

HARNISCHFEGER CORPORATION MATERIAL STANDARD

P&H NO. 3021

Friction Material

1.0 Scope

1.1 This specification covers the physical and mechanical qualities of a friction material used on clutch shoes and brake bands for transferring frictional forces on dry surfaces of friction drums.

2.0 Physical Qualities

2.1 The construction shall consist of a rigid molded block made of asbestos with a special binder for metallic friction particles. Molded under high heat and pressure affording long life under a wide range of temperatures, possessing high friction qualities.

2.2 The specific gravity shall be 1.74

3.0 Mechanical Qualities

3.1 The following are the maximum values:

Pressure	150 P.S.I.
Rubbing Speed	7500 F.P.M.
Operating Temperature	1000° F. Short Periods

3.2 When in operation the material shall conform to the following frictional test data at 50 p.s.i.

Coefficient of Friction	.56 plus or minus .07
Operating Temperature	350° F.
Rubbing Speed	1200 F.P.M.
Rate of Wear	.0043 Cubic Inches per Horsepower Hour

4.0 Procurement

4.1 This material is available in the following ranges:

Thickness Range	1/4" to 4"
Width Range	1" to 24"
Length Range	120° circle (Limited to 24" on chord length) maximum area 600 sq. in.

ORIG. 12-61

Sheet 1 of 2

5.0 Tolerance

5.1 Thickness

Up to 8" wide
plus .000" minus .020"
8" to 12" wide
plus .000" minus .032"

Width

Up to 8" wide
plus or minus 1/32"
8" and over
plus or minus 1/16"

Radius

Machined block
plus 1/16" minus .000"
Plain Moulded
plus or minus 1/8"

Over 12" O.D. ground
plus .125" minus .000"

Length
plus or minus 1/16"

6.0 Marking

6.1 The name and brand of the manufacturer shall legibly appear on each piece in such a way as to be readily identified.

7.0 Inspection

7.1 Material furnished to this specification shall be subject to incoming inspection at any of the Harnischfeger Corporation plants, who reserve the right to reject all material which does not comply with this specification.

Note: Purchasing Department - This specification applies to material 1257 manufactured by the Johns-Manville Company.

Original: 12-30-61

FRICION MATERIAL — MOLDED BLOCK WITH METALLIC FRICTION PARTICLES

Disc 07-99

1.0 SCOPE

- 1.1 This specification covers the physical and mechanical properties of a friction material used on clutch shoes and brake bands for transferring frictional forces on dry contact with friction drums.
- 1.2 Common product applications include clutch shoes, brake bands, and holding brakes.

2.0 PHYSICAL PROPERTIES

- 2.1 The construction shall consist of a rigid molded block of asbestos combined with a special binder containing metallic friction particles. The material shall be molded under high heat and pressure to provide a long life under a wide range of temperature along with high frictional qualities.
- 2.2 Other physical properties shall be as specified under Paragraph 7.0.

3.0 MECHANICAL PROPERTIES

- 3.1 This molded block must maintain maximum coefficient of friction under static conditions and be suitable for holding brake applications.
- 3.2 The mechanical properties shall be as specified under Paragraph 7.0 for each product furnished under this specification.
- 3.3 These properties are not a complete description of the product required and are stated only as reference material for descriptive purposes. Conformance shall not constitute the sole basis of acceptance. The material must be judged further on its ability to perform satisfactorily in the field on P&H equipment.

4.0 MANUFACTURING PRACTICES

- 4.1 The products furnished shall be produced to Harnischfeger Corporation detailed drawings. Identification or marking shall be as indicated on the detailed drawings or in accordance with the section relating to part identification in the Harnischfeger Quality Control Standard.
- 4.2 All tolerances as they apply shall be specified under Paragraph 7.0 for each vendor.
- 4.3 It is expected that the manufacturer will exercise inspection procedures to assure that the material is controlled within acceptable limits of quality control.

5.0 IDENTIFICATION

- 5.1 In addition to the Harnischfeger Corporation part number, the name and brand of the manufacturer shall legibly appear on each piece in such a way as to be readily identified.
- 5.2 Each package, container, bundle or lift shall be tagged or marked with the following information:
- 5.2.1 Harnischfeger Name or P&H Trademark and Purchase Order Number
 - 5.2.2 Supplier's Name
 - 5.2.3 Grade or Specification
 - 5.2.4 Harnischfeger Part Number

6.0 INSPECTION AT PURCHASER'S WORKS

- 6.1 Acceptance of material furnished under this specification shall be subject to confirmation by Harnischfeger Materials Engineering and Quality Control Departments.
- 6.2 The purchaser shall have the option of accepting or rejecting material that fails to meet any of the requirements of this specification.
- 6.3 In the event of rejection, the supplier will be granted a hearing at his request.

