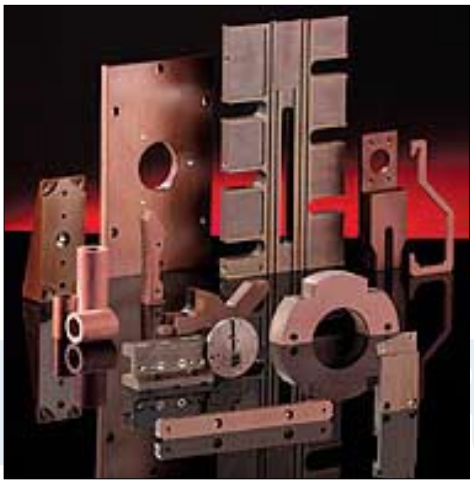
ERIKS plastics



solutions in composites

DOCUMENTATION N° OF THIS PUBLICATION:
055007 (2006)
FOR MORE INFORMATION, PLEASE CALL:

(03) 829 27 50

(03) 828 39 59

ERIKS nv
Boombekelaan 3
B-2660 Hoboken, Belgium
info@eriks.be
www.eriks.be

www.solutions-in-plastics.info

Table of contents

Introduction

Fibre reinforced laminated plastic materials are a popular construction material in the equipment manufacturing. The reinforcement influences strongly the mechanical and electrical properties. For higher temperatures mica, silicate and cement fibres are used.

We distinguish following types, based on the main properties:
- temperature
- mechanical strength
- electrical resistance

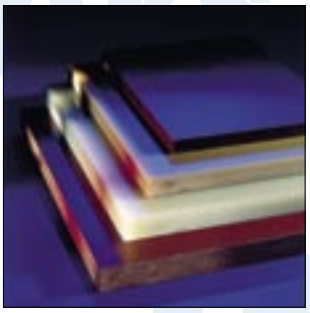
In chapter 1 of this brochure you can find an overview of the most important types.

Responsibility

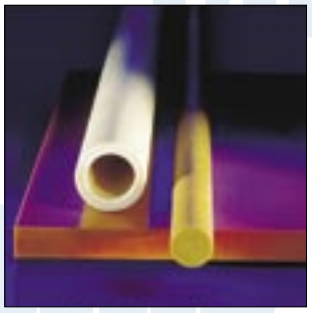
All information published in this brochure was collected with the utmost care and precision.
Despite of this, ERIKS cannot and will not accept any liability claims, originating from possible incompleteness and/or inadequacy of the contents of this brochure.
All information included herein is subject to change without prior notice.

1. Most important types

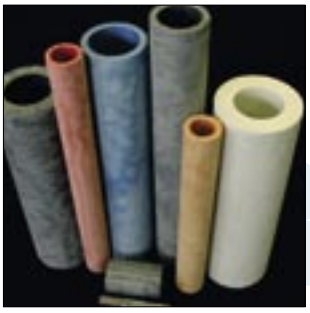
We distinguish following groups:



1.1. Hapa hardpaper
Popular construction material for equipment manufacturers where mainly electrical isolation is important. Applicable up to 120 °C. (Types: see p.9).



1.2. Epratex phenol Hgw 2082
Fine textile phenol construction material with very good electrical properties. Also good oil and solvent resistance. Applicable up to 120 °C. (Types: see p.10).



1.3. Epratex Epoxy Hgw 2372.4
Glass filament reinforced high performance composite with high mechanical values and excellent electrical properties. Application mainly in presses, textile, glass and packaging industry. Applicable up to 180 °C (Types: see p.11).

1.4. Epratex Silicone Hgw 2572
Glass filament reinforced high performance composite with high mechanical values and excellent electrical properties. Applicable up to 180 °C. White colour.

1.5. Epratex Epoxy High Temp 230 / 250M
These Epratex High Temp materials are based on special high quality ingredients. Even at high temperatures still 80% of the mechanical values are maintained. (Types: see p.12).

1.6. Frathernit™
These isolation materials are used in the construction and maintenance of presses.

1. Overzicht belangrijkste types

1.7. Mica materials

Eritherm Mica has exceptional physical properties:

- high temperature resistance
- self-extinguishing
- high electrical isolation values
- high compression loads
- low water absorption

We distinguish 3 types:

- Eritherm Mica 500 M up to 500 °C: sintered high performance material, does not take any moisture
- Eritherm Mica 600 M up to 600 °C: based on: Muscovit Mica
- Eritherm Mica 800 M up to 800 °C: based on: Phlogopit Mica

1.8. Eritherm isolation materials

Eritherm 1000/1100 and 1200 types are used in high temperature applications where a high mechanical strength is not needed. These types are based on mixtures of mica, cement fibres, silicate fibres and aluminum oxide ceramics.

- Eritherm 650 : up to 650 °C continuous, compression up to 100 N/mm^2
- Eritherm 700 : up to 700 °C continuous, compression up to 120 N/mm^2
- Eritherm 1000 : up to 1000 °C continuous, compression up to 31 N/mm^2
- Eritherm 1100 : up to 1100 °C continuous, compression up to 16 N/mm^2
- Eritherm 1200 : up to 1200 °C continuous, compression up to 5 - 30 N/mm^2

