

**MATERIAL SAFETY DATA SHEET**

This MSDS complies with 29 CFR 1910.1200

**SECTION 1 - PRODUCT IDENTIFICATION**

**PRODUCT FINISH DESCRIPTION** All styles of woven fabric containing PAN based carbon and aramid fibers or tracers  
Greige, loom state, unfinished  
Woven textile fabric

**SECTION 2 - HAZARDOUS INGREDIENTS**

| CHEMICAL OR COMMON NAME        | MAX. % BY WEIGHT | UN#          | CAS#         | TLV (SOURCE)                           | PEL (SOURCE)                            |
|--------------------------------|------------------|--------------|--------------|--|---|
| Carbon fiber (textile grade)   | 99               | not assigned | 7440-44-0    | not listed                             | not listed                              |
| Respirable fibrous carbon dust | not known*       | not assigned | not assigned | 5mg/m <sup>3</sup> (ACGIH) (inhalable) | 5 mg/m <sup>3</sup> (OSHA) (respirable) |
| Aramid fibers                  | 75               | not assigned | not assigned | not available                          | not available                           |

\*AMOUNT WILL BE DEPENDENT UPON METHOD OF HANDLING

**SECTION 3 - OTHER INGREDIENTS**

ITEMS LISTED IN THIS SECTION ARE EITHER CHEMICALLY OR PHYSICALLY BONDED TO THE FIBROUS GLASS TEXTILE AND ARE DEEMED NON-HAZARDOUS IN THE STATE SUPPLIED.

| CHEMICAL AND COMMON NAME                      | MAX. % BY WEIGHT |
|---|------------------|
| Uncured epoxy resin                           | 2.0              |
| Poly(terephthaloychloride/p-phenylenediamine) | 75.0             |
| Textile sizing and lubricants                 | 3.5              |
| Absorbed water                                | 7.0              |

**SECTION 4 - PHYSICAL DATA**

**Specific Gravity:** Approx. 1.45 to 1.75  
**APPEARANCE/PHYSICAL STATE:** Black and various other colors such as yellow, orange, red, blue, green; solid

**SOLUBILITY IN WATER:** Negligible

**ODOR:** No distinctive odor

**SECTION 5 - FIRE HAZARD DATA****FLASH POINT:** Not applicable**FLAMMABLE LIMITS:** Not applicable**EXTINGUISHING MEDIA:** Water, dry powder, or foam (needed for packaging only).**SPECIAL FIRE FIGHTING PROCEDURE:** In any sustained fire, wear self-contained breathing apparatus.**UNUSUAL FIRE HAZARDS:** In a sustained fire, combustible decomposition products may be released.

Decomposition products are those related to carbon, hydrogen, oxygen, and nitrogen. The products formed will be dependent on the available oxygen and other factors. In a sustained fire, combustible decomposition products may be released. These products include carbon dioxide, carbon monoxide, compounds of nitrogen, and airborne fibers. \*\*

**SECTION 6 - REACTIVITY DATA****STABILITY:** Stable**CONDITIONS/MATERIALS TO AVOID:** Note: Carbon fibers, dust, and fibrous particles are electrically conductive and can cause shorting in electrical equipment. Explosive shorting of high voltage systems is possible.**HAZARDOUS DECOMPOSITION PRODUCTS:** None generated under normal storage or handling conditions. Heat generated by laser or other types of cutting of composites containing Aramid Fiber (example KEVLAR<sup>®</sup>) generates a variety of toxic off gases, some of which may cause irritation of the respiratory tract.**SECTION 7 - HEALTH HAZARD DATA****POTENTIAL ROUTES OF ENTRY:** Inhalation, skin contact**EFFECTS OF OVEREXPOSURE:** Direct skin contact with fibrous glass or its dust may cause mechanical irritation and transitory dermatitis. Breathing of fibers or dust may cause mechanical irritation of the mouth, nose, and throat. For additional information see Section 8.**EMERGENCY AND FIRST AID PROCEDURE:**

Inhalation: Move to fresh air area.

Ingestion: Not likely to occur through normal use, should ingestion occur seek medical attention.

Eyes: Flush with flowing water for 15 minutes - seek medical attention

Skin: Flush with ample cool water followed by washing with mild soap to remove accumulated fibers.

