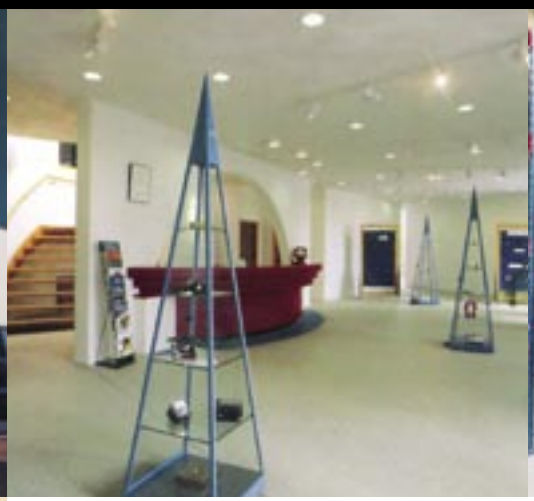
PERMANENT MAGNETS

GOUDSMIT
magnetic supplies

www.goudsmitmagnets.com

PERMANENT MAGNETS

The Goudsmit Magnetic supplies premises in the Prunellalaan in Waalre.



The showroom.

The storehouse offers space for an exquisite buffer stock which is composed in consultation with our customers.

Content

GOUDSMIT: DRIVEN BY MAGNETISM SINCE 1959!

From the very beginning permanent magnets have played an important role in electrotechnics. Especially Alnico and Ferrite magnets have already been applied for years in loudspeakers, dynamos, motors and relays. Since the early seventies very powerful magnets have been produced on the basis of alloys from rare earth materials such as Samarium-Cobalt (SmCo) and Neodymium-Iron-Boron (NdFeB). Especially NdFeB magnets, at Goudsmit better known under the brand name Neoflux®, are applied in modern electronic applications. The number of magnets used in airbags, starting motors, ABS systems, tachometers and in combination with sensors, has strongly increased in the automotive industry.

Goudsmit Magnetic Supplies has been producing and supplying magnets and magnetic products already since 1959 and is NEN-EN-ISO 9001 certified. Goudsmit quality is guaranteed by a team of experienced and disciplined Qa engineers. They make use of the most advanced measuring systems such as the Permagraph, Helmholz coil, flux meters and CNC-controlled 3D measuring equipment. Apart from that Goudsmit also offers you good advice in the (re)design process of your product. This is done on the basis of consultancy and basically through 2d or 3d computer simulations. An extensive stock program and an efficient logistic system enable them to provide you with the right magnets in a timely manner. Flexibility, trust and know-how form the basis of Goudsmit's success.

ISO certified (no: 651218)

LIST OF CONCEPTS

ANISOTROPIC—ISOTROPIC
When some kind of magnetic material is pressed in a magnetic field this magnetic material is called preferentially-oriented and anisotropic. When this magnetic material is not pressed in a magnetic field, it is called isotropic. Later on isotropic magnetic material can be magnetised in all directions, anisotropic only in the preferential direction. The remanence (Br) of anisotropic magnetic material is (in preferential direction) about twice as high as the remanence of isotropic magnetic material (see figure 1).

B
See magnetic induction.

(BH)max
See maximum energy density.

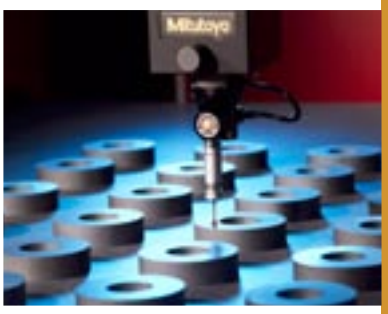
Br
See remanence.

COERCIVITY, NORMAL HcB
The necessary field strength to make the magnetic induction in a magnetic material o (see demagnetisation curve). The "-"mark is usually left out in specifications. Units: A/m or Oe.

COERCIVITY, INTRINSIC HcJ
The necessary field strength to make the polarisation of a magnetic material o (see demagnetisation curve). The "-"mark is usually left out in specifications. Units: A/m or Oe.

CURIE TEMPERATURE
Temperature above which magnetism completely disappears. Units °C en K among others.