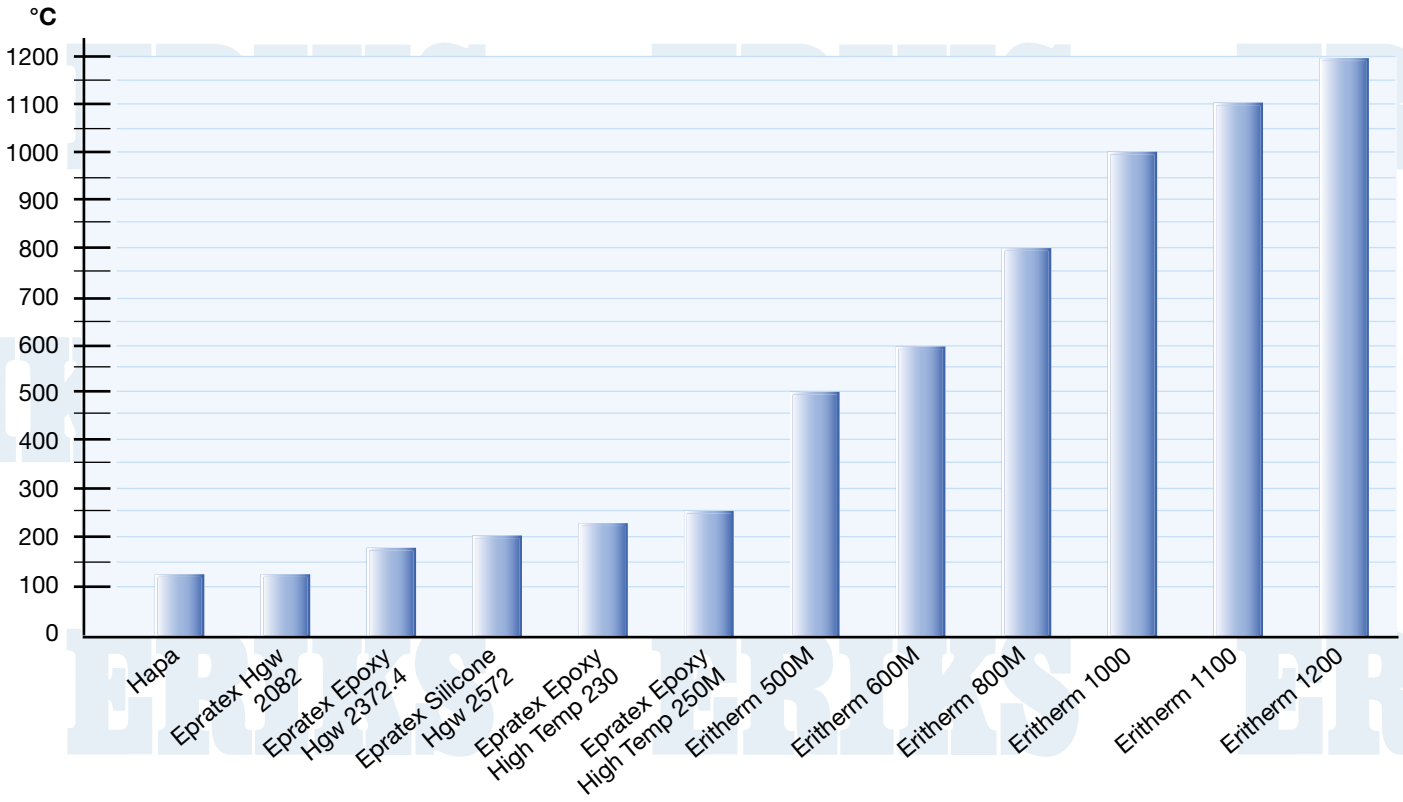
1.9. Anti-abrasion composites

- Epratex Bear for bearings up to 200 °C
- Eritherm Slide for sliding applications up to 600 °C

2. Overview of properties

Here you find an overview of the most important properties of these composite materials.

