

NdFeb-----Most powerful magnet available today

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Sintered Ndfef Magnet

Bonded Ndfef magnet

Injection Bonded Ndfef Magnet



## General Description

# NdFeB Rare Earth Magnets

Rare Earth Magnets are including **Neodymium(Nd) -Iron(Fe)-Boron(B)** types and **Samarium(Sm)- Cobalt(Co)** classes. The most commonly produced material is neodymium-iron-boron (NdFeB). This group of magnetic materials provides the highest available magnetic energies of any material. NdFeB magnets allow small shapes and sizes with high magnetic fields. Energy product range from 26 MGOe to about 45 MGOe.

Super-Strength Rare Earth Magnet----Sintered NdFeB magnets, have the characteristics of :

- \*Extreme strong Br Resident induction.
- \*Excellent demagnetization resistance capability.
- \*Good Price relative to its high magnetic properties.
- \*Coating is needed for NdFeB

Surface Treatment Method: Type Information

Metallic Zinc, Nickel, Nickel+Nickel, Copper+Nickel, Nickel+Copper+Nickel,

Gold, Organic Epoxy, Nickel+Epoxy coating

Temporary Surface: Passivation

Both NdFeB and SmCo are available in sintered as well as bonded forms. Sintered NdFeB parts however, will produce the highest magnetic properties. NdFeB is sensitive to heat and should not be used in the environments that exceed 200°C. Bonded NdFeB are generally low in properties due to the special process of gluing the powder in a mold. The bonded form of the material can be produced with close tolerance off tools with little or no finishing required. The sintered form usually some finishing operations in order to hold close mechanical tolerances.

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## Sintered Ndfef Magnet

## Sintered Ndfeb Magnet

Neodymium Iron Boron (NdFeB), the most powerful y Rare Earth magnet available today, possesses high energanging from 8MGOe to 48MGOe and wonderful coercive force. As the third generation of Rare Earth permanent magnet, NdFeB products are quite a bit less expensive, and are mechanically stronger and less brittle than SmCo, also density of NdFeB products is about 13% smaller than SmCo products. Because NdFeB magnets are more prone to oxidation than any other magnet alloy, for most applications, coating or plating the magnets is recommended.

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Gold, Organic Epoxy, Nickel+Epoxy coating

Temporary Surface: Passivation

## MAGNETIC AND PHYSICAL CHARACTERISTICS (NdFeB)

TYPE	Remanence Br		Coercivforce bHc		Intrinsic coercive force iHc		Max. energy product (BH) max		Working Temperature
	KGs	T	KOe	KA/m	KOe	KA/m	MGOe	KJ/m <sup>3</sup>	℃
1 N-30	10.8-11.2	1.08-1.12	9.8-10.5	780-836	≥12	≥955	28-30	223-239	≤80
2 N-33	11.4-11.7	1.14-1.17	10.5-11.0	836-876	≥12	≥955	31-33	247-263	≤80
3 N-35	11.7-12.1	1.17-1.21	10.8-11.5	860-915	≥12	≥955	33-35	263-279	≤80
4 N-36	11.9-12.2	1.19-1.22	10.8-11.5	860-915	≥12	≥955	34-36	271-287	≤80
5 N-38	12.2-12.6	1.22-1.26	10.8-11.5	860-915	≥12	≥955	36-38	287-303	≤80
6 N-40	12.6-12.9	1.26-1.29	10.5-11.0	836-876	≥12	≥955	38-40	303-318	≤80
7 N-42	12.9-13.2	1.29-1.32	10.5-11.0	836-876	≥12	≥955	40-42	318-334	≤80
8 N-43	13.0-13.3	1.30-1.33	10.5-11.0	836-876	≥12	≥955	41-43	326-342	≤80
9 N-45	13.3-13.7	1.33-1.37	10.5-11.0	836-876	≥12	≥965	43-45	342-358	≤80
10 N-27M	10.2-10.6	1.02-1.06	9.6-10.1	764-804	≥15	≥1194	25-27	199-215	≤100
11 N-30M	10.8-11.2	1.08-1.12	10.1-10.6	804-844	≥15	≥1194	28-30	223-239	≤100
12 N-33M	11.4-11.7	1.14-1.17	10.5-11.0	844-884	≥15	≥1194	31-33	247-263	≤100
13 N-35M	11.7-12.1	1.17-1.21	10.8-11.5	860-915	≥15	≥1114	33-35	263-279	≤100

