



**ALLIED-SIGNAL INC.
BENDIX FRICTION MATERIALS DIVISION
MATERIAL SAFETY DATA SHEET**

The following data may be used to comply with OSHA's Hazard Communication Standard 29 CFR 1910.1200. The OSHA Standard must, however, be consulted for specific requirements.

The Friction Material products identified in this Sheet meet the OSHA definition of an "article" and are exempt from the Hazard Communication Standard as to all reasonable uses. Some potential may, however, exist for exposure to asbestos dust.

The ingredients in these Friction Material products are resin-bonded and cured. Hazards normally associated with exposure to or contact with pure dusts of the listed ingredients are not expected to be significant. Allied-Signal has listed in Section II significant ingredients present in a series of friction material products identified below. All Friction Material products identified on this MSDS contain processed chrysotile asbestos fibers, but may contain some of the other materials shown. The recommended exposure limits are those for the most hazardous substance in a class of substances. Exact formulations are proprietary and therefore confidential. Precise product composition will not be disclosed, other than in accordance with applicable laws and regulations, or with a written Secrecy Agreement.

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PRODUCTS — Bendix Friction Materials covered by this Material Safety Data Sheet can be identified from box labels or price lists as follows:

Drum Brake Segments—"Friction King", "FK.", "FKD.", "D.", "FKL", "L.", "M.", "AE.", "E.", "ED.", "Flexible."

Disc Brake Pads — "Organic" and "FK II" (semi-metallic).

Note: The "wearing surface" of "FK II" disc pads does not contain processed chrysotile asbestos fiber. However, processed chrysotile asbestos fibers may be included in the "backing layer" which is "sandwiched" between the friction material and the steel shoe plate.

SECTION I

Manufacturer's Name: ALLIED-SIGNAL INC.
Bendix Friction Materials Division
Address: P.O. Box 238
Troy, New York 12181

Emergency Telephone Number 518-270-0200
Date prepared July 30, 1986
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Preparer E.L. Rogers

SECTION II — Hazardous Ingredients/Identify Information

Hazardous Components (Specific Chemical Identity: Common Name(s))	C.A.S. No.	OSHA PEL	ACGIH TLV/TWA
Asbestos (Chrysotile)	1332-21-4	0.2 fiber/c.c.	2 fibers/c.c.
Alpha Aluminum Oxide	1344-28-1	{ 15 mg/m ³ Total Dust 5 mg/m ³ Respirable Portion	10 mg/m ³
Barium Sulfate	7727-43-7		"
Calcium Carbonate	1317-65-3		"
Graphite (Synthetic)	—		"
Magnesium Oxide	1309-48-4		"
Carbon Black	1333-86-4	3.5 mg/m ³	3.5 mg/m ³
Graphite (Natural)	7782-42-5	15 mppcf**	2.5 mg/m ³
Inert & Nuisance Dusts:			
Cured Phenolic & Cashew Resins	Various	10 mg/m ³	10 mg/m ³
Iron Oxide	1309-37-1		
Silica (α-quartz)	14808-60-7		
* = Respirable Fraction	10 mg/m ³		
as based upon the formula	% Silica + 2	(See 29 CFR 1910.1000, Table Z-3)	

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SECTION III — Physical/Chemical Characteristics

Boiling Point	NA	Specific Gravity (H ₂ O = 1)	1.6 - 3.7
Vapor Pressure (mm Hg.)	NA	Melting Point	NA
Vapor Density (Air = 1)	NA	Evaporation Rate	0
Solubility in Water	NO		
Appearance and Odor: Solid, Odorless, Light Tan to Dark Gray Color			

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SECTION IV — Fire and Explosion Hazard Data

Flash Point (Method Used): NA Flammable Limits: NA LEL: NA UEL: NA
Extinguishing Media: Water (ABC Extinguisher), Fog or Foam
Special Fire Fighting Procedures: NA
Unusual Fire and Explosion Hazards: NA

SECTION V — Reactivity Data

Stability

Unstable: Conditions to Avoid: None Known
Stable X

Incompatibility (Materials to Avoid): None Known

Hazardous Decomposition or Byproducts: Incomplete combustion will create carbon monoxide and carbon dioxide

Hazardous Polymerization

May Occur: Conditions to Avoid: None Known
Will Not Occur: X

SECTION VI — Health Hazard Data

Route(s) of Exposure:

Inhalation? Yes

Skin? Yes

Ingestion? Yes

Health Hazards (Acute and Chronic)

Some persons may be sensitive to partially cured phenolic or cashew resins and develop dermatitis-type reactions. Dusts of crystalline silica may produce silicosis. IARC has classified pure crystalline silica as a possible carcinogen. Metal dusts can be irritants of the eyes and upper respiratory system. There is little known evidence of chronic industrial poisoning from iron, aluminum, and zinc dusts.

