Material Safety Data Sheet

Material Name: MONOFRAX® S (CS-3, CS-4, CS-5) & MONOFRAX® R **ID: 363**

* * * Section 1 - Chemical Product and Company Identification * * *

Chemical Name: FUSED CAST REFRACTORY

Manufacturer Information

RHI Monofrax Ltd
1870 New York Ave.
Falconer, NY 14733

Phone: (716) 483-7200

General Comments

CHEMTREC Assist: 1-800-424-9300 (Continental U.S.)
202-483-7616 (Outside Continental U.S. - Call Collect)

NOTE: Emergency telephone numbers are to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure, or accident involving chemicals. All non-emergency questions should be directed to customer service.

* * * Section 2 - Composition / Information on Ingredients * * *

CAS #	Component	Percent
1344-28-1	Aluminum oxide (non-fibrous)	45-55
1314-23-4	Zirconium oxide	30-45
65997-17-3	Glass, oxide	10-20

Component Related Regulatory Information

This product may be regulated, have exposure limits or other information identified as the following: Zirconium (7440-67-7), Radionuclides, Nuisance particulates.

Component Information/Information on Non-Hazardous Components

This material contains crystalline silica. Due to a variable occurrence, the exact percentage of crystalline silica is unknown. This product contains trace quantities of radionuclides.

* * * Section 3 - Hazards Identification * * *

Emergency Overview

WARNING! Product is a cream colored block. Cutting, sanding or grinding this material may release particles of crystalline silica (quartz). Overexposure to airborne particles may cause lung damage including a risk of cancer. This product contains trace quantities of radionuclides. This product may be harmful if swallowed or inhaled. This product is irritating to the eyes, respiratory system and skin. Prolonged contact with this product may cause allergic skin sensitization reactions. This product contains components that are cancer hazards.

Potential Health Effects: Eyes

Dust or powder may irritate eye tissue. Rubbing may cause abrasion of cornea.

Potential Health Effects: Skin

May cause cuts and abrasions. Dust from cutting or grinding may cause irritation. Repeated or prolonged contact may cause a rash, itching, redness, and swelling (dermatitis). Prolonged contact with this product may cause allergic skin sensitization reactions.

Potential Health Effects: Ingestion

In normal industrial use, ingestion is not considered a probable route of exposure. Ingestion of this product may cause nausea, vomiting and diarrhea.

Potential Health Effects: Inhalation

Inhalation of dusts during normal usage is unlikely because material is supplied in a block form. Dust from cutting or grinding may cause respiratory tract irritation, sore throat, coughing, or nasal congestion.

Conditions Aggravated by Exposure

Pre-existing eye, skin and respiratory disorders.

HMIS Ratings: Health: 2* **Fire:** 0 **Physical Hazard:** 0
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

* * * Section 4 - First Aid Measures * * *

First Aid: Eyes

Flush immediately with large amounts of water for at least 15-20 minutes while holding eyelids open. Do not rub eyes. Get immediate medical attention.

First Aid: Skin

Flush with large amounts of water while removing contaminated clothing. If irritation persists, get medical attention.

First Aid: Ingestion

Get immediate medical attention or advice -- Do not induce vomiting. Never give anything by mouth to a person who is unconscious or is having convulsions.

First Aid: Inhalation

Immediately remove the affected person to fresh air. If the affected person is not breathing, apply artificial respiration. Seek medical attention.

* * * Section 5 - Fire Fighting Measures * * *

Flash Point: Not applicable
Method Used: Not applicable
Upper Flammable Limit (UFL): Not applicable
Lower Flammable Limit (LFL): Not applicable
Auto Ignition: Not applicable
Flammability Classification: Non-flammable
Rate of Burning: Not applicable

General Fire Hazards

Not a fire hazard.

Hazardous Combustion Products

Thermal decomposition may release oxides of aluminum and irritating smoke and fumes.

Extinguishing Media

Use methods for the surrounding fire.

