FERRO

MATERIAL SAFETY DATA SHEET

Ferro Corporation
Performance Pigments & Colors
251 West Wylie Ave.
Washington, PA 15301 USA

Emergency telephone number
CHEMTREC: 1-800-424-9300
CHEMTREC (outside U.S.): 1-703-527-3887
Phone Number: 1-724-223-5900

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

Product Name: 9630 Clear Flux DRM100LB **Date of Preparation:** 12/20/2011
Chemical Family: 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: 1133871

2. HAZARDS IDENTIFICATION

Emergency Overview
Caution
May cause respiratory tract, eye and skin irritation. Do not breathe vapours/dust. Contains titanium dioxide which may cause lung damage including cancer.

		HMIS	NFPA 704
Color:	White	1*	1
Physical state:	Powder	0	0
Odor:	Odorless	0	0
		X	

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. Titanium Dioxide is listed by IARC as possibly carcinogenic to humans (Group 2B) based on inadequate evidence of carcinogenicity in humans and sufficient evidence in experimental animals.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS Number	Weight %
Frit*		100% (May contain - see below)
Titanium Dioxide	13463-67-7	<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.

This product contains trace quantities of naturally occuring radioactive uranium, thorium and radium (<0.01% total). Overexposure by inhalation to respirable dusts containing uranium, thorium and radium may cause cancer, however, observance of the OSHA limit for respirable dusts of 5 mg/m^3 will ensure the use of this product to be well below the regulatory limits established for these components.

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. Remove and wash contaminated clothing before re-use. If symptoms persist, call a physician.

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.

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. Shovel into suitable container for disposal. 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
Titanium Dioxide	15 mg/m^3 TWA total dust	10 mg/m^3 TWA

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:	NIOSH-approved respirators should be worn where engineering controls and work practices do not reduce exposure to or below the PEL. In case of insufficient ventilation wear suitable respiratory equipment . Seek professional advice prior to respirator selection and use.
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:	No data is available on the product itself.
Chronic Toxicity:	In lifetime inhalation studies of rats, airborne respirable size titanium dioxide particles have been shown to cause lung tumors at concentrations associated with substantial particle lung burdens and consequential pulmonary overload and inflammation. However, other laboratory animals such as mice and hamsters did not develop lung tumors under similar testing with titanium dioxide. Human epidemiology studies do not suggest an association between occupational exposure to titanium dioxide and risk for cancer.
Target Organ Effects:	Titanium dioxide: 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

Frit

NTPS. Carcinogen:	Reasonably Anticipated To Be A Human Carcinogen
IARC - Group 1:	Listed
IARC - Group 2A:	Listed
IARC - Group 2B:	Listed

Titanium Dioxide

LD50s and LC50s:	Oral LD50 (Rat) = 10000 mg/kg
OSHA - Select Carcinogens:	Present

12. ECOLOGICAL INFORMATION

Aquatic toxicity: Not determined.

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:

Components	U.S. - CERCLA/SARA - Section 313 - Emission Reporting
Zinc compounds (1 - 5%)	1.0 % de minimis concentration

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	PARTK:
Zinc compounds	Listed (PARTK)

Components	NJRTK:
Zinc compounds	Listed (NJRTK)

Components	State Regulation - CA Prop65
Titanium Dioxide	Carcinogen

Canadian WHMIS

WHMIS hazard class: D2B Toxic materials

International Inventories

TSCA 8(b):	Listed or exempt.
Canadian DSL/NDSL list	All ingredient(s) are listed on the DSL or NDSL
EC-No.	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