Inhalation of concentrations of airborne asbestos fibers in excess of the OSHA limits may be hazardous to health and may cause serious bodily harm, such as asbestosis, lung cancer or mesothelioma. These diseases may not be recognized until many years after exposure. Medical literature indicates that people who smoke are at a significantly increased health risk when working with airborne asbestos fibers.

Carcinogenicity Listing:

Asbestos fibers
Crystalline silica

NTP?

Yes
No

IARC Monographs?

Yes
Yes

OSHA Regulated?

Yes
No

Signs and Symptoms of Exposure:

Partially Cured Cashew Resins — skin eruptions similar in appearance to poison ivy. Lung Effects from asbestos and crystalline silica — coughing, wheezing, shortness of breath, impaired pulmonary function. Dusts in eye may cause irritation. Gastrointestinal disturbances possible from ingestion.

Emergency and First Aid Procedures —

Should not be necessary from a proper handling of this Friction Material product.

SECTION VIA — Section 313 Supplier Notification

Some of the products identified on page one of this MSDS contain certain toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of 1988 and of 40 CFR 372:

C.A.S. No.	Name	Percent by Weight in Product Line
1344-28-1	Aluminum Oxide	Between 1.5 & 3.5% in FK (Edge Code MU) & ED (Edge Code DP)
727-43-1	Barium Sulfate	Between 7 & 10% in FK II; Disc Pads Between 12 & 15% in "Organic Disc Pads" Between 20 and 25% in FK (Edge Code MU)
1332-21-4	Asbestos (Chrysotile)	An average of about 50% in all products except FK II (see backing layer note in Product Section.)

The finished units of friction materials shipped to you contain encapsulated asbestos fiber which is not friable. Subsequent processing (drilling, grinding or chamfering) may create a potential for the release of asbestos dust or airborne fiber to the atmosphere (e.g., from your dust collection system, if you grind our product; or to a landfill (e.g., if you dispose of wetted or pelletized grinding dust or drill chips). If they are of sufficient quantities, you may be required to report such "Releases" on EPA Form "R".

This information must be included in all MSDS's that are copied and distributed with these materials.

In addition, under the Canadian Hazardous Products Act we advise you that our FK II Disc Pads contain:

1309-48-4 Magnesium Oxide In the 3 to 7 weight percent range.

SECTION VII — SPILL OR LEAK PROCEDURES

Steps to be taken in case material is released or spilled:

Refer to Section IX (Special Precautions) below and "Recommended Procedures" on Page 4.

Waste Disposal Method:

Dispose of in proper receptacles appropriately labelled in accordance with applicable federal, state and local laws and regulations.

Place receptacles in an "Authorized Landfill" as designated by federal or state authorities.

SECTION VIII — Special Protection Information

Respiratory Protection (Specify Type): Not Required under normal conditions.

However, if concentration of airborne asbestos fibers in excess of the OSHA standard is created, respirators approved by NIOSH for asbestos fibers should be used.

Ventilation:

(during all operations which might generate dust—
including grinding and drilling)

Local Exhaust: Preferred

Mechanical (General): Not applicable

Protective Gloves (e.g., cotton, canvas, etc.) should be worn

Eye Protection: Safety Glasses should be worn

Other Protective Equipment:

See paragraph 7 of Recommended Procedures on Page 4

SECTION IX — SPECIAL PRECAUTIONS

The Friction Material product, as shipped, is not considered hazardous, but machining (grinding and drilling) and/or normal use may create asbestos dust or airborne asbestos fibers in excess of OSHA standard and should be considered hazardous.

Recommended Precaution — If airborne asbestos fiber concentrations exceed OSHA limits, NIOSH approved respirators should be worn and proper engineering controls implemented. If product is ground or machined, local exhaust to control exposure to airborne asbestos fibers or dust is recommended. (See "Recommended Procedures" on Page 4.)

The work environment should be monitored to determine whether employee exposure exceed OSHA permissible exposure level in accordance with OSHA regulation 29 CFR Part 1910.1001.