Fire Fighting Equipment/Instructions

Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask.

NFPA Ratings: Health: 2 **Fire:** 0 **Instability:** 0
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

* * * Section 6 - Accidental Release Measures * * *

Containment Procedures

Isolate the material and wet down lightly with water. Avoid generating dusty conditions. The use of a dust suppressant agent or water is recommended to control the creation of airborne dusts.

Clean-Up Procedures

Collect spill using a vacuum cleaner with a HEPA filter. Avoid dry sweeping. When cleaning spill, wear appropriate personal protective equipment including safety goggles and chemical-resistant gloves. Releases into the environment may be reportable in certain states or localities.

Evacuation Procedures

None necessary.

Special Procedures

Follow all Local, State, Federal and Provincial regulations for disposal.

* * * Section 7 - Handling and Storage * * *

Handling Procedures

Avoid contact with skin and eyes. Wash thoroughly after handling. Avoid breathing dusts from this material. If cutting or grinding is necessary, a wet brick saw or wet grinder should be used.

If this product has been in service at temperatures greater than 982ºC (1800ºF) it may contain cristobalite, a form of crystalline silica. IARC has classified crystalline silica, which includes cristobalite, as a group I carcinogen (known human carcinogen).

Removal and cleanup of after-service-product may result in exposure to mixed dusts containing cristobalite.

If this product has been in service, particularly in the glass industry, it may be contaminated with toxic substances such as heavy metals. During removal, exposed product should be frequently misted with water to minimize airborne dusts. A surfactant may be added to the water to improve the wetting process. Use only enough water to wet the product. Do not allow water to accumulate on floors.

Product packaging may contain product residue. Do not reuse.

Storage Procedures

Keep this material in a dry place.

* * * Section 8 - Exposure Controls / Personal Protection * * *

Exposure Guidelines

A: General Product Information

No exposure limits have been developed by the Occupational Safety and Health Administration (OSHA) or the American Conference of Governmental Hygienists (ACGIH) for this product. Exposure limits exist for the following ingredients.

B: Component Exposure Limits

Aluminum oxide (non-fibrous) (1344-28-1)

ACGIH: 10 mg/m3 TWA (particulate matter containing no asbestos and < 1% crystalline silica)
OSHA: 10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)

Zirconium oxide (1314-23-4)

ACGIH: 5 mg/m3 TWA (related to Zirconium)
10 mg/m3 STEL (related to Zirconium)
OSHA: 5 mg/m3 TWA (related to Zirconium)
10 mg/m3 STEL (related to Zirconium)

Glass, oxide (65997-17-3)

ACGIH: 10 mg/m3 TWA (inhalable particles); 3 mg/m3 TWA (respirable particles) (related to Particulates (insoluble or poorly soluble) not otherwise specified (PNOS))
OSHA: 15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction) (related to Particulates not otherwise regulated)

C: Exposure Limits for Chemicals Generated in Use

Silica, cristobalite (14464-46-1)

ACGIH: 0.05 mg/m3 TWA (respirable fraction)
OSHA: 0.05 mg/m3 TWA (respirable dust)

Engineering Controls

Ventilation should effectively remove and prevent buildup of any dust generated from the handling of this product.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face

Wear safety glasses or chemical goggles. The use of contact lenses is not recommended if dusts can be generated when handling this product.

Personal Protective Equipment: Skin

Use impervious gloves.

Personal Protective Equipment: Respiratory

If ventilation is not sufficient to effectively prevent buildup of dust, appropriate NIOSH/MSHA respiratory protection must be provided.

Personal Protective Equipment: General

Eye wash fountain is recommended.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Cream colored block	**Odor:**	Odorless
Physical State:	Solid	**pH:**	Not available
Vapor Pressure:	Not applicable	**Vapor Density:**	Not applicable
Boiling Point:	Not available	**Melting Point:**	1790ºC-1840ºC (3250ºF-3350ºF)
Solubility (H2O):	Slight	**Specific Gravity:**	3.85-4.11
Softening Point:	Not available		

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

Stable.

