



Material Safety Data Sheet

PRODUCT IDENTITY (As used on the label or friction material)
No. 0212

916-46Q2, 916-46Q3, 916-46Q3B, 1001-49, 1150-22, 1222-1A, 1269-43, FA003, FA804, FER4106F, FER4109F, FM2109, FM2123, FM2129, FM2160, FM2170, FM2176, FM3000, FM4111, FM4112, HP12.

1. PRODUCT AND COMPANY INFORMATION

Manufacturer: Federal-Mogul Friction Products
 1 Grizzly Lane or 2410 Papermill Road or 2084 Rowesville Road
 Smithville Winchester Orangeburg
 Tennessee 37166 Virginia 22604 South Carolina 29116

U.S.A. Contact: Dr. Mark Phipps
Contact Number: 615-597-3673

Common Name: Friction Material
Synonyms: Friction Lining, Brake Lining
CAS Number: Not applicable to mixtures
Chemical Formula: Not applicable to mixtures

2. COMPOSITION/INFORMATION ON INGREDIENTS

Although some of the ingredients used to formulate this product may be hazardous in their raw state, the manufacturing process results in a solid, infusible form, binding or otherwise rendering the mixture inert. Identified below those hazardous constituents present in quantities greater than 0.1% that may be released from the product by overheating, burning, machining, or abrading. Crystalline silica (Quartz CAS # 14808-60-7) may be present as a trace element in some of the ingredients listed below but its total content is below the 0.1% de minimis level. All fibers listed below have fiber diameters well above 5 microns and should pose no long term medical problems.

The products listed above do not contain all of the ingredients listed below (*).

Component	CAS Number
Aramid Fiber*	26125-61-1
Barium Sulfate	7727-43-7
Cashew Resin – Cured*	6833-94-8
Graphite	7782-42-5
Hydrated Lime*	1305-62-0
Iron Powder*	7439-89-6
Kyanite*	1302-76-7

Component	CAS Number
Magnesium Oxide*	1309-48-4
Mullite*	1302-93-8 & 7631-86-9
Nitrile Rubber*	9003-18-3
Phenolic Resin-Cured	9003-35-4
Steel Fiber	65997-19-5
Zinc Powder*	7440-66-6

3. HAZARDS IDENTIFICATION

Ingredients that are found on any of the OSHA designated carcinogen lists are as follows:

<u>Ingredient</u>	<u>NTP</u>	<u>IARC</u>	<u>OSHA</u>
None	-	-	-

Symptoms and Effects of Exposure to the Individual Components:

ARAMID FIBERS

Inhalation hazards – Overexposure to respirable fibers by inhalation may cause mild and temporary upper respiratory irritation, with discomfort or cough. Based on animal testing, prolonged and repeated exposure to excessive concentrations of respirable fibers may cause permanent lung injury. **Other hazards** – Skin sensitization has not been observed in human tests. The mechanical action of fibers may cause slight skin irritation at clothing binding points and mild irritation of the eyes and nasal passages.

BARIUM SULFATE

Inhalation hazards – Should be treated as a nuisance dust. Exposure to Barium Sulfate may cause paroxysmal coughing, wheezing, difficult breathing and upper respiratory tract irritation. **Other hazards** – No adverse effects have been reported from ingestion. Eye contact may cause temporary discomfort and irritation.

CASHEW RESIN – CURED

In the raw form cashew oil can cause skin sensitization similar to poison ivy the resin contained in these products if fully cured and presents only a nuisance dust hazard.

GRAPHITE

Inhalation hazards – Acute: exposure may result in cough, dyspnea, black sputum, and fibrosis. Chronic: Prolonged exposure may cause pneumoconiosis. It is reported that diseases of the respiratory and cardiovascular system may be aggravated by exposure.

HYDRATED LIME

Inhalation hazards – Dust may cause irritation of nasal and respiratory passages. **Other hazards** – Lime is a strong eye irritant, and may cause corrosive damage and blindness. Exposure to dust may cause severe skin irritation, drying and burning, particularly with damaged skin. Swallowing of excessive amounts may damage mucous membranes of digestive system. There are no known chronic hazards.

IRON DUST (IRON OXIDE)

Inhalation hazards – Repeated or prolonged exposures to iron dust may cause a form of benign pneumoconiosis called siderosis. Exposure is generally not associated with pulmonary fibrosis or disability unless there is concurrent exposure to other fibrosis-producing materials such as silica. **Other hazards** – Contact may cause skin and eye irritation.

KYANITE

Inhalation hazard – may cause coughing, and shortness of breath. **Other hazards** – may irritate eyes and abrasions to the skin.

MAGNESIUM OXIDE

Inhalation hazards – Inhalation of fumes may cause metal fume fever. **Other hazards** – Serious hazard from burns. Overexposure may result in eye, skin or respiratory irritation over a long period of time.

MULLITE

A mixture of bauxitic kaolin and amorphous glass. May contain small amounts of crystalline silica.