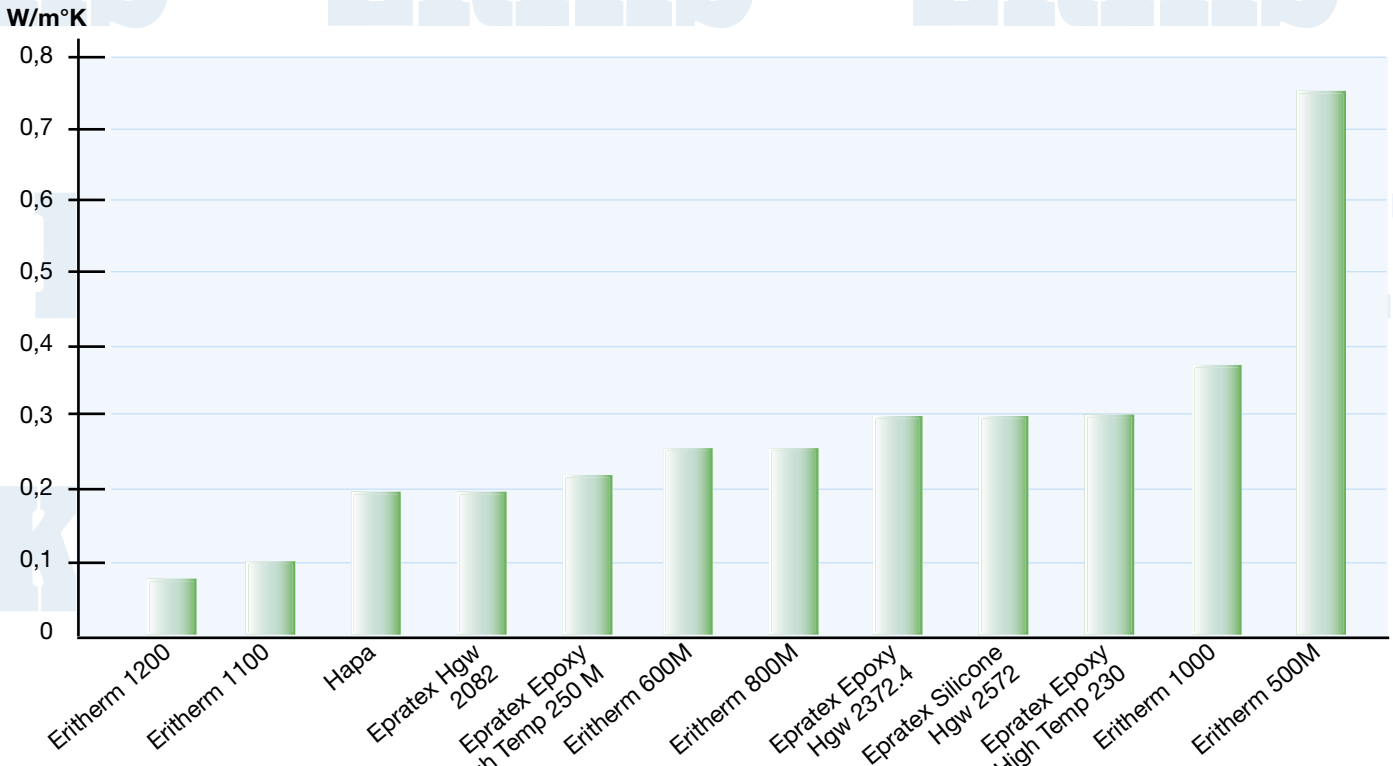
2.1. Temperature overview / long term



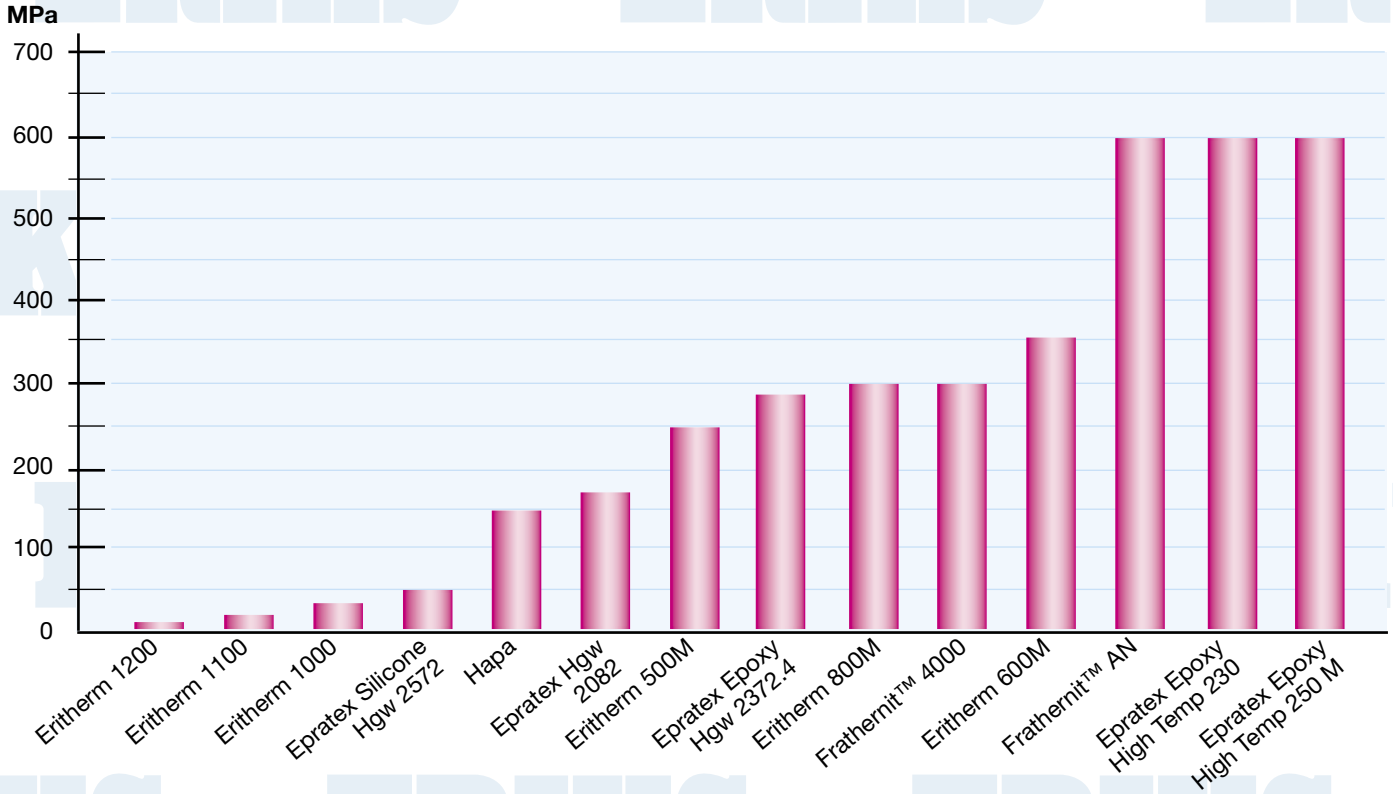
The long term temperatures are these at which material decomposition takes place. It should be noted that the properties at these temperatures are very different from these at room temperature.

2. Overview of properties

2.2. Thermal conductivity foll. DIN 52612



2.3. Compression load foll. ISO 604 at room temperature



3. Overview of properties in comparison (most important types)

	Properties							
Material	*Max. Temp. °C*	*Specific Weight DIN 53479 kg/dm³*	*Flexural Strength DIN 53453 MPa*	*Compressive Strength DIN 53454 MPa*	*Thermal Conductivity DIN 53612 W/m°K*	*Dielectric Strength DIN 53481 kV/mm*	*Sheet Thickness mm*	*Sheet Format (max.) mm*
Hapa HP 2061	120	1,30 - 1,40	150	150	0,20	15	1-150	2150x1020 2750x1200
Epratex phenol Hgw 2082	120	1,30 - 1,40	130	170	0,2	5	1-150	2150x1020 2750x1200
Epratex epoxy Hgw 2372.4	180	1,70 - 1,90	350	150	0,3	40	1-80	2150x1020 1075x1020
Epratex silicone Hgw 2572	200	1,70 - 180	125	50	0,30	20	3-50	1075x1020
Epratex epoxy High Temp 230	230	2,0	600	600	0,3	39 (VDE 0303)	3-50	2000x1000
Epratex epoxy High Temp 250M	250	2,0	350	600	0,23	36 (VDE 0303)	5-50	2000x1100
Eritherm Mica 500 M	500	2,7	110	250	0,75	20 (VDE 0303)	3-30	380x500
Eritherm Mica 600 M	600	2,2	180	350	0,26	25 (VDE 0303)	1-75	1000x1200
Eritherm Mica 800 M	800	2,2	140	300	0,26	25 (VDE 0303)	1-30	1000x1200
Eritherm 650	650	1,6	30	100	0,39	3,8 (VDE 0303)	6-25	2520x1240
Eritherm 700	700	1,75	32	120	0,37	2,9 (VDE 0303)	6-75	1220x910
Eritherm 1000	1000	1,4	16	31	0,37	4,7 (VDE 0303)	6-80	1500x1220
Eritherm 1100	1100	0,8	7	16	0,1	-	19-75	2570x1270
Eritherm 1200	1200	0,9	-	5-30	0,08	2 (VDE 0303)	1-10	1000x1000

For more details, please consult the different types further in this brochure

4. Overview of properties in detail

4.1. Hapa-phenol paper laminate up to 120

Properties

Test Method	*Norm*		*Sheets*	*Sheets*	*Tubes and rods*
	(D) DIN 7735		*Hp 2061*	*Hp 2061.5*	*HP 2065*
	EN 60893/IEC 893		*PF CP 201*	*PF CP 202*	*PF CP 21*
	(GB) BS		*5102-3*	*5102-1*	
	(USA) NEMA L1		*X.XP*	*XX*	
	(F) NF C26		*150-PO*	*150-Pa*	
	(CH) VSM		*S-PF-CP 1*	*S-PF-CP2*	
	Resin		*phenol*	*phenol*	*phenol*
	Reinforcement		*paper*	*paper*	*paper*
Denisity	DIN 53479	g/cm^3	1,3-1,4	1,3-1,4	1,0-1,1
Flexural strength, unproces. / 23°C	DIN 53453	MPa	150	130	100
Impact strength a $_{n10}$ end a $_{n15}$	DIN 53453	kJ/m^2	20	20	-
Notched bar impact value a $_{k10}$	DIN 53453	kJ/m^2	5	4	-
Notched bar impact value a $_{k15}$	DIN 53453	kJ/m^2	15	15	-
Tensile strength	DIN 53455	MPa	120	100	50
Compressive strength	DIN 53454	MPa	150	150	40
Split load	DIN 53463	N	2000	2000	-
Modulus of elasticity-bending test	DIN 53457	MPa	7000	7000	6000
Resistance between plugs after 24 h storage in water/23°C	DIN 53482	Ω	-	-	10^8
1 minute test voltage parallel to lamination	DIN 53481	kV	15	40	25
1 minute test voltage perpendicular to lamination	DIN 53481	kV	15	40	25
Dielectric loss factor					
50 Hz / 96h / 105 °C	DIN 53483	max.	-	0,05	-
1 MHz / 24h storage in water	DIN 53483	max.	-	-	-
Dielectric constant e_r	DIN 53483	>>	5	5	-
Tracking resistance index	IEC 112	CTI	100	100	100
Electrolytic corrosion	DIN 53489	max.	-	-	-
Arc resistance	DIN 53484	class.	-	-	-
Thermal conductivity	DIN 52612	W/m*k	0,2	0,2	-
Linear expansion coefficient	VDE 0304/2	10^{-6}/K	20-40	20-40	-
Temperature index	VDE 0304/2	°C	120	120	120
Flammability	UL 94	class	-	-	-
Oxygen index	ISO 4589	%	-	-	-
Insulating class	IEC Publ.85		E	E	-
Glow rod test	DIN 53459	class	2b	2b	-
Water absorbtion, 4 mm thick.	DIN 53459	mg	600	300	-
Colour			brown	brown	brown

