

## Ransom &amp; Randolph

**1. Product and Company Identification**

<i>Product Name</i> Matrixblend™ refractory blue	<i>MSDS Code Number</i> 381
<i>Trade Name &amp; Synonyms</i> Fused silica, silicon dioxide	<i>Date of Last Revision</i> 09/2008
<i>Chemical Name</i> Inorganic oxide	<i>Manufacturer</i>
<i>C.A.S. Number</i>	<i>Address</i> 3535 Briarfield Blvd, Maumee, OH 43537
<i>Grades or Minor Variant Identities</i>	<i>Information Telephone Number</i> 419/865-9497 FAX 419/865-9997
<i>Product Use</i> Investment casting refractory material	<i>Emergency Telephone Number</i> 419/865-9497

**2. Composition of Ingredients**

<i>Hazardous Components</i>	<i>C.A.S. Number</i>	<i>%</i>
Silica (cristobalite)	14464-46-1	<0.75
Fused silica (amorphous)	60676-86-0	>80

**3. Hazardous Identification***Emergency Overview*

Matrixblend refractory blue contains crystalline silica. Do not breathe dust.

<i>Routes of Exposure</i>	<i>Signs &amp; Symptoms</i>	<i>Single, Repeated, or Lifetime Exposure</i>	<i>Severity (Mild, Moderate, Severe)</i>	<i>Acute and Chronic Health Effect(s)</i>	<i>Target Organ(s)</i>
<i>Eye</i>	Irritation				
<i>Skin</i>	Irritation				
<i>Inhalation</i>	Cough, tightness in chest, shortness of breath, wheezing and sputum production	Silicosis	Silicosis	Silicosis	Lungs
<i>Ingestion</i>	Not likely route				
<i>Other</i>					

**Medical Conditions Aggravated by Exposure**

Any pre-existing respiratory or pulmonary disease or condition, such as, but not limited to, bronchitis, emphysema and asthma. Individuals with silicosis are predisposed to develop tuberculosis.

**Carcinogenicity (IARC, NTP)**

IARC: Yes

IARC Monograph Volume 68: Silica, silicates, coal dust, and para-aramid fibrils states that there is sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica in the forms of quartz and cristobalite from occupational sources. Crystalline silica is categorized in the "Group 1" category which the IARC defines as the agent is carcinogenic to humans.

Amorphous Silica has been designated by IARC as a Group 3, "not classifiable as to human carcinogenicity." This means that evidence is insufficient to link that fiber to cancer.

NTP: Yes

The National Toxicology Program (NTP) published its Ninth Annual Report on Carcinogens which concludes that "silica, crystalline respirable" is known to be a human carcinogen. The NTP conclusion is based on sufficient evidence for the carcinogenicity of respirable crystalline silica in experimental animals and limited evidence in humans.

**Potential Environmental Effects**

No ecotoxicity data is available. This product is not expected to present an environmental hazard.

**4. First Aid Measures**

<i>Routes of Exposure</i>	<i>First Aid Instructions</i>	<i>Immediate Medical Attention</i>	<i>Delayed Effects</i>
<i>Eye</i>	Flush with plenty of water.	If discomfort or irritation persists, consult a physician.	
<i>Skin</i>	Wash with soap and water.	If discomfort or irritation persists, consult a physician.	
<i>Inhalation</i>	Remove affected persons to fresh air.	If discomfort or irritation persists, consult a physician.	
<i>Ingestion</i>	Drink water. Do not induce vomiting.	If discomfort or irritation persists, consult a physician.	

**5. Fire and Explosion Data**

<i>Flashpoint: (Method)</i> N/A	<i>Flammable (Explosive) Limits in Air</i> <i>LEL:</i> N/A <i>UEL:</i> N/A		<i>Autoignition Temperature:</i> N/A	<i>Other</i> Do not inhale dust. Wear NIOSH-certified respirator.
<i>Flame Propagation or Burning Rate (for solids):</i> This product will not burn.	<i>Properties Contributing to Fire Intensity</i> N/A	<i>Flammability Classification NFDA Rating:</i>		
<i>Extinguishing Media</i> This product is compatible with all extinguishing media. Use any media appropriate for the surrounding fire.		<i>Extinguishing Media to Avoid</i> - None		

**Protection and Procedures for Firefighters:**  
Avoid eye and skin contact. Do not breathe fumes.

**Unusual Fire and Explosion Hazards:**

N/A

## 6. Accidental Release Measures

### *Containment Techniques*

### *Spill/Leak Clean-Up Procedures and Equipment*

Use dustless methods (vacuum) and place into closable container for disposal, or flush with water. Do not dry sweep. Do not use compressed air to clean spills. Wear protective equipment.

