SAFETY DATA SHEET

Following Regulation 1910.1200

SDS Number: MK211 Date of first issue: 10 March 2014 Date of last revision: 21 February 2022

1 - Identification of product

a - Product identifier used on the label

Tradenames: Flexible Min-K F150, Flexible Min-K F150 Thermal Barrier System

b - Other means of identification

MICROPOROUS INSULATION

c - Recommended use of the chemical and restrictions on use

These products are used as high temperature thermal insulation in aerospace, automotive, nuclear and fire protection applications.These boards and shapes products combine high temperature insulating properties and very low thermal conductivity and can be used particularly where conditions impose low weight and space constraints at high temperature.

d - Name, address, and telephone number

Morgan Advanced Materials 2730 Industrial Parkway Elkhart, IN 46516 Telephone: 574-296-3500	**Morgan Advanced Materials** P. O. Box 923; Dept. 300 Augusta, GA 30903-0923 Telephone: 706-796-4200

e - Emergency Phone Number

For Product Stewardship and Emergency Information:
Hotline - 1-800-722-5681
Fax - 706-560-4054

For additional SDSs and to confirm this is the most current SDS for the product, visit our web page www.morganthermalceramics.com or send a request to MT.NorthAmerica@morganplc.com

2 - Hazard Identification

a - Classification of the chemical in accordance with paragraph (d) of §1910.1200

Under OSHA HCS 2012, Titanium Dioxide is classified as a category 2 carcinogen.

b - Signal word, hazard statement(s), symbol(s) and precautionary statement(s) in accordance with paragraph (f) of §1910.1200

Hazard Pictogram

Signal Words

Warning

Hazard Statements

Suspected of causing cancer by inhalation.

Precaution Statements

Do not handle until all safety instructions have been read and understood.

Use respiratory protection as required; see Section 8 of the Safety Data Sheet.

If concerned about exposure, get medical advice.

Store in a manner to minimize airborne dust.

Dispose of waste in accordance with local, state and federal regulations.

May cause temporary mechanical irritation to exposed eyes, skin or respiratory tract.

Minimize exposure to airborne dust.

Emergency Overview

c - Describe any hazards not otherwise classified that have been identified during the classification process

Mild mechanical irritation to skin, eyes and upper respiratory system may result from exposure.
These effects are usually temporary.

d - Mixture Rule

Not applicable.

3 - Composition / Information On Ingredients

a - Composition table

COMPONENT	% BY WEIGHT	CAS NUMBER	IndexNumber	REACH RegistrationNumber
Amorphous silica	< 90	112945-52-5 or similar	Not applicable	Not yet available
E-glass filament	<5	65997-17-3	Not applicable	Not applicable
Special Purpose Glass Fibers	< 10	65997-17-3	650-017-00-8	Not yet available
Titanium dioxide	< 20	1317-80-2	Not applicable	N.A.
AES fibers*	0 - 10	436083-99-7	650-016-00-2	01-2119457644-32-0000

None of the components are radioactive under the terms of European Directive Euratom 96/29.

*CAS definition: Alkaline earth silicate (AES) consisting of silica (50-82 wt%), calcia and magnesia (18-43 wt%), alumina, titania and zirconia (less than 6 wt%), and trace oxides

b - Common Name

(See Section 8 "Exposure Controls / Personal Protection" for exposure guidelines)

d - Impurities and Stabilizing Additives

Not applicable.

4 - First-Aid measures

a - Description of necessary measures, subdivided according to the different routes of exposure, i.e., inhalation, skin and eye contact, and ingestion

Eyes

In case of eye contact flush abundantly with water; have eye bath available. Do not rub eyes.

Skin

If a skin rash develops due to mechanical irritation, wash the affected area gently with soap and water. A skin cream or lotion after washing may be helpful. Do not rub or scratch the exposed skin. Changing into clean clothing is recommended.

Respiratory Tract

If these become irritated move to a dust free area, drink water and blow nose.

