



# **Fiber Glass Systems**

**OCCUPATIONAL EXPOSURE TO FIBERGLASS**

**June 2010**

The information contained herein is meant for informational purposes only and primarily to differentiate the regulatory treatment and potential health effects of continuous glass filaments found in Fiber Glass Systems products from other fibers such as glass wool, rock wool, slag wool, and asbestos. Best practices should always be employed to identify, measure, and reduce workplace exposures to hazardous substances.

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## 1.0 INTRODUCTION

There is a lot of confusion surrounding the potential adverse health effects of workers exposed to fiberglass. The information presented here attempts to help the reader gain a fuller understanding of this issue. Some differences between the continuous glass filaments found in Fiber Glass Systems' products and other types of fibrous materials such as glass wool, rock wool, slag wool, and asbestos will be discussed. Fiber morphology and how it relates to health effects is examined along with the current regulatory treatment and classification of glass fibers. Lastly, recommendations on protecting employees from overexposure are provided.

Most of the information presented here is taken from the following source:

ATSDR. 2002. *Technical Briefing Paper: Health Effects from Exposure to Fibrous Glass, Rock Wool, or Slag Wool*. U.S. Department of Health and Human Services, ASTDR. Contract Number: 205-1999-00024.

## 2.0 TYPES OF FIBERS and THEIR USES

Synthetic vitreous fibers is a classification of man-made materials that includes continuous filament fibers, glass wool, rock wool, slag wool, and refractory ceramic fibers. Asbestos is a naturally occurring mineral. While continuous glass filament fibers are used as a reinforcement in composites, the other fiber types mentioned are typically employed as thermal and/or sound insulators. In addition to their *end-use* differences, the average diameter of continuous glass fibers is greater than the other fibers listed, which is a key point in understanding potential adverse health effects.

## 3.0 FIBER MORPHOLOGY and HEALTH EFFECTS

Due to the much-publicized link between chronic asbestos fiber exposure and certain lung cancers, synthetic vitreous fibers have been closely scrutinized in an attempt to determine their ability, or lack thereof, to cause cancer in humans. Three main parameters: fiber diameter, fiber length, and fiber durability, seem to play a major role in a fiber's ability to cause cancer.

**Fiber Diameter.** Fibers with diameters of less than about 3-5  $\mu\text{m}$  are considered *respirable*. That is, they can be inhaled into the lower lung where gas exchange occurs. Fibers greater than 3-5  $\mu\text{m}$  in diameter are generally deposited in the upper airways where the body quickly clears them to the throat. Most continuous glass fibers, such as those used in Fiber Glass Systems' products, have relatively large diameters (6-15  $\mu\text{m}$ ).

**Fiber Length.** Longer *respirable* fibers are more difficult for the body to remove than shorter *respirable* fibers. This is due to the mechanism by which the body employs to remove foreign particles from the lower lung. In layman's terms, specialized cells called *macrophages* (literally *large eaters*) engulf foreign particles and transport them to the upper respiratory tract where they can be cleared to the throat. Studies indicate that

respirable fibers with lengths longer than the diameter of the macrophage cells (about 12-20  $\mu\text{m}$ ) are not cleared due to the macrophage cells inability to fully engulf the fibers.

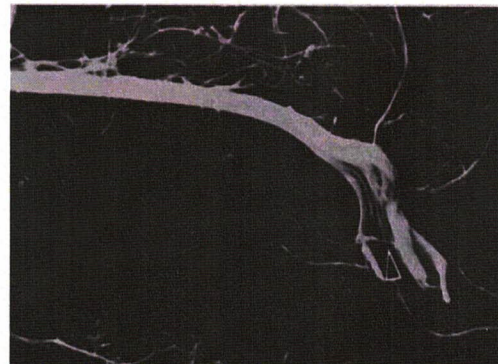
**Fiber Durability.** The longer a fiber persists in body tissues, the greater the potential for adverse health effects. Continuous glass fibers generally have less durability (persistence) in biological tissues than asbestos fibers.

