



WHEN THE **HEAT** IS ON, KEEP YOUR COOL WITH **AVS!**

## Safety Data Sheet (SDS)

SDS-150  
May 2019

### Product: Wire Inserted Ceramic Fabric

#### 1. Chemical Product and Company Identification

**Trade Name:** AVS Wire Inserted Ceramic Fabrics

**Synonyms:** CF27W2 and CF42W2

**Manufacturer:**

AVS Industries LLC  
21 Bellecor Drive  
Unit C  
New Castle, DE 19720

Phone Product Information (302) 221-1720  
Revision Date: May 31, 2019

**a - Product identifier used on the label**

AVS Wire Inserted Ceramic Fabric is made from Refractory Ceramic Fiber (RCF), 310 Stainless Steel Wire, and E-Fiberglass reinforcement.

**b - Other means of identification**

WOVEN REFRACTORY CERAMIC FABRIC, WIRE INSERTED

**c - Recommended use of the chemical and restrictions on use:**

Primary Use: AVS Wire Inserted Ceramic Fabrics are used primarily in high temperature industrial insulating applications. Specific areas of use include heat shields, gaskets, expansion joints, furnaces, ovens, kilns, boilers and other applications up to 2012°F (1100°C).

#### 2. Hazard Identification

**a - Classification of the chemical in accordance with paragraph (d) of §1910.1200**

The U.S. Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (HCS) 2012 indicates that IARC Group 2B corresponds to OSHA HCS 2012 Category 2 carcinogen classification (see, e.g., §1910.1200, Appendix F, Part D).

**b - Signal word, hazard statement(s), symbol(s) and precautionary statement(s) in accordance with paragraph (f) of §1910.1200**

Under OSHA HCS 2012, RCF is classified as GHS category 2 carcinogen.

**Signal Word(s)** – Warning

**Product: Wire Inserted Ceramic Fabrics**

**Hazard Statements** - Suspected of causing cancer by inhalation.

**Precautionary Statements**

Do not handle the RCF until all safety instructions have been read and understood.  
Respiratory protection is recommended; see section 8 of the Safety Data Sheet.  
If concerned about exposure, get medical advice.  
Store in a manner to minimize airborne dust.  
Dispose of waste in accordance with local, state and federal regulations.

**Supplementary Information**

May cause temporary mechanical irritation to exposed eyes, skin or respiratory tract.  
Minimize exposure to airborne dust.

**Emergency Overview**

**c - Describe any hazards not otherwise classified that have been identified during the classification process**

Mild irritation to skin, eyes and upper respiratory system may result from exposure. These effects are usually temporary.

**d - Mixture Rule**

Not applicable.

**3. Composition / Information - Ingredients**

**a - Composition table**

<b>COMPONENTS</b>	<b>CAS NUMBER</b>	<b>Approximate Percentage (%) By Weight</b>
Refractories, Fibers, Aluminosilicate	142844-00-6	93- 95
310 Stainless Steel Wire	65997-19-5	2 - 4
E-Fiberglass	65997-17-3	1 - 3

**b - Common Name**

Refractory Ceramic Fiber (RCF), ceramic fiber, Alumino Silicate Wool (ASW), synthetic vitreous fiber (SVF), man-made vitreous fiber (MMVF), man-made mineral fiber (MMMMF), high temperature insulation wool (HTIW).

**d - Impurities and Stabilizing Additives**

Not applicable.

**4. First-Aid Measures**

**a - Description of necessary measures, subdivided according to the different routes of exposure, i.e., inhalation, skin and eye contact, and ingestion**

**Eyes**

Flush immediately with large amounts of warm water for at least 15 minutes. Please hold your eyelids away from your eyeball to ensure thorough rinsing. Do not rub eyes.

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**Skin**

Immediately remove any contaminated clothing. Please do not rub or scratch any exposed skin. Wash area off the contact thoroughly with soap and water. Application of a skin cream or lotion after washing may be helpful.

**Respiratory (Inhalation)**

Immediately move the person into a dust free location. See Section 8 for additional measures to reduce or eliminate exposure. Contact a physician if conditions get worse.

