

*innuovo*<sup>®</sup> 英洛华

有创新，就有未来  
NO INNOVATION. NO FUTURE

Innuovo  
Magnetics

ZHEJIANG INNUOVO MAGNETICS CO., LTD.



## **| Company Overview**

Zhejiang Innuovo Magnetics Co., Ltd. (formerly Rare-earth Permanent Magnetic Material Complex of Hengdian Group, since 1986), founded in 2003, is a domestic leading high-tech company engaged in R&D, production and marketing of magnetic material. Innuovo Magnetics is specialized in manufacturing Sintered Nd-Fe-B magnets and Bonded Nd-Fe-B magnets. Up to now, our company has owned three production bases as area cover 14000 m<sup>2</sup>, a high-efficient enterprise management system and a powerful R&D department. The annual production capacities of Sintered and Bonded Nd-Fe-B magnets have reached 6000 tons and 500 tons respectively, and now Innuovo Magnetics can produce high grade Sintered Nd-Fe-B magnets like N52, N48H, N45H, N42SH, N40UH, and N38EH.

Innuovo Magnetics sticks to the idea of “No Innovation, No Future” and attaches importance to the quality training of staff. We have integrate the professionalism into every link of corporation operation, and also actively builded a harmonious culture. The Institution of “Zhejiang University—INNUOVO R&D Center of New Material” was established by us and Zhejiang University in 2004, in order to promote our capability in R&D of new products. With the implement and adhering of the ISO9001, ISO14001 and TS16949, Innuovo Magnetics has become one of the best rare-earth permanent magnet manufacturers in China.

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NO INNOVATION, NO FUTURE

In the future, our company, Innuovo Magnetics will adhere to the innovation and sustainability in our development strategy, business model, management and R&D of products. Today, we are making efforts to create the largest domestic base of Nd-Fe-B permanent magnet material, and trying to become one of the world's leading brands of permanent magnetic industry.



## HISTORY OF DEVELOPMENT

**1986**

Dongyang Nd-Fe-B Magnetic Material Factory, which is one of the earliest enterprises for the R&D of Rare-earth Permanent Magnets in China, was established by Hengdian Group.

**1992**

The factory was renamed to the Rare-earth Permanent Magnetic Material Complex of Hengdian Group.

**2001**

The company exploited the series of N45, N38SH, N40SH, which were called the provincial new technological products.

**2003**

Reshuffling of the enterprises, Hengdian Group founded “Zhejiang Innuovo Magnetics Co., Ltd.” and made efforts to build the largest base of Nd-Fe-B Magnet. Innuovo Magnetics entered into a rapid growth period.

**2003**

A production line with annual production capacity of 1200 tons high property Sintered Nd-Fe-B magnet per year was built; it was in the important Program of Zhejiang Provincial Technology Innovation.

**2004**

A production line with an annual production capacity of 300 tons Bonded Nd-Fe-B magnet was built.

**2004**

The Institution of “Zhejiang University-INNUOVO R&D Center of New Material” was established by Innuovo magnetics and the Zhejiang University.

**2004**

N52 high property Nd-Fe-B magnet was developed by Innuovo Magnetics and it passed the appraisal of provincial-level.

**2006**

Innuovo Magnetics was honored with the National Torch Plan Key High-Tech Enterprise by MOST (Ministry of Science and Technology).

**2006**

A production line with an annual production capacity of 1440 tons Sintered Nd-Fe-B magnet was built.

**2007**

Our domestic trade mark “Dongxing” was awarded “Zhejiang Provincial Famous Trademark”.

**2008**

The project “Industrialization of Nd-Fe-B Permanent Magnet for wind power generation” passed the