14N-36M	11.9-12.2	1.19-1.22	11.1-11.6	884-923	≥15	≥1194	34-36	271-287	≤100
15 N-38M	12.2-12.6	1.22-1.26	10.8-11.5	860-915	≥14	≥1114	36-38	287-303	≤100
16 N-40M	12.6-12.9	1.26-1.29	10.8-11.5	860-915	≥14	≥1114	38-40	303-318	≤100
17 N-42M	12.9-13.2	1.29-1.32	10.8-11.4	860-907	≥14	≥1114	40-42	318-334	≤100
18 N45M	13.3-13.7	1.33-1.37	10.8-11.4	860-907	≥17	≥1114	43-45	334-358	≤100
19 N-27H	10.2-10.6	1.02-1.06	9.6-10.1	764-804	≥17	≥1353	25-27	199-215	≤120
20 N-30H	10.8-11.2	1.08-1.12	10.1-10.6	804-844	≥17	≥1353	28-30	223-239	≤120
21 N-33H	11.4-11.7	1.14-1.17	10.6-11.1	844-884	≥17	≥1353	31-33	247-263	≤120
22 N-35H	11.7-12.1	1.17-1.21	10.8-11.5	860-915	≥17	≥1353	33-35	263-279	≤120
23 N-36H	11.9-12.2	1.19-1.22	11.1-11.6	884-923	≥17	≥1353	34-36	271-287	≤120
24 N-38H	12.2-12.6	1.22-1.26	11.5-12.0	915-955	≥17	≥1353	36-38	287-303	≤120
25 N-40H	12.6-12.9	1.26-1.29	11.5-12.0	915-955	≥17	≥1353	38-40	303-318	≤120
26 N-42H	12.9-13.2	1.29-1.32	11.5-12.0	915-955	≥17	≥1353	40-42	318-334	≤120
27N-27SH	10.2-10.6	1.02-1.06	9.6-10.1	764-804	≥20	≥1592	25-27	199-215	≤150
28N-30SH	10.8-11.2	1.08-1.12	10.1-10.6	804-844	≥20	≥1592	28-30	223-239	≤150
29N-33SH	11.4-11.7	1.14-1.17	10.6-11.1	844-884	≥20	≥1592	31-33	247-263	≤150
30N-35SH	11.7-12.1	1.17-1.21	10.8-11.5	860-915	≥20	≥1595	33-35	263-279	≤150
31N-38SH	12.1-12.5	1.21-1.25	10.8-11.5	860-915	≥20	≥1592	36-38	287-302	≤150
32N-40SH	12.6-12.9	1.26-1.29	10.8-11.5	860-915	≥20	≥1592	38-40	303-318	≤150
33N25UH	9.8-10.2	0.98-1.02	9.2-9.6	732-764	≥25	≥1990	23-25	183-199	≤180
34N28UH	10.4-10.8	1.04-1.08	9.8-10.2	780-812	≥25	≥1990	26-28	207-223	≤180
35N30UH	10.8-11.2	1.08-1.12	10.1-10.6	804-844	≥25	≥1990	28-30	223-239	≤180
36N35UH	11.7-12.1	1.17-1.21	10.5-11.2	836-890	≥25	≥1989	33-35	263-278	≤180
37N25EH	9.8-10.2	0.98-1.02	9.2-9.6	732-764	≥30	≥2387	23-25	183-199	≤200
38N28EH	10.4-10.8	1.04-1.08	9.8-10.2	780-812	≥30	≥2387	26-28	207-223	≤200

39N30EH	10.8-11.2	1.08-1.12	10.1-10.6	804-844	$\geq 30$	$\geq 2387$	28-30	223-239	$\leq 200$
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Remark: The above mentioned data of magnetic and physical characteristics are given at room temperature

\*\* The open flux irreversible loss of the testing sample at this temperature  $\leq 5\%$

## Bonded Ndfef magnet

Bonded NdFeB magnets are manufactured by binding rapid-quenching NdFeB powder. The powder is mixed with resin to form a magnet by compression molding with epoxy or injection molding with nylon. The latter technique is particularly effective in large volume production, though the magnetic value of products is lower than those made with compression molding because of their relatively lower density. Various shapes of high dimensional accuracy can be produced without further processing. Surface is treated by epoxy coating or nickel-plating to prevent corrosion.

