

Ransom & Randolph

1. Product and Company Name

<i>Product Name</i> SJ-279, SJ-439, SJ-679, Plasticast®	<i>MSDS Code Number</i> 288
<i>Trade Name & Synonyms</i>	<i>Date of Last Revision</i> 06/04
<i>Chemical Name</i>	<i>Manufacturer</i> Ransom & Randolph
<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 material	<i>Emergency Telephone Number</i> 419/865-9497

2. Composition

<u>Hazardous Components</u>	<u>C.A.S. Number</u>	<u>%</u>
Calcium sulfate	7778-18-9	<60
Crystalline quartz	14808-60-7	<90
Cristobalite	14464-46-1	<80
Fiberglass	7631-86-9	<1
Amorphous silica	7631-86-9	<1

3. Hazardous Identification

Emergency Overview

These products contain crystalline silica. Do not breathe dust. May cause delayed lung injury (silicosis, pneumoconiosis).

<i>Routes of Exposure</i>	<i>Signs & 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	Irritation and/or dermatitis			
<i>Inhalation</i>	Transitory upper respiratory irritant. 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 limited to, bronchitis, emphysema, and asthma. Individuals with silicosis are predisposed to develop tuberculosis.

Carcinogenicity (IARC, NTP)

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.
IARC: Yes	IARC Monographs 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 in carcinogenic to humans.
OTHER: California Proposition 65	Crystalline Silica (quartz) is classified as a substance known to the State of California to be a carcinogen.

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>	Wash eyes with copious amounts of water. If irritation persists, see a physician.	If discomfort or irritation persists, consult a physician.	
<i>Skin</i>	Wash exposed skin with copious quantities of soapy water.		
<i>Inhalation</i>	If gross inhalation of dust occurs, remove person immediately to fresh air, give artificial respiration as needed, and seek medical attention as needed.		
<i>Ingestion</i>	If conscious and small quantity ingested, immediately give large quantity of water or milk to induce vomiting by touching finger to the back of throat.	If discomfort or irritation persists, consult a physician.	
<i>Other</i>	Never give anything by mouth to an unconscious person. If large quantity is ingested, seek medical attention immediately.		

Note to Physicians (Treatment, Testing, and Monitoring)

5. Fire-fighting Measures

<i>Flashpoint: (Method)</i> N/A	<i>Flammable (Explosive) Limits in Air</i> LEL: UEL:		<i>Autoignition Temperature:</i>	<i>Other</i> Do not inhale dust. Wear respirator.
<i>Flame Propagation or Burning Rate (for solids):</i>	<i>Properties Contributing to Fire Intensity</i>	<i>Flammability Classification NFDA Rating:</i>		
<i>Extinguishing Media</i> This inorganic mineral material is non-combustible and non-explosive. Use extinguishing media appropriate to the surrounding area. Water will cause product to solidify.		<i>Extinguishing Media to Avoid</i> N/A		

Protection and Procedures for Firefighters:
Do not inhale dust. Avoid eye and skin contact.

Unusual Fire and Explosion Hazards:
At 1450°C, hazardous decomposition of the product to corrosive sulfur gasses will occur.

6. Accidental Release Measures

Containment Techniques

Avoid creating dust. Sweep up small quantities with a dust suppressive agent.

Spill/Leak Clean-Up Procedures and Equipment

Vacuum up large spills. Use a vacuum system with an exhaust that discharges outside and with a high efficiency particulate air filter unit. Slurry may plug drain. Avoid washing down material into drains without plaster traps or blockage of drain can result.

Evacuation Procedures

Special Instructions

Reporting Requirements

7. Handling and Storage

Handling Practices and Warnings

Be sure proper ventilation and respiratory and eye protection are used. Wash contaminated clothing before reusing. Practice good hygiene after contact with the material. Avoid inhalation or ingestion of the material. Avoid eye contact. Train all supervisory and operating personnel in the health hazards and protective procedures for working with silica. Warn workers of the additional health risk caused by the silica hazard and smoking. **AVOID CAUSING AIRBORNE DUST.**

Storage Practices and Warnings

Store at room temperature in a sealed container in a dry location.

