Material Safety Data Sheet

SILICA, AS, CAS, AS/AR, CAS/AR, ASM and AST SERIES

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Names/Synonyms	Amorphous silica in various forms - cloth, tapes, blankets, mat, tubing, etc.
Product Identification	AS, CAS, AS/AR, CAS/AR, ASM and AST series.
Chemical Name/Synonyms	Continuous filament silicon dioxide (SiO_2)/fibrous silica, amorphous silica chemical family.
Manufacturer's Name	DAR Industrial Products Inc 2 Union Hill Road Bldg # 1 West Conshohocken, Pa. 19428 (610) 825-4900
Date prepared	February 17, 1994
Revised	November 7, 1996 (second revision) November 4, 1997 (third revision: update Section 7, Handling based on IARC reclassification)
Reviewed for content & accuracy	April 16, 2007

2. COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredients	Weight %	OSHA-PEL	ACGIH-TLV	OTHER
Silicone dioxide, continuous filament	≥ 90	a.	10 mg/ m^3. 8-hr TWA	none known
Nonhazardous Ingredients				
Sizing/bound water	≤ 10	----------none established----------		

a. OSHA has not established a specific PEL for fibrous silicone dioxide (amorphous silica). It is considered to be a "particulate not otherwise regulated" (PNOR) and is covered under the OSHA nuisance dust PEL's of 5 mg/m^3 for the respirable dust fraction and 15 mg/m^3 for the total dust fraction for an 8-hr TWA (Time Weighted Average). Chemically, AMI-SIL® is amorphous silica which has an OSHA limit of 20 mppcf or 80 mg/m^3.

3. HAZARDS IDENTIFICATION

PRIMARY ROUTES OF EXPOSURE: Inhalation and skin contact.

HEALTH HAZARDS (Including acute and chronic effects and symptoms of overexposure):

Material Safety Data Sheet

SILICA, AS, CAS, AS/AR, CAS/AR, ASM and AST SERIES

3. HAZARDS IDENTIFICATION (CONT)

ACUTE:

Inhalation: Inhalation of dusts and fibers may result in irritation of the upper respiratory tract (mouth, nose and throat).

Skin Contact: Skin contact with dusts and fibers may produce itching and temporary mechanical irritation.

Eye Contact: Eye contact with fibers and dusts may produce temporary mechanical irritation.

Ingestion: Temporary mechanical irritation of the digestive tract. Observe individual. If symptoms develop, consult a physician.

CHRONIC: See carcinogenicity section below. There are no known health effects associated with chronic exposure to this product.

CARCINOGENICITY:

Hazardous Ingredients:	Listed as carcinogen by:	ACGIH	IARC	NTP	OSHA
Silicone dioxide, continuous filament		NA	NA	NA	NA

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Persons with a history of chronic respiratory or skin conditions that are aggravated by mechanical irritants may be at increased risk for worsening their condition from exposure during use of the product.

4. FIRST AID MEASURES

Inhalation: Move individual to fresh air. Seek medical attention if irritation persists.

Skin Contact: Wash with mild soap and running water. Use a washcloth to help remove fibers. To avoid further irritation do not rub or scratch irritated areas. Rubbing or scratching may force fibers into the skin. Seek medical attention if irritation persists.

Eye Contact: Flush eyes with flowing water for at least 15 minutes. Seek medical attention if irritation persists.

Ingestion: N. A. (Not Applicable)

Material Safety Data Sheet

SILICA, AS, CAS, AS/AR, CAS/AR, ASM and AST SERIES

5. FIRE FIGHTING MEASURES

Flash Point (^{O}F): NA (Not Applicable)

Auto Ignition Temperature (^{O}F): NA

Flammability Limits (%): LEL: NA UEL: NA

Extinguishing Media: Water, foam, carbon dioxide, dry chemical

Special Fire-Fighting Instructions: In a sustained fire, self contained breathing apparatus should be worn.

Unusual Fire and Explosion Hazards: None known.

6. ACCIDENTAL RELEASE MEASURES

ACTION TO TAKE FOR SPILLS (Use Appropriate Safety Equipment): For solid product, not applicable. For dusts and fibers generated during fabrication vacuum up and containerize.

7. HANDLING, STORAGE AND DISPOSAL

HANDLING: See Section 8.

The toxicologic data indicate that these materials should be handled with caution. The handling practices described in Section 8 of this MSDS must be strictly followed.