### Other Properties of NdFeB Bonded Magnets

#### Hybrid magnets to create different magnetic properties

With different ratio of additives to NdFeB powder, magnetic properties of hybrid NdFeB magnets can be tuned in a wide range. Once the ratio is fixed, magnetic property fluctuation can still be limited in a narrow bank. Hybrid magnets will meet customers' specified properties.

#### Characteristics for the initial magnetization of NdFeB bonded magnets

Rapidly quenched NdFeB powder used for bonded magnets is multi grain with grain size of sub-micron. Powder is isotropic in magnetic properties, which results in flat increasing of remanence and intrinsic coercivity with applied field. Magnet can only be magnetized to saturation in high fields.

#### Advantages of Bonded Magnet

- \*Produced with high efficiency, stability and repeatability.
- \*Magnet and other part may form together in one step.
- \*Free choice of magnetizing direction-especially for multi-polar applications
- \*High dimensional accuracy-large quantity applications with minimum post-press machining.
- \*Thin-wall ring and complex shape magnets.
- \*High resistance to corrosion.

#### Magnetic properties of bonded NdFeB Magnets

P/N	Br Remanence		Hcj Intrinsic Coercivity		Hcb Coercive Force		(BH)max. Maximum Energy Product	
	MT	kG	kA/m	kOe	kA/m	kOe	KJ/m <sup>3</sup>	MGOe
ndfeb-NB6	440-560	4.40-5.60	560-680	7.0-8.5	240-320	3.0-4.0	32-48	4.0-6.0
ndfeb-NB8	540-640	5.40-6.40	640-720	8.0-9.0	320-400	4.0-5.0	48-64	6.0-8.0

ndfeb-NB8M	540-620	5.40-6.20	1040-1360	13.0-17.0	384-464	4.8-5.8	56-72	7.0-9.0
ndfeb-NB10	620-700	6.20-7.00	608-800	7.6-10.0	360-456	4.5-5.7	64-80	8.0-10.0
ndfeb-NB12	690-760	6.90-7.60	640-840	8.0-10.5	400-480	5.0-6.0	80-96	10.0-12.0

### Physical Characteristics of bonded NdFeB Magnets

P/N	$\mu_{rec}$ Recoil Permeability	Hs Magnetizing Field	$\rho$ Density	Temperature Coefficient			Tc Curie Temperature	K <sup>[2]</sup> Ring Crushing Strength	Coefficient of Thermal Expansion (25-200; $\mu\epsilon$ )
	$\mu_{rec}$	kA/m	g/cm <sup>3</sup>	kOe	$\alpha(Br)\%/^{\circ}C$	$\beta(H_{cj})\%/^{\circ}C$	$^{\circ}C$	kg/mm <sup>2</sup>	10 <sup>-6</sup> / $^{\circ}C$
ndfeb-NB6	1.22	$\sqrt{1600}$	5.1-5.6	$\dot{1}20$	-0.14	-0.40	360	$\sqrt{5.5}$	4.8
ndfeb-NB8	1.22	$\sqrt{1600}$	5.4-5.8	$\dot{1}20$	-0.13	-0.40	360	$\sqrt{5.5}$	4.8
ndfeb-NB8M	1.18	$\sqrt{2000}$	5.8-6.0	$\dot{1}25$	-0.12	-0.38	305	$\sqrt{5.5}$	4.8
ndfeb-NB10	1.22	$\sqrt{1600}$	5.8-6.0	$\dot{1}20$	-0.11	-0.40	360	$\sqrt{5.5}$	4.8
ndfeb-NB12	1.17	$\sqrt{1600}$	5.9-6.1	$\dot{1}20$	-0.11	-0.41	360	$\sqrt{5.5}$	4.8

Note: [1] The properties given above are typical at room temperature(23 $^{\circ}C$ )for uncoated samples.