Another very important difference between continuous glass fibers and asbestos fibers is glass fibers' propensity to break horizontally into smaller lengths but not longitudinally into smaller diameters. This difference between the two fiber types can clearly be seen in the figures below. Several studies have shown that even when composite laminates are sanded, grinded, cut, etc. that the glass fibers do not split longitudinally into smaller diameter particles.

### Comparison of Glass Fibers and Asbestos Fibers



Continuous Glass Fibers



Asbestos Fibers

#### 4.0 REGULATORY TREATMENT and CLASSIFICATION OF GLASS FIBERS

The International Agency for Research on Cancer (IARC) reported in 2001 that there was no evidence of increased risks of lung cancer or of mesothelioma (cancer of the thin lining surrounding the lung or the abdominal cavity) from occupational exposure during the manufacture of synthetic vitreous fibers and inadequate evidence overall of any excess cancer risk. The American Conference of Governmental Industrial Hygienists (ACGIH), also in 2001, established an A4, *not classifiable as a human carcinogen*, designation for continuous filament glass fibers.

ACGIH, NIOSH (National Institute for Occupational Safety and Health), and OSHA all provide occupational exposure limit values for several potential respiratory hazards. The exposure limits for fiberglass from each organization are summarized below.

- ACGIH** TLV = 1 f/cc (measured as total fibers per cubic centimeter)  
 TLV = 5 mg/m<sup>3</sup> (measured as inhalable particulates)
- NIOSH** REL = 3 f/cc (measured as total fibers per cubic centimeter)  
 REL = 5 mg/m<sup>3</sup> (measured as inhalable particulates)
- OSHA** No specific PEL for fibers. These materials are regulated under the PEL's of 15/mg/m<sup>3</sup> for total particulate dusts and 5 mg/m<sup>3</sup> for respirable particulates.
- NOTE:** TLV (Threshold Limit Value)  
 REL (Recommended Exposure Limit)  
 PEL (Permissible Exposure Limit)

The following table provides a summary of actual industrial hygiene monitoring results from Fiber Glass Systems' Oklahoma manufacturing facility.

**Fiberglass and Total Nuisance Dust Industrial Hygiene Monitoring Results Summary for Fiber Glass Systems – Sand Springs, OK**

Analyte	Location & Process	IH Survey Result	OSHA PEL <sup>1</sup>	ACGIH TLV <sup>2</sup>
Fiberglass	Building 2, Glass Table	0.008 f/cc	None Established	1 f/cc
	Building 6, Finishing	0.018 f/cc		
	Building 2, Glass Table	0.007 f/cc		
Total Nuisance Dust	Building 2, Finishing	0.23 mg/m <sup>3</sup>	15 mg/m <sup>3</sup>	10 mg/m <sup>3</sup>
	Building 6, Finishing	0.27 mg/m <sup>3</sup>		

**5.0 EMPLOYEE PROTECTION**

Most occupational exposure issues associated with fiberglass are acute (short-term) irritation of the skin, eyes, and upper respiratory tract. These can all be easily avoided with the use of appropriate personal protective equipment (PPE) and clothing. Workers should be directed to wear such clothing to minimize skin contact with fibers. Gloves and eye protection are also strongly recommended. In enclosed areas with poor ventilation and where the fibers and/or the laminate are disturbed, airborne concentrations of dusts/fibers may need to be monitored to ensure compliance with applicable standards. A simple dust mask will usually provide adequate protection.

## **6.0 CONCLUSION**

The glass fibers in Fiber Glass Systems' products are very different from other man-made fibers and asbestos. Several studies have shown that glass fibers do not pose the same cancer-causing risks as asbestos fibers. OSHA and other non-governmental agencies agree with these studies as can be seen in their classification of glass fibers. Routine industrial hygiene monitoring performed at Fiber Glass Systems manufacturing facilities shows that typical sanding, grinding, and cutting of its products does not expose workers in excess of applicable standards.