DEMAGNETISATION CURVE
(2nd quadrant of the hysteresis curve)
The demagnetisation curve of a kind of magnetic material is determined by putting the magnetic material in a closed system and by generating a magnetic field by means of coils first magnetising the material to saturation (+H) and then demagnetising (-H). During this process the polarisation of the magnetic material (J) is measured. The magnetic induction B in the magnet is calculated by means of the following formula:
B=J+μo •H in which J = polarisation of material (share of material)
μo •H = share of field



Goudsmit checks the dimensions of your magnet by using the very newest CNC measuring equipment.

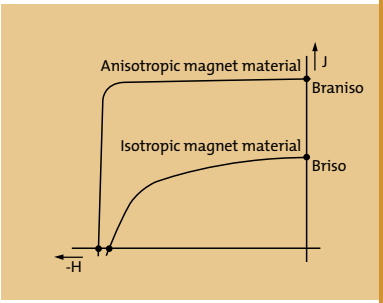


Figure 1: demagnetisation curve of isotropic and anisotropic magnetic material.

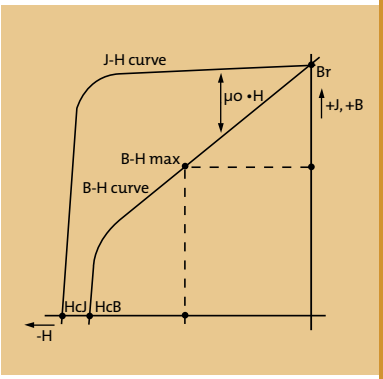
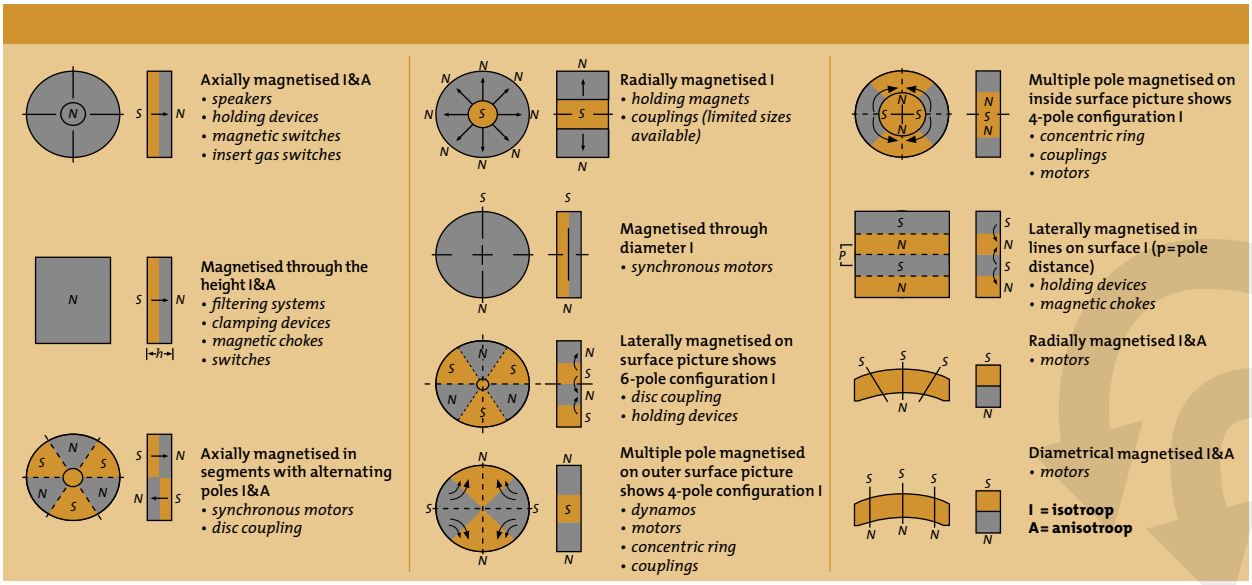


Figure 2: demagnetisation curve.



Goudsmit checks the dimensions of your magnet by using the very newest CNC measuring equipment.

The Helmholz coil is used in combination with a flux meter to quickly and accurately measure the different formats and complex forms of magnetised SmCo, Neoflux® and ferrite magnets.

The Permagraph checks whether the magnets meet the magnet specifications, possibly to a maximum temperature of 200 °C!

Magnetisation and demagnetisation of magnets and magnet systems is performed in-house.