Gastrointestinal

c - Indication of immediate medical attention and special treatment needed, if necessary

5 - Fire-fighting measures

a - Suitable (and unsuitable) extinguishing media and

Use extinguishing media suitable for type of surrounding fire

c - Special Protective Equipment and Precautions for Firefighters

NFPA Codes: Flammability: 0 Health: 1 Reactivity: 0 Special: 0

b - Specific hazards arising from the chemical (e.g., nature of any hazardous combustion products):

None

6 - Accidental Release Measures

a - Personal precautions, protective equipment, and emergency procedures

Where abnormally high dust concentrations occur, provide the workers with appropriate protective equipment as detailed in section 8.
Restore the situation to normal as quickly as possible.
Prevent further dust dispersion for example by damping the materials.
If brushing is used, ensure that the area is wetted down first.
Do not use compressed air for clean up.
Do not allow being windblown. Do not flush spillage to drain and prevent from entering natural watercourses.

b - Methods and materials for containment and cleaning up

Pick up large pieces and use a vacuum cleaner. If brushing is used, ensure that the area is wetted down first.
Do not use compressed air for clean up. Do not allow being windblown. Do not flush spillage to drain and prevent from entering natural watercourses. For wastes disposal refer to section 13.

7 - Handling and storage

a - Precautions for safe handling

Handling can be a source of dust emission. The process or processes should be designed to limit the amount of handling. Wherever possible, handling should be carried out under ventilation with filtered exhaust. Regular good housekeeping will minimise secondary dust dispersal.

b - Conditions for safe storage, including any incompatibilities

SPECIFIC USE
Please refer to your local Thermal Ceramics' supplier.

c - empty containers

Product packaging may contain residue. Do not reuse.

8 - Risk Management Measures / Exposures Controls / Personal Protection

a - OSHA permissible exposure limit (PEL), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV), and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet, where available

EXPOSURE GUIDELINES			
MAJOR COMPONENT	***OSHA PEL***	***ACGIH TLV***	***MANUFACTURER'S REG***
Amorphous Silica	20 mppcf or (80 mg/m^3 ÷ % SiO_2)	Not Established	NONE
E-Glass Filament	Not Established	$5mg/m^3$	1 f/cc
Special Purpose Glass Fibers	Not Established	1 f/cc	1 f/cc
Titanium Dioxide	$15mg/m^3$	$10mg/m^3$	NONE
AES Fibers	Not Established	Not Established	1 f/cc
OTHER OCCUPATIONAL EXPOSURE LEVELS (OEL) Ontario Canada OEL - Special Purpose Glass Fibers = 1 f/cc. Glass Filament = 1/f/cc. Industrial hygiene standards and occupational exposure limits vary between countries and local jurisdictions. Check which exposure levels apply to your facility and comply with local regulations. If no regulatory dust or other standards apply, a qualified industrial hygienist can assist with a specific workplace evaluation including recommendations for respiratory protection.			

b - Appropriate Engineering Controls

Review your applications in order to identify potential sources of dust exposure.
Local exhaust ventilation, which collects dust at source, can be used. For example down draft tables, emission controlling tools and materials handling equipment.

Keep the workplace clean. Use a vacuum cleaner. Avoid brushing and compressed air.

c - Individual protection measures, such as personal protective equipment

PPE - Skin

Wear gloves and work clothes, which are loose fitting at the neck and wrists. Soiled clothes should be cleaned to remove excess fibers before being taken off (e.g. use vacuum cleaning, not compressed air).

PPE - Eye

As necessary wear goggles or safety glasses with side shields.

PPE – Respiratory

When engineering and/or administrative controls are insufficient to maintain workplace concentrations below the PEL/REG or OEL the use of appropriate respiratory protection, pursuant to the requirements of OSHA Standards 29 CFR 1910.134 and 29 CFR 1926.103, is recommended. A NIOSH certified respirator with a filter efficiency of at least 95% should be used. The 95% filter efficiency recommendation is based on NIOSH respirator selection logic sequence for exposure to particulates. Selection of filter efficiency (i.e. 95%, 99% or 99.97%) depends on how much filter leakage can be accepted and the concentration of airborne contaminants. Other factors to consider are the NIOSH filter series N, R or P. (N) **N**ot resistant to oil, (R) **R**esistant to oil and (P) oil **P**roof. These recommendations are not designed to limit informed choices, provided that respiratory protection decisions comply with 29 CFR 1910.134.

The evaluation of workplace hazards and the identification of appropriate respiratory protection is best performed , on a case by case basis, by a qualified industrial hygienist.