**1. CHEMICAL PRODUCT & COMPANY IDENTIFICATION****24-Hour Emergency Phone Number**

Chem-Tel 800-225-3024 North America

Chem-Tel collect: 813-248-0585 Outside North America

Product: Fiberglass Pipe and Fittings

Effective Date: 03/07/08

Date Printed: 03/07/08

MSD: SA00001

Manufactured by:

Fiber Glass Systems, L.P.

2425 SW 36<sup>th</sup> Street

San Antonio, Texas 78237

Customer Information:

210-434-5043

**2. COMPOSITE / INFORMATION OR INGREDIENTS**

CAS#65977-17-3

Cured epoxy resin  
Fiberglass18% to 35%  
65% to 82%**3. HEALTH HAZARDS INFORMATION**

Emergency Overview: Toxic fumes may be released during combustion

Hazard Statement: Dust due to grinding or cutting operations can cause eye, skin, and respiratory irritation.

Potential Health Effects:

Eyes: Dust can cause irritation

Skin: Itching and mechanical irritation may result from dust

Ingestion: Dust may irritate digestive track

Inhalation: Mouth, nose and throat may be irritated by dust

**4. FIRST AID INFORMATION**

Eyes: Flush with large amounts of water for 10 minutes

Skin: Wash with soap and cold water

Ingestion: Seek medical attention if irritation persists

Inhalation: Seek medical attention if irritation persists

**5. FIRE FIGHTING INFORMATION**

Flash Point: NA Method Used: NA

Upper Flammable Limit (UFL): NA

Lower Flammable Limit (LFL): 400 F

Auto Ignition: NA

General Fire Hazards:

Toxic gases may be released during combustion

Extinguishing Media: Water, dry chemicals, CO2 or foam

Fire Fighting Equipment Instructions:

Wear SCUBA gear and full body protective equipment

NFPA Rating

Health: 1

Fire: 1

Reactivity: 0

Other: 0

Scale: 0 = Minimal 1 = Slight 2 + Medium 3 = Serious 4 = Severe

**6. ACCIDENTAL RELEASE MEASURES**

Containment Techniques: NA

Clean-Up Procedures: NA

Other Emergency Advice: NA

**7. HANDLING AND STORAGE**

Storage: Do not store near ignition source

Product appearance may be effected by long term exposure to sunlight

Handling: Wear gloves

Other Precautions:

**8. EXPOSURE CONTROLS / PERSONAL PROTECTIVE EQUIPMENT**

Eyes: Wear safety glasses  
 Hands: Wear gloves  
 Clothing: Wear NIOH/MSHA approved dust respirator when machining  
 Engineering Controls: Use exhaust when generating dust  
 Work and Hygienic Practices: Use good industrial hygiene practices. Wash with soap and water.

**9. TYPICAL PHYSICAL AND CHEMICAL PROPERTIES**

Physical Form:	Solid
Color:	Product dependent
Odor:	None
PH:	NA
Vapor Pressure (mmHg at 21C):	NA
Vapor Density (Air = 1):	NA
Boiling Point:	NA
Melting Point:	NA
Solubility in Water:	Insoluble
Specific Gravity (Water = 1):	NA
Molecular Weight:	NA

**10. CHEMICAL STABILITY AND REACTIVITY**

Chemical Stability:	Stable
Conditions to Avoid:	Heat exceeding 400F
Incompatibility (Material to avoid):	NA
Hazardous Decomposition Products (from Burning):	Carbon monoxide, carbon dioxide, hydrogen cyanide, nitrogen oxides
Hazardous Polymerization:	NA

**11. TOXICOLOGICAL INFORMATION**

Acute Oral Toxicity:	NA
Acute Dermal Toxicity:	NA
Other Acute Effects:	NA
Irritation Effects Data:	NA
Chronic / Sub-chronic Data	NA