Inhalation hazards – Dust may cause irritation of nasal and respiratory tracts. Long term exposure may aggravate pre-existing respiratory conditions and may cause pneumoconiosis (kaolinosis). **Other hazards** – May cause irritation to the skin and eyes. Can cause abrasive damage to outer eye surface.

Non-toxic if ingested.

NITRILE RUBBER

Inhalation hazards – Gases and fumes from thermal processing or decomposition of this product may cause irritation of respiratory tract, skin and eyes. **Other hazards** – Eyes – may cause eye irritation if material introduced into the eye. Eyes may feel scratchy, become red, and tear.

PHENOLIC RESIN – CURED

Inhalation hazards – Dust may cause irritation of nasal and respiratory tracts. If formaldehyde vapors are present, inhalation may cause a form of nasal cancer. **Other hazards** – Prolonged exposure can cause irritation, redness, and tearing of the eyes and may lead to sensitization of the skin and dermatitis.

STEEL FIBER

An odorless gray metal containing iron, manganese, and silicon. **Inhalation hazard - Acute:** metal fume fever with symptoms of chills, fever, cough, muscle aches and difficulty in breathing from manganese; silicon can cause respiratory tract irritation. **Chronic:** repeated exposure to iron over time may cause lung changes, benign pneumoconiosis; cumulative central nervous system and lung damage may occur with manganese as well as insomnia, malaise and asthenia; may cause irritation of the lungs and discoloration of the skin and hair.

ZINC

Inhalation hazards – High concentrations can cause irritation. Pure zinc powder, dust, fume is relatively non-toxic to humans by inhalation. **Other hazards** – Repeated skin contact can cause irritation. Zinc is relatively non-toxic when ingested. High concentrations can cause eye irritation.

4. FIRST AID MEASURES

Inhalation: Move to fresh air. Obtain medical attention.
Eyes: Flush with water to remove particulate. Obtain medical attention.
Skin: Wash thoroughly with soap and water. If persistent irritation develops, obtain medical attention.
Ingestion: Obtain medical attention.

5. FIRE FIGHTING MEASURES

Flash Point:	None.
Auto-ignition Temperature:	This product is inherently flame resistant but may ignite at temperatures exceeding 1112°F (600°C) in an oxygen enriched atmosphere.
Flammable Limits in Air:	% in Air by Volume: LEL: N/A UEL: N/A
Flame Propagation Rate:	Not Established.
Extinguishing Media:	Use media suitable for surrounding fire.
Special Fire Fighting Procedure:	When heated to very high temperatures, may give off smoke and decomposition products which may contain toxic compounds.

Protective Equipment: Fire fighters and others exposed should wear self-contained breathing apparatus.

Unusual Fire and Explosion Hazards: None

6. ACCIDENTAL RELEASE MEASURES

If a release of dust occurs during machining, abrading, or riveting, remove dust by vacuuming or wet mopping. Vacuums used for this purpose should be equipped with HEPA filters. Do not use compressed air to blow dust from the workplace.

7. HANDLING AND STORAGE

Store in a dry place. Shipping and storage may result in accumulation of dust in shipping containers. If this occurs, dispose of the container in an airtight polyethylene bag (see disposal instructions below) or remove dust by vacuuming or wet mopping. Vacuums used for this purpose should be equipped with HEPA filters. Do not use compressed air to blow dust from storage containers.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

As shipped, friction materials are not considered hazardous but operations (overheating, burning, machining, abrading, or riveting) that can create airborne dust should be avoided. Such operations could cause concentrations in excess of permissible exposure limits for the respective ingredient and therefore should be considered hazardous. Exposure limits are shown below. Crystalline silica (Quartz CAS # 14808-60-7) is present as a trace element in some of the ingredients listed below but its total content is below the 0.1% de minimis level.

Component	OSHA PEL	ACGIH TLV	NIOSH
Aramid fiber	2 fibers/cc(respirable)*	None established	None established
Graphite	15 mppcf	2.0 mg/m ³ (respirable)	2.5 mg/m ³ (respirable) IDLH : 1250 mg/m ³
Hydrated Lime	15 mg/m ³ total dust TWA	5 ppm	5 mg/m ³ TWA
Mullite (as Kaolin)	10 mg/m ³ (total dust) 5 mg/m ³ (respirable)	2 mg/m ³ TWA	10 mg/m ³ (total dust) 5 mg/m ³ (respirable)
Zinc (as Zinc Oxide dust)	15 mg/m ³ total dust TWA 5 mg/m ³ (respirable)	10 mg/m ³ TWA	5 mg/m ³ (respirable) IDLH : 500 mg/m ³
Barium Sulfate, Cashew Resin – Cured, Iron, Kyanite, Magnesium Oxide, Nitrile Rubber, Phenolic Resin-Cured, Steel Fiber	15 mg/m ³ total dust TWA 5 mg/m ³ (respirable)	10 mg/m ³ total dust TWA	10 mg/m ³ total dust TWA 5 mg/m ³ (respirable)

* No OSHA limit has been established for this substance. The limit shown is a recommended limit established by DuPont, a manufacturer of Aramid fibers (Kevlar®).

