATION

GLASS

Extensive medical-scientific research has been conducted regarding the health aspect of fiber glass over the past 50 years. The International Agency for Research on Cancer (IARC), an agency of the World Health Organization (WHO), at a meeting in June 1987, reviewed all the significant research on the health effects attributed to fiber glass.

IARC determined that the data from both human and animal studies was inadequate to classify continuous filament glass fibers, such as used in our Fiber Glass Reinforcement products, as carcinogenic to humans.

IARC classified glass wool, which is used in some insulation products, as a category 2B, "possibly carcinogenic to humans." This classification was based largely on animal implantation experiments. For further information on glass wool products, refer to CertainTeed's fiber glass wool products Material Safety Data Sheets. These are available from the address cited on page 1.

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Animal data

Eye effects: Kevlar® is untested for eye irritancy. As with other particles, mechanical action of fibers in the eye may cause slight irritation.

Skin effects: Kevlar® fiber is not a skin irritant, or a skin sensitizer in animals. None of three tests using guinea pigs produced sensitization.

Skin sensitization has not been observed in human patch test or in industrial experience. (Kevlar® fiber has been used in direct contact with the skin in industrial gloves and protective apparel for many years.)

The mechanical action of the fibers may cause slight skin irritation at clothing binding points. Repeated harsh rubbing of the skin with fibrous dust or supported Kevlar® fiber structures (e.g., sized, coated or impregnated fabrics, paper edges, etc.) may cause abrasion, with resulting irritation and rash. Symptoms disappear following cessation of skin contact.

Acute oral effects: Kevlar® has very low toxicity by ingestion. Oral ALD < 7500 mg/kg in rats.

Acute inhalation effects: Industrial experience shows that inhalation of Kevlar® fibrous dust and fly may cause mechanical irritation of the mucous membrane of the nose and throat; these symptoms disappear upon cessation of exposure.

Subchronic inhalation effects: In a two weeks inhalation study with rats (1983), respirable Kevlar® fibrils (subfibers) at concentration of 1000-2000 fibrils per cubic centimeter (f/cc) caused mild nonprogressive fibrosis (lung scarring that shrinks with cessation of exposure) and nonspecific effects such as weight loss and irritation. There were no permanent effects at concentration of 280 f/cc or less.

Chronic inhalation effects: A two years inhalation study with Kevlar® pulp (refined to increase its respirable fibril content) showed fibrosis at concentrations of 25, 100, and 400 f/cc. To further characterize these lesions (previously identified as cystic keratinizing squamous cell carcinomas) a panel of 12 pathologists from North America and Europe reviewed them and diagnosed them as “proliferative keratin cysts”. They agreed that the lesions are not malignant neoplasms and are most likely not neoplastic. This unique lesion is not found in humans and may be indicative of a nonspecific biological response to the respirable material, rather than an indication of the toxicity of Kevlar®. No fibrosis was seen in animals exposed to 2,5 f/cc for two years. At no concentrations were fibers found to have migrated beyond the lungs and associated lymph system. Four experiments at fibril concentrations of 2,5 to 400 f/cc have shown that Kevlar® fibrils in the lungs of rats are shortened with time, probably by enzymatic clipping of the polymer chain. While not all fibrils disappear, long fibers are cut to an average of less than 5 micrometers and gradually removed. This effect is faster, the lower is the exposure. Abdominal cavity tumors have been observed in rats administered Kevlar® by intra-cavity injection, but at levels not considered significant.

Industrial monitoring of airborne fibril concentrations indicate it would be unlikely that human exposures would approach levels that caused permanent health effects in animal studies. However, based on these animal studies, long term exposures to high doses of respirable fibers could lead to pulmonary inflammation and subsequent development of chronic lung disease.

No animal tests have been run to define mutagenic, developmental or reproductive hazards.

SECTION XII: ECOLOGICAL INFORMATION

GLASS

This product is not manufactured with, nor does it contain any Class I Ozone depleting chemicals as defined by EPA in Title VI of the Clean Air Amendments of 1990 40 CFR Parts 82, Protection of Stratospheric Ozone. This product is not classified as a hazardous air pollutant in Title III Clean Act of 1990.

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Kevlar® aramid fiber is essentially nonbiodegradable in the environment, and does not leach material toxic to flora or fauna.