[2] Ring Crushing Strength K is defined as follows, with the force applying along a diameter of magnet ring and P is the value at which the first crack appears.  $K=P(D-T)/LT^2$

K-Ring Crushing Strength(kg/mm<sup>2</sup>) P-Load on magnet ring(kg)

D-Outer diameter(mm) T-Ring thickness(mm)

L-Height of the ring(mm)

### [Demagnetization Curves of Bonded NdFeB Magnets](#)

#### Safety Notes for the Use and Storage of Bonded Magnets.

\*Do not place magnets near person wearing electrical medical equipment.such as pacemaker,because the magnet may result in malfunction of the equipment and endanger person's life.

\*Keep magnets away from magnetic memory media or other magnetic field sensitive devices such as magnetic cards.tapes,floppy disks,hard disk drivers,and watches.Otherwise information stored in the media or the devices may be damaged.

\*Big block of magnet will strongly attract each other or attract iron steel pieces,which may cause serious injure to person.

\*Relatively weak in strength,bonded magnets may break into pieces when collide with other materials.Be careful in assembling magnets and prevent the finy fragments from entering into eyes or cause other injuries.

\*Keep magnets in good condition and avoid following environment in case that magnets become rust or weaken in mechanical or magnetic strength.

A. With acid,alkali,organic solvent or electrolytes.

B. Immersed in water or in oil.

C. Space filled with hydrogen.

D. Space filled with corrosive gases such as Cl<sub>2</sub>,NH<sub>3</sub>,Nox,etc.

E. With radioactive rays.

## Injection Bonded NdFeB Magnets

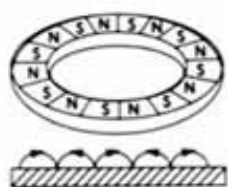
Injection Plastic Ndfieb magnet, a kind of new-generation composite material made from permanent magnetic powder and plastic, has outstanding magnetic properties and plastic properties and features high size precision and exceptional shock resistance. It can be processed into various components with complicated shapes,thus can be used in the industries of micro or special motor, office equipment, instrument, meter, and beeper. Custom design available.

### CHARACTERISTICS

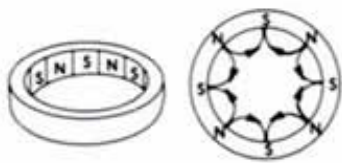
- 1) Design and manufacturing of orientation moulds were carried out
- 2) Having high dimensional precision and impact-resistance. Capable of forming products with inlay.
- 3) The injection moulding parts are suitable for forming products with various shapes and thin walls.
- 4) Multi polar magnetization can be carried out according customer' requirements

### APPLICATIONS

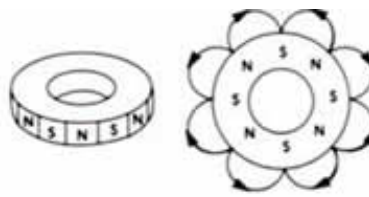
- \*Different kind of micro-special motor
- \*Different kind of fan motor
- \*Different kind of DC motor
- \*Synchronization electric motor
- \*House electric apparatus
- \*Ice chipper electric motor
- \*Hand-operated electric generator
- \*Automobile motor
- \*Time gauge
- \*Instruments for auto