FLUX DENSITY
See magnetic induction

QUANTITIES AND UNITS
A few widely used quantities with their units most used:

Quantity	Units	Relation between units
B magnetic induction	T (Tesla) G (Gauss)	1 T = 10000 G 1 kG = 0.1 T
B H Energy density	J/m^3 (Joule / meter^3) GOe (Gauss·Oersted)	7.96 Kj/m^3 = 1 MGOe
H Magnetic field strength	A/m (Ampère/meter) Oe (Oersted)	79.6 kA/m = 1 kOe

HcB
See coercivity, normal.

HcJ
See coercivity, intrinsic.

IRREVERSIBLE LOSS, RECOVERABLE
Permanent loss of magnetism due to too high temperatures for example. Only remagnetisation can restore the loss.

IRREVERSIBLE LOSS, IRRECOVERABLE
Permanent loss of magnetism due to too high temperature for example or oxidation. This loss is irrecoverable.

ISOTROPIC
See anisotropic.

J
See magnetic polarisation.

MAGNETIC INDUCTION, B
Magnetic ordering in a material as a result of a magnetic field (H) and/or magnetic material (J) or: The number of magnetic field lines per unit area. Units: Including T and G.

MAGNETIC POLARISATION, J
Share of material to the magnetic induction. Units including T and G.

MAGNETIC FIELD STRENGTH, H
Magnetic power resulting in magnetic induction.

MAXIMAL ENERGY DENSITY (BH)max
Biggest possible product of B and H on the demagnetisation curve (see demagnetisation curve). In general the following holds: the bigger the (BH)max of magnetic material, the smaller might be the volume. The "-"mark is usually left out in specifications. Units: kJ/m3 and MGOe. Example: The volume of a GSN35 magnet can be ±10 x smaller than the volume of a GSF33H magnet and still have the same application.

GENERAL PROPERTIES

	Ferrite	Plastic bonded ferrite	Neoflux®	Plastic bonded Neoflux®	SmCo	AlNico
max. temperature of use Tw (°C)	225	120~150	80~230	160	250	450
Reversible temperature coefficients; aBr (%/°C)	-0.20	-0.2	-0.9~-0.12	-0.08~-0.12	-0.03~-0.05	-0.03
Reversible temperature coefficients; aHcJ (%/°C)	+0.20 /+0.50	+0.3	-0.45~-0.85	-0.5	-0.3~-0.5	+0.02
Curie temperature Tc (°C)	460	450	310~380	320	700~800	850
Density (103 x kg/m3)	4.5~5.1	3.3~3.7	7.4~7.6	5~6.5	8~8.5	7.3

Values only serve for comparing the kinds of material
* Mechanical stress: Due to the brittleness of the materials it is not advisable to subject magnets to mechanical stress
* Given magnetic properties for the materials are measured in accordance with the IE404-5 standard: the magnetic properties mentioned in the tables cannot be achieved for all magnet forms and dimensions

MAXIMAL APPLICATION TEMPERATURE
Indication of the maximal temperature at which the magnetic material can be used with limited irreversible losses (see Working Point, Operating Line).

PERMANENT MAGNET
A magnet which completely or partially keeps its magnetism after being magnetised.

PERMEABILITY
The capacity of material to conduct magnetism. The permeability of vacuum (μ_0) is 12.56•10-6 T/(A/m) or 1 G/Oe.

REMANENCE Br
Magnetic induction in magnetic material when the field strength is zero (H=0) and after saturation (see demagnetisation curve). Units: Including T and G.

REVERSIBLE LOSS
Temporary loss of magnetism due to f.e. temperature change.

TEMPERATURE COEFFICIENT (Br and HcJ)
This indicates the reversible change (in percentage) of Br or HcJ in case of temperature change. The values depend on the kind of material, the quality and the temperature among other things.

FREE POLES
The field lines leaving the magnet go back to the magnet through the air (no ferromagnetic material).

WORKING POINT / OPERATING LINE
2 demagnetisation curves (only the normal curves) of random Neoflux® material are shown in figure 3. The working point (Bm, Hm) of a magnet is the point of intersection of the working line with the B-H curve. For magnets with free poles and without external magnetic field the angle of the working line with respect to the B axis depends on the relation between the length and diameter of the magnet; $L_1/D_1 > L_2/D_2$ Working line1 is closer to the B axis than the working line$_2$.

