

# Products Friction Linings





# Products

# **Friction Linings**

# ZA GOLD



### **ZAGOLD Product Data Sheet**

#### General Description

ZAGold is a solid woven friction material. It is based on yarn spun from a blend of glass and synthetic fibres together with a fine brass wire to enhance its strength and heat dissipation properties. The impregnant has been specially developed to give it good frictional properties combined with a fair degree of flexibility. It has a high coefficient of friction with excellent fade resistance and is particularly suitable for mine winder brakes. To help during fitting to brake shoes and bands it can be softened and made more pliable by warming in a bonding oven to between 150 & 180°C for sufficient time for the heat to penetrate the fabric. This material is not suited to operate in oil-immersed conditions.

#### **Applications**

Industrial drum and band brake linings Mine winder brake linings

#### Bonding

ZAGOLD may be bonded using any of the established adhesives recommended for friction material. However, to obtain the best results it is necessary to use a thermosetting adhesive.

#### Mating Surface

A good quality, fine grained, pearlitic cast iron or cold rolled steel with a Brinell hardness of 180. Cast steels are not recommended. <u>Availability</u>

#### • Roll

non				
Length			10.0 Metres	
Width			20 to 510mm	
Thickne	ss range		12.7mm to 25.4mm	
		~ ~		

- Sheet size 1000mm x 660mm x 12.7mm to 25.4mm thick
- Linings and special shapes available on request



The information supplied in this data sheet is believed to be accurate and reliable, and was obtained by scientific and laboratory testing. However, since actual conditions of use are largely outside the control of FEROTEC FRICTION LIMITED, it is suggested that this material be therein the process of the



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# Products

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### MZ GOLD



# **MZGOLD Product Data Sheet**

#### **General Description**

MZ Gold is a solid woven friction material. It is based on yarn spun from a blend of fiberglass and synthetic fibres together with fine brass wires to enhance its strength and heat dissipation properties. The impregnant has been specially developed to give it good frictional properties combined with a fair degree of flexibility. It has a high coefficient of friction with excellent fade resistance and is particularly suitable for mine winder brakes. It is recommended for operation in oil immersed applications. To help during fitting to brake shoes and bands it can be softened and made more pliable by warming in a bonding oven to between 150 & 180°C for sufficient time for the heat to penetrate the fabric.

#### **Applications**

Industrial drum and band brake linings Mine winder brake linings

#### Bonding

MZGOLD may be bonded using any of the established adhesives recommended for friction material. However, to obtain the best results it is necessary to use a thermosetting adhesive.

#### Mating Surface

A good quality, fine grained, pearlitic cast iron or cold rolled steel with a Brinell hardness of 180. Cast steels are not recommended.

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Availability		
Roll		<u>Sheet</u>
Length	10.0 Metres	Sheet size 1000mm x 660mm x 3.2mm to 12.7mm thick
Width	20 to 510mm	
Thickness range	3.2mm to 12.7mm	Linings and special shapes available on request

#### **TECHNICAL DATA**

Friction			
μ for design purposes :	Normal	0.50	
	Hot 0.48		
`	Static @ 100°C	0.48	
	Static @ 200°C	0.42	
<b>Recommended Operating Ra</b>	nge		
Pressure	Dynamic		0.1—1.00 MPa
Max. rubbing speed	25 m/s		
Max. continuous temperature	150°C		
Max. intermittent temperature	200°C		
Max. temperature	300°C		

#### PHYSICAL PROPERTIES

Density (SAE J380)	1.36-1.42 g/cc
Ultimate tensile strength	TBD
Ultimate compressive strength	135 MPa
Ultimate shear strength	TBD
Wear Rate in <sup>3</sup> /hp-hr	0.086

(All physical properties shown above are all mean values)

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### **MZGOLD Product Data Sheet**





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# Products

# **Friction Linings**



# **D3731 Product Data Sheet**

#### General Description

D3731 is a rigid moulded, resin based material, containing non-asbestos mineral fibres in a random dispersion with selected friction modifiers. It has a medium coefficient of friction with a good resistance to fade and wear. Both surfaces are ground during manufacture so that it can be either bonded or riveted to brake shoes and metal parts. D3731 is not suitable for operating in oil.

#### Applications

- Wind Turbine Brakes
- Industrial drum and band brakes, clutches and miscellaneous industrial devices
  - Crane and excavator brake and clutch linings

#### **Bonding**

D3731 may be bonded using any of the established adhesives recommended for friction material. However, to obtain the best results it is necessary to use a thermosetting adhesive.