Product which has been in service at elevated temperature (> 1800^{O} F) may undergo partial conversion to cristobalite, a form of crystalline silica. This reaction occurs at the lining hot face. As a consequence, this material becomes more friable (brittle); special caution must be taken to minimize generation of airborne dust. The amount of cristobalite present will depend on the temperature and length in service.

IARC has recently reviewed the animal, human and other relevant experimental data on silica in order to critically evaluate and classify the cancer causing potential. Based on its review, IARC has now classified crystalline silica/cristobalite as a Group 1 carcinogen. Crystalline silica inhaled in the form of quartz or cristobalite from industrial sources was classified as ***carcinogenic to humans*** on the basis of a relatively large number of epidemiological studies that together provided ***sufficient evidence*** in humans for the carcinogenicity of inhaled crystalline silica under the conditions specified. Crystalline silica is also listed by the NTP as a substance reasonably anticipated to be a carcinogen.

Material Safety Data Sheet

SILICA, AS, CAS, AS/AR, CAS/AR, ASM and AST SERIES

7. HANDLING, STORAGE AND DISPOSAL (CON'T)

HANDLING (CON'T): See Section 8.

Therefore, special care should be taken when working with "used" material to minimize the generation of dust. The OSHA permissible exposure limit (PEL) for cristobalite is 0.05 mg/m^3 (resp.). The ACGIH threshold limit value (TLV) for cristobalite is 0.05 mg/m^3 (resp.). (ACGIH 1989 - 90). If exposure limits are exceeded or if irritation is experienced, NIOSH approved respiratory protection should be worn. NIOSH approved respirator for particulates with a TLV of less than 0.05 mg/m3 is generally acceptable, except that supplied air respirators are required for high airborne dust concentrations.

STORAGE: Store in a clean, dry area. Keep containers closed.

DISPOSAL: Dispose in accordance with federal, state and local regulations as a solid nonhazardous waste.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

VENTILATION: General dilution ventilation and/or local exhaust ventilation should be provided, as necessary, to maintain exposures below PEL's or TLV's. **Adequate ventilation must be provided at elevated temperatures.** The base silica material is noncombustible; however, at temperatures above 250°F, the coating may generate some light steam and/or smoke for a brief period which may require local ventilation and/or exhaust.

RESPIRATORY PROTECTION: A properly fitted NIOSH/MHSA approved disposable dust respirator such as the 3M model 8710 or model 9900 (in high humidity environments) or equivalent should be used when: high dust levels are encountered; the level of fibers in the air exceeds the OSHA permissible exposure limits; or if irritation occurs. Use respiratory protection in accordance with your company's respiratory protection program and OSHA regulations under 29 CFR 1910.134.

EYE PROTECTION: Wear safety glasses or chemical goggles to prevent eye contact. Contact lenses should not be worn unless chemical goggles are also used and care is taken not to touch the eyes with contaminated body parts or materials. Have eye washing facilities readily available where eye contact can occur.

PROTECTIVE CLOTHING: Wear loose fitting, long sleeved shirt that covers to the base of the neck, and long pants. Skin irritation from exposure to silica fibers is known to occur chiefly at pressure points such as around the neck, wrist and waist. Wear gloves when handling product.

Material Safety Data Sheet

SILICA, AS, CAS, AS/AR, CAS/AR, ASM and AST SERIES

8. EXPOSURE CONTROLS / PERSONAL PROTECTION (CONT)

WORK/HYGIENIC PRACTICES: Handle in accordance with good industrial hygiene and safety practices:

- Avoid unnecessary exposure to dusts and fibers
- Remove fibers from skin after exposure
- Be careful not to rub or scratch irritated areas. Rubbing or scratching may force the fibers into the skin. The fibers should be washed off. Use of barrier creams can, in some instances, be helpful.
- Use vacuum equipment to remove fibers and dusts from clothing. **COMPRESSED AIR SHOULD NEVER BE USED.** Always wash work clothes separately and wipe out the washer/sink in order to prevent loose fibers from getting on other clothes.
- Keep the work area clean of any dusts and fibers generated during fabrication. Use vacuum equipment to clean up dusts and fibers. Avoid sweeping or using compressed air as these techniques resuspend dusts and fibers into the air.
- Have access to safety showers and eye wash fountains.
- For professional use only. **Keep out of children's reach.**

9. PHYSICAL AND CHEMICAL PROPERTIES

MELTING POINT (Softening): >3000°F

BOILING POINT (°C): NA (Not Applicable)

SPECIFIC GRAVITY: 2.2

PERCENT VOLATILE: NA

VAPOR PRESSURE (mm Hg): NA

VAPOR DENSITY (Air = 1): NA

EVAPORATIVE RATE (Ethyl Ether = 1): NA

SOLUBILITY IN WATER: Not soluble

APPEARANCE AND ODOR: White/off-white/tan colored solid with no odor; AR series has an orange color.

pH: NA

Material Safety Data Sheet

SILICA, AS, CAS, AS/AR, CAS/AR, ASM and AST SERIES

10. STABILITY AND REACTIVITY

STABILITY (Conditions to Avoid): Product is stable.