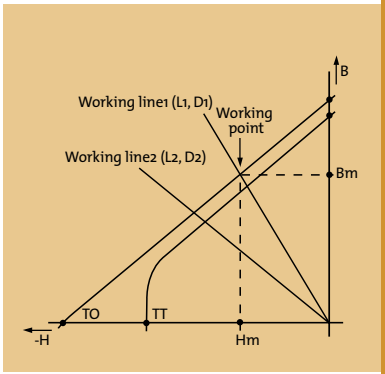
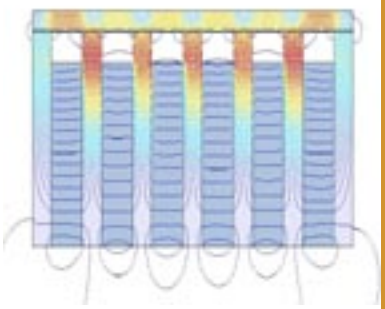


Figure 3: Demagnetisation curves and working point for any given Neoflux® magnet.



Goudsmit UK can advise you on a consultancy basis by means of computer simulations. We make use of the most advanced software to calculate your magnetic system.

Permanent magnets are also available in a steel pot (if desired with a rubber cuff); these kinds of magnets have one attraction area which makes them a lot stronger.

An advanced product such as a loudspeaker requests a dustproof magnet with the right magnetic and mechanical properties.

Our delivery program also includes electro magnets .

NEOFLUX® (Nd-Fe-B) MAGNETS:

- Since 1986 Goudsmit has been selling NdFeB (Neodymium, Iron, Boron) magnets under the brand name Neoflux®.
- Neoflux® is the strongest available permanent magnet with a maximal energy product of more than 50 MGOe with an excellent coercivity.
- A favourable price-quality ratio combined with the best possible magnetic properties.
- Standard tolerances are ± 0.1 mm. If grinded ± 0, 05 mm. Tighter tolerances are available on request.
- Processing is possible with diamond tools provided they are well cooled, as grinding residue can spontaneously ignite in combination with oxygen.
- For the protection of corrosion Neoflux® magnets are provided with a coating which can consist of double Nickel, Nickel-Copper-Nickel, Zinc, Tin, Aluminium, Teflon or Epoxy, depending on the application.
- Neoflux® magnets are always anisotropic which means that they can only be magnetised in preferential direction, axially and diametrically.
- By using special coils Neoflux® can be magnetised in a multipoled way.
- Neoflux® can be made in all kinds of shapes without additional tool costs; a clear drawing can avoid misunderstandings.
- These magnets are not only used in motors, loudspeakers, separators, MRI scanners, windmills, electronics but also in cars, often in combination with sensors.
- As Neoflux® magnets are mechanically spoken not as strong although very strong from a magnetic point of view, it is very important to handle them with great care.
- Temperature of use is maximum 80°C to 200°C, depending on the specification, dimensions and system design
- The minimum dimension for a block magnet is 1 x 1 x 1 mm, whereas the maximum dimension for this type is 160 x 150 x 50 mm.
- The minimum dimension for a disc magnet is Ø 1.5 x 0.5 mm, whereas the maximum dimension for this type is Ø 150 x 50 mm.
- The minimum dimension for a ring magnet is Ø 3 x Ø 1 x 1 mm, whereas the maximum dimension for this type is Ø 150 x Ø* x 50 mm (* inside diameter in consultation).

NEOFLUX® MAGNETS:

Quality	Remanence (Br)				"Normal coercivity (HcB)"				"Intrinsic coercivity (HcJ)"		"Maximum energy density ((BH)max)"				Max. temperature of use *
	T		KG		kA/m		kOe		kA/m	kOe	kJ/m³		MGOe		(°C)
	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Min.	Min.	Typ.	Min.	Typ.	
GSN35	1.17	1.22	11.7	12.2	836	891	10.5	11.2	955	12	263	279	33	35	80
GSN38	1.22	1.26	12.2	12.6	836	891	10.5	11.2	955	12	279	302	35	38	80
GSN40	1.26	1.30	12.6	13.0	836	891	10.5	11.2	955	12	302	318	38	40	80
GSN42	1.30	1.33	13.0	13.3	836	891	10.5	11.2	955	12	318	334	40	42	80
GSN45	1.33	1.37	13.3	13.7	836	891	10.5	11.2	955	12	334	358	42	45	80
GSN48	1.37	1.40	13.7	14.0	812	859	10.2	10.8	875	11	358	382	45	48	80
GSN50	1.40	1.43	14.0	14.3	812	859	10.2	10.8	875	11	382	398	48	50	70
GSN33M	1.14	1.17	11.4	11.7	812	859	10.2	10.8	1114	14	239	263	30	33	100
GSN35M	1.17	1.22	11.7	12.2	836	891	10.5	11.2	1114	14	263	279	33	35	100
GSN38M	1.22	1.26	12.2	12.6	859	915	10.8	11.5	1114	14	279	302	35	38	100
GSN40M	1.26	1.30	12.6	13.0	859	915	10.8	11.5	1114	14	302	318	38	40	100
GSN42M	1.30	1.33	13.0	13.3	859	915	10.8	11.5	1114	14	318	334	40	42	100
GSN45M	1.33	1.37	13.3	13.7	859	915	10.8	11.5	1114	14	334	358	42	45	100
GSN48M	1.37	1.41	13.7	14.1	859	915	10.8	11.5	1114	14	358	382	45	48	100
GSN30H	1.08	1.14	10.8	11.4	780	812	9.8	10.2	1353	17	223	239	28	30	120
GSN33H	1.14	1.17	11.4	11.7	812	875	10.2	11.0	1353	17	239	263	30	33	120
GSN35H	1.17	1.22	11.7	12.2	836	891	10.5	11.2	1353	17	263	279	33	35	120
GSN38H	1.22	1.26	12.2	12.6	859	915	10.8	11.5	1353	17	279	302	35	38	120
GSN40H	1.26	1.30	12.6	13.0	859	915	10.8	11.5	1353	17	302	318	38	40	120
GSN42H	1.30	1.33	13.0	13.3	859	915	10.8	11.5	1353	17	318	334	40	42	120
GSN44H	1.33	1.37	13.3	13.7	859	915	10.8	11.5	1353	17	334	358	42	44	120
GSN46H	1.35	1.37	13.5	13.7	859	915	10.8	11.5	1353	17	350	358	44	45	120
GSN48H	1.37	1.40	13.7	14.0	859	915	10.8	11.5	1353	17	358	382	45	48	120
GSN30SH	1.08	1.14	10.8	11.4	780	812	9.8	10.2	1592	20	223	239	28	30	150
GSN33SH	1.14	1.17	11.4	11.7	812	875	10.2	11.0	1592	20	239	263	30	33	150
GSN35SH	1.17	1.22	11.7	12.2	836	891	10.5	11.2	1592	20	263	279	33	35	150
GSN38SH	1.22	1.26	12.2	12.6	859	915	10.8	11.5	1592	20	279	302	35	38	150
GSN40SH	1.26	1.30	12.6	13.0	859	915	10.8	11.5	1592	20	302	318	38	40	150
GSN42SH	1.30	1.33	13.0	13.3	859	915	10.8	11.5	1592	20	318	334	40	42	150
GSN44SH	1.33	1.36	13.3	13.6	859	915	10.8	11.5	1592	20	334	358	42	44	150
GSN28UH	1.04	1.08	10.4	10.8	780	812	9.8	10.2	1989	25	199	223	25	28	160
GSN30UH	1.08	1.14	10.8	11.4	796	844	10.0	10.6	1989	25	223	239	28	30	160
GSN33UH	1.14	1.17	11.4	11.7	812	875	10.2	11.0	1989	25	239	263	30	33	160
GSN35UH	1.17	1.22	11.7	12.2	836	891	10.5	11.2	1989	25	263	279	33	35	160
GSN38UH	1.22	1.26	12.2	12.6	836	891	10.5	11.2	1989	25	279	302	35	38	160
GSN40UH	1.26	1.30	12.6	13.0	836	891	10.5	10.5	1989	25	302	318	38	40	160
GSN28EH	1.04	1.08	10.4	10.8	780	812	9.8	10.2	2387	30	199	223	25	28	180
GSN30EH	1.08	1.14	10.8	11.4	796	844	10.0	10.6	2387	30	223	239	28	30	180
GSN33EH	1.14	1.17	11.4	11.7	812	875	10.2	11.0	2387	30	239	263	30	33	180
GSN35EH	1.17	1.22	11.7	12.2	836	891	10.5	11.2	2387	30	263	279	33	35	180
GSN38EH	1.22	1.26	1.22	12.6	836	891	10.5	11.2	2387	30	279	302	35	38	180

At maximum temperature of use a magnet with free poles is considered without the presence of an external magnetic field.
If the L/D ratio > 0.7 the irreversible loss is < 5%. We are always ready to give you advice!