4. Overview of properties in detail

4.2. Epratex phenol textile up to 120 °C

Properties

Test Method	*Norm*					*Tubes and rods*	
	(D) DIN 7735		*Hgw 2082*	*Hgw 2082.5*	*Hgw 2083*	*Hgw 2085*	*Hgw 2088*
	EN 60893/IEC 893		*PF CC 201*	*PF CC 202*	*PF CC 203*	*PF CC 22*	*PF CC 42*
	(GB) BS		*2572-F3*	*2572-F4*	*2572-F2*	*(EN 61212)*	*(EN 61212)*
	(USA) NEMA L1		*C*	*CE*	*L*		
	(F) NF C26		*150 C*	*150 C*	*150 CC*		
	(CH) VSM		*S-PF-CC1*	*S-PF-CC2*	*S-PF-CC3*		
	Resin		*phenol*	*phenol*	*phenol*	*phenol*	*phenol*
	Reinforcement		*cotton fabric med. weave*	*cotton fabric med. weave*	*cotton fabric fine weave*	*cotton fabric fine weave*	*cotton fabric fine weave*
Density	DIN 53479	g/cm^3	1,3-1,4	1,3-1,4	1,0-1,1	1,2	1,3
Flexural strength, unproces. / 23°C	DIN 53452	MPa	130	115	150	80	80
Impact strength a $_{n10}$ end a $_{n15}$	DIN 53453	kJ/m^2	30	20	35	-	-
Notched bar impact value a $_{k10}$	DIN 53453	kJ/m^2	10	10	12	-	-
Notched bar impact value a $_{k15}$	DIN 53453	kJ/m^2	15	15	15	-	-
Tensile strength	DIN 53455	MPa	80	60	100	50	50
Compressive strength	DIN 53454	MPa	170	150	170	40	65
Split load	DIN 53463	N	2500	2500	2500	-	-
Modulus of elasticity-bending test	DIN 53457	MPa	7000	7000	7000	6000	7000
Resistance between plugs after 24 h storage in water/23°C	DIN 53482	Ω	-	10^7	-	10^8	10^8
1 minute test voltage parallel to lamination	DIN 53481	kV	8	20	8	5	5
1 minute test voltage perpendicular to lamination	DIN 53481	kV	5	5	5	10	5
Dielectric loss factor							
50 Hz / 96h / 105 °C	DIN 53483	max.	-	-	-	-	-
1 MHz / 24h storage in water	DIN 53483	max.	-	-	-	-	-
Dielectric constant	DIN 53483	>>	5	5	5	-	-
Tracking resistance index	IEC 112	CTI	100	100	100	100	100
Electrolytic corrosion	DIN 53489	max.	-	-	-	-	-
Arc resistance	DIN 53484	class.	-	-	-	-	-
Thermal conductivity	DIN 52612	W/m*k	0,2	0,2	0,2	-	-
Linear expansion coefficient	VDE 0304/2	10^{-6}/K	20-40	20-40	20-40	-	-
Temperature index	VDE 0304/2	°C	110	110	110	120	120
Limit value determin. of the limit based on flexural str.	-	MPa	65	60	75	-	-
Flammability	UL 94	class	-	-	-	-	-
Oxygen index	ISO 4589	%	-	-	-	-	-
Insulating class	IEC Publ.85		A	A	A	-	-
Glow rod test	DIN 53459	class	2b	2b	2b	-	-
Water absorbtion, 4 mm thick.	DIN 53459	mg	120	120	120	-	-
Colour			brown	brown	brown	brown	brown