### *Evacuation Procedures*

### *Special Instructions*

### *Reporting Requirements*

## 7. Handling and Storage

### *Handling Practices and Warnings*

Avoid breakage of bagged material or spills of bulk materials.

### *Storage Practices and Warnings*

Normal warehouse storage.

### *Other precautions:*

Use dustless systems for handling, storage and clean up so that airborne dust does not exceed the PEL. Use adequate ventilation and dust collection. Practice good housekeeping. Do not permit dust to collect on walls, floors, sills, ledges, machinery, or equipment. Maintain, clean, and fit test respirators in accordance with OSHA regulations. Maintain and test ventilation and dust collection equipment. Wash or vacuum clothing which has become dusty. See also control measures in Section 8.

See OSHA Hazard Communication Rule 29 CFR Sections 1910.1200, 1915.99, 1917.28, 1918.90, 1926.59 and 1928.21, and state and local worker or community "right to know" laws and regulations. We recommend that smoking be prohibited in all areas where respirators must be used. **WARN YOUR EMPLOYEES (AND CUSTOMERS-USERS IN CASE OF RESALE) BY POSTING AND OTHER MEANS OF THE HAZARD AND OSHA PRECAUTIONS TO BE USED. PROVIDE TRAINING FOR YOUR EMPLOYEES ABOUT THE OSHA PRECAUTIONS.**

See also American Society for Testing and Materials (ASTM) Standard Practice E1132-86, "Standard Practice for Health Requirements Relating to Exposure to Quartz Dust."

## 8. Exposure Controls/Personal Protection

<i>Ventilation</i>	<i>Other Engineering Controls</i> Use sufficient local exhaust to reduce the level of respirable dust to the PEL. See ACGIH "Industrial Ventilation, A Manual Recommended Practice," the latest edition.	
<i>Routes of Entry:</i>	<i>Personal Protective Equipment (PPE) for Normal Use:</i>	<i>PPE for Emergencies:</i>
<i>Eye/Face</i>	Wear protective shield (safety glasses) when exposed to dust particles.	
<i>Skin</i>		
<i>Inhalation</i>	See "Respirator Protection" below.	

<p><b>General Hygiene Considerations and Work Practices</b> Practice good housekeeping. Do not permit dust to collect on walls, floors, sills, ledges, machinery, or equipment. Maintain clean and fit test respirator in accordance with regulations. Maintain and test ventilation and dust collection equipment. Wash or vacuum clothing which has become dusty.</p>
<p><b>Other Protective Measures and Equipment</b> We recommend that smoking be prohibited in all areas where respirators must be used. See attached table entitled "TABLE OF OCCUPATIONAL EXPOSURE LIMIT VALUES."</p>

## OCCUPATIONAL PROTECTION MEASURES

<p><b>Respirator Protection:</b> The following chart specifies some of the types of respirators which may provide respiratory protection for crystalline silica.</p>		
<b>CONDITION</b> Particulate Concentration	<b>RESPIRATORY PROTECTION FOR CRYSTALLINE SILICA MINIMUM RESPIRATORY PROTECTION*</b>	
Up to 10 x PEL	A NIOSH-certified dust respirator, except single-use or quarter mask respirator. Any fume respirator or high efficiency particulate filter respirator. Any supplied-air respirator. Any self-contained breathing apparatus.	
Greater than 10 x PEL	<b>Please reference the following OSHA regulation: 29 CFR 1910.134(d) Selection of respirators.</b> This paragraph requires the employer to evaluate respiratory hazard(s) in the workplace, identify relevant workplace and user factors, and base respirator selection on these factors. The paragraph also specifies appropriately protective respirators for use in IDLH atmospheres, and limits the selection and use of air-purifying respirators.	
Abrasive Blasting	No Ransom & Randolph products are authorized for use as abrasive blasting media.	
<p><b>*Only NIOSH-certified equipment should be used. (See 29 CFR Section 1910.134(d)(1)(ii)).</b> See also ANSI standard Z88.2 (latest version) "Practices for Respiratory Protection."</p>		
<b>9. Physical and Chemical Characteristics</b>		
<i>Appearance</i> White powder or grain		<i>Odor</i>
<i>Normal Physical State:</i>		<i>Boiling Point</i> N/A
<i>Liquid</i>	<i>Gas</i>	<i>Melting Point</i> N/A
<i>Solid</i>	<i>Powder</i> X	<i>Freezing Point</i> N/A
<i>Specific Gravity or Density (H<sub>2</sub>O=1)</i> 2.19	<i>Solubility in Water</i> Insoluble	<i>pH</i> @ 6 - 7
<i>Vapor Pressure (mm Hg.)</i> N/A	<i>Vapor Density (AIR = 1)</i> N/A	<i>Evaporation Rate (Butyl Acetate=1)</i>
<i>Other</i>		