STABILISED NEOFLUX®:

2 mg/cm 2 mass loss after 2 days of PCT

Quality	Remanence (Br)				"Normal coercivity (HcB)"		"Intrinsic coercivity (HcJ)"		"Maximum energy density ((BH)max)"				Max. temperature of use *
	T		KG		kA/m	kOe	kA/m	kOe	kJ/m³		MGOe		(°C)
	Min.	Typ.	Min.	Typ.	Min.	Min.	Min.	Min.	Min.	Typ.	Min.	Typ.	
GSNS53N	1.44	1.50	14.4	15.0	>836	>10.5	>876	>11	398	430	50	54	80
GSNS50M	1.40	1.46	14.0	14.6	>1043	>13.1	>1114	>14	374	406	47	51	100
GSNS35EH	1.17	1.24	11.7	12.4	>868	>10.9	>2388	>30	263	295	33	37	200
GSNS30AH	1.08	1.15	10.8	11.5	>804	>10.1	>2786	>35	223	255	28	32	230(**)
GSNS33AH	1.14	1.21	11.4	12.1	>852	>10.7	>2786	>35	247	279	31	35	230(**)

Exception: (**) the irreversible loss for these materials is < 3% with L/C ratio > 0.447)
For the most actual specifications, dimensions and curves we invite you to have a look at our website: www.goudsmitmagnets.com

SAMARIUM-COBALT MAGNETS:

- Next to Neoflux® magnets Samarium-Cobalt (SmCo) magnets also belong to the group of rare earth magnets.
- SmCo magnets have very good magnetic properties with a maximum energy product of 18 to 30 MGOe, a low temperature coefficient and high stability.
- The maximum temperature of use is 250°C depending on the specification, dimensions and system design.
- SmCo magnets are well resistant against oxidation and - as long as they are used under normal conditions - do not require a coating.
- SmCo magnets are often the best choice for applications in which durability is very important such as for high-quality electronic products, medical devices and in the automobile industry.
- De cost price of SmCo magnets, in comparison with Neoflux®, is a lot higher due to the high, unstable Cobalt prices.
- SmCo is very fragile.
- The minimum dimension for a block magnet is 2 x 2 x 1 mm, whereas the maximum dimension for this type is 120 x 52 x 52 mm.
- The minimum dimension for a disc magnet is Ø 2 x 1 mm, whereas the maximum dimension for this type is Ø 90 x 50 mm.
- The minimum dimension for a ring magnet is Ø 3 x Ø 1.5 x 1 mm, whereas the maximum dimension for this type is Ø 90 x Ø* x 50 mm (* inside diameter in consultation).

Quality	Remanence (Br)				"Normal coercivity (HcB)"				"Intrinsic coercivity (HcJ)"		"Maximum energy density ((BH)max)"				Max. temperature of use *
	T		KG		kA/m		kOe		kA/m	kOe	kJ/m³		MGOe		(°C)
	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	
GSS20	0.92	0.94	9.2	9.4	653	685	8.2	8.6	>1194	>15	150	158	18.8	19.8	250
GSS23	0.95	0.98	9.5	9.8	637	684	8.0	8.6	>1433	>18	175	182	22	22.9	250
GSS27	1.05	1.07	10.5	10.7	756	776	9.5	9.7	>1433	>15	205	212	25.8	26.6	300
GSS29	1.08	1.09	10.8	10.9	780	796	9.8	10.0	>955	>12	220	230	27.6	28.9	300

For the most actual specifications, dimensions and curves we invite you to have a look at our website: www.goudsmitmagnets.com

PLASTIC-BONDED FERRITE MAGNETS:

- Plastic-bonded magnets can be manufactured by pressing or injection-moulding using basic materials consisting of ferrite, Neoflux® or Samarium-Cobalt. It is mixed with a thermoplastic material such as polyamide.
- The advantage of this material is that it can be pressed or injection-moulded in very capricious shapes, with strict tolerances of ± 0.05 mm without finishing.
- Although plastic-bonded Neoflux® magnets have a greater resistance to corrosion that sintered Neoflux®, it is advisable to apply a coating to them.
- Thanks to the isotropy, this material can be magnetised in various directions (see page 3).