4. Overview of properties in detail

4.3. Epratex epoxy glasscloth up to 180 °C

Properties

Test Method	*Norm*		*(D) DIN 7735*	*Hgw 2272*	*Hgw 2572*	*Hgw 2372*	*Hgw 2372.1*	*Hgw 2372.4*	*Hgw 2372.4H*	*Hgw 2372.4*	*Hm 2471*	*Tubes and rods Hgw 2375*
			EN 60893/IEC 893	*MF GC 201*	*SI GC 202*	*EP GC 201*	*EP GC 202*	*EP GC 203*	*EP GC 203*	*EP GC 306/308*	*UP GM 203*	*EP GC 21 (EN61212)*
			(GB) BS	*3953-MF 4*	*3953-SI 5*	*3953-EP 3*	*3953-EP 4*	*3953-EP 7*	*3953-EP 7*	*3953-EP 7*	*3953-UP 3*	
			(USA) NEMA L1	*G5*	*G7*	*G10*	*FR4*	*G11*	*G11*	*G11*	*GPO-3*	
			(F) NF C26	*-*	*154-VS 1/2*	*151-VT-EE1*	*141-VT-EE1*	*151-VT-EE2*	*151-VT-EE2*	*151-VT-EE2*	*153-Vm P2e*	
			(CH) VSM	*-*	*S-SI GC 2*	*S-EP GC 1*	*S-EP CG 2*	*S-EP GC 3*	*S-EP GC 3*	*S-EP GC 3*	*S-UP GM 3*	
			Resin	*melamine*	*silicone*	*epoxy*	*epoxy*	*epoxy*	*epoxy*	*epoxy*	*polyester*	*epoxy*
			Reinforcement	*glass filam. fabric*	*glass filam. fabric*	*glass filam. fabric*	*glass filam. fabric*	*glass filam. fabric*	*glass filam fabric*	*glass filam. fabric*	*glass filam. mat*	*glass filam. mat*
Density	DIN 53479	g/cm^3		1,8-2,0	1,7-1,8	1,7-1,9	1,7-1,9	1,7-1,9	1,7-1,9	1,7-1,9	>1,8	1,8
Flexural strength, unproces. / 23°C	DIN 53452	MPa		270	125	350	350	350	350	350	125	300
Impact strength a $_{n10}$ end a $_{n15}$	DIN 53453	kJ/m^2		50	40	100	100	100	100	100	80	-
Notched bar impact value a $_{k10}$	DIN 53453	kJ/m^2		30	25	50	50	50	50	50	40	-
Notched bar impact value a $_{k15}$	DIN 53453	kJ/m^2		-	-	-	-	-	-	-	-	-
Tensile strength	DIN 53455	MPa		120	90	220	220	220	240	220	60	200
Compressive strength	DIN 53454	MPa		180	50	200	200	290	500	150	140	150
Split load	DIN 53463	N		1800	1000	3000	3000	3000	3000	3000	2130	-
Modulus of elasticity-bending test	DIN 53457	MPa		14000	13000	18000	18000	18000	18000	18000	9000	-
Resistance between plugs after 24 h storage in water/23°C	DIN 53482	Ω		10^7	10^8	$5*10^{10}$	$5*10^{10}$	$5*10^{10}$	$5*10^{10}$	$5*10^{10}$	10^8	10^{12}
1 minute test voltage parallel to lamination	DIN 53481	kV		20	25	40	40	40	40	40	42	40
1 minute test voltage perpendicular to lamination	DIN 53481	kV		25	20	40	40	40	40	40	34	40
Dielectric loss factor 50 Hz / 96h / 105 °C	DIN 53483	max.		-	0,05	0,05	0,05	0,05	0,05	0,05	0,0102	-
1 MHz / 24h storage in water	DIN 53483	max.		-	0,07	0,04	0,04	0,04	0,04	0,04	0,0153	-
Dielectric constant	DIN 53483	>>		7	5	5	5	5	5	5	5,18	-
Tracking resistance index	IEC 112	CTI		600	440	200	200	180	180	600	600	100
Electrolytic corrosion	DIN 53489	max.		A/B 2	AN 1,4	AN 1,4	AN 1,4	AN 1,4	AN 1,4	AN 1,4	A/B 1,4	-
Arc resistance	DIN 53484	class.		-	-	-	-	-	-	-	L1	-
Thermal conductivity	DIN 52612	W/m*k		0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,82	-
Linear expansion coefficient	VDE 0304/2	10^{-6}/K		20-40	10-20	10-20	10-20	10-20	10-20	10-20	20-30	-
Temperature index	VDE 0304/2	°C		130	180	130	120	155	180	180	155	130
Limit value determin. of the limit based on flexural str.	-	MPa		135	65	175	175	175	175	175	-	-
Flammability	UL 94	class		VO	-	-	VO	-	-	-	VO	-
Oxygen index	ISO 4589	%		-	-	-	-	-	-	-	-	-
Insulating class	IEC Publ.85			B	H	B	E	F	H	H	F	-
Glow rod test	DIN 53459	class		2a	2a	2a	2a	2a	2a	2a	2a	-
Water absorbtion, 4 mm thick.	DIN 53459	mg		310	45	28	28	28	25	25	60	-
Colour				white	white	green-brown	green-brown	green-brown	green-brown	green-brown	red	green

4. Overview of properties in detail

4.4. Epratex epoxy HighTemp glasscloth up to 250 °C

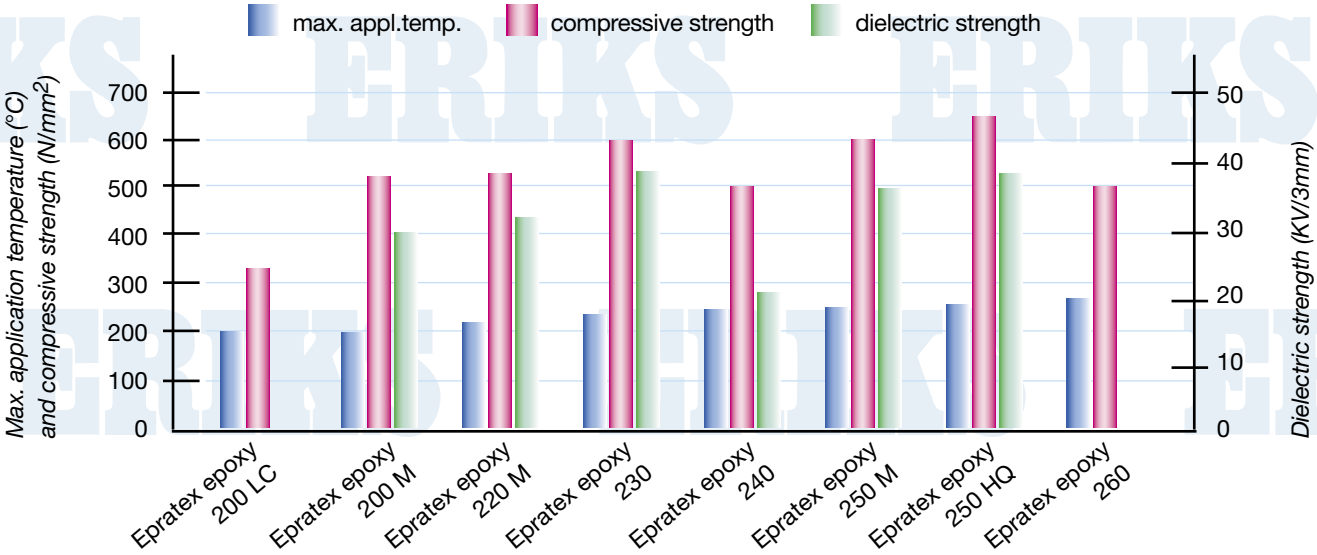
These Epratex epoxy high temperature materials are based on special high quality raw materials. Form stability and good heat isolation are the main properties of these materials.

Even under high continuous temperature loads the mechanical values of Epratex 250 M are maintained for 80%. Halogene-free and self extinguishing types are also available.

Properties

Test Method	*Norm*		*Epratex epoxy 200 LC*	*Epratex epoxy 200 M*	*Epratex epoxy 220 M*	*Epratex epoxy 230*	*Epratex epoxy 240*	*Epratex epoxy 250 M*	*Epratex epoxy 250 HQ*	*Epratex epoxy 260*
Density	ISO 1183	g/cm^3	1,5	1,85	1,85	2	1,7	2	2	1,8
Continuous application temp.		°C	200	200	220	230	240	250	250	260
Max. application temperature		°C	210	210	230	240	250	260	260	280
Coefficient linear expansion	10^{-6}	I/K	20	20	10	10-20	10-20	13	10-15	10-20
Thermal conductivity	DIN 52612	W/mK	0,13	0,25	0,22	0,3	0,3	0,23	0,23	0,3
Compressive strength	ISO 604	N/mm^2	330	530	530	600	350	600	660	500
Flexural strength	ISO 178	N/mm^2	200	220	350	600	240	350	780	350
Modulus of elasticity	ISO 178	N/mm^2	10000	12000	18000	30000	13000	20000	32000	25000
Tensile strength	ISO 527	N/mm^2		120	280	500	160	280	500	250
Cleavage strength	DIN 53463	N/mm^2		2200	4500			4500		
Tracking resistance	IEC 112	class		CTI 600	CTI 150	CTI 500	CTI 400	CTI 600	CTI 500	
Dielectric strength	VDE 0303	KV/3mm		30	33	39	20	36	39	
Thermal class	UL 94					V0		V0	V0	
Dimensions		mm	2000x1200	2000x1250	2400x1200	2000x1000	1050x1050	2000x1100	2000x1100	2400x1180
Thickness		mm	5-100	3-50	5-80	3-50	1-50	5-50	5-50	5-50

Typical material properties in comparison



4. Overview of properties in detail

4.5. Frathernit™ isolation composites for moulds

Due to the higher working temperatures, heat isolation solutions in moulds for presses or injection moulding are becoming more and more popular in the industry. ERIKS offers you isolation sheets for specific solutions.

