



MATERIAL SAFETY DATA SHEET

Ferro Corporation
4150 East 56th Street
Cleveland, Ohio 44105 USA

Emergency telephone number
CHEMTREC: 1-800-424-9300
CHEMTREC (outside U.S.): 1-703-527-3887
Plant Number: 1-216-641-8580

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product Name: 3278-2 Glaze Frit BAG50LB **Date of Preparation:** 10/25/2011
Chemical Family: Frit
Chemical Name: Frit
Synonym Glassy mixture of particle size reduction after milling.
CAS-No.: 65997-18-4
Formula: TSCA Description: "Frit is a mixture of inorganic chemical substances produced by rapidly quenching a molten, complex combination of materials, confining the chemical substances thus manufactured as non-migratory components of glassy solid flakes or granules."
Product Code: 1133416

2. HAZARDS IDENTIFICATION

Emergency Overview

Warning

May cause respiratory tract, eye and skin irritation. Do not breathe vapours/dust. Contains crystalline silica which causes silicosis and lung cancer.

| | | HMIS | NFPA 704 |
|------------------------|----------|-------------|-----------------|
| Color: | White | 2* | 2 |
| Physical state: | Powder | 0 | 0 |
| Odor: | Odorless | 0 | 0 |
| | | E | |

Potential Health Effects

Principle routes of exposure: Inhalation, ingestion, skin and eye contact.

Eye contact: Contact with eyes may cause irritation.

Skin contact: Prolonged skin contact may cause skin irritation.

Inhalation: Dust or fumes from firing irritating to respiratory tract. Fumes may cause lung inflammation.

Ingestion: May irritate digestive tract.

Chronic toxicity: Excessive inhalation of fumes or dust may cause chemical pneumonitis, cyanosis, and pulmonary edema. Respirable crystalline silica has been classified as a Group I (sufficient evidence in humans for carcinogenicity) carcinogenic by IARC and is listed by NTP as a substance which may reasonably be anticipated to be a carcinogen. Long term inhalation causes lung damage (silicosis and cancer).

3. COMPOSITION/INFORMATION ON INGREDIENTS

| Components | CAS Number | Weight % |
|---------------|------------|--------------------------------|
| Frit* | | 100% (May contain - see below) |
| Quartz silica | 14808-60-7 | <0.5% |

The specific chemical identities are being withheld as a trade secret (29CFR1910.1200).

* Frit, with CAS # [65997-18-4], is a mixture of inorganic chemical substances produced by rapidly quenching a molten, complex combination of materials, confining the chemical substances thus manufactured as non-migratory components of glassy solid flakes or granules. These components are present as part of the Frit.

4. FIRST AID MEASURES

| | |
|----------------------------|--|
| Eye contact: | Rinse thoroughly with plenty of water, also under the eyelids. Get medical attention if irritation develops. |
| Skin contact: | Wash off immediately with soap and plenty of water. Get medical attention if irritation develops. |
| Inhalation: | Move to fresh air. If breathing is difficult, give oxygen. If symptoms persist, call a physician. |
| Ingestion: | Drink plenty of water. Do not induce vomiting. Consult a physician if necessary. |
| Notes to physician: | Treat symptomatically. |

5. FIRE-FIGHTING MEASURES

| | |
|---|---|
| Flash point (°C): | Non combustible |
| Suitable extinguishing media: | The product itself does not burn. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. |
| Hazardous decomposition products: | Thermal decomposition can lead to release of irritating gases and vapors. Heavy metal compounds. |
| Special protective equipment for firefighters: | As in any fire, wear self-contained breathing apparatus (pressure-demand, NIOSH approved or equivalent) and full protective gear. |
| Unusual hazards: | None known. |

6. ACCIDENTAL RELEASE MEASURES

| | |
|-----------------------------------|---|
| Personal precautions: | Avoid dust formation. Do not breathe vapors/dust. Avoid contact with skin, eyes and clothing. Use personal protective equipment. Ensure adequate ventilation. |
| Environmental precautions: | Prevent further leakage or spillage if safe to do so. Prevent product from entering drains. Do not flush into surface water or sanitary sewer system. |
| Methods for cleaning up: | Wear personal protective equipment. Use approved industrial vacuum cleaner for removal. Clean contaminated surface thoroughly. Dispose of promptly. |

7. HANDLING AND STORAGE

Handling:
Handle in accordance with good industrial hygiene and safety practice. Use only in area provided with appropriate exhaust ventilation. In case of insufficient ventilation, wear suitable respiratory equipment. Avoid contact with skin, eyes and clothing. Do not eat, drink, or smoke in areas of use or storage.