**Computers and Office Automation**

**Home Appliances**

**Hard Drives**

**Mobile Telephone**

**CD-ROM Drive**

**Instruments Sensors**

**Printers and Scanners Stepper Motor**

**Power Tools**

**Printer Head**

**Auto Industry**

**Magnetic Coupler & Pump**

**Sensor**

**Bearing**

**Electric Pump**

**Generator**

**Toy**

**Household Items**

**Brushless DC Electric**

**NMR**

**Drive**



ISO 9001:2000



ISO 14001:2004



ISO/TS 16949:2002



## Digital Measuring Projector

## Laser Particle Size Analyzer



## Metallographic Analyzer



## Plasma Spectrometer



## Salt Spray Test Chamber



## Infrared Carbon and Sulfur Analyzer



## High Temperature Magnetic Property Tester



## High and Low Temperature Alternating Humidity Chamber



## Infrared Apparatus for Oxygen Determination



## High-pressure Accelerated Life Testing Machine



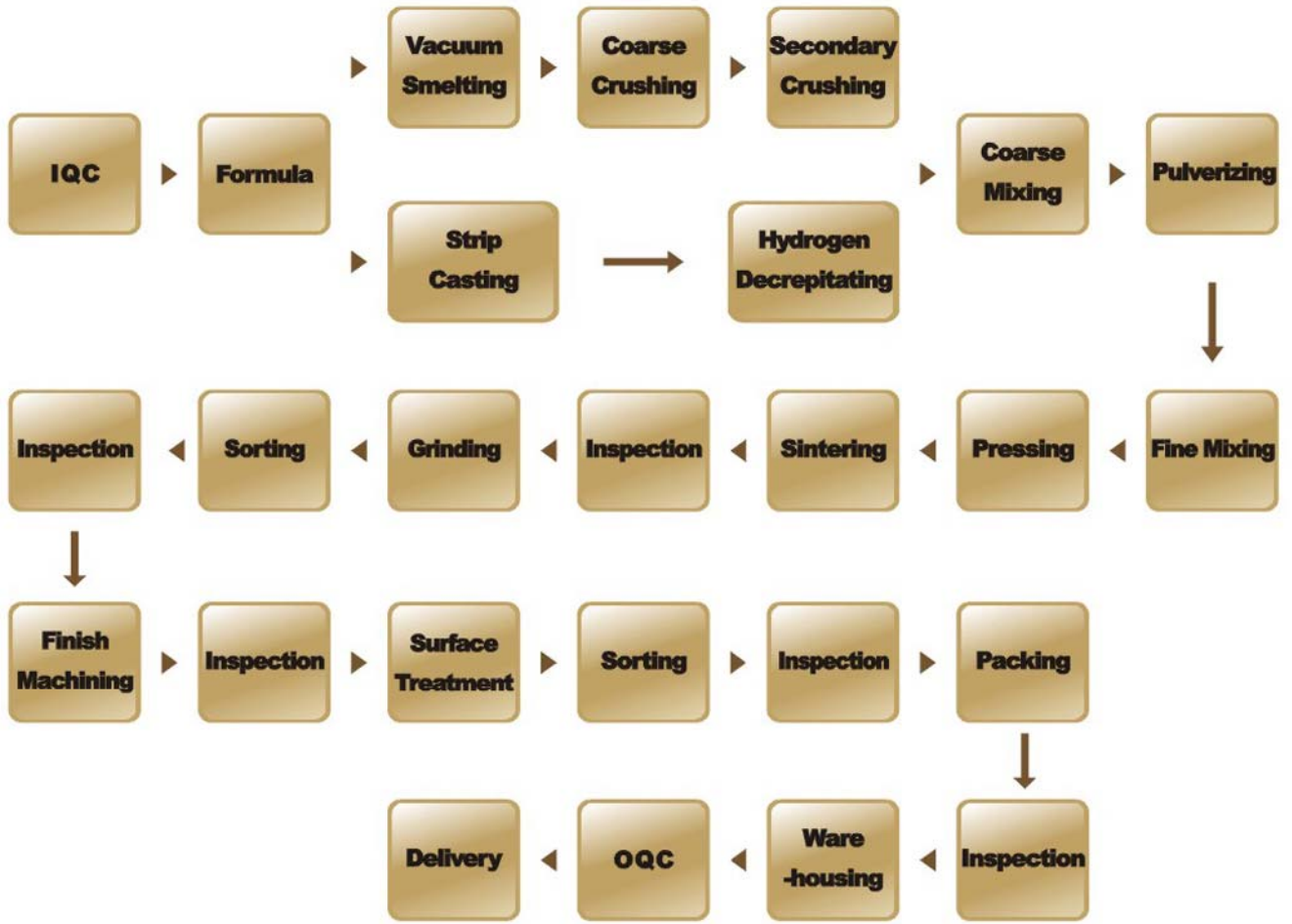
## Research and Development

In order to prompt the R&D of new products, Innuovo Magnetics cooperates with universities and institutes such as Zhejiang University, Ningbo Institute of Material Technology & Engineering, Iron & Steel Research Institute. Combining the advantage of professional staff, R&D, information in those universities and institutes with our company's advantage in marketing and production for advantage complementary, it increases ability of innovation, and speed up the transformation of research achievements.