INCOMPATIBILITY (Materials to Avoid): Basic phosphates, hydrofluoric acid, some oxides and hydroxides.

HAZARDOUS DECOMPOSITION PRODUCTS: Sizings or binders may decompose in a fire. Primary decomposition products include carbon monoxide, carbon dioxide, other hydrocarbons and water.

HAZARDOUS POLYMERIZATION: Will not occur.

To the best of our knowledge, the information contained herein is accurate. The information provided is based upon data furnished by our suppliers. However, neither DAR Industrial Products Inc., nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. While believed to be reliable, the information or products are intended for use by skilled persons at their own risk. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards which exist.

Material Safety Data Sheet

WIRE MESH, IWM Series

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Names/Synonyms	Inconel Mesh Cable
Product Identification	Inconel Mesh Cable
Chemical Name/Synonyms	Inconel alloy.
Manufacturer's Name	D.A.R. Industrial Products Inc. 2 Union Hill Road, Bldg # 1 West Conshohocken, Pa. 19428
Date prepared	October 19, 1998
Reviewed for accuracy & content	April 2, 2007

2. COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredients	Weight %	OSHA-PEL	ACGIH-TLV	OTHER
Iron (Fe) (as oxide fume)	proprietary	10 mg/m^3	5 mg/m^3	----------
Chromium (Cr)	proprietary	1 mg/m^3	0.5 mg/m^3	----------
Nickel (Ni)	proprietary	1 mg/m^3	1 mg/m^3	----------
Cobalt (Co)	proprietary	0.1 mg/m^3	0.1 mg/m^3	----------
Aluminum (Al)	proprietary	none	10 mg/m^3	----------
Manganese (Mn)	proprietary			
Dust		5 mg/m^3 C*	5 mg/m^3 C*	----------
Fume		3 mg/m^3	----------	----------
Molybdenum (Mo)	proprietary	15 mg/m^3	10 mg/m^3	----------
Tantalum (Ta)	proprietary	5 mg/m^3	5 mg/m^3	----------
Tungsten (W)	proprietary	none	5 mg/m^3	----------
Yttrium (Y)	proprietary	1 mg/m^3	1 mg/m^3	----------

Nonhazardous Ingredients	Weight %	OSHA-PEL	ACGIH-TLV	OTHER
Niobium (Nb)	proprietary	----------none----------		
Iron (Fe) Dust	proprietary	----------none----------		

C* = Ceiling Limit

Material Safety Data Sheet

AMI-FAB® WIRE MESH, IWM Series

3. HAZARDS IDENTIFICATION

PRIMARY ROUTES OF EXPOSURE: Inhalation and skin contact of dusts and fumes.

HEALTH HAZARDS (Including acute and chronic effects and symptoms of overexposure):

ACUTE: NOTE: Inconel products in their usual physical state do not pose any health hazards. However, when subjected to welding, burning, grinding, cutting, abrasive blasting, heat treatment, pickling, or similar operations, potentially hazardous fumes or dusts may be emitted. Despite the fact that welding, burning, etc. of inconel products in this category may produce fumes containing manganese, chromium, nickel and copper, the air concentrations generated of these components are expected to be extremely low.

Iron (Fe): Subjecting iron and alloys containing iron to high temperatures (such as welding) will cause the formation of iron oxide. Long-term exposure to iron oxide fumes or dusts has been associated with a benign lung condition known as siderosis which is observable as an x-ray change. No physical impairment of lung function has been linked to siderosis.