Storage:
Keep in a dry, cool and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure limits
Minimize exposure in accordance with good hygiene practice.

| Components | OSHA | ACGIH |
|---------------|--|--|
| Frit | 0.5 mg/m ³ TWA Sb 5 mg/m ³ TWA Zr 5 mg/m ³ Ceiling Mn | 0.5 mg/m ³ TWA Sb 5 mg/m ³ TWA Zr 0.2 mg/m ³ TWA Mn |
| Quartz silica | Listed | 0.025 mg/m ³ TWA respirable fraction |

| | |
|----------------------------------|---|
| Engineering measures: | Provide appropriate exhaust ventilation at machinery and at places where dust or fumes can be generated. Ensure that eyewash stations and safety showers are proximal to the work-station location. |
| Eye protection: | Safety glasses with side-shields. |
| Skin and body protection: | Lightweight protective clothing. Keep working clothes separately. Remove and wash contaminated clothing before re-use. |
| Hand protection: | Impervious gloves. |
| Respiratory protection: | In case of insufficient ventilation wear suitable respiratory equipment . Seek professional advice prior to respirator selection and use. NIOSH-approved respirators should be worn where engineering controls and work practices do not reduce exposure to or below the PEL. |
| Hygiene measures: | Wash hands before breaks and at the end of workday. Wash contaminated clothing before re-use. |

9. PHYSICAL AND CHEMICAL PROPERTIES

| | | | |
|-------------------------------------|-------------------|-------------------------------------|-------------------|
| Color: | White | Physical state: | Powder |
| Odor: | Odorless | Molecular weight: | No data available |
| Boiling point/range (°C): | No data available | pH: | No data available |
| Melting point/range (°C): | No data available | Specific gravity (Water =1): | No data available |
| Vapor density: | Non-volatile | Vapor pressure : | No data available |
| Evaporation Rate (Water = 1) | Non-volatile | Water solubility: | Insoluble |
| VOC content (%) | 0 | | |

10. STABILITY AND REACTIVITY

| | |
|--|--|
| Stability: | Stable at normal conditions. |
| Polymerization | Will not occur. |
| Hazardous decomposition products: | No decomposition if stored normally. Thermal decomposition can lead to release of irritating gases and vapors. |
| Materials to avoid: | None known. |
| Conditions to avoid | None known. |

11. TOXICOLOGICAL INFORMATION

| | |
|------------------------------|---|
| Acute toxicity: | Information given is based on data on the components and the toxicology of similar products. |
| Chronic Toxicity: | Contains crystalline silica which causes silicosis and lung cancer. |
| Carcinogenic Effects: | Respirable crystalline silica has been classified as a Group I (sufficient evidence in humans for carcinogenicity) carcinogenic by IARC and is listed by NTP as a substance which may reasonably be anticipated to be a carcinogen. Crystalline silica is also a known cause of silicosis, a non-cancerous lung disease caused by excessive exposure to crystalline silica. |
| Target Organ Effects: | Silica: Respiratory system. |

Component information, if any, is listed below

Frit

LD50s and LC50s: Oral LD50 (Rat) = 2000 mg/kg
OSHA - Select Carcinogens: Present
NTP: Known Human Carcinogen
NTPS. Carcinogen: Reasonably Anticipated To Be A Human Carcinogen
IARC - Group 1: Listed
IARC - Group 2A: Listed
IARC - Group 2B: Listed

Quartz silica

LD50s and LC50s: Oral LD50 (Rat) = 500 mg/kg
OSHA - Select Carcinogens: Present
NTP: Known Human Carcinogen
IARC - Group 1: Listed

12. ECOLOGICAL INFORMATION

Aquatic toxicity: No data is available on the product itself. Information given is based on data on the components and the ecotoxicology of similar products.

Persistence and degradability: No information available.

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products: Waste must be disposed of in accordance with federal, state and local environmental control regulations. Where possible recycling is preferred to disposal or incineration.

14. TRANSPORT INFORMATION**DOT (U.S.)**

Proper shipping name: Not regulated.

TDG (Canada)

Proper shipping name: Not regulated.

15. REGULATORY INFORMATION**U.S. Regulations:**

TSCA: Not subject to TSCA 12(b) Export Notification

SARA 313: Not subject to the provisions of SARA 313 Title III

State Regulations

This product or its ingredients have been evaluated for New Jersey, Pennsylvania, and California Prop 65 supplier notification requirements. Substances that are subject to notification requirements, if any, are listed below.

| Components | NJRTK: |
|---------------|----------------|
| Quartz silica | Listed (NJRTK) |

| Components | State Regulation - CA Prop65 |
|---------------|------------------------------|
| Quartz silica | Carcinogen |

Canadian WHMIS

WHMIS hazard class: D2A Very toxic materials

International Inventories

| | |
|--|--|
| TSCA 8(b): | Listed or exempt. |
| Canadian DSL/NDSL list EC-No. | All ingredient(s) are listed on the DSL or NDSL Listed or exempt. |
| Philippines (PICCS): | Listed. |
| Japan (ENCS): | Listed or exempt. |
| Korea (KECL): | Listed. |
| China (IECS): | Listed. |
| Australia (AICS): | Listed. |
| New Zealand (NZIoC): | Listed. |

16. OTHER INFORMATION

For Industrial Use Only.

Prepared by: Ferro Technical Center

Disclaimer: The information and recommendations contained in this Material Safety Data Sheet have been compiled from sources believed to be reliable and to represent the most reasonable current opinion on the subject when the MSDS was prepared. No warranty, guaranty or representation is made as to the correctness or sufficiency of the information. The user of this product must decide what safety measures are necessary to safely use this product, either alone or in combination with other products, and determine its environmental regulatory compliance obligations under any applicable federal or state laws.

End of Safety Data Sheet