## 10. Stability and Reactivity

### *Incompatibility (Materials to Avoid)*

Silicon dioxide is incompatible with strong oxidizers (i.e.: fluorine, oxygen difluoride, and chlorine trifluoride).

### *Hazardous Products Produced During Decomposition*

Thermal decomposition will produce silica and aluminum oxides.

### *Hazardous Polymerization?*

*May Occur*

*May Not Occur*

*Conditions to Avoid*

N

Y

N/A

### *Stability?*

*Stable*

*Unstable*

*Conditions to Avoid*

Y

N

None

## 11. Toxicological Information

### *Toxicity Data, Epidemiology Studies, Carcinogenicity, Neurological Effects, Genetic Effects, Reproductive Effects, or Structure Activity Data*

**Crystalline Silica** - Prolonged exposure to respirable crystalline silica may cause delayed (chronic) lung injury (silicosis, pneumoconiosis). Acute or rapidly developing silicosis may occur in a short period of time in heavy exposure in certain occupations such as sandblasters. Silicosis is a form of disabling pulmonary fibrosis which can be progressive and may lead to death. There is evidence that individuals with silicosis may also experience incidences of scleroderma (immune system disorder), tuberculosis, and nephrotoxicity (kidney lesions).

The National Toxicology Program (NTP) published its Ninth Annual Report on Carcinogens which concludes that "silica, crystalline (respirable)" is known to be a human carcinogen. The NTP conclusion is based on sufficient evidence for the carcinogenicity of respirable crystalline silica in experimental animals and limited evidence in humans.

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Amorphous Silica has been designated by IARC as a Group 3, "not classifiable as to human carcinogenicity." This means that evidence is insufficient to link that fiber to cancer.

Crystalline Silica (quartz) is classified as a substance known to the State of California to be a carcinogen.

### *Properties (Physical/Chemical) Affecting Disposal*

## 12. Ecological Information

### *Toxicity, Environmental Fate, Physical/Chemical Data, or Other Data Supporting Environmental Hazard Statements*

No ecotoxicity data is available. This product is not expected to present an environmental hazard.

## 13. Disposal Considerations

### *Regulations*

Material may become contaminated during use, dispose in accordance with federal, state, and local regulations.

### *Properties (Physical/Chemical) Affecting Disposal*

<b>14. Transport Information</b>		
<i>Regulated for shipping?</i> Yes      No <input checked="" type="checkbox"/>	<i>Proper Shipping Name</i> Sand NOI	<i>Packing Group</i> N/A
<i>Do changes in quality, packaging, or shipment method change product classification?</i> Yes      No <input checked="" type="checkbox"/>	<i>Hazard Class</i>  N/A	<i>Identification Number</i>  N/A
<i>Other</i>		
<b>15. Regulator Information</b>		
<i>Federal Regulations</i>		
<i>International Regulations</i>		
<p><i>Other</i></p> <p>CANADIAN WHMIS: D2A</p> <p>OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200: This product is hazardous under the criteria of this rule.</p> <p>EPCRA Section 302 (EHSs): This product does not contain ingredients subject to reporting requirements of 40 CFR Part 355, Appendices A and B (Extremely Hazardous Substances).</p> <p>CERCLA, Section 304: This product does not contain ingredients subject to state and local reporting under Section 304 of SARA Title III as listed in 40 CFR Part 302, Table 302.4.</p> <p>SARA 313 REPORTING REQUIREMENTS: This product does not contain ingredients subject to the reporting requirements of Section 313 SARA, and Section 6607 of the Pollution Prevention Act.</p> <p>SARA HAZARD CATEGORY: This product has been reviewed according to the EPA Hazard Categories promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and by definition meets the requirements of the following category:  <div style="text-align: center;">Chronic Health Hazard</div></p> <p>CALIFORNIA PROPOSITION 65: This product contains crystalline silica, an ingredient known to the State of California to cause cancer.</p> <p>TSCA (Toxic Substances Control Act): All ingredients contained in this product are on the TSCA inventory.</p>		
<b>16. Other Information</b>		
<p>The information set forth herein has been gathered from standard reference materials and/or Ransom &amp; Randolph Company test data and is, to the best knowledge and belief of Ransom &amp; Randolph Company accurate and reliable. Such information is offered solely for your consideration, investigation and verification and it is not suggested or guaranteed that the hazard precautions or procedures mentioned are the only ones which exist. Ransom &amp; Randolph Company makes no warranties, express or implied, with respect to the use of such information or the use of the specific material identifies here in combination with any other material or process, and assumes no responsibility therefore.</p>		