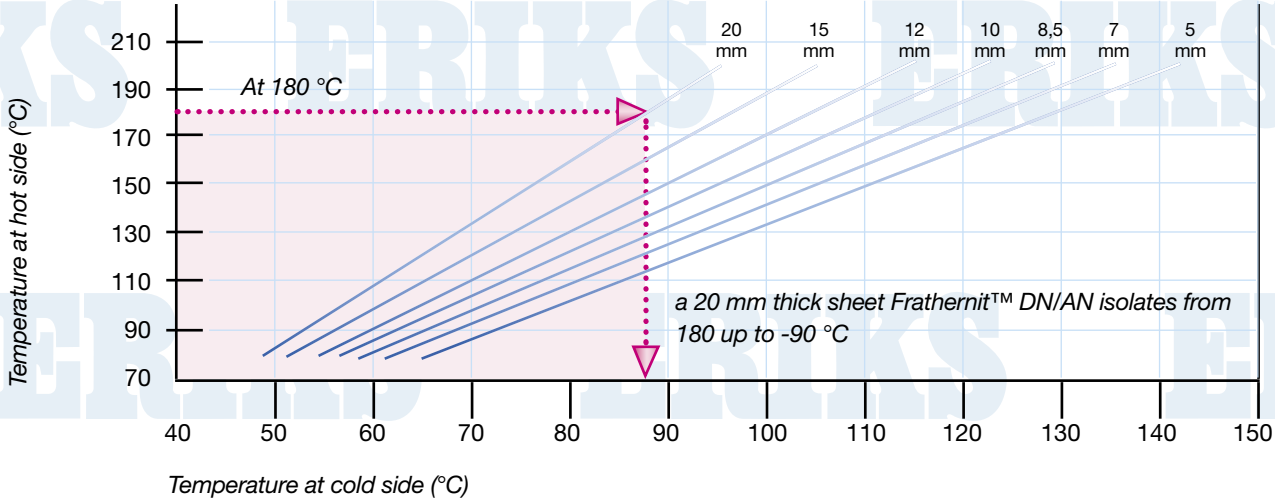
Advantages:
- easy to machine
- temperature resistant
- load and impact resistant
- no moisture absorption
- long lifecycle

In the table below the properties of these isolation sheets are shown.

Properties

Frathernit ™	*Temperature °C*		*Heat conductivity W/mK*	*Compression resistance MPa*	
	Duur	*Max*		*23 °C*	*200 °C*
For low closing forces					
DN	200	210	0,18	330	120
4000	200	230	0,13	300	100
For high closing forces					
AN	200	210	0,19	600	350
AE3	250	260	0,23	470	250
For pressureless isolation					
2000B	160	210	0,12	300	110
For isolation of air-canalisation					
SG	500	600	0,35	400	250

Thickness of Frathernit™ isolation sheets



4. Overview of properties in detail

4.6. Eritherm Mica materials for temperatures from 500 up to 800 °C

Eritherm Mica has exceptional physical properties:

- high temperature resistance
- non-flammability
- high dielectric strength
- high compressive strength and high modulus of elasticity
- low waterabsorption
- resistance to most chemicals and mineral oil products

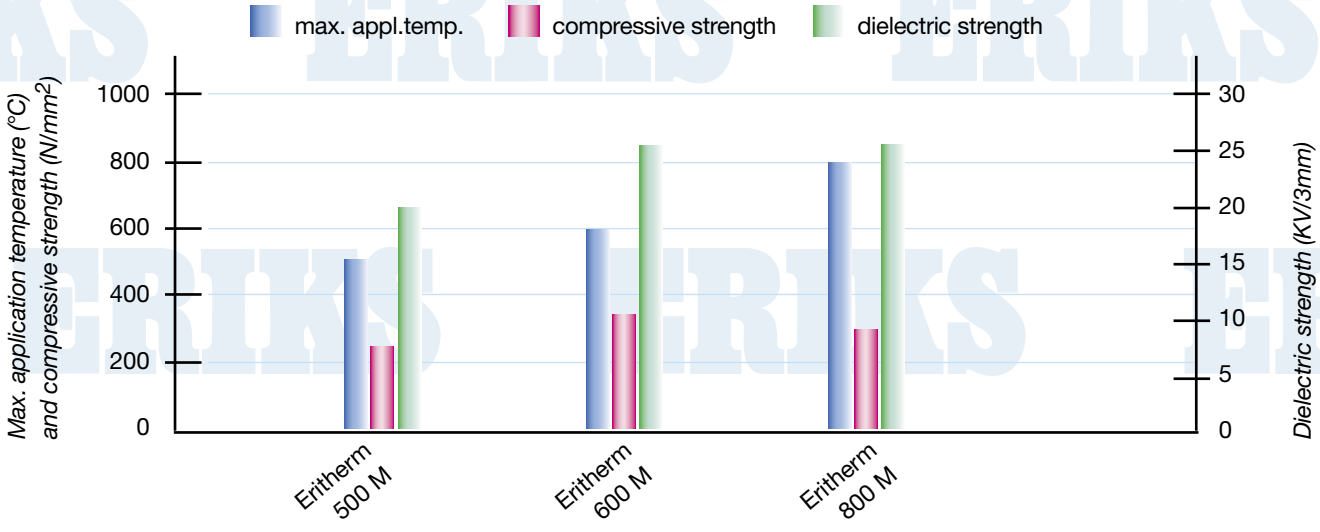
We distinguish 3 types:

- Eritherm Mica 500 M, sintered material, resists up to 500 °C; no humidity absorption,
- Eritherm Mica 600 M resists temperatures up to 600 °C; filled with Muscovite mica fibres,
- Eritherm Mica 800 M resists temperatures up to 800 °C; filled with phlogophite mica fibres.