Manganese (Mn): Mn intoxication is usually due to the oxide or salts of Mn; elemental Mn exhibits very low toxicity. The dusts and fumes can act as minor irritants to the eyes and respiratory tract. Both acute and chronic exposure may adversely affect the central nervous system (CNS), but symptoms are more likely to occur after at least one or two years of prolonged or repeated exposures. Early symptoms may include weakness in the lower extremities, sleepiness, salivation, nervousness and apathy. In more advanced stages, severe muscular incoordination, impaired speech, spastic walking, mask-like facial expressions and uncontrollable coughing may occur. Manganese fumes have also been reported to result in metal fume fever, a flu-like syndrome with symptoms such as dizziness, chills, fever, headache and nausea. An increased incidence of pneumonia, bronchitis and pneumonitis has been reported in some worker populations exposed to manganese. Animal studies indicate exposure may increase susceptibility to bacterial and viral infection.

Chromium (Cr): The toxicity and health hazards of chromium are heavily dependent on its oxidation state. The elemental (as in the metals), divalent and trivalent forms are of very low toxicity. The hexavalent form (such as occurs in chromates and chromic acids) is very toxic and can produce both acute and chronic effects. Adverse effects on the skin may include ulcerations, irritative dermatitis and allergic skin reactions. Adverse effects on the respiratory system may include bronchospasms, edema, hypersecretion, bronchitis, irritation, allergic asthmatic reactions, and, ulceration and perforation of the nasal septum. Respiratory symptoms may include coughing and wheezing, shortness of breath and nasal itch. Eye irritation or inflammation can also be produced. Exposure to some hexavalent chromium compounds have also been shown to be associated with an increased risk of lung cancer.

Nickel (Ni): Ni fumes and dust are respiratory irritants and may cause severe pneumonitis. Skin contact with nickel and its compounds may cause an allergic dermatitis. The resulting skin rash is often referred to as "nickel itch". Ni and its compounds may also produce eye irritation, particularly on the inner surfaces of the eyelids (i.e. the conjunctiva). Animal and/or epidemiology studies have linked nickel and certain nickel compounds to an increased incidence of cancer of the lungs and nasal passages.

Material Safety Data Sheet

AMI-FAB® WIRE MESH, IWM Series

3. HAZARDS IDENTIFICATION (CONT'D)

Copper (Cu): Inhalation of copper fume may cause irritation of the eyes and throat and a flu-like illness called metal fume fever. Signs and symptoms of metal fume fever include fever, muscle aches, nausea, chills, dry throat, cough and weakness. Cu fume may also produce a metallic or sweet taste. Repeated or prolonged exposure to Cu fume may cause discoloration of the skin or hair.

Aluminum (Al): There are no reported known health effects. Aluminum is generally considered to be in the nuisance dust category.

Silicon (Si): Silicon may produce x-ray changes in the lungs. There has been no known disability reported from the x-ray changes.

Tungsten (W): There has been some reported evidence of pulmonary involvement such as a cough.

Molybdenum (Mo): Molybdenum has caused, in animal studies, irritation of the nose and throat, weight loss and digestive disturbances. There have been no reports of industrial poisoning.

Cobalt (Co): Cobalt has been reported to cause asthma. It may also cause interstitial pneumonitis and sensitization of the respiratory system.

ACUTE: Inhalation: Inhalation of dusts and fibers may result in irritation of the upper respiratory tract (mouth, nose and throat).

Inconel - dust or fumes may give a metallic taste; headache; nausea; chills; fever; tightness of chest; irritation of the respiratory tract, eyes, nose; cough.

Loss of consciousness/death due to welding gases or lack of oxygen.

Skin Contact: Skin contact with dusts and fibers may produce itching and temporary mechanical irritation.

Eye Contact: Eye contact with fibers and dusts may produce temporary mechanical irritation.

Ingestion: Temporary mechanical irritation of the digestive tract. Observe individual. If symptoms develop, consult a physician.

CHRONIC: See carcinogenicity section below. Chronic exposure to Chromium (Cr)/Nickel (Ni)/Manganese (Mn) fumes or dust may cause skin sensitization, asthma, bronchitis, lung fibrosis or pneumoniosis. It may also cause damage to the kidneys and liver as well as the nervous system.

Material Safety Data Sheet

AMI-FAB® WIRE MESH, IWM Series

3. HAZARDS IDENTIFICATION (CONT'D)

CARCINOGENICITY:

Hazardous Ingredients:	Listed as carcinogen by: ACGIH IARC NTP OSHA
Chromium (Cr)/Nickel (Ni)**	----none known----

****Dusts and fumes containing Chromium (Cr) or Nickel (Ni) should be considered carcinogens.**

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Persons with a history of chronic respiratory or skin conditions that are aggravated by mechanical irritants may be at increased risk for worsening their condition from exposure during use of the product.