## TABLE OF OCCUPATIONAL EXPOSURE LIMIT VALUES

The following table shows the Occupational Exposure Limits (OEL) for quartz, cristobalite and tridymite in application in Europe and in some other countries.

Country	Occupational Exposure Limit (OEL) Name	Adopted by	Quartz (q) (mg/m <sup>3</sup> )	Cristobalite (c) (mg/m <sup>3</sup> )	Tridymite (t) (mg/m <sup>3</sup> )
Australia	National Exposure Standard	Worksafe Australia, National Occupational Health & Safety Commission	0.2	0.1	
Austria	Maximalen Arbeitsplatzkonzentration	Bundesministerium für Arbeit und Soziales	0.15	0.15	0.15
Belgium		Ministère de l'Emploi et du Travail	0.1	0.05	0.05
Denmark	Threshold Limit Value	Direktoratet for Arbejdstilsynet	0.1	0.05	0.05
Finland	Occupational Exposure Standard	National Board of Labour Protection	0.2	0.1	0.1
France	Empoussiérage de référence	Ministère de l'Industrie (RGIE)	5 or 25k/Q		
	Valeur limite de Moyenne d'Exposition	Ministère du Travail	0.1	0.05	0.05
Germany	Maximalen Arbeitsplatzkonzentration	Grenzwerte in der Luft am Arbeitsplatz	0.15	0.15	0.15
Greece		Legislation for mining activities	0.1	0.05	0.05
Ireland		2001 Code of practice for the Safety, Health & Welfare at Work (CoP)	0.05	0.4	0.4
Italy	Threshold Limit Value	Associazione Italiana Degli Igienisti Industriali	0.05	0.05	0.05
Luxembourg	Maximlen Arbeitsplatzkonzentration	Grenzwerte in der Luft am Arbeitsplatz	0.15	0.15	0.15
Netherlands	Maximaal Aanvarde Concentratie	Ministerie van Sociale Zaken en Werkgelegenheid	0.075	0.075	0.075
Norway	Threshold Limit Value	Direktoratet for Arbejdstilsynet	0.1	0.05	0.05
Portugal	Threshold Limit Value	Instituto Portugues da Qualidade, Hygiene & Safety at Workplace	0.1	0.05	0.05
Spain	Valores Limites	Instituto Nacional de Seguridad e Higiene en el Trabajo	0.1		
		Instrucciones de Técnicas Complementarias (ITC)	0.1	0.05	0.05
		Reglamento General de Normas Basicas de Seguridad Minera	5 or 25k/Q		
Sweden		National Board of Occupational Safety and Health	0.1	0.05	0.05
Switzerland	Valeur limite de Moyenne d'Exposition		0.15	0.15	0.15
United Kingdom	Maximum Exposure Limit	Health & Safety Executive	0.3	0.3	0.3
	Occupational Exposure Standard				
USA	Permissible Exposure Limit (as respirable dust)	Occupational Safety & Health Administration (OSHA)	10/(%SiO <sub>2</sub> +2)	PEL (Quartz)/2	PEL (Quartz)/2
	Threshold Limit Value (TLV-TWA)	American Conference of Governmental Industrial Hygienists	0.025	0.025	None – TLV withdrawn in 2005

Q: quartz percentage

Source: Adapted from IMA-Europe

Date: 08/05/03, Updated version available at <http://www.ima-eu.org/en/silhsefacts.html>

OELs are applicable to 100 % quartz, cristobalite, or tridymite.

Some countries have special rules for mixed dust, e.g. in France the following equation is applied:  $C_{ns}/5 + C_q/0.05 + C_t/0.05 \leq 1$  (C = mean concentration, ns = non silicogen)