**CARCINOGEN:** Not listed under IARC, NTP, or OSHA. Current known industry studies have shown fibrous carbon to be a non-carcinogen. Lifetime animal inhalation studies with respirable aramid fibrils have shown no toxic effects at up to 25 times typical work place concentrations. For further data pertaining to aramid see section 8**SECTION 8 - SPECIAL PROTECTION REQUIRED****Pertaining to Aramid Fibers (KEVLAR<sup>®</sup>)\*\*\***

"As shipped, KEVLAR aramid fiber products do not pose a hazard. KEVLAR staple and pulp contain a small amount of respirable fibers which may become airborne during opening, mixing, carding, or regrinding waste products containing KEVLAR. When mechanically working KEVLAR fiber or materials containing KEVLAR in operations such as cutting, machining, grinding, crushing or sanding, airborne respirable fibers may be formed. Repeated or prolonged inhalation of excessive concentration of respirable fibers may cause permanent lung injury.

**ANIMAL DATA:** Oral ALD: 7500 mg/kg in rats  
**OTHER:** Observe good personal hygiene.

KEVLAR fiber is not a skin irritant, is untested for eye irritancy and is not a skin sensitizer in animals. By ingestion, the fiber has very low acute oral toxicity with no deaths observed in animal feeding studies at dose levels up to maximum, 7500 mg/kg. In a two week inhalation study, (1983) respirable KEVLAR fibers at concentrations of 1000-2000 fibers per cubic centimeter caused mild non-progressive fibrosis (lung scarring that shrinks with cessation of exposure), and nonspecific effects such as weight loss and irritation, but no effects at concentrations of 280 fibers per cubic centimeter. A two-year inhalation study (1985) with KEVLAR pulp (refined to increase its respirable content) showed fibrosis at concentrations of 25, 100, 400 fibers per cubic centimeter and lung lesions (previously identified as cystic keratinizing squamous cell carcinomas) in some rats in the group exposed to respirable fibers at concentrations of 100 fibers per cubic centimeters. This is a unique type of lesion not found in humans and may be indicative of a nonspecific biological response to the respirable material rather than an indication of KEVLAR toxicity. No fibroids were seen in animals exposed to 2.5 respirable fibers per cubic centimeter for two years. At no concentrations were fibers found to have migrated beyond the lungs and associated lymph system. Abdominal cavity tumors have been observed in two studies where rats were administered KEVLAR by intra-cavity injection. For additional details, see References.

#### **HUMAN DATA:**

Skin sensitization has not been observed in human skin tests or animal skin tests. The mechanical action of the fibers may cause slight skin irritation at clothing binding points and mild irritation of the eyes and nasal passages. Overexposure to the respirable fibers by inhalation may cause mild and temporary upper respiratory irritation with discomfort or cough. Based on animal testing, prolonged and repeated exposure to excessive concentrations may cause permanent lung injury. In all processing of KEVLAR, the use of compressed air to clean equipment can temporarily increase the airborne fibril concentrations markedly. Equipment should be vacuumed or wiped instead.

#### **Carcinogenicity**

None of the components in this material is listed by IARC, NTP, OSHA, or ACGIH as a carcinogen. See Animal Data discussed above.

Exposure Limits for KEVLAR ARAMID FIBER - DuPont

AEL \* (DuPont) : 2 respirable fibers/cc (8-hr. TWA), < 3-micron diameter

TLV \*\* (ACGIH) : None established

PEL (OSHA) : None established

\*AEL is DuPont's Acceptable Exposure Limit.

\*\*TLV is a registered trademark of the American Congress of Governmental Industrial Hygienists

Other Applicable Exposure Limits:

Exposure Limits for KEVLAR Dust

AEL \* (DuPont): 5 mg/m<sup>3</sup>, total dust, and <3-micron diameter

TLV \*\* (ACGIH) : None established

PEL (OSHA) : None established

### **Particulates Not Otherwise Related**

WEEL (AIHA): 5 mg/m<sup>3</sup>, 8 hr. TWA total dust (non-respirable fibers and non-fibrous particles)

### **Safety Precautions**

Avoid breathing fibers or dust. Follow good industrial hygiene practices for ventilation and clean-up; in particular avoid the use of air jets to blow off equipment; use vacuum cleaners with high efficiency particulate air (HEPA) filters instead.