#### Mating Surface

A good quality, fine grained, pearlitic cast iron or cold rolled steel with a Brinell hardness of 180. Cast steels are not recommended. Availability

Sheets 900mm x 700mm and 660mm x 530mm from 3.2mm to 32mm thick Customer specific pad configuration









#### **TECHNICAL DATA**

**Friction** μ for design purposes : Static (cold) 0.35 Dynamic 0.40

#### Recommended Operating Range

Pressure :	Static	70-2100 kN/r	n⁴ (10•	-300 lbf/in²)
	Dynamic	70-860 kN/m	n² (10	-125l bf/in²)
Max. rubb	ing speed		25 m/s	(82 ft/s)
Max. continuous temperature		perature	180°C	
Max. inter	mittent tem	perature	275°C	
Max. temp	perature		325°C	

#### TEST CONDITIONS

Temperature Sensitivity Application Speed 15 m/s Clamping pressure 0.61 MN/m2(88.5 lbf/in2) Temperatures ranging from 50 to 350°C in steps of 25°C

Initial Bedding Application speed 15 m/s Clamping pressure 0.61 MN/m2 (88.5 lbf/in2) Average Temperature 140°C

Pressure Sensitivity Application speed 15 m/s Average temperature 80°C

Speed Sensitivity Clamping pressure 0.61 MN/m<sup>2</sup> (88.5 lbf/in<sup>2</sup>) Average temperature 80°C

#### PHYSICAL PROPERTIES Density 1.85 g/cc minimum Ultimate tensile strength 15.2 MN/m<sup>2</sup> (2,200 lbf/in<sup>2</sup>) Ultimate compressive strength 59.2 MN/m2 (8,600 lbf/in2) Ultimate shear strength 29.6 MN/m² (4,300 lbf/in²) (All physical properties shown above are all mean values)

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# Products

# **Friction Linings**



# **D3751 Product Data Sheet**

#### General Description

 $D_{3751}$  is a rigid moulded, resin based material, containing non-asbestos fibres in a random dispersion with selected friction modifiers. It has a medium-high coefficient of friction with a good resistance to fade and wear. Both surfaces are ground during manufacture so that it can be either bonded or riveted to metal parts.

#### <u>Applications</u>

Wind turbine yaw brakes.

#### **Bonding**

D3751 may be bonded using any of the established adhesives recommended for friction material. However, to obtain the best results it is necessary to use a thermosetting adhesive.

#### Mating Surface

A good quality, fine grained, pearlitic cast iron or cold rolled steel with a Brinell hardness of 180. Cast steels are not recommended.

#### <u>Availability</u> Customer specific pad configuration

Sheets 3.2mm-25.4mm.thick. Sheet size to be established.



# Wear Test





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TECHNICAL DATA

 Friction
 μ
 for design purposes : Static (cold)
 0.52

 Dynamic
 0.48

Recommended Operating Range			
Pressure :	2100 kN/m <sup>2</sup>		
Max. rubbing speed	25 m/s (82 ft/s)		
Max. continuous temperature	180°C		
Max. intermittent temperature	275°C		
Max. temperature	325°C		

417rpm 1034 kN/m² Ambient to 340°C

#### TEST CONDITIONS

Speed	
Pressure	
Temperature	

D

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<u>PHYSICAI</u>	L PROPERTIES	
ensity	2.26 g/cc minimum	
timate tensile strength	35.0 MN/m <sup>2</sup>	

Ultimate compressive strength 59.2 MN/m<sup>2</sup> (8,600 lbf/in<sup>2</sup>)

(All physical properties shown above are all mean values)



# Products

# **Friction Linings**



# **D3806 Product Data Sheet**

#### General Description

**Distortion Decomposition Distortion Decomposition** with a fine copper wire to enhance its strength and heat dissipation properties. The impregnant has been specially developed to give it good frictional properties combined with a good degree of flexibility. It has a high coefficient of friction and performs well in wet and damp environments which makes it particularly suited for marine applications. To help during fitting to brake shoes and bands it can be softened and made more pliable by warming in a bonding oven to between 150 & 180°C for sufficient time for the heat to penetrate the fabric.

#### **Applications**

Industrial drum and band-brakes Industrial clutches Marine towing winches Miscellaneous industrial devices

#### Bonding

D3806 may be bonded using any of the established adhesives recommended for friction material. However, to obtain the best results it is necessary to use a thermosetting adhesive.