7.0 APPROVED SOURCES, MECHANICAL AND PHYSICAL PROPERTIES, SIZE RANGE AND TOLERANCES**7.1 National Friction Products Corporation - Material Number NF-180****7.1.1 Mechanical and Physical Properties**

Kinetic Coefficient of Friction	.50
Maximum Recommended Pressure	4,000 P.S.I.
Maximum Recommended Rubbing Speed	7,500 F.P.M.
Maximum Constant Operating Temperature	480°F
Wear Rate (Cu. In./Hp. Hr.)	.006
Specific Gravity	1.78 ± .05
Tensile Strength	3,000 Lbs.

7.1.2 Size Range

National Friction Products will quote sizes on specific parts.

7.1.3 Standard Tolerances

National Friction Products will set tolerances on specific parts.

7.2 Gatke Corporation - Material Number 3508

7.2.1 Mechanical and Physical Properties

Kinetic Coefficient of Friction

@ 75 psi, 1575 F.P.M.

Static Coefficient of Friction

Wear Rate (Cu. In./Hp. Hr.)

Maximum Recommended Pressure

Maximum Recommended Rubbing Speed

Energy Absorption (HP/sq.in.)

Compressive Strength

Flexural Strength

Impact Strength (IZOD)

Hardness (Rockwell M)

Density (Oz./Cu. In.)

.56 ± .05 Dry

.60 ± .05 Dry

.005

150 P.S.I.

5,000 F.P.M.

2.50

12,000 P.S.I.

9,500 P.S.I.

1.20 P.S.I.

84

1.23

7.2.2 Size Range

Thickness: 3/16" to 4"

Width: 1" to 24"

Length: 20" Max.

7.2.3 Standard Tolerances

Thickness: ± .010"

Width: ± 1/64"

Length: ± 1/16"

7.3 H.K. Porter Company - Material Number D-650

7.3.1 Mechanical and Physical Properties

Kinetic Coefficient of Friction

@ 350°F, 100 P.S.I.

Static Coefficient of Friction

Wear @ 100 to 600°F, 100 P.S.I.

.51

.32 to .36

.00127 In.

7.3.2 Size Range

Thickness: 1/8" to 3/4"

Diameter: 24" Max.

7.3.3 Standard Tolerances

Thickness: ± .010"

Diameter: ± .030"

7.4 H.K. Porter Company - Material Number D-813

7.4.1 Mechanical and Physical Properties

Kinetic Coefficient of Friction

@ 350°F, 100 P.S.I.

Static Coefficient of Friction

Wear @ 100 to 600°F

.44

.31 to .36

.0011 In.

7.4.2 Size Range

Thickness: .50 In. Max.

Smallest Drum Diameter for .50" Thick is 16"

7.4.3 Standard Tolerances

Thickness: ± .010"

Width: ± .030"

Length: ± .125

7.5 Abex Corporation, American Brakeblok Div. - Material Number 41-16

7.5.1 Mechanical and Physical Properties

Kinetic Coefficient of Friction

@ 1300 F.P.M., 75 P.S.I., 350°F

Wear Rate @ 500°F (Cu. In./Hp. Hr.)

.46

.006

7.5.2 Size Range

Abex Corporation will quote sizes on specific parts.

7.5.3 Standard Tolerances

Thickness: +.000" -.010"

Width: +.030" -.000"

Length: ± 1/32"

7.6 Abex Corporation, American Brakeblok Div. - Material Number 150-102B**7.6.1 Mechanical and Physical Properties**

Kinetic Coefficient of Friction

@ 1300 F.P.M., 75 P.S.I., 350°F

.52

Wear Rate @ 500°F (Cu. In./Hp. Hr.)

.040**7.6.2 Size Range**

Abex Corporation will quote sizes on specific parts.

7.6.3 Standard TolerancesThickness: $+.000'' - .010''$ Width: $+.030'' - .000''$ Length: $\pm 1/32''$ **7.7 Raybestos Manhattan - Material Number MA-428****7.7.1 Mechanical and Physical Properties**

Kinetic Coefficient of Friction @ 350°F

.43

Wear (SAE Test)

.019''**7.7.2 Size Range**

Raybestos-Manhattan will quote sizes on specific parts.

7.7.3 Standard Tolerances

Raybestos-Manhattan will set tolerances on specific parts.