Conditions to Avoid

Avoid generation of dusts.

Incompatibility

None identified.

Hazardous Decomposition

Thermal decomposition may release oxides of aluminum and irritating smoke and fumes.

Hazardous Polymerization

Will not occur.

* * * Section 11 - Toxicological Information * * *

Acute and Chronic Toxicity

A: General Product Information

Aluminum oxide is considered a nuisance dust and as such it is expected to cause eye, skin and respiratory irritation due to mechanical action. Chronic occupational exposures may produce small pulmonary radiographic opacities, which are usually not fibrogenic. Some epidemiological studies have shown excess nonmalignant pulmonary disease and fibrosis. Chronic exposure can cause fibrotic changes in the lungs.

This product contains zirconium oxide. Zirconium oxide contains trace quantities of naturally occurring radioactive material (NORM) consisting of uranium, thorium, and/or radium. IARC has classified radionuclides as known carcinogens (Group 1). A single intratracheal instillation of zirconium oxide to rats was reported to produce fibrogenic and profilerative changes and sclerosis in lung tissue. Similarly, when injected intratracheally in rats, the hydrated from of aluminum oxide produced dense and numerous nodules of advanced fibrosis. However, since these types of exposures bypass pulmonary defense mechanisms, the significance of the results are difficult to interpret. Chronic inhalation studies of zirconium oxide in animals resulted in no detectable effects. One study reported pulmonary granulomas in animals exposed to zirconium compounds.

B: Component Analysis - LD50/LC50

No LD50/LC50's are available for this product's components.

Carcinogenicity

A: General Product Information

Crystalline silica inhaled in the form of quartz or crystalline tripoli has been classified by IARC as carcinogenic to humans (Group 1) based on sufficient evidence of carcinogenicity in humans. NTP lists crystalline silica as a substance reasonably anticipated to be a carcinogen. In rats, inhalation of quartz caused liver tumors while intratracheal administration caused tumors of the respiratory tract.

B: Component Carcinogenicity

Aluminum oxide (non-fibrous) (1344-28-1)

ACGIH: A4 - Not Classifiable as a Human Carcinogen

Zirconium oxide (1314-23-4)

ACGIH: A4 - Not Classifiable as a Human Carcinogen (related to Zirconium)

IARC: Monograph 78, 2001 (related to Radionuclides, a and/or b-particle emitting, internally deposited (Specific radionuclides for which there is sufficient evidence for carcinogenicity to humans are also listed individually as Group 1 agents)) (Group 1 (carcinogenic to humans))

C: Component Carcinogenicity for Chemicals Generated in Use

Silica, cristobalite (14464-46-1)

IARC Monograph 68, 1997 (inhaled in the form of quartz or cristobalite from occupational sources) Group 1 (carcinogen to humans)

* * * Section 12 - Ecological Information * * *

Ecotoxicity

No information available.

Environmental Fate

No information available.

* * * Section 13 - Disposal Considerations * * *

US EPA Waste Number & Descriptions

A: General Product Information

This product, as supplied, is manufactured with zirconium compounds. These compounds contain trace quantities of naturally occurring radioactive material (NORM) consisting of uranium, thorium, and/or radium. The quantity of radioactive materials in this product is below the regulatory level, for source material, of 0.05% by weight (500 ppm) as defined by the Nuclear Regulatory Commission (NRC) regulations under 10 CFR 40.4. Check local, regional, and state or provincial regulations for specific applicable handling and disposal requirements. Any processing, using, alteration, or chemical additions to the product, as purchased, may alter the disposal requirements. You must test your waste using methods described in 40 CFR Part 261 to determine if it meets these or other applicable definitions of hazardous wastes.

B: Component Waste Numbers

No EPA Waste Numbers are applicable for this product's components.

Disposal Instructions

Dispose of waste material according to Local, State, Federal, and Provincial Environmental Regulations.