Finishes and additives used with Kevlar® are routinely tested for their potential effects on manufacturing wastewater treatment systems. Biocompatibility and aquatic toxicity tests give the following results:

- No finishes appear to be inhibitory or toxic to microbes commonly found in biological treatment systems.
- Biodegradation and normal anti-foam treatments should control foaming.
- Discharge of scoured finishes should not result in increased effluent toxicities.
- Finishes are completely or substantially biodegradable.

Since concentrations and treatment conditions vary, the above should be considered indicative only.

SECTION XIII: DISPOSAL INFORMATION

GLASS

Scrap material should be disposed of in sanitary landfill in accordance with federal, state and local regulations. Waste material is not considered hazardous as defined by RCRA (40 CFR Part 261).

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Kevlar® aramid fiber is not a hazardous waste as defined by regulations implementing the Resource Conservation and Recovery Act (RCRA). In general, Kevlar® waste materials may be treated, stored, transported and disposed of in accordance with the State and Local regulations governing the disposal of other common or non-RCA regulated waste material.

Waste such as waterjet cutter sludge or dust from air filters may be enriched in respirable fibers. Bag securely, label as containing respirable fibers, and dispose of it as nonhazardous industrial waste.

Since the fiber is essentially nonbiodegradable it should not be flushed to surface waters or sanitary sewer systems.

SECTION XIV: TRANSPORTATION INFORMATION

GLASS

National Motor Freight Classification (NMFC): 1714100, Rovings or yarn, glass fibre; or strand, glass fibre in continuous lengths or chopped; in packages.

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DOT: Proper Shipping Name: None. Not regulated

CANADA: TDG CLASS: Not regulated

ICAO: International Civil Aviation Organization classification not required

IMDG: International Maritime Dangerous Goods classification not required

Shipping information – Canada

This material is not regulated

SECTION XV: REGULATORY INFORMATION

As this product is considered a mixture, each component is listed below identifying its status on specific regulatory lists.

CHEMICAL Name	Fiber glass textile 65997-17-3	2-Butenedioic Acid (E)-, Polymer with 1,2-... 39382-21-3	2-Butenedioic Acid (E)-, Polymer with .α,... 39382-25-7	Polyester resin CAS: proprietary
SARA Title III Section 313	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SARA Title III Section 302	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CA Proposition 65	✓ [†]	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Canada DSL	<input type="checkbox"/>	<input type="checkbox"/>	✓	<input type="checkbox"/>
Canada NDSL	✓	<input type="checkbox"/>	<input type="checkbox"/>	✓
Korea KECI	✓	<input type="checkbox"/>	✓	?
Europe EINECS	✓	<input type="checkbox"/>	<input type="checkbox"/>	✓
Japan MITI	✓	<input type="checkbox"/>	✓	?
Philippines PICCS	✓	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Australia AICS	✓	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
USA TSCA	✓	<input type="checkbox"/>	✓	✓

[†] listed as glass wool fibers/airborne particulates of respirable size.

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U.S. Federal Regulations

OSHA: This MSDS is provided to comply with provisions of the Hazard Communication Standard (29 CFR 1910.1200).

EPA: Kevlar® products are listed on the TSCA inventory.

CERCLA: Kevlar® is not regulated as hazardous waste under CERCLA.

SARA TITLE III, section 313: Not reportable.

CLEAN AIR AMENDMENTS OF 1990: Kevlar® aramid fiber products and their packaging do not contain, nor are they manufactured with, any of the ozone-depleting substances listed in either Class I (chlorofluorocarbons) or Class II (hydrochlorofluorocarbons) of the Clean Air Act Amendments of 1990.

FDA: Some, but not all, Kevlar® aramid fiber products are approved for use as articles or components of articles intended for repeated contact with food.

State Regulations (U.S.)

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This product contains none of the substances known to the State of California to cause cancer or reproductive toxicity.

Pennsylvania and New Jersey Right-to-Know Laws: This product is not subject to the provisions of the Pennsylvania or New Jersey Right-to-Know Laws.

Canadian Regulations

This is not a WHMIS controlled product.

CEPA status: DSL: REPORTED/INCLUDED.

Regulatory information disclaimer: The information given here in section XV – Regulatory information is intended to be as complete as possible. It is the user's responsibility, however, to determine and comply with all applicable laws and regulations under federal, state, and local requirements in the use of this product.