Do not handle moving thread lines of KEVLAR, as entanglement with a high strength fiber can severely cut or even sever fingers.

### **FIRST AID**

**INHALATION:** If large amounts of fibers are inhaled, remove to fresh air. If breathing is difficult, give oxygen, and call a physician.

**SKIN CONTACT:** If fibers irritate the skin, wash with soap and water.

### **PROTECTION INFORMATION**

Generally Applicable Control Measures and Procedures

If the fibers or parts made from the fibers are cut or otherwise mechanically worked, dusts and fibers may be generated. Use engineering controls where technically feasible such as isolation, enclosures, exhaust ventilation, wetting, and dust collection systems wherever necessary to control airborne respirable fiber exposure below applicable limits.

Loose fitting clothing that is routinely washed is recommended to reduce build up of fibers at chafing points.

Laser cutting of fabric of KEVLAR or of laminates containing KEVLAR or machining that produces smoke should be well exhausted or ventilated to remove fumes from the workplace.

Water jet cutting of fabric or composites of KEVLAR produces fibrils in the cutting waste. If dried, this waste can become a source of airborne respirable fibers. Rinse or wipe waste from work surfaces and parts.

### **Personal Protective Equipment**

#### **EYE/FACE PROTECTION**

When cutting or mechanically working this product, wear safety glasses or coverall goggles.

**RESPIRATORS**

When cutting or mechanically working this product, wear NIOSH approved respiratory protection if there is potential for airborne exposures in excess of applicable limits, or if there is potential for irritation of the nasal passages to occur due to the mechanical action of the fibers".

\*\*\* Section 8 has been extracted from DuPont's MSDS for KEVLAR<sup>®</sup> Aramid Fiber Issued 03/25/96. Additional questions concerning KEVLAR<sup>®</sup> may be answered by calling 1-800-4-KEVLAR; DuPont will also make available a 12-minute videotape that discusses safe handling of KEVLAR<sup>®</sup>

Exposure to fibrous glass may cause mechanical irritation to the skin, eyes, nose and throat. Typically such irritation occurs to newly exposed individuals, and usually diminishes after several days of exposure.

**Pertaining to Carbon Fibers**

**RESPIRATORY:** If airborne dust or fibers are visible, or if upper respiratory irritation occurs, use a NIOSH respirator approved for nuisance type dusts.

**VENTILATION:** Normal area ventilation is sufficient in most cases to keep dust and fiber levels below 2 respirable fibers per cubic centimeter.

**SKIN:** Gloves may be required for certain workers who have sensitive skin or contact dermatitis.

**EYE:** None required for normal use, but suggested as a good safety practice whenever use of the product releases aramid fibrils or dust.

**OTHER:** Observe good personal hygiene.

**SECTION 9 - CONTAINMENT AND DISPOSAL**

**CONTAINMENT AND CLEAN UP:** Dust or loose fibers can be vacuumed or swept with the aid of a dust suppressant.

**DISPOSAL:** Do not incinerate. Waste material should be bagged or containerized, sealed and dispose according to local, state, and federal laws. This material is not regulated under RCRA hazardous waste regulations.

**SECTION 10 - SPECIAL PRECAUTIONS**

**SHIPPING:** Not regulated by DOT; not classified by TDG

**STORAGE:** Store in dry area.

**HANDLING:** Carbon fibers, dust and fibrous particles are electrically conductive and can cause shorting in electrical equipment. Explosive shorting of high voltage systems is possible.

**SECTION 11 - REGULATORY INFORMATION**

**EPA, RCRA 40 CFR, Part 261, 1990:** Non-hazardous

**CERCLA:** Not listed

**SARA TITLE III:** Exempt by definition

**PA RIGHT-TO-KNOW:** Less than reportable quantity

**TSCA INVENTORY:** Exempt per section 8(a), 710.2(f), and 704.5(a)

**CA PROPOSITION 65:** Insignificant trace quantity

**MA RIGHT-TO-KNOW:** Less than reportable quantity

**NJ RIGHT-TO-KNOW:** Less than reportable quantity

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