**Gastrointestinal**

If gastrointestinal tract irritation develops, move the person to a dust free environment.

**c - Indication of immediate medical attention and special treatment needed, if necessary**

**5. Fire-fighting measures**

**a - Suitable (and unsuitable) extinguishing media**

Use extinguishing media suitable for type of surrounding fire

**b - Specific hazards arising from the chemical (e.g., nature of any hazardous combustion products):** None

**c – Special Protective Equipment and Precautions for Firefighters**

NFPA Codes: **Flammability: 0      Health: 1      Reactivity: 0      Special: 0**

**6. Accidental Release Measures**

**a - Personal precautions, protective equipment, and emergency procedures.**

Minimize airborne dust. Do not use any compressed air or dry sweeping for clean-up activities. See Section 8 "Exposure Controls / Personal Protection" for exposure guidelines.

**b – Methods and materials for containment and cleaning up**

Frequently clean the work area with vacuum or wet sweeping to minimize the accumulation of debris. Do not use compressed air for clean-up.

**7. Handling and storage**

**a - Precautions for safe handling**

Handle RCF carefully to minimize airborne dust and particulate. Limit use of power tools unless in conjunction with local exhaust ventilation. Use hand tools whenever possible.

**b - Conditions for safe storage, including any incompatibilities.**

Store in a manner to minimize airborne dust.

**c – Empty Storage Containers**

Product packaging may contain some fiber residue. Do not reuse.

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**8. Risk Management Measures / Exposures Controls / Personal Protection**

**a – OSHA Permissible Exposure Limit (PEL), American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Value (TLV), and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data.**

<b>EXPOSURE GUIDELINES</b>			
<b>Major Component</b>	<b>OSHA PEL</b>	<b>ACGIH TLV</b>	<b>Manufacturer's Regulations (REG)</b>
Refractories, Fibers, Alumino Silicate	None Established*	0.2 f/cc, 8-hour TWA	0.5 f/cc, 8-Hour TWA**

\* Except for the state of California there is no specific regulation for RCF products in the United States. OSHA's "Particulate Not Otherwise Regulated (PNOR)" regulation standard [29 CFR 1910.1000, Subpart Z Air Contaminants] applies – Total Dust 15 mg/m<sup>3</sup>, Respirable Fraction 5 mg/m<sup>3</sup>. The PEL for all RCF products in California is 0.2 f/cc, 8-Hour TWA.

\*\* The HTIW Coalition has sponsored toxicology and epidemiology studies to identify any potential RCF related health effects (More details in Section 11), consulted professional experts familiar with refractory fiber and particle science, conducted detailed review of RCF-related scientific literature, and further evaluated the data in quantitative risk assessment. Based on these efforts and in the absence of an established OSHA PEL, the HTIW Coalition has adopted an exposure guideline regulation (REG), as measured under NIOSH Method 7400 B. The manufacture's REG is intended to promote Occupational Health and Safety (OHS) through exposure and reductions as determined by extensive industrial hygiene monitoring efforts undertaken voluntarily and pursuant to an agreement with the United States Environmental Protection Agency (EPA).

**OTHER OCCUPATIONAL EXPOSURE LEVELS (OEL)**

- RCF related occupational exposure limits vary internationally
- RCF Regulatory OEL levels around the world include the following: Canada – 0.2 to 1.0 f/cc; United Kingdom (UK) – 1.0 f/cc.
- RCF Non-regulatory OEL limits – HTIW Coalition REG – 0.5 f/cc. The objectives and criteria underlying each of these OEL decisions also vary.
- The relative applicability of the RCF products in the workplace is best performed, on a case-by-case basis by a qualified Industrial Hygienist.

**b - Appropriate Engineering Controls**

Consider using engineering controls such as local exhaust ventilation, point of generation dust collection, down draft work stations, emission controlling tool designs and materials handling equipment designed to minimize airborne fiber emissions.

**c - Individual Personal Protection – Safety Equipment**

**PPE - Skin**

Wear personal protective equipment (e.g. gloves), as necessary to prevent skin irritation. Washable or disposable clothing may be used. If possible, do not take unwashed clothing home. If soiled work clothing must be taken home, employees should be informed on best practices to minimize non-work dust exposure (e.g., vacuum clothes before leaving the work area, wash work clothing separately, and rinse washer before washing other household clothes.