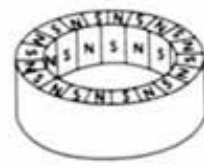
① Multi-poles  
or Axial



② Multi-poles in  
inside diameter



③ Multi-poles in  
outside diameter



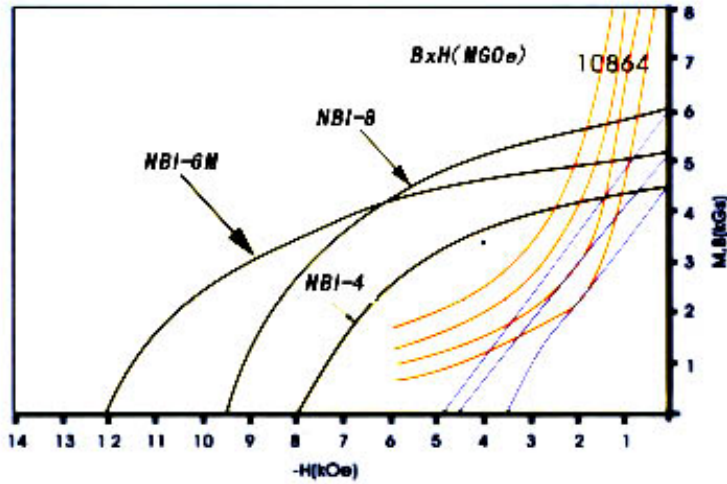
④ Complex  
multi-poles

### Physical Magnetic properties Of Injection NdFeB Bonded Magnet

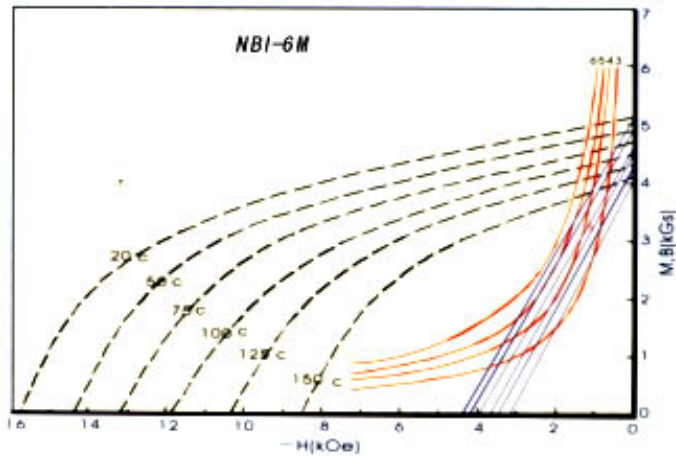
P/N	NBI-4	NBI-6	NBI-6M	NBI-8
Br (mT)	400-490	490-570	480-560	570-630
bHc(kA/m)	256-312	312-384	336-400	382-430
iHc(kA/m)	576-736	640-800	960-1360	680-840
(BH)max(kJ/m <sup>3</sup> )	28-36	40-56	44-60	60-68
Recoil permeability $\mu_r$	1.1-1.22	1.1-1.22	1.1-1.22	1.1-1.22

Recoil temperature coefficient of Br. ( $\%/^{\circ}\text{C}$ )	-0.10 (15-100 $^{\circ}\text{C}$ )	-0.09 (15-100 $^{\circ}\text{C}$ )	-0.10 (15-100 $^{\circ}\text{C}$ )	-0.10 (15-100 $^{\circ}\text{C}$ )
Magnetizing field (Ka/m)	$\geq 1592$	$\geq 1592$	$\geq 1990$	$\geq 1592$
Density(g/cm <sup>3</sup> )	4.0-4.5	4.5-5.5	5.0-5.5	5.0-5.5
Ring crushing strength constant (N/mm <sup>2</sup> )	> 78	> 78	> 78	> 78

### Typical Demagnetization curve of Injection NdFeB Magnet



### Temperature Characteristic Curve Of Injection NdFeB Magnet



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- 1 [Surface protection and surface coating for the permanent magnet](#)
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<b>Flexible Magnet</b> Flexible Magnetic Sheeting Flexible Magnetic Extrusions Flexible Magnets for Micro-Motor	<b>Magnetic Compound</b> Extruding fridge stripe Dry pressing ferrite magnet Injection ferrite bonded Injection NdFeB bonded Injection SmCo bonded	<b>Magnetic Assemblies</b> Alnico holding assemblies Ferrite holding assemblies Magnetic Base Permanent Magnet Lifter	<b>Magnetic Powder</b> Ferrite powder Ndfef Powder Alnico powder Smco powder	<b>Fridge Magnet</b> Flat fridge magnets 2D flat fridge magnets Fridge magnet Application <b>&gt;&gt;home</b>

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