9 - Physical and chemical properties

a - Appearance	Quilted blanket, tape or pre-formed tan disk; slight odor
b -Odor	Not applicable
c - Odor Threshold	Not applicable
e- pH	Not applicable
d - Melting Point	Not determined
f- Initial Boiling Point/Range	Not applicable
g- Flashpoint	Not applicable
h - Evaporation Rate	Not applicable
i - Flammability	Not applicable
j - Upper/Lower Flammability or Explosive Limits	Not applicable
k - VAPOR PRESSURE	Not applicable
l - VAPOR DENSITY	Not applicable
m - Solubility	Not determined
n - Relative Density	Not applicable
o - Partition Coefficient: n-Octanol/water	Not applicable
p - Auto-ignition temperature	Not applicable
q - Decomposition Temperature	Not applicable
r - Viscosity	Not applicable

10 - Stability and Reactivity

a - Reactivity

Stable under conditions of normal use.

b - Chemical Stability

This is a stable material.

c - Possibility of Hazardous Reaction

Not applicable.

d - Conditions to Avoid

None

e - Incompatible Materials

Not known

f - Hazardous decomposition products

This product can produce carbon dioxide, carbon monoxide and traces of ammonia, formaldehyde and phenol during initial heating.

11 - Toxicological information

a - TOXICOKINETICS, METABOLISM AND DISTRIBUTION

Exposure is predominantly by inhalation or ingestion. AES fibers contained in the products listed in the title have been designed to be rapidly cleared from lung tissue. This low biopersistence has been confirmed in many studies on AES using EU protocol ECB/TM/27(rev 7). When inhaled, even at very high doses, they do not accumulate to any level capable of producing a serious adverse biological effect.

b - Acute Toxicity

c - Epidemiology

GLASSWOOL
Epidemiological studies did not show any health effects related to fibres among Mineral Wool manufacturing workers. The excess of lung cancers reported in 1982 have been the subject of additional investigations and the examination of the confounding factors showed that the excess were not attributed to fibers. Smoking has been identified as the most important of these confounding factors.

E GLASS CONTINOUS FILAMENT
Due to its large diameter, continuous glass filament is not respirable.
No specific information on human toxicology available at this time.

d - Toxicology

EXPERIMENTAL STUDIES FOR AES WOOL
In lifetime chronic studies there was no exposure-related effect more than would be seen with any "inert" dust. Subchronic studies at the highest doses achievable produced at worst a transient mild inflammatory response. Fibers with the same ability to persist in tissue do not produce tumours when injected into the peritoneal cavity of rats.

SPECIAL PURPOSE GLASS FIBER
There is suficient evidence in experimental animals for the carcinogenicity of special purpose glass fibers including E-glass and '475' glass fibers. Many intraperitioneal studies of speical-purpose glass fibers have been conducted, most of wehihc have examined the tumorigenic potential of two composition of special-purpose glass fibers (E-glass and '475' fibers) after injection or surgical implantation of fibers at high doses (approximiately 109 fibers) into the peritioneal cavity of rats. All of these studies reported an increase in peritioneal tumors (IARC VOL: 81 (2002))

Per the Toxicological Profile for Synthetic Vitreous Fibers by the Agency for Toxic Substances and Disease Registry (ATSDR), the International Agency for the Research on Cancer (IARC 2002) concluded that special purpose glass fibers (E-glass and '475' glass fibers) not used as insulating materials were classified as Group 2b, possibly carcinogenic to humans, because of their relatively high biopersistence.

Experimental Studies for Titanium Dioxide
Titanium dioxide was reclassified by the IARC in 2006 as a "possibly carcinogenic to humans (Group 2B)". The classification was based on sufficient evidence in experimental animals but inadequate evidence in humans for the carcinogenicity of titanium dioxide. IARC indicated in the monograph that "the studies do not suggest an association between occupational exposure to titanium dioxide as it occurred in recent decades in Western Europe and North America and risk for cancer." (IARC Monograph volume 93.)

IRRITANT PROPERTIES
When tested using approved methods (Directive 67/548/EEC, Annex 5, Method B4), fibers contained in this material give negative results. All man-made mineral fibers, like some natural fibers, can produce a mild irritation resulting in itching or rarely, in some sensitive individuals, in a slight reddening. Unlike other irritant reactions this is not the result of allergy or chemical skin damage but is caused by mechanical effects.