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 VIII.

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

Ventilation

Other Engineering Controls

Use properly designed exhaust ventilation system if TLV is exceeded. Local and general exhaust suggested.

Routes of Entry:

Personal Protective Equipment (PPE) for Normal Use:

PPE for Emergencies:

Eye/Face

Use eye protection, goggles to avoid particulate irritation to eye. The use of a dust mask or equivalent to EN149 Category FFP2S, and the provision of dust extraction/ventilation where dust is produced are recommended.

Skin

Use rubber or plastic gloves and/or barrier cream for hands and suitable clothing to protect the body.

Inhalation

Use an appropriate NIOSH approved respirator for mineral dust and silica to meet the TLV levels that exist.

General Hygiene Considerations and Work Practices

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.

Other Protective Measures and Equipment

We recommend that smoking be prohibited in all areas where respirators must be used. See attached table entitled "TABLE OF OCCUPATIONAL EXPOSURE LIMIT VALUES."

Respirator Protection: The following chart specifies the types of respirators which may provide respiratory protection for crystalline silica.

CONDITION Particulate Concentration	RESPIRATORY PROTECTION FOR CRYSTALLINE SILICA MINIMUM RESPIRATORY PROTECTION*
Up to 5 x PEL	Any dust respirator.
Up to 10 x PEL	Any 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.
Up to 50 x PEL	A high efficiency particulate filter respirator with a full-face piece. Any supplied-air respirator with a full-face piece, helmet, or hood. Any self-contained breathing apparatus with a full-face piece.
Up to 500 x PEL	A powered air-purifying respirator with a high efficiency particulate filter. A Type C supplied-air respirator operated in pressure-demand or other positive pressure or continuous-flow mode.
Greater than 500 x PEL or entry and escape from unknown concentrations	Self-contained breathing apparatus with a full-face piece operated in pressure-demand or other positive pressure mode. A combination respirator which includes a Type C supplied-air respirator with a full-face piece operated in pressure-demand or other positive pressure continuous-flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.
Abrasive Blasting	Any Type CE, supplied-air respirator with a full-face piece, hood, or helmet, operated in a positive-pressure mode. (See 29 CFR Section 1910.94 (a).)

***Only NIOSH-approved equipment should be used. (See 29 CFR Section 1910.134).**

See also ANSI standard Z88.2 (latest version) "Practices for Respiratory Protection."

9. Physical and Chemical Properties

<i>Appearance</i> Ivory, white, or pink		<i>Odor</i> Bland or slight pepper-like odor	
<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>	X	<i>Freezing Point</i>	N/A
<i>Specific Gravity or Density (H₂O=1)</i> Not Determined	<i>Solubility in Water</i> <0.2%		<i>pH</i> 6-8