4. FIRST AID MEASURES

Inhalation: Move individual to fresh air. Seek medical attention if irritation persists. Administer artificial respiration, if breathing has stopped.

Skin Contact: Wash with mild soap and running water. To avoid further irritation do not rub or scratch irritated areas. Seek medical attention if irritation persists.

Eye Contact: Flush eyes with flowing water for at least 15 minutes. Seek medical attention if irritation persists.

Ingestion: N. A. (Not Applicable)

5. FIRE FIGHTING MEASURES

Flash Point (°F): NA (Not Applicable)

Auto Ignition Temperature (°F):NA

Flammability Limits (%): LEL: NA UEL: NA

Extinguishing Media: Water, foam, carbon dioxide, dry chemical

Special Fire-Fighting Instructions: In a sustained fire, self contained breathing apparatus should be worn.

Unusual Fire and Explosion Hazards: None known.

6. ACCIDENTAL RELEASE MEASURES

ACTION TO TAKE FOR SPILLS (Use Appropriate Safety Equipment): For solid product, not applicable. For dusts and fibers generated during fabrication vacuum up and containerize.

Material Safety Data Sheet

AMI-FAB® WIRE MESH, IWM Series

7. HANDLING, STORAGE AND DISPOSAL

HANDLING: See Section 8.

STORAGE: No special precautions necessary.

DISPOSAL: Dispose in accordance with federal, state and local regulations as a solid nonhazardous waste.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

VENTILATION: General dilution ventilation and/or local exhaust ventilation should be provided, as necessary, to maintain exposures below PEL's or TLV's. **Adequate ventilation must be provided at elevated temperatures. Adequate ventilation must also be provided when welding or grinding the inconel core.**

RESPIRATORY PROTECTION: A properly fitted NIOSH/MHSA approved disposable dust respirator should be used when: high dust levels are encountered; the level of Chromium/Nickel/Manganese/Cobalt/ Aluminum/Molybdenum/Tantalum/Tungsten/Yttrium dust in the air exceeds the OSHA permissible exposure limits; or if irritation occurs. Use an air supplied respirator in confined spaces. Use industrial hygiene air monitoring to insure that TLV or PEL values are not exceeded. Use respiratory protection in accordance with your company's respiratory protection program and OSHA regulations under 29 CFR 1910.134 .

EYE PROTECTION: Safety glasses, goggles or face shields should be worn.

PROTECTIVE CLOTHING: Wear loose fitting, long sleeved shirt that covers to the base of the neck, and long pants. Wear gloves when handling product.

WORK/HYGIENIC PRACTICES: Handle in accordance with good industrial hygiene and safety practices:

= Avoid unnecessary exposure to dusts.

= **Do not expose skin when cutting, grinding or welding the inconel mesh cable.**

= Be careful not to rub or scratch irritated areas. Use of barrier creams can, in some instances, be helpful.

= Use vacuum equipment to remove dusts from clothing. **COMPRESSED AIR SHOULD NEVER BE USED.** Always wash work clothes separately.

= Keep the work area clean of any dusts generated during fabrication. Use vacuum equipment to clean up dusts. Avoid sweeping or using compressed air as these techniques resuspend dusts into the air.

= Have access to safety showers and eye wash fountains.

= For professional use only. **Keep out of children's reach.**

Material Safety Data Sheet

AMI-FAB® WIRE MESH, IWM Series

9. PHYSICAL AND CHEMICAL PROPERTIES

MELTING POINT (Softening): NM (Not Measured)

BOILING POINT (°C): NA (Not Applicable)

SPECIFIC GRAVITY (Bare Glass): NM

PERCENT VOLATILE: NA

VAPOR PRESSURE (mm Hg): NA

VAPOR DENSITY (Air = 1): NA

EVAPORATIVE RATE (Ethyl Ether = 1): NA

SOLUBILITY IN WATER: Not soluble

APPEARANCE AND ODOR: Metallic appearing mesh with no odor.

pH: NA

10. STABILITY AND REACTIVITY

STABILITY (Conditions to Avoid): Product is stable.

INCOMPATIBILITY (Materials to Avoid): None known.

HAZARDOUS DECOMPOSITION PRODUCTS: SEE SECTION 3.

HAZARDOUS POLYMERIZATION: Will not occur.

To the best of our knowledge, the information contained herein is accurate. The information provided is based upon data furnished by our suppliers. However, neither [redacted], nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. While believed to be reliable, the information or products are intended for use by skilled persons at their own risk. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards which exist.