SECTION XVI: OTHER INFORMATION

Acronyms/definitions used in this MSDS:

ACGHI:	American Conference of Government Industrial Hygienists
CAS No:	Chemical Abstracts Service Number
EPA:	Environmental Protection Agency
f/cc:	Fibers per cubic centimeter
HEPA:	High Efficiency Particulate Air (filter)
HMIS:	Hazardous Material Identification System
IARC:	International Agency for Research on Cancer
LC ₅₀ :	The air concentration of a substance, when administered over a specified time period in an animal assay, is expected to cause the death of 50% of a defined animal population.
LD ₅₀ :	The single dose of a substance that, when administered by a defined route in an animal assay, is expected to cause the death of 50% of a defined animal population.
LEL:	Lower Explosive Limit
mg/m ³ :	Milligrams per cubic meter
MSHA:	Mine Safety & Health Administration
N/A:	Not Applicable
NFPA:	National Fire Protection Association
NIOSH:	National Institute for Occupational Safety and Health
NTP:	National Toxicology Program
OSHA:	Occupational Safety and Health Administration
PEL:	Permissible Exposure Limit
RCRA:	Resource Conservation and Recovery Act
REL:	Recommended Exposure Limit
SARA:	Superfund Amendments and Reauthorization Act
Title III:	Emergency Planning and Community Right to Know Act Section 302 – Extremely Hazardous Substances Section 313 – Toxic Chemicals
TLV:	Threshold Limit value
TSCA:	Toxic Substance control Act (USA)
TWA:	Time Weighted Average
UEL:	Upper Explosive Limit
WHO:	World Health Organization

Australia AICS:	Australian Inventory of Chemical Substances
CA proposition 65:	California Title 22, Division 2, Chapter 3 Safe Drinking Water and Toxic Enforcement Act of 1986
Canada DSL:	Canadian Domestic Substance List
Canada NDSL:	Canadian Non-domestic Substance List
Europe EINECS:	European Inventory of Existing Commercial Chemical Substances
Japan MITI:	Ministry of International Trade and Industry
Korea KECI:	Korean Existing Chemicals Inventory
Philippines PICCS:	Philippine Inventory of Chemicals and Chemical Substances
Respirable Dust:	The respirable fraction of suspended airborne particulates
Respirable Fibers:	Suspended airborne particulates with diameters of 3 micrometers or less,

lengths of 5 micrometers or more and 5:1 length-to-width aspect ratio (NIOSH 7400 method, B rules)

Total Dust: Suspended airborne particles of “nuisance” dusts including those of non-respirable size.

Total Glass Dust: Suspended airborne particles of dust composed of glass only, including those of non-respirable size.

NFPA, NPCA-HMIS

NFPA rating:

Health: 0
Flammability: 1
Reactivity: 0

NPCA-HMIS rating:

Health: 0 (Chronic health effects)
Flammability: 1
Reactivity: 0

Additional information

CAUTION: DO NOT USE IN MEDICAL APPLICATIONS INVOLVING PERMANENT OR TEMPORARY IMPLANTATION IN THE HUMAN BODY OR CONTACT WITH BODY FLUIDS.

References:

Reindhardt, C.F., M.D., PROCEEDINGS OF NATIONAL WORKSHOP ON SUBSTITUTES FOR ASBESTOS, (1980), EPA-560/3-80-001, 443-447.

Lee, K.P., et al., TOXICOLOGY AND APPLIED PHARMACOLOGY, 71 (1983), 243-253.

Lee, K.P., et al., FUNDAMENTAL AND APPLIED TOXICOLOGY, 11 (1988), 1-20.

Kelly, D.P., Merriman, E.A., Kennedy, G.L., Jr., and Lee, K.P., FUNDAMENTAL AND APPLIED TOXICOLOGY, 21, (1993), 345-354.

Malley, L.A., Slone, T.W., Jr., Makovec, O.T., Elliott, G.S., and Kennedy, G.L., Jr., FUNDAMENTAL AND APPLIED TOXICOLOGY, 28, (1995), 80-93.

Warheit, D.B., Kellar, K.A. and Hartsky, M.A., TOXICOLOGY AND APPLIED PHARMACOLOGY, 116, (1992), 225-239.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

The technical department