International Agency for Research on Cancer and National Toxicology Program

Titanium dioxide was reclassified by the IARC in 2006 as a "possibly carcinogenic to humans (Group 2B)".
The classification was based on sufficient evidence in experimental animals but inadequate evidence in humans for the carcinogenicity of titanium dioxide.The IARC classification are based on very specific evidence showing that high concentrations of pigment-grade (powdered) and ultrafine titanium dioxide dust caused respiratory tract cancer in rats exposed by inhalation and intratracheal instillation.

IARC also classified Special Purpose Fibers as "possibly carcinogenic to humans (Group 2B)".
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12 - Ecological information

No data available.

c - Bioaccumulative potential

No information for the product.

d - Mobility in soil

No information for the product.

e - Other adverse effects (such as hazardous to the ozone layer

No adverse effects of this material on the environment are anticipated.

13 - Disposal Considerations

Waste Management and Disposal

Unless wetted, such a waste is normally dusty and should therefore be properly sealed in containers for disposal. At some authorized disposal sites dusty waste may be treated differently, in order to ensure that they are dealt with promptly and to avoid them being windblown. Check for any national and/or regional regulations which may apply.

Additional information

This product, as manufactured, is not classified as a listed or characteristic hazardous waste according to U. S. Federal regulations (40 CFR 261). Any processing, use, alteration or chemical additions to the product, as purchased, may alter the disposal requirements. Under U. S. Federal regulations, it is the waste generator's responsibility to properly characterize a waste material, to determine if it is a "hazardous" waste. Check local, regional, state or provincial regulations to identify all applicable disposal requirements.

14 - Transport information

a - UN number.

Hazard Class: Not Regulated United Nations (UN) Number: Not Applicable
Labels: Not Applicable North America (NA) Number: Not Applicable
Placards: Not Applicable Bill of Lading: Product Name

b - UN proper shipping name

Not applicable.

c - Transport hazard class(es)

Not applicable.

d - Packing group, if applicable

Not applicable.

e - Environmental hazards (e.g., Marine pollutant (Yes/No))

No.

f - Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code)

Not regulated.

g - Special precautions which a user needs to be aware of, or needs to comply with, in connection with transport or conveyance either within or outside their premises

Not applicable.

International

INTERNATIONAL
Canadian TDG Hazard Class & PIN: Not regulated
Not classified as dangerous goods under ADR (road), RID (train), IATA (air) or IMDG (ship).

15 - Regulatory information

15.1 - United States Regulations

UNITED STATES REGULATIONS
SARA Title III: This product does not contain any substances reportable under Sections 302, 304, 313 (40 CFR 372). Sections 311 and 312 apply.
OSHA: Comply with Hazard Communication Standards 29 CFR 1910.1200 and 29 CFR 1926.59 and Respiratory Protection Standards 29 CFR 1910.134 and 29 CFR 1926.103.
TSCA: All substances contained in this product are listed, if required, in the TSCA Chemical Inventory.

15.2 - International Regulations

INTERNATIONAL REGULATIONS
Canada WHMIS: Special Purpose Glass fiber (respirable size) and titanium dioxide are classified as Class D2A-Materials, causing other toxic effects.
Canadian EPA: All substances in this product are listed, as required, on the Domestic Substance List (DSL).

16 - Other Information

initial statement

Devitrification

Product Stewardship Program

HMIS HAZARD RATING

HMIS Health	1* (* denotes potential for chronic effects)
HMIS Flammable	0
HMIS Reactivity	0
HMIS Personal Protective Equipment	X (To be determined by user)

TECHNICAL DATA SHEETS

Revision Summary

Revision date updated.

MSDS prepared by

SDS Prepared By: MORGAN THERMAL CERAMICS ENVIRONMENTAL, HEALTH & SAFETY DEPARTMENT

Disclaimer

The information presented herein is presented in good faith and believed to be accurate as of the effective date of this Safety Data Sheet. Employers may use this SDS to supplement other information gathered by them in their efforts to assure the health and safety of their employees and the proper use of the product. This summary of the relevant data reflects professional judgment; employers should note that information perceived to be less relevant has not been included in this SDS. Therefore, given the summary nature of this document, Morgan Thermal Ceramics does not extend any warranty (expressed or implied), assume any responsibility, or make any representation regarding the completeness of this information or its suitability for the purposes envisioned by the user.