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**PPE - Eye**

As necessary, wear goggles or safety glasses with side shields.

**PPE – Respiratory**

When engineering and/or administrative controls are insufficient to maintain workplace concentrations below the 0.5 f/cc REG or a regulatory OEL, the use of appropriate respiratory protection, pursuant to the requirements of OSHA Standards 29 CFR 1910.134 and 29 CFR 1926.103, is recommended. A NIOSH certified respirator with a filter efficiency of at least 95% should be used. The 95% filter efficiency recommendation is based on NIOSH respirator selection logic sequence for exposure to manmade mineral fibers. Pursuant to NIOSH recommendations, N-95 respirators are appropriate for exposures up to 10 times the NIOSH Recommended Exposure Limit (REL). With respect to RCF, both the NIOSH REL and the industry REG have been set at 0.5 f/cm<sup>3</sup>. Accordingly, N95 would provide the necessary protection for exposures up to 5 f/cm<sup>3</sup>. Further, the Respirator Selection Guide published by 3M Corporation, the primary respirator manufacturer, specifically recommends use of N- 95 respirators for RCF exposures. In cases where exposures are known to be above 5.0 f/cm<sup>3</sup>, 8-hour TWA, and the potential presence of crystalline silica.

**9. Physical and chemical properties**

- a - Appearance White, odorless, fibrous material
- b -Odor Not applicable
- c - Odor Threshold Not applicable
- d - Melting Point 1760°C (3200°F)
- e- pH Not applicable
- f- Initial Boiling Point/Range Not applicable
- g- Flashpoint Not applicable
- h - Evaporation Rate Not applicable
- i - Flammability Not applicable
- j - Upper/Lower Flammability or Explosive Limits Not applicable
- k - Vapor Pressure - Not applicable
- l – Vapor Density – Not applicable
- m- Solubility Not soluble in water
- n – Relative Density 2.50 – 2.75
- o – Partition Coefficient: n-Octanol/water Not applicable
- p -Auto-ignition temperature Not applicable
- q – Decomposition Temperature Not applicable
- r – Viscosity Not applicable

**10. Stability and Reactivity**

**a – Reactivity**

Stable under conditions of normal use.

**b - Chemical Stability**

RCF is a stable material.

**c – Possibility of Hazardous Reaction**

Not applicable.

**d - Conditions to Avoid**

Please refer to handling and storage advise in Section 7.

**e – Incompatible Materials**

None

**f - Hazardous decomposition products**

None

**Product: Wire Inserted Ceramic Fabrics**

**11. Toxicological Information**

**a - TOXICOLOGY, METABOLISM AND DISTRIBUTION**

Exposure is predominantly by inhalation or ingestion. Man-made vitreous fibers of a similar size to RCF have not been shown to migrate from the lung and/or gut and do not become located in other organs of the body.

**b - Acute Toxicity**

**c - Epidemiology**

In order to determine possible human health effects following RCF exposure, the University of Cincinnati has been conducting medical surveillance studies on RCF workers in the U.S.A; this epidemiological study has been ongoing for 25 years and medical surveillance of RCF workers continues. The Institute of Occupational Medicine (IOM) has conducted medical surveillance studies on RCF workers in European manufacturing facilities.

Pulmonary morbidity studies among production workers in the U.S.A. and Europe have demonstrated an absence of interstitial fibrosis. In the European study a reduction of lung capacity among smokers has been identified, however, based on the latest results from a longitudinal study of workers in the U.S.A. with over 17-year follow-up, there has been no accelerated rate of loss of lung function (McKay et al. 2011).

A statistically significant correlation between pleural plaques and cumulative RCF exposure was evidenced in the U.S.A. longitudinal study.

The U.S.A. mortality study showed no excess mortality related to all deaths, all cancer, or malignancies or diseases of the respiratory system including mesothelioma (LeMasters et al. 2003).