#### Mating Surface

A good quality, fine grained, pearlitic cast iron or cold rolled steel with a Brinell hardness of 180. Cast steels are not recommended.

#### <u>Availability</u>

<u>Roll</u>	
Length	10 Metres
Width	20 to 510mm
Thickness range	3.2mm to 201

Thickness range 3.2mm to 20mm Sheet size 1000mm x 660mm x 4.8 to 16.0mm thick

Linings and special shapes on request

Initial Bedding Characteristics	TECHNICAL DATA Friction μ for design purposes : Recommended Operating Range Pressure Max. rubbing speed Max. continuous temperature Max. intermittent temperature	Static (cold) Dynamic Dynamic Static 25 m/s no°C 180°C	0.45 0.42 70-860 kN/m² 70-2,410 kN/m²	
Pressure Sensitivity 0.6 0.5 0.4 0.2 0.2 0.5 0.5 0.4 0.2 0.2 0.5 0.5 0.4 0.5 0.5 0.4 0.5 0.4 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	Max. Interiniterin temperature Max. temperature Test Conditions Application Speed Clamping pressure Average temperature Average temperature	15m/s 0.61 MN/m <sup>3</sup> (88.5 ibf Initial Bedding Pressure Sensitivity /	'/in²) 140°C / Speed Sensitivity	80°C
Speed Sensitivity 0.6 0.5 0.4 0.2 0.1 0.5 0.0 0.5 0.0 0.5 0.0 0.5 0.0 0.0	PHYSICAL PROPERTIES Density Ultimate tensile strength Ultimate compressive strength Ultimate shear strength Rivet holding capacity Thermal conductivity	1.20 g/cc 24.0 MN/m² (3,500 ił 100.0 MN/m² (14,500 17.2 MN/m² (2,500 ił 61.8 MN/m² (9,000 ił 0.70 W/m °C	of/in²) ibf/in²) f/in²) of/in²)	

(All physical properties shown above are all mean values)

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# Products

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# Ferotec Friction Ltd D3920 Product Data Sheet

#### General Description

D3920 is a partially cured and hence more flexible version of D3921 which has been specially developed to allow customers the ability to undertake some degree of re-radiusing and "cure-out" for themselves. To help in the re-radiusing operation and to convert D3920 into D3921, the material should firstly be warmed to between 120°C (248°C) and 150°C (302°F) before gently inducing a change of radius. However, care should be taken whilst carrying out this procedure to ensure that no one area is re-radiused more than another, otherwise cracking or possible distortion could occur. (392°F to 446°F) for a minimum of one hour, before being allowed to cool to approximately 100°C (212°F) and the formers removed. Some light scorching or discoloration may occur around the edges of the material but this is quite normal and will be found to be merely superficial.

N.B. This Data Sheet should be read in conjunction with the Data Sheet for D3921.

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# **D3921 Product Data Sheet**

#### General Description

D3921 is a rigid moulded friction material, light green in colour, and having a non-asbestos basis of short steel filaments in a random dispersion to enhance its heat dissipation properties and strength. It incorporates a blend of carefully selected friction modifi-ers and a binder which has been specially developed to enhance its properties. Whilst not affected physically by slight oil contamination, this material is not intended to operate in oil. D3921 is also available as semi-cured, semi-flexible roll although in this form it is known by the reference D3920. Information on how to convert D3920 into D3921 is available on request.

#### Applications

Bonding

Industrial drum and band-brake linings Crane and excavator brake and clutch linings Miscellaneous industrial devices

D3921 may be bonded using any of the established adhesives recommended for friction material. However, to obtain the best results it is necessary to use a thermosetting adhesive.

Mating Surface A good quality, fine grained, pearlitic cast iron or cold rolled steel with a Brinell hardness of 180. Cast steels are not recommended. Availability

#### Roll •

Friction

Friction

-riction

Friction

Length	5M
Width	20 to 330mm
Thickness range	3.2mm to 12.7mm

- Sheet size 660mm x 330mm x 3.2 up to 12.7mm thick
- Sheet size 660mm x 530mm x above 12.7mm to 32.0mm thick
- Special shapes and discs on request