* * * Section 14 - Transportation Information * * *

International Transportation Regulations

This product is not regulated as a hazardous material by the United States (DOT) or Canadian (TDG) transportation regulations.

* * * Section 15 - Regulatory Information * * *

US Federal Regulations

A: General Product Information

This product as purchased contains the following constituents regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA 40 CFR 302). Any release of this product into the environment in excess of the reportable quantities (RQs) listed below may be reportable to the National Response Center (1-800-424-8802). In addition, the release may be reportable under the Superfund Amendments and Reauthorization Act (SARA - 40 CFR 355). Reference the specific regulations for actual reporting requirements.

Constituent	RQ in Pounds
Natural uranium, thorium, and/or radium in secular equilibrium with its daughters	1,666,666

B: Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Zirconium oxide (1314-23-4)

CERCLA: 1 lb statutory RQ; 0.454 kg statutory RQ (related to Radionuclides)

C: US EPA Clean Air Act (CAA)

This product as purchased contains the following substances regulated as hazardous air pollutants under Section 112 of the Clean Air Act Amendments of 1990.

Component	CAS	CAA
Zirconium oxide (related to Radionuclides)	1314-23-4	Yes

State Regulations

A: General Product Information

Other state regulations may apply. Check individual state requirements.

B: Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Aluminum oxide (non-fibrous)	1344-28-1	No	Yes	Yes	Yes	Yes	Yes
Zirconium oxide ([1]related to Zirconium)	1314-23-4	Yes [1]	Yes [1]	Yes [1]	Yes [1]	Yes [1]	Yes [1]
Glass, oxide ([1]related to Nuisance particulates)	65997-17-3	No	No	Yes	No	No	Yes [1]

C: State Lists for Chemicals Generated in Use

The following components appear on one or more of the following state hazardous substances lists

Component	CAS	CA	FL	MA	MN	NJ	PA
Silica, cristobalite	14464-46-1	No	No	Yes	Yes	Yes	No

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.

Other Regulations

A: General Product Information

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all information required by the CPR.

B: Component Analysis - Inventory

Component	CAS #	TSCA	DSL	EINECS
Aluminum oxide (non-fibrous)	1344-28-1	Yes	Yes	Yes
Zirconium oxide	1314-23-4	Yes	Yes	Yes
Glass, oxide	65997-17-3	Yes	Yes	Yes

C: Component Analysis - WHMIS IDL

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Component	CAS #	Minimum Concentration
Aluminum oxide (non-fibrous)	1344-28-1	1 % (English Item 44, French Item 195)
Zirconium oxide	1314-23-4	1 % (English Item 1733, French Item 1736) (related to Zirconium, elemental)

D: Component Analysis: WHMIS IDL for Chemicals Generated in Use

Component	CAS #		Data
Silica, cristobalite	14464-46-1	WHMIS	1 % (English Item 1405, French Item 1490)

WHMIS Classification: D2A,D2B

* * * Section 16 - Other Information * * *

Other Information

The information presented herein is based on data considered to be accurate as of the date of preparation of the Material Safety Data Sheet. However, no warranty or representation, express or implied, is made as to the accuracy or completeness of the foregoing data and safety information, nor is any authorization given or implied to practice invention without a license.

In addition, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices, or from any hazards inherent in the nature of the product.

Key/Legend

NA = Not available or Not Applicable. ACGIH = American Conference of Governmental Industrial Hygienists. TLV = Threshold Limit Value. NIOSH = National Institute of Occupational Safety and Health. NTP = National Toxicology Program. OSHA = Occupational Safety and Health Administration. NFPA = National Fire Protection Association. HMIS = Hazardous Material Information System. CFR = Code of Federal Regulations. CERCLA= Comprehensive Environmental Response and Compensation Liability Act. SARA = Superfund Amendments and Reauthorization Act. IARC = International Agency for Research on Cancer. WHMIS = Workplace Hazardous Material Information System. RCRA = Resource Conservation and Recovery Act.

This is the end of MSDS # 363