**d - Toxicology**

***Acute toxicity: short term inhalation***

- No data available: Short term tests have been undertaken to determine fiber (bio) solubility rather than toxicity; repeat dose inhalation tests have been undertaken to determine chronic toxicity and carcinogenicity.

***Acute toxicity: oral***

- No data is available: Repeated usage studies have been carried out using gavage. No effect was found.

***Skin corrosion/irritation***

- Not a chemical irritant according to test method OECD no. 404.

***Serious eye damage/irritation***

- Not possible to obtain acute toxicity information due to the morphology and chemical inertness of the substance.

***Respiratory or skin sensitization***

- Human epidemiological studies have produced no evidence of any respiratory or skin sensitization potential.

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***Germ cell mutagenicity/genotoxicity***

- Method: In vitro micronucleus test
- Species: Hamster (CHO)
- Dose: 1-35 mg/ml
- Routes of administration: In suspension.
- Results: Negative

***Carcinogenicity***

- Method: Inhalation, multi-dose
- Species: Rat
- Dose: 3 mg/m<sup>3</sup>, 9 mg/m<sup>3</sup> and 16 mg/m<sup>3</sup>
- Routes of administration: Nose only inhalation
- Results: Fibrosis just reached significant levels at 16 and 9 mg/m<sup>3</sup> but not at 3 mg/m<sup>3</sup>. None of the parenchymal tumor incidences were higher than the historical control values for this strain of animal.
- Method: Inhalation, single dose
  - Species: Rat
  - Dose: 30 mg/m<sup>3</sup>
  - Routes of administration: Nose only inhalation
  - Results: Rats were exposed to a single concentration of 200 WHO fibers/ml specially prepared RCF for 24 months. High incidence of exposure-related pulmonary neoplasms (bronchoalveolar adenomas and carcinomas) was observed. A small number of mesotheliomas were observed in each of the fiber exposure groups (Mast et al 1995a).
- Method: Inhalation, single dose
- Species: Hamster
- Dose: 30 mg/m<sup>3</sup>
- Routes of administration: Nose only inhalation
- Results: Hamsters were exposed to a single concentration of 260 WHO fibers/ml specially prepared RCF for 18 months and developed lung fibrosis, a significant number of pleural mesotheliomas (42/102) but no primary lung tumors (McConnell et al 1995).
- Method: Inhalation, single dose
- Species: Rat
- Dose: RCF1: 130 F/ml and 50 mg/m<sup>3</sup> (25% of non-fibrous particles)
- RCF1a: 125 F/ml and 26 mg/m<sup>3</sup> (2% of non-fibrous particles)
- Routes of administration: Nose only inhalation
- Results: Rats were exposed to RCF1 and RCF1a for 3 weeks. The objective of the study was to compare lung retention and biological effects of the original RCF1 compared to RCF1a. The main difference of these 2 samples was the non-fibrous particle content of respectively 25% versus 2%. The post treatment observation was 12 months. Alveolar clearance was barely retarded after RCF1A exposure. After RCF1 exposure, however, a severe retardation of clearance was observed. (Bellmann et al 2001).

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- After intraperitoneal injection of ceramic fibers into rats in three experiments (Smith et al 1987, Pott et al 1987, Davis et al 1984), mesotheliomas were found in the abdominal cavity in two studies, while the third report (Pott et al 1987) had incomplete histopathology. Only a few mesotheliomas were found in the abdominal cavity of hamsters after intraperitoneal injection in one experiment (Smith et al 1987). However, the ceramic fibers tested were of relatively large diameter. When rats and hamsters were exposed via intraperitoneal injection, tumor incidence was related to fiber length and dose (Smith et al 1987, Pott et al 1987, Miller et al 1999, Pott et al 1989). (From SCOEL publication (EU Scientific Committee on Occupational Exposure Limits) SCOEL/SUM/165, September 2011).

***Reproductive toxicity***

- Method: Gavage
- Species: Rat
- Dose: 250mg/kg/day
- Routes of administration: Oral
- Results: No effects were seen in an OECD 421 screening study. There are no reports of any reproductive toxic effects of mineral fibers. Exposure to these fibers is via inhalation and effects seen are in the lung. Clearance of fibers is via the gut and the feces, so exposure of the reproductive organs is extremely unlikely.