#### TECHNICAL DATA

Temperature Sensitivity	<b><u>Friction</u></b> $\mu$ for design purposes :	Static (cold) Dynamic	0.38 0.42
2 2 5 5 5 5 5 5 5 5 5 5 5 5 5	Recommended Operating Range Pressure Max. rubbing speed Max. continuous temperature	Dynamic Static 25 m/s 175°C	70-860 kN/m² 70-2,410 kN/m²
	Max. intermittent temperature Max. temperature	225°C 300°C	
2 1 0 25 50 75 100 125 150 175 200 225 Number of Brake Applications	Application Speed Clamping pressure Average temperature Average temperature	15m/s o.61 MN/m <sup>3</sup> (88.5 ibf/ Initial Bedding Pressure Sensitivity /	/in²) 140°C Speed Sensitivity 80°C
Pressure Sensitivity	PHYSICAL PROPERTIES		
0.2	Density	2.30 g/cc	
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5	Ultimate tensile strength	15.0 MN/m <sup>2</sup> (2,177 ibf	/in²)
Unit Pressure (MIVm <sup>2</sup> )	Ultimate compressive strength	93.0 MN/m² (13,520 ibf/in²)	
Speed Sensitivity	Ultimate shear strength	12.0 MN/m² (1,750 ibf	/in²)
5	Rivet holding capacity	86.0 MN/m² (12,500 i	bf/in²)
2	Thermal Conductivity	1.034 W/m°C	
0 5 10 15 20 25 30	Hardness (Shore D)	75	
Speed (m/s)	(All physical properties shown above	e are all mean values)	

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# **D9010 Product Data Sheet**

#### General Description

D9010 is a non-asbestos woven material manufactured from finely carded yarns containing brass wire. Its' construction combined with the resins used provide a dense, tough material with particularly good resistance to heat and compression under load. D9010 is suited for light to heavy duty operating conditions against quality steel and cast iron mating surfaces. It is oil and grease resistant and is suitable for light to medium duty in oil-immersed conditions. To help during fitting to brake shoes and bands it can be softened and made more pliable by warming in an appropriate oven to between 150 & 180°C for sufficient time for the heat to penetrate the fabric.

#### Applications

Industrial drum and band-brakes Industrial clutches Marine towing winches Oil immersed steering brakes Miscellaneous industrial devices

#### Bonding

D9010 may be bonded using any of the established adhesives recommended for friction material. However, to obtain the best results it is necessary to use a thermosetting adhesive.

#### Mating Surface

A good quality, fine grained, pearlitic cast iron or cold rolled steel with a Brinell hardness of 200. Cast steels are not recommended.

#### **Availability** Ro •

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Roll	
Length	7.5 Metres
Width	20 to 330mm
Thickness range	3.2mm to 19mm

Sheet size 6600mm x 660mm x 4.8 to 16.0mm thick

٠ Linings and special shapes on request

Initial Bedding Characteristics	TECHNICAL DATA		
$\begin{array}{c} 0.5 \\ 0.5 \\ 0.5 \\ 0.7 \\ 0.7 \\ 0.7 \\ 0.7 \\ 0 \end{array}$	$\frac{Friction}{\mu \text{ for design purposes :}}$	Static (cold) Static (in oil) Dynamic (dry) Dynamic (in oil)`	0.50 0.12 - 0.15 0.42 0.08 - 0.12
0 25 50 75 100 125 150 175 200 225 Number of Brake Applications	Recommended Operating Range Pressure	Dynamic (dry)	70-1,400 kN/m <sup>2</sup> (10 - 200 lbf/in <sup>2</sup> )
Pressure Sensitivity	Max. rubbing speed Max. continuous temperature Max. intermittent temperature Max. temperature	Dynamic (in oil) Static 18 m/s 180°C 275°C 300°C	350-1,750 kN/m² (50 - 250 lbf/in²) 70-3,500 kN/m² (10-500 lbf/in²)
0.1 0.5 1 1.5 2 2.5 3 3.5 4 Unit Pressure (MN/m <sup>2</sup> )	Test Conditions Application Speed Clamping pressure Average temperature	15m/s 0.61 MN/m <sup>3</sup> (88.5 ib Initial Bedding Pressure Sensitivity	f/in <sup>2</sup> ) 140°C (Speed Sensitivity 80°C
Speed Sensitivity	PHYSICAL PROPERTIES	Tressure benshivity	, opeca ochonivný – ob c
5 0.4 5 0.3	Density	1.60 g/cc	
	Ultimate tensile strength	31.0 MN/m² (4,500 il	bf/in <sup>2</sup> )
0 5 10 15 20	Ultimate compressive strength	5.2 MN/m <sup>2</sup> (750 ibf/i	in²)
Speed (m/s)	Ultimate shear strength	43.4 MN/m² (6,300 i	bf/in <sup>2</sup> )

(All physical properties shown above are all mean values)

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