Quality	Remanence (Br)				"Normal coercivity (HcB)"				"Intrinsic coercivity (HcJ)"				"Maximum energy density ((BH)max)"				Max. temperature of use *
	T		KG		kA/m		kOe		kA/m		kOe		kJ/m³		MGOe		(°C)
	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	
GSFI-1	0.11	0.13	1.1	1.3	70	85	0.88	1.07	190	230	2.39	2.89	1.5	3.0	0.19	0.38	120
GSFI-2	0.13	0.18	1.3	1.8	85	125	1.07	1.57	190	230	2.39	2.89	3.0	3.6	0.38	0.45	120
GSFI-3	0.21	0.24	2.1	2.4	120	170	1.50	2.13	160	230	2.01	2.89	7.0	12.0	0.87	1.50	120
GSFI-4	0.25	0.26	2.5	2.6	165	195	2.07	2.45	210	320	2.63	4.02	11.0	13.0	1.38	1.63	120
GSFI-5	0.27	0.28	2.7	2.8	170	200	2.13	2.51	210	320	2.63	4.02	14.03	15.1	1.80	1.90	120
GSFI-6	0.28	0.29	2.8	2.9	180	190	2.26	2.38	210	230	2.63	2.89	15.9	16.5	2.0	2.07	120

PLASTIC-BONDED NEOFLUX® MAGNETS:

Quality	Remanence (Br)				"Normal coercivity (HcB)"				"Intrinsic coercivity (HcJ)"				"Maximum energy density ((BH)max)"				Max. temperature of use *
	T		KG		kA/m		kOe		kA/m		kOe		kJ/m³		MGOe		(°C)
	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	
GSNB-4	0.35	0.4	3.5	4.0	240	260	3.0	3.2	640	720	8.0	9.0	24	28	3.0	3.5	150
GSNB-6	0.5	0.55	5.0	5.5	320	340	4.0	4.3	640	720	8.0	9.0	40	48	5.0	6.0	150
GSNB-8	0.6	0.63	6.0	6.3	360	400	4.5	5.0	640	760	8.0	9.5	64	68	8.0	8.5	140
GSNB-8H	0.56	0.61	5.6	6.1	400	432	5.0	5.4	960	1160	12.0	14.5	60	66	7.5	8.3	120
GSNB-10	0.68	0.70	6.8	7.0	400	420	5.0	5.2	640	720	8.0	9.0	72	76	9.0	9.5	120
GSNB-12	0.7	0.75	7.0	7.5	416	448	5.2	5.6	640	720	8.0	9.0	80	88	10.0	11.0	130
GSNB-12D	0.7	0.75	7.0	7.5	448	464	5.6	5.8	720	840	9.0	10.5	80	88	10.0	11.0	140

For the most actual specifications, dimensions and curves we invite you to have a look at our website: www.goudsmitmagnets.com

ALNICO MAGNETS:

- Alnico magnets are made of Aluminium, Nickel, Cobalt and Iron and have already been applied since 1930. Sometimes a few other elements such as copper, titanium and niobium are added.
- Alnico magnets have a maximum energy product of 1 to ± 9 MGOe and do not require coating when used under normal conditions.
- The maximum temperature of use is 450°C depending on the specification, dimensions and system design.
- Most of the Alnico magnets are caste and in this process the alloy, which is liquid, is poured into sand moulds at very high temperature.
- Some of these magnets are pressed and sintered.
- Casting Alnico can happen in complex forms, such as horseshoes for example.
- Sintered Alnico has slightly lower magnetic properties however they have better mechanical properties than caste alnico, with very small casting amounts during the casting process.
- Standard tolerance for grinded alnico is ±0.1 mm, depending on the size and shape.
- It is important (watch out!) that the length/diameter ratio is kept, this will prevent demagnetisation.
- The minimum dimension for a block magnet is 2 x 2 x 2 mm, whereas the maximum dimension for this type is 100 x 100 x 100 mm.
- The minimum dimension for a disc magnet is Ø 1 x 2 mm, whereas the maximum dimension for this type is Ø 100 x 100 mm.
- The minimum dimension for a ring magnet is Ø 5 x Ø 3.5 x 1 mm, whereas the maximum dimension for this type is Ø 200 x Ø* x 50 mm (* inside diameter in consultation).