Packages containing the Friction Material Product should be labelled in accordance with OSHA regulation 29 CFR Part 1910.1001 (i) (2) as follows:

**DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE
HAZARD**

Standard industrial hygiene practices, including good housekeeping and vacuuming or wet cleaning work surfaces to prevent asbestos fibers or dust from becoming airborne, should be instituted or implemented and maintained.

SEE REVERSE SIDE FOR FRICTION MATERIALS STANDARDS INSTITUTE'S RECOMMENDED PROCEDURES FOR REDUCING ASBESTOS DUST DURING BRAKE SERVICING.

RECOMMENDED PROCEDURES FOR REDUCING ASBESTOS DUST DURING BRAKE SERVICING

While most friction materials used for brake service may still contain asbestos, many suppliers are now replacing asbestos with steel, mineral, and/or synthetic fibers. The OSHA regulations refer directly to the asbestos used in friction materials. However, since the long term medical effects of the non-asbestos fibers are unknown, it is suggested that exposure levels be controlled for all replacement friction materials.

1. The OSHA regulations on asbestos exposure emphasize two levels for airborne concentrations of asbestos. These levels determine (1) if the workplace is in compliance with the regulations, and (2) if not, what action must be taken.

(1) The Permissible Exposure Level (PEL): 0.2 fiber per cc, 8 hour time weighted average (TWA).

(2) The Action Level: 0.1 fiber per cc 8 hour TWA. (The regulation is not activated if fiber exposure remains below 0.1 fiber per cc.)

If certain precautions are taken, it is believed that the workplace can be maintained at levels below the Action Level, and if this is the case, several requirements of the OSHA regulations may be avoided. Monitoring of these levels is required where exposure is or may be expected to exceed the Action Level.

2. Areas where brakes are serviced should be set aside. If concentrations exceed the permissible exposure level (PEL), a "regulated area" must be established which restricts occupancy to authorized personnel. Where a "regulated area" is designated a warning sign must be displayed at each entrance to the area:

**DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA**

3. When removing worn friction materials or cleaning used brake parts, remove the accumulated dust with a vacuum cleaner equipped with a High Efficiency Particulate Air (HEPA) filter. If removing accumulated dust or other debris from the brake assembly, alternate wet methods may be used: (a) Compressed air/solvent bottle system where parts are sprayed with a mist and the wetted particles are removed with a wet rag, or (b) Solvent spray-mist with final clean-up with a wet rag. Do not use compressed air or dry brushing for cleaning unless the assembly is enclosed and properly exhausted. (Refer to OSHA Asbestos Regulations, CFR Title 29, Part 1910. 1001, Appendix F).
4. Whenever possible, purchase friction materials preground and ready for installation. If machining

is necessary, there is the possibility that the permissible exposure level (PEL) may be exceeded, in which case respirator protection is required. There must be local exhaust ventilation such that worker exposures are maintained below the PEL. Local exhaust ventilation consists of dust collection hoods or enclosures connected by duct or piping to a collection filter and suction source.

5. In certain grinding operations, where concentrations cannot be reduced below the permissible exposure level (PEL), a respirator program shall be used. The respirator must be one approved by the National Institute for Occupational Safety and Health (NIOSH) for the concentrations encountered. Respirators may also be required during certain maintenance, start-up or emergency situations where engineering controls cannot maintain concentrations below the PEL. Where a regulated area is designated for concentrations exceeding the PEL, approved respirators with high efficiency filters must be worn.
6. Industrial vacuum cleaner bags containing asbestos dust, cloths used for wiping brake assemblies, used cartridges from respirators, and disposable work clothing should be sealed in plastic bags and labeled with the following warning label printed in letters of sufficient size and contrast to be readily visible and legible:

**DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD**

All asbestos waste should be disposed of in accordance with OSHA and EPA asbestos regulations and local ordinances.

7. Good housekeeping is essential in a workplace where asbestos-containing materials are handled. Industrial vacuum cleaners equipped with High Efficiency Particulate Air (HEPA) filters should be used for removing accumulations of asbestos dust and waste. Never use compressed air or dry sweeping for cleaning. Water or other dust suppressants should be applied if brooms are used.
8. Good personal hygiene practices are important in minimizing asbestos dust exposure. Do not smoke. Wash before eating. Shower after work. If the PEL is exceeded, protective clothing must be worn. Change to work clothes upon arrival at work and change from work clothes at conclusion of work. Do not take work clothing home. Laundering of asbestos contaminated clothing shall be done so as to prevent release of airborne asbestos fibers in excess of the permitted exposure level.

CAUTION: DO NOT BREATHE ASBESTOS DUST