Properties

Test Method	*Norm*		*Eritherm 500 M*	*Eritherm 600 M*	*Eritherm 800 M*
Density	ISO 1183	g/cm^3	2,7	2,2	2,2
Absorption of humidity	ISO 62	%	0	<0,1	<0,1
Continuous application temperature		°C	500	600	800
Coefficient linear expansion	10^{-6}	I/K	10	10	10
Thermal conductivity	DIN 52612	W/mK	0,75	0,26	0,26
Compressive strength	ISO 604	N/mm^2	250	350	300
Flexural strength	ISO 178	N/mm^2	110	180	140
Tracking resistance	IEC 112	class	CTI 600	CTI 500	CTI 525
Dielectric figure	DIN 53483		7	6,5	6
Arc resistance	DIN IEC 93		L6	L3	L3
Dielectric strength	VDE 0303	KV/3mm	20	25	25
Dimensions max.		mm	508x381	1200x1000	1200x1000
Thickness		mm	3-30	1-75	1-30

Typical material properties in comparison



4. Overview of properties in detail

4.7. Eritherm fibre isolation materials up to 1200 °C

The high temperature materials ERITHERM 650 and 700 have enough mechanical strength for constructive purposes. For high temperature applications, where the mechanical strength is not important, ERITHERM 1000 is a perfect solution. For low thermal conductivity ERITHERM 1100 and 1200 are ideal.

ERITHERM 650 en 700 :
- based on: cement and inorganic fibres
- compression resistance up to 12N/mm^2

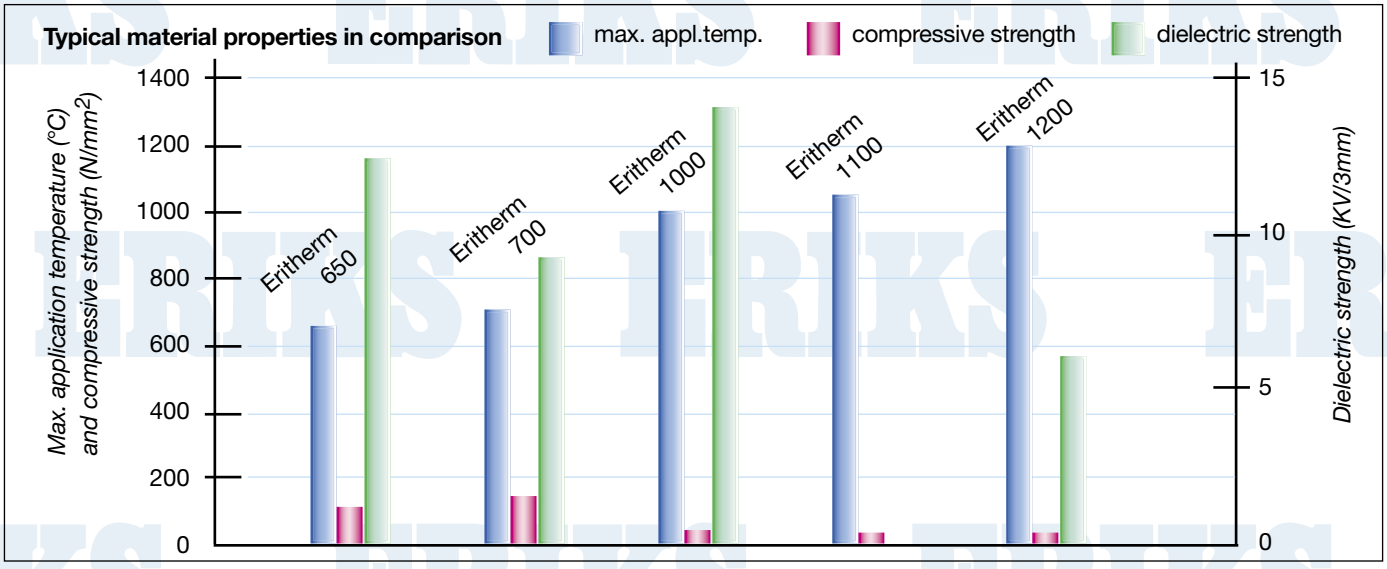
ERITHERM 1000 :
- compression resistance up to 18N/mm^2
- resists temperatures up to 1000 °C
- based on calciumsilicate and graphite fibres

ERITHERM 1100 :
- compression resistance up to 7N/mm^2
- resists temperatures up to 1000 °C
- filled with carbon fibres
- based on calciumsilicate and graphite fibres

ERITHERM 1200 :
- compression resistance up to 0,6N/mm^2
- heat resistance: up to1200 °C
- very low thermal conductivity
- based on inorganic fibres

Properties

Test Method	*Norm*		*Eritherm 650*	*Eritherm 700*	*Eritherm 1000*	*Eritherm 1100*	*Eritherm 1200*
Density	ISO 1183	g/cm^3	1,6	1,75	1,4	0,8	0,9
Absorption of humidity	ISO 62	%	6	15	23	20	85
Continuous application temperature		°C	650	700	1000	1100	1200
Coefficient linear expansion	10^{-6}	I/K	8,5	6	6,4	7	
Thermal conductivity	DIN 52612	W/mK	0,39	0,37	0,37	0,1	0,08
Shrinkage at max. temperature	24h	%	1	0,5	1	5	4
Compressive strength	ISO 604	N/mm^2	100	120	31	16	5-30
Flexural strength	ISO 178	N/mm^2	30	32	16	7	
Tracking resistance	IEC 112	class	CTI 600	CTI 600	CTI 600		
Dielectric figure	DIN 53483				4		
Arc resistance	DIN IEC 93		L6	L6	L4	L4	
Dielectric strength	VDE 0303	KV/mm	3,8	2,9	4,7		2
Dimensions max.		mm	2520x1240	1220x910	1500x1220	2570x1270	1000x1000
Thickness		mm	6-25	6-75	6-80	19-75	1-10



4. Overview of properties in detail

4.8. Epratex Bear anti-abrasion plastics for bearings

Epratex Bear high performance composites are materials with extreme abrasion resistance at high loads. Mostly used as bearings.