Quality	Remanence (Br)		"Normal coercivity (HcB)"		"Intrinsic coercivity (HcJ)"		"Maximum energy density ((BH)max)"		Max. temperature of use *
	T	KG	kA/m	kOe	kA/m	kOe	kJ/m³	MGOe	(°C)
	Min.	Min.	Min.	Min.	Min.	Min.	Min.	Min.	
GSA5A	1.20	12.0	48	0.600	49	0.62	36	4.50	450
GSA5B	1.25	12.5	55	0.69	57	0.72	47	5.90	450
GSA6	1.30	13.0	56	0.70	58	0.73	60	7.50	450
GSA8	0.80	8.0	110	1.380	111	1.40	37	4.70	450
GSAS5A	1.10	11.0	48	0.60	51	0.64	34	4.25	450
GSAS5B	1.00	10.0	56	0.70	57	0.71	28	3.50	450

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FERRITE MAGNETS (CERAMIC MAGNETS):

- Ferrite or ceramic magnets are still the most widely used magnets with a maximum energy product of 1 to ± 4.3 MGOe.
- Due to the environmental requirements which are becoming more stringent barium ferrite has been replaced by strontium ferrite during the last years.
- Ferrite is the cheapest magnetic material and has a high corrosion resistance making coating unnecessary.
- This magnetic material is hard and fragile and must be processed with diamond, preferably when it is not in a magnetic state.
- Because it might shrink during the sinter process a tolerance of ± 2 % should be taken into account when determining the dimensions. If grinded ± 0.1 mm.
- Tighter tolerance is available on request.
- Ferrite magnets can be supplied both isotropically as anisotropically and are used in the most divergent products such as loudspeakers, magnetrons, measuring devices, toys, engines, reed contacts etc.
- The maximum temperature of use is 225°C depending on the specification, dimensions and system design.
- For specifications: See the table below. For magnetisation possibilities: see page 3.
- The minimum dimension for block magnets is 2 x 2 x 2 mm, whereas the maximum dimension for this type is 270 x 90 x 25.4 mm.
- The minimum dimension for disc magnets is Ø 2 x 1 mm, whereas the maximum dimension for this type is Ø 156 x 25.
- The minimum dimension for ring magnets is 8 x 2.5 x 3 mm, whereas the maximum dimension for this type is Ø 256 x Ø* x 25 mm (* inside diameter in consultation).

Quality	Remanence ((Br)				" Normal coercivity (HcB)"				"Intrinsic coercivity (HcJ)"				"Maximum energy density ((BH)max)"				Max. temperature of use *
	T		KG		kA/m		kOe		kA/m		kOe		kJ/m³		MGOe		(°C)
	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	
GSFD-10	0.21	0.23	2.1	2.3	127	159	1.60	2.00	211	235	2.65	2.95	5.6	8.8	0.7	1.1	225
GFSD-25	0.38	0.40	3.8	4.0	143	175	1.8	2.2	147	179	1.85	2.25	23.9	27.1	3.0	3.4	225
GFSD-30	0.39	0.41	3.9	4.1	175	207	2.20	2.60	179	211	2.25	2.65	25.5	28.7	3.2	3.6	225
GFSD-33H	0.39	0.41	3.9	4.1	239	271	3.0	3.4	243	275	3.05	3.45	27.1	30.3	3.4	3.8	225
GFSD-34H	0.370	0.390	3.70	3.90	263	291	3.30	3.65	307	330	3.85	4.15	28.7	30.3	3.6	3.8	225
GFSD-42	0.415	0.435	4.15	4.35	215	239	2.70	3.00	219	243	2.75	3.05	31.2	34.4	3.9	4.3	225

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magnetic supplies

www.goudsmitmagnets.com

Goudsmit Magnetic Supplies B.V.
Prunellalaan 14
P.O. Box 7
5580 AA Waalre
The Netherlands
Tel.: +31-(0)40-2219015
Fax: +31-(0)40-2220256
www.goudsmitmagnets.com
supplies@goudsmit-magnetics.nl

Folder number: 07/73