**12. ECOLOGICAL INFORMATION**

NA

**13. DISPOSAL CONSIDERATIONS**

Comply with all Federal, State, and Local Regulations for non-hazardous material

**14. TRANSPORTATION INFORMATION**

Shipping name:	Plastic pipe and fittings
Hazard class:	Non-regulated material

**15. REGULATORY INFORMATION: NA**
**16. OTHER INFORMATION: NA**

The information presented herein is based on data considered to accurately reflect the scientific evidence used in making the hazard determination and is accurate as of the date of preparation of this Material Safety Data Sheet. However, no warranty or representation, expressed or implied, is made as to the accuracy or completeness of the foregoing data and safety information. In addition, the vendor assumes no liability for any loss, damage or injury of any type that may result from or arise out of the use of the product, from any failure to adhere to the recommended practices, from reliance on the scientific evidence used in formulating this assessment, or from any hazards inherent in the nature of the product. No responsibility is assumed by the vendor for any damage or injury from abnormal use, from any failure to adhere to recommended practices, or from any hazards inherent in the nature of the product.



**1. CHEMICAL PRODUCT & COMPANY IDENTIFICATION**
**24-Hour Emergency Phone Number**

**800-523-9374 North America**  
**610-481-7711 Outside North America**

Product: Ancamine\* 2450 Curing Agent

Effective Date: 03/07/08

Date Printed: 03/07/08

MSD: H 2450U - SA00005

Manufactured by:

Air Products and Chemicals, Inc.  
 7201 Hamilton Blvd.  
 Allentown, PA 18195-1501  
 800-345-3148

Customer Information:

**2. COMPOSITE / INFORMATION OR INGREDIENTS**

CAS# 135108-88-2	Formaldehyde, polymer with benzeneamine, hydrogenated	60%
CAS# 694-83-7	Cyclohexanediamine, 1,2-	40%

Chemical Family: Cycloaliphatic Amine

**3. HEALTH HAZARDS INFORMATION**
**Emergency Overview:**

Harmful if swallowed  
 Corrosive  
 Keep away from heat and sources of ignition.  
 Combustible liquid  
 Severe respiratory irritant  
 Severe skin irritant  
 Severe eye irritant  
 May cause sensitization by skin contact  
 May cause sensitization by inhalation.

**Potential Health Effects:**

Target Organs: Respiratory system, eyes, skin.  
 Eyes: Causes eye burns. May cause blindness. Severe eye irritation.  
 Skin: Causes skin burns.  
 Ingestion: Harmful if swallowed. If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the esophagus and the stomach.  
 Inhalation: Harmful if inhaled and may cause delayed lung injury. Inhalation of aerosol may cause irritation to the upper respiratory tract. Risk of serious damage to the lungs (by inhalation). May cause nose, throat, and lung irritation. Can cause severe eye, skin and respiratory tract burns. Inhalation of vapors and/or aerosols in high concentration may cause irritation of respiratory system.  
 Chronic Effects: This product contains no listed carcinogens according to IARC, ACGIH, NTP and/or OSHA in concentrations of 0.1 percent or greater. Prolonged contact may result in chemical burns and permanent damage. Repeated or prolonged contact causes sensitization, asthma and eczemas.  
 Aggravated Medical Condition: Asthma. Adverse respiratory effects (such as cough, tightness of chest or shortness of breath). Eye disease Skin disorders and Allergies.  
 Adverse skin effects (such as rash, irritation or corrosion). Adverse eye effects (such as conjunctivitis or corneal damage)

**4. FIRST AID INFORMATION**

General advice: Seek medical advice. If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately.

Eyes: Rinse immediately with plenty of water also under the eyelids for at least 20 minutes. Remove contact lenses.

Skin: Immediately remove contaminated clothing, and any extraneous chemical, if possible to do so without delay. Wash off immediately with plenty of water for at least 20 minutes. Cover wound with sterile dressing. Take off contaminated clothing and shoes immediately.