We distinguish 2 types:
- Epratex Bear T 100G up to 130 °C
- Epratex Bear T 200G up to 200 °C

Properties/advantages:
- suitable for extreme loadings
- extremely impact resistant
- extreme low coefficient of friction
- self lubrication possible (graphite-MOS_2-PTFE)

For over 30 years Epratex Bear is being used worldwide for extreme applications

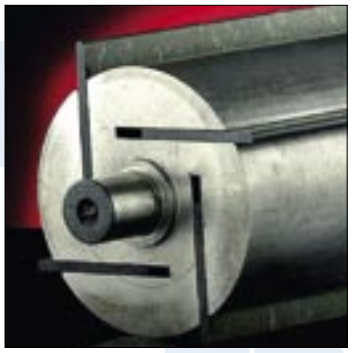
Properties

Test Method	*Epratex Bear T 100G*	*Epratex Bear T 200G*
Density	1,25-1,48	1,25-1,48
Tensile strength		
Lengthwise	90 N/mm^2	90 N/mm^2
Crosswise	76 N/mm^2	76 N/mm^2
Flexural strength		
Lengthwise	138 N/mm^2	138 N/mm^2
Crosswise	107 N/mm^2	107 N/mm^2
Shear strength	134 N/mm^2	240 N/mm^2
Compressive strength		
Flatwise	345 N/mm^2	345 N/mm^2
Edgewise	138 N/mm^2	138 N/mm^2
SWL	55 N/mm^2	-
Water absorption	< 0,1%	< 0,1%
Max. constant operating temp.	130 °C	200 °C
Fluxural Modulus	0,32 (M/mx10^4)	0,32 (M/mx10^4)
Lubricant	Graphite	Graphite
Coefficient of friction, against stainless steel	dry 0,19 water 0,01 oil 0,02	dry 0,19 water 0,01 oil 0,02
Bearing pressure	15,5 N/mm^2	15,5 N/mm^2
Surface speed	2,20 m/sec	2,20 m/sec
Hardness Rockwell	100M	100M

Applications Epratex Bear

Market sector	*Products and applications*
Waste Water Treatment Plants	bearings, scrapers
Agricultur	Bearings and bushing on Harvesters
Chemical Industries	Filters, chemical process equipment
Contractor Plant	Stone crusher bearings, road bearings, vibrator roll bushes
Fluid Handling	Effluent pumps, bearings, filters plates, water strainers, effluent treatment bearings, impeller wear rings, valve bearings
Fork lifts	Truck bearings, most support bearings
Food Industry	Food machinery, pump bearings and rams, steriliser bearings, conveyor guide strips, filter plates
Hydraulic Engineering	Hydraulic Cylinder wear rings, front cover bushes, neck bushes, gland bushes, split piston bushes
Marine, Harbour infrastructure	Stern tube bearings, stabiliser bearings, water pump bearings, fairlead bushes, Shroud rollers, hatch wheel bushes, cargo winch bushes, pintle bearings, rudder bearings
Mechanical Handling	Conveyor bearings, wheel bearings, guide strips
Railways	Locomotive brake gear pads, drawback guides
Steel Rolling Mills	Rolling mill bearings, scale breaker bushes, thrust collar rings, wear strips, anti-scratch rollers
Textiles Printing and Paper	Dye vat bearings, doll head bushes, gears for looms, bearings for spinning frame spindles, felting rollers, tap guide pulleys and sheaves paper mill bearings

4. Overview of properties in detail



4.9. Eritherm Slide anti-abrasion composites for sliding applications

Where other materials fail due to thermal mechanical forces, 'Eritherm slide' is the solution in applications for bearings that require a low coefficient of friction and a high abrasion resistance up to 600 °C.
We distinguish 3 types:

ERITHERM DBG180/DBG260/DBG300
- based on: organic fibres and special thermo hardeners, modified with lubricants
- applicable up to 180/260 and 300 °C

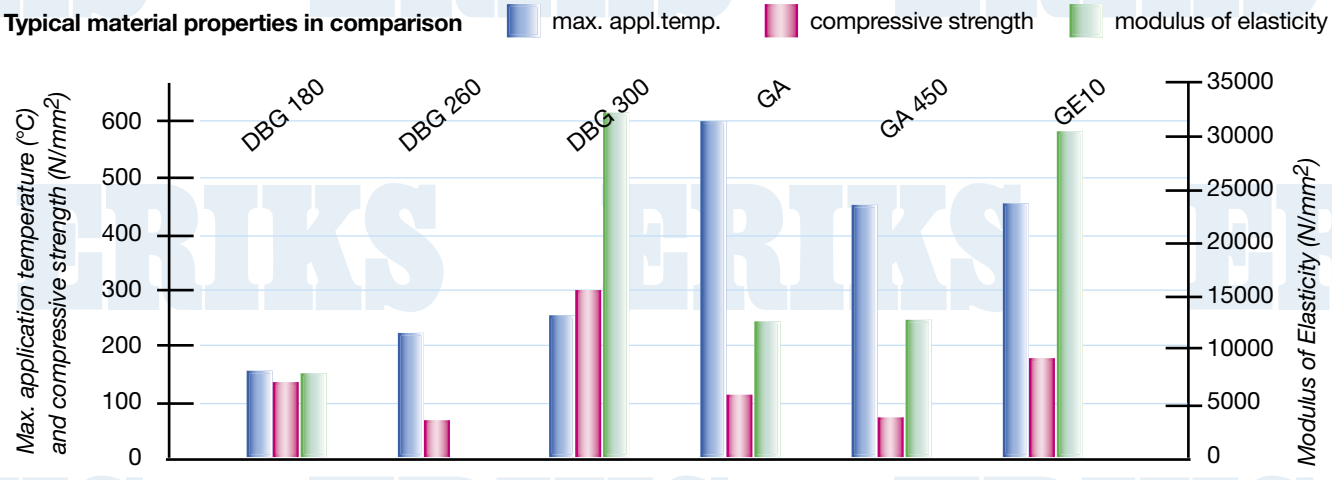
ERITHERM GA450/GA
- based on: fine graphite
- applicable up to 450 °C

ERITHERM GE10
- based on: graphite and carbon fibres
- heat resistance up to 600 °C

Properties

Test Method	*Norm*		*DBG180*	*DBG260*	*DBG300*	*GA*	*GA450*	*GE10*
Density		g/cm^3	1,4	1,9	2,0	1,83	1,76	1,36
Flexural strength		N/mm^2	75	25	140	45	35	110
Compressive strength		N/mm^2	140	80	300	110	75	180
Volume Resistivity	DIN 53482	Ω x cm	10^{12}	-	10^{14}	0,0021	0,0014	-
Sliding Friction			0,2	0,14	0,2	0,1	0,1	0,25
Modulus of Elasticity		N/mm^2	7000	-	31000	12000	12000	30000
Thermal Expansion Coefficient		10^{-6}/K	30	17	8	3,4	3,0	0,5
Thermal conductivity	100°C	W/mK	0,35	<0,45	0,28	3,4	3,0	3,0
Temperature Duration		°C	160	220	240	600	450	450
Temperature Short		°C	180	260	300	-	-	600
Shrinkage	24h/150°C	%	0,5	<0,1	-	-	-	-
Water Absorption	24h	%	1,1	3,0	-	-	-	-
Oil/Fat Resistance	24h	%	resistant	resistant	resistant	-	-	-

Typical material properties in comparison



5. Markets

Applications

- Glass industry
- Induction ovens
- Generators
- Transformers
- Electronic industry
- Plastic presses
- Welding machines
- Metal Forming
- Pump manufacturing
- Steel industry
- Drying installations