Respiratory Protection: Use NIOSH-approved respirator if exposure to dust, vapors, or fumes in

concentrations exceeding PEL's or TLV's is possible. (See 29 CFR 1910.134 for respiratory protection standards)

Ventilation: Any operations which may produce dust, including machining, grinding, riveting, or abrading of this product, should be adequately exhausted to prevent inhalation of dust.

Personal Protective Equipment: Suitable respiratory protection should be worn if dust exposure is possible. All regulations and safe practices related to the use of respiratory protection must be observed. Refer to OSHA standards and NIOSH guidelines. If skin irritation occurs, gloves and other protective garments may be worn.

9. PHYSICAL AND CHEMICAL CHARACTERISTICS

Boiling Point:	N/A	Vapor Density:	N/A	Vapor Pressure:	N/A
Melting Point:	None	Solubility in water:	Insoluble	Odor:	Phenolic
Color:	Gray/Black	Specific Gravity:	2.90 – 3.90 g/cc	Form:	Solid
pH:	8 – 13	Evaporation Rate:	0		

10. STABILITY AND REACTIVITY

Stability:	Stable at normal temperatures and storage conditions.
Incompatibility:	None.
Hazardous Decomposition Products:	Oxides of carbon, nitrogen and sulfur. Hydrocarbons, ammonia and other trace organic compounds.
Hazardous Polymerization:	Does not occur.

11. TOXICOLOGICAL INFORMATION

Acute: Skin and eye irritation may occur with repeated contact to dusts.

Chronic: This product is a mixture of chemicals physically bonded together, therefore, in the as supplied state this product is considered non-hazardous. If in the event that dust is generated, some of the ingredients can have the long-term effects. These are detailed in section 3.

12. ECOLOGICAL INFORMATION

No data available.

13. DISPOSAL CONSIDERATIONS

Disposal of solid waste is regulated by federal and state law. Waste should be placed in airtight containers, and disposed of in accordance with 40CFR261, 40CFR262 and applicable state and local regulations

14. TRANSPORT INFORMATION

D.O.T. / IMO / IATA / AFI

Proper Shipping Name: Not regulated by these modes of transportation

D.O.T. Hazard Code: N/A

15. REGULATORY INFORMATION

All chemicals used in the manufacture of this product are listed on the TSCA Inventory and the Canadian Domestic and Non-Domestic Substances lists.

List:	NTP	IARC	NIOSH	"Prop65"	OSHA
Aramid Fiber, Barium Sulfate, Graphite, Hydrated Lime, Iron Powder, Kyanite, Magnesium Oxide, Nitrile Rubber, Phenolic Resin-Cured., Steel Fiber, Zinc Powder	No	No	No	No	No

The following chemicals are subject to SARA Title III/CERCLA "reportable quantities" (RQs) and / or "threshold planning quantities" (TPQs) and / or are classified as "Toxic Chemicals" under the Emergency Planning and Community Right-To-Know Act of 1986 and of 40 CFR 372:

INGREDIENT NAME	SARA 313 (toxic chemical)	SARA/CERCLA RQ (LB)	SARA EHS TPQ (LB)
Zinc (only as fume or dust)	Yes	1,000	

CAS numbers are found in section 2. **Zinc is not used in all the formulations covered by this MSDS**, but the maximum % of Zinc will be confirmed (if found in a particular compound) to the appropriate health officials on a need to know basis, by calling **615-597-3673**.

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center (800-424-8802) and to Your Local Emergency Planning Committee.

16. OTHER INFORMATION

Issue Date: 14th February 2000

MSDS Number: 0212

Revision Date: 4th February 2003

Issue: 8

Prepared by: Dr. Mark Phipps

This product does not contain any deliberate addition of asbestos.

Disclaimer:

The information and recommendations set forth herein are taken from sources believed to be accurate as of the date of revision. Federal-Mogul makes no warranty with respect to the accuracy of the information or the suitability of the recommendations, and assumes no liability, including direct, incidental or consequential damages for any reliance thereon.

This MSDS should not be used as a complete or accurate summary of the content of the product. For specific information on brand names, manufacturers, or quantities, please refer to specific product specification documents where available.

REVISION HISTORY (NOT PART OF MSDS)

Issue	Changes	Date
A	Initial Release	2/14/2000
B		2/14/2000
C		8/21/2000
4	Added FM2123. (No new chemicals required)	5/23/2001
5	Added FM2170. (No new chemicals required). Updated phone numbers removed Winchester contact.	7/12/2002
6	Replaced 1269-43 with FM2129 (AKA FER4109) (No new chemicals required).	7/22/02
7	Added FM2176. Added Mullite and Cashew particle	8/14/02
8	Changed 1288-1 to FM2109. Added FM3000 (no new chemicals needed)	2/04/2003
9	Added FM2160. No new chemicals needed.	3/18/2003