<i>Vapor Pressure (mm Hg.)</i> N/A	<i>Vapor Density (AIR = 1)</i> N/A	<i>Evaporation Rate (Butyl Acetate=1)</i> N/A	
<i>Other</i> 1450°C CaSO ₄ decomposes			
10. Stability and Reactivity			
<i>Incompatibility (Materials to Avoid)</i> Acids and strong oxidizing agents and temperatures above 1450°C that can yield toxic and corrosive sulfur gases. Acids and strong oxidizing agents, such as, fluorine, chlorine trifluoride, manganese trioxide, oxygen difluoride, may cause fires.			
<i>Hazardous Products Produced During Decomposition</i> Silica will dissolve in hydrofluoric acid and produce a corrosive gas, silicon tetrafluoride. Calcium sulfate may react with strong acids to generate volatile, toxic, and flammable hydrogen sulfide and will decompose at temperatures above 1450°C to release sulfur gases and lime. This product will form a solid mass within 3 to 60 minutes once it comes in contact with water.			
<i>Hazardous Polymerization?</i>	<i>May Occur</i>	<i>May Not Occur</i> X	<i>Conditions to Avoid</i> This product will form a solid mass within 1 to 60 minutes once it comes in contact with water.
<i>Stability?</i>	<i>Stable</i> Y	<i>Unstable</i>	<i>Conditions to Avoid</i> Will solidify and generate heat when powder comes in contact with water.
11. Toxicological Information			
<i>Toxicity Data, Epidemiology Studies, Carcinogenicity, Neurological Effects, Genetic Effects, Reproductive Effects, or Structure Activity Data</i> 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. IARC Monographs 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 in carcinogenic to humans. Crystalline Silica (quartz) is classified as a substance known to the State of California to be a carcinogen. Fibrous Glass: (Acute) may cause irritation of skin or less frequently eyes, nose and throat (chronic) animal inhalation studies for fiberglass have not shown evidence of a carcinogenic or fibrogenic response. Studies using artificial implantation or injection of glass fibers have resulted in cancer in laboratory animals. However, since there are no natural mechanisms which would mimic such artificial exposure, these studies are not thought to be relevant to human exposure.			
12. Ecological Information			
<i>Toxicity, Environmental Fate, Physical/Chemical Data, or Other Data Supporting Environmental Hazard Statements</i> None available. Once powder is exposed to water, the product will revert to gypsum, quartz, and cristobalite, which is considered non-hazardous in the environment.			
13. Disposal Considerations			

Regulations Non-hazardous as defined by the RCRA (40CFR261). Use waste containers suitable for transportation and which do not release fugitive dust. Do not wash product into drains without plaster traps. Dispose product in accordance with federal, state, and local regulations.			
Properties (Physical/Chemical) Affecting Disposal Be sure proper ventilation and respiratory and eye protection are used. Wash contaminated clothing before reusing. Practice good hygiene after contact with material. Avoid inhalation or ingestion of material. Avoid eye contact. Train all supervisory and operating personnel in health hazards and protective procedures for working with silica. Warn workers of the additional health risk caused by the silica hazard and smoking. AVOID CAUSING AIRBORNE DUST.			
14. Transport Information			
Regulated for shipping? Yes No X		Proper Shipping Name Not regulated	
		Packing Group N/A	
Do changes in quality, packaging, or shipment method change product classification? Yes No X		Hazard Class N/A	
		Identification Number N/A	
Other			
15. Regulator Information			
Federal Regulations SARA III Information: Highly hazardous materials on the CERCLA or section 313 list are not present in any of the products.			
International Regulations			
Other WARNING: Contains respirable crystalline silica (RCS). Do not breathe dust. May cause delayed lung injury (silicosis, pneumoconiosis). The IARC (International Agency for Research on Cancer) reports IARC Monograph 68) there is sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica in the forms of quartz and cristobalite from occupational sources. The NTP (National Toxicity Program) reports (Ninth Annual Report on Carcinogens) that RCS is known to be a carcinogen based on sufficient evidence from studies in humans indicating a causal relationship between exposure to RCS and increased lung cancer rates in workers exposed to crystalline silica dust. Follow Safety and Health Standards for crystalline silica.			
16. Other Information			
NFPA Hazard Rating	Health: 1	Flammability: 0	Reactivity: 0
HMIS Hazard Rating	Health: 3	Flammability: 0	Reactivity: 0
Personal Protection: Use NIOSH/OSHA approved respirator.			

The information set forth herein has been gathered from standard reference materials and/or Ransom & Randolph Company test data and is, to the best knowledge and belief of Ransom & 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 & 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.

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)	Cristobalite (c)	Tridymite (t)
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 reference	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 Portuges 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	Occupational Safety & Health Administration	10/(%SiO ₂ +2)	PEL (Quartz)/2	PEL (Quartz)/2
	Threshold Limit Value	American Conference of Governmental Industrial Hygienists	0.05	0.05	0.05

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)