***STOT-Single exposure***

- Not applicable

***STOT-Repeated exposure***

- Not applicable

***Aspiration hazard***

- Not applicable
- See the following review publications for a summary and discussion:
- Interpretation of these animal experiments is complex and there is not complete agreement among scientists internationally. A summary of the evidence relating to RCF carcinogenicity in vivo can be found in SCOEL/SUM/165 and in Utell and Maxim 2010. 8/13 201

**Other information**

- Studies indicate the relevance of biopersistence as a determinant of toxic effects of fiber exposure. (Maxim et al 2006).

**Irritant Properties**

Negative results have been obtained in animal studies (EU method B 4) for skin irritation. Inhalation exposures using the nose only route produce simultaneous heavy exposures to the eyes, but no reports of excess eye irritation exist. Animals exposed by inhalation similarly show no evidence of respiratory tract irritation.



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Human data confirm that only mechanical irritation, resulting in itching, occurs in humans. Screening at manufacturers' plants in the UK has failed to show any human cases of skin conditions related to fiber exposure.

**International Agency for Research on Cancer (IARC) and National Toxicology Program (NTP)**

IARC, in 1988, Monograph v.43 (and later reaffirmed in 2002, v.81), classified RCF as possibly carcinogenic to humans (group 2B). IARC evaluated the possible health effects of RCF as follows:

There is inadequate evidence in humans for the carcinogenicity of RCF. There is sufficient evidence in experimental animals for the carcinogenicity of RCF. The Annual Report on Carcinogens (latest edition), prepared by NTP, classified respirable RCF as "reasonably anticipated" to be a carcinogen). Not classified by OSHA.

**12. Ecological information**

**a - Ecotoxicity (aquatic and terrestrial, where available)**

These products are not reported to have any ecotoxicity effects.

**c - Bioaccumulative potential**

No bioaccumulative potential.

**d – Mobility in soil**

No mobility in soil.

**e - Other adverse effects (such as hazardous to the ozone layer**

No adverse effects of this material on the environment are anticipated.

**13. Disposal Considerations**

**Waste Management and Disposal**

To prevent waste materials from becoming airborne during waste storage, transportation and disposal, a covered container or plastic bagging is recommended.

**Additional information**

This product, as manufactured, is not classified as a listed or characteristic hazardous waste according to U. S. Federal regulations (40 CFR 261). Any processing, use, alteration or chemical additions to the product, as purchased, may alter the disposal requirements. Under U. S. Federal regulations, it is the waste generator's responsibility to properly characterize a waste material, to determine if it is a "hazardous" waste. Check local, regional, state or provincial regulations to identify all applicable disposal requirements.

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**14. Transport information**

**a – UN number.**

Hazard Class: Not Regulated United Nations (UN) Number: Not Applicable  
Labels: Not Applicable North America (NA) Number: Not Applicable  
Placards: Not Applicable Bill of Lading: Product Name

**b - UN proper shipping name**

Not applicable.

**c - Transport hazard class(es)**

Not applicable.

**d - Packing group, if applicable**

Not applicable.

**e - Environmental hazards (e.g., Marine pollutant (Yes/No))**

No.

**f - Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code)**

Not regulated.

**g - Special precautions which a user needs to be aware of, or needs to comply with, in connection with transport or conveyance either within or outside their premises**

Not applicable.

**International**

**INTERNATIONAL**

Canadian TDG Hazard Class & PIN: Not regulated  
Not classified as dangerous goods under ADR (road), RID (train), IATA (air) or IMDG (ship).

**15. Regulatory information**

**15.1 - United States Regulations**

UNITED STATES REGULATIONS

**EPA: Superfund Amendments and Reauthorization Act (SARA)** Title III - This product does not contain any substances reportable under Sections 302, 304, 313, (40 CFR 372). Sections 311 and 312 (40 CFR 370) apply (delayed hazard). **Toxic Substances Control Act (TSCA)**—RCF has been assigned a CAS number; however, it is not required to be listed on the TSCA inventory.

**Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)** and the **Clean Air Act (CAA)** - RCF contains fibers with an average diameter greater than one micron and thus is not considered a hazardous air pollutant.

**OSHA:** Comply with Hazard Communication Standards 29 CFR 1910.1200 and 29 CFR 1926.59 and the **Respiratory Protection Standards** 29 CFR 1910.134 and 29 CFR 1926.103. California: Ceramic fibers (airborne particles of respirable size) is listed in Proposition 65, The Safe Drinking Water and Toxic Enforcement Act of 1986 as a chemical known to the State of California to cause cancer.

**Other States:** RCF products are not known to be regulated by states other than California; however, state and local OSHA and EPA regulations may apply to these products. If in doubt, contact your local regulatory agency.

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**15.2 - International Regulations**

INTERNATIONAL REGULATIONS

**Canada:**

**Canadian Workplace Hazardous Materials Information System (WHMIS)** - RCF is classified as Class D2A - Materials Causing Other Toxic Effects

**Canadian Environmental Protection Act (CEPA)**- All substances in this product are listed, as required, on the Domestic Substances List (DSL)

**European Union:**

**European Directive 97/69/EC** classified RCF as a Category 2 carcinogen; that is it "should be regarded as if it is carcinogenic to man."

**REACH Regulation:**

RCF is classified under the CLP (classification, labelling and packaging of substances and mixtures) regulation as a category 1B carcinogen. On January 13, 2010 the European Chemicals Agency (ECHA) updated the candidate list for authorization (Annex XV of the REACH regulation) and added 14 new substances in this list including aluminosilicate refractory ceramic fibers.

As a consequence, EU (European Union) or EEA (European Economic Area) suppliers of articles which contain aluminosilicate refractory ceramic fibers in a concentration above 0.1% (w/w) have to provide sufficient information, available to them, to their customers or upon requests to a consumer within 45 days of the receipt of the request. This information must ensure safe use of the article, and as minimum contains the name of the substance.

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**16. Other Information**

**Devitrification**

All RCF fibers are vitreous (glassy) materials which do not contain crystalline silica. Continued exposure to elevated temperatures over time may cause these fibers to devitrify (become crystalline). The first crystalline formation (mullite) begins to occur at approximately 985° C (1805° F). Crystalline phase silica may begin to form at approximately 1100° C (2012° F). When the glass RCF fibers devitrify, they form a mixed mineral crystalline silica containing dust. The crystalline silica is trapped in grain boundaries within a matrix predominately consisting of mullite. The occurrence and extent of crystalline phase formation is dependent on the duration and temperature of exposure, fiber chemistry and/or the presence of fluxing agents or furnace contaminants. The presence of crystalline phases can be confirmed only through laboratory analysis of the "hot face" fiber.

IARC's evaluation of crystalline silica states "Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1)" and additionally notes "carcinogenicity in humans was not detected in all industrial circumstances studied." IARC also studied mixed mineral crystalline silica containing dusts such as coal dusts (containing 5–15 % crystalline silica) and diatomaceous earth without seeing any evidence of disease. (IARC Monograph Vol. 68, 1997). NTP lists all polymorphs of crystalline silica as substances which may "reasonably be anticipated to be carcinogens".

IARC and NTP did not evaluate after-service RCF, which may contain various crystalline phases. However, an analysis of after-service RCF samples obtained pursuant to an exposure monitoring agreement with the EPA, found that in the furnace conditions sampled, most did not contain detectable levels of crystalline silica. Other relevant RCF studies found that (1) simulated after-service RCF showed little, or no, activity where exposure was by inhalation or by intraperitoneal injection; and (2) after-service RCF was not cytotoxic to macrophage-like cells at concentrations up to 320 micrograms/cm<sup>2</sup> - by comparison, pure quartz or cristobalite were significantly active at much lower levels (circa 20 micrograms/cm<sup>2</sup>).

**HMIS HAZARD RATING**

HMIS Health	1 (Inhalation issue for chronic effects)
HMIS Flammable	0
HMIS Reactivity	0
HMIS Personal Protective Equipment	X (User will determine PPE)

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