



# *jb martin*

## MATERIAL SAFETY DATA SHEET

### SECTION I: PRODUCT IDENTIFICATION

Product Name:	9.0 oz/yd <sup>2</sup> Kevlar® Aramid fabric, TA-09-S Kevlar® Aramid yarn
Weaver:	<i>jb martin ltée</i> 445 St-Jacques Québec, Canada J3B 2M1 Tel.: (450) 346-6853
Raw material:	<b>DuPont Canada, Inc.</b> <b>P.O. Box 2200</b> <b>Streetsville</b> <b>Mississauga, Ontario</b> <b>L5M 2H3</b>
Product Information:	(800) 387-2122
Transport Emergency:	(613) 348-3616 (24 hours)
Medical Emergency:	(613) 348-3616 (24 hours)

### SECTION II: COMPOSITION/INFORMATION ON INGREDIENTS

<u>Components</u>		
<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

### 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

**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

**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, CO<sub>2</sub>.

**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

**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

**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 or 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/m<sup>3</sup>, 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

**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

**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

### 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

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

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

### Shipping information:

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

### U.S. Federal Regulations

**OSHA:** This msds is provides 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.

### Sate 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.

## SECTION XVI: OTHER INFORMATION

### 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 Hartschy, 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