## Test Center

Our Test Center owns complete test equipments; it can test the materials and control the process strictly to ensure the high

# Process Flow Chart of Sintered Nd-Fe-B Magnet



**Smelting**



**Pulverizing**



**Pressing**



**Sintering**



**Finish Machining**



**Surface Treatment**



**Sorting and Packing**



**Final Products**



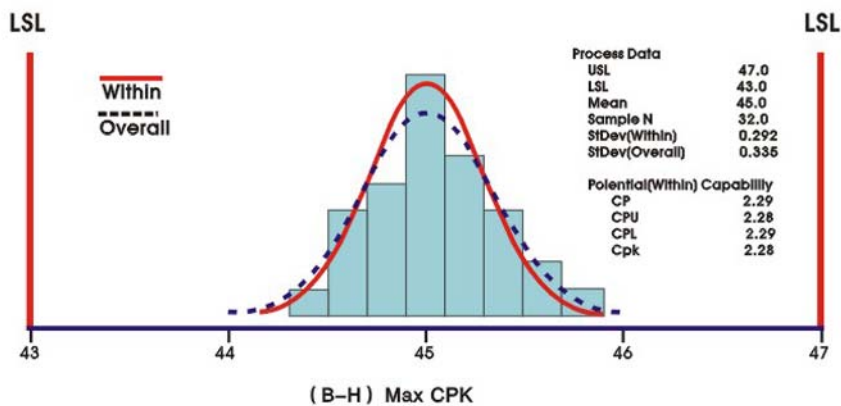


## Sintered Nd-Fe-B Magnet

The Sintered Nd-Fe-B Magnet is the nowadays strongest permanent magnet in the world. It is not only of high remanence, high coercivity, high performance and good cost-effective, but also easily processed, especially is applicable to the production of magnets which require high performance, miniature and light parts.

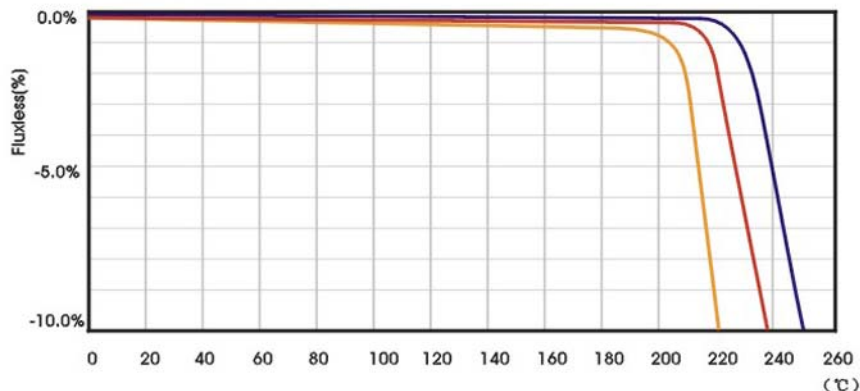
### High Consistency

The consistency and stability of products between each orders, provides safeguard to our customers. For example, the consistency of (BH)max reaches 66. (CPK is larger than 1.67).



### High Working Temperature

In order to raise working temperature of our products, Innuovo Magnetics works hard to realize better high thermal stability and low thermal demagnetization, developed the series VH series products which can work at temperature higher than 220°C.



Innuovo Magnetics owns advanced equipments and has a good ability on machining. The Square shaped, segment-shaped, cylinder-shaped and ring-shaped products can be well made.

Unit: mm

### 1. Square-shaped products



Dimensional Range	Dimensional Tolerance	Parallelism	Rectangularity
$L \leq 10$	$\pm 0.04$	0.04	$< 0.5^\circ$
$10 < L \leq 25$	$\pm 0.04$	0.04	
$25 < L \leq 60$	$\pm 0.05$	0.10	
$L > 60$	$\pm 0.06$	0.10	

Unit: mm

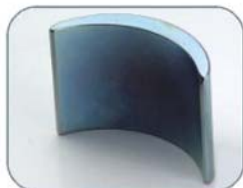
### 2. Wafer-shaped Products



Dimensional Range	Dimensional Tolerance	Circularity	Planeness
$D \leq 10$	$\pm 0.03$	0.03	0.03
$10 < D \leq 25$	$\pm 0.03$	0.03	0.04
$25 < D \leq 60$	$\pm 0.04$	0.04	0.10
$D > 60$	$\pm 0.05$	0.05	0.10

Unit: mm

### 3. Segment-shaped Products



Geometric Tolerance	Dimensional Tolerance	Dimensional Tolerance
Wall thickness	$T \leq 10$	$\pm 0.04$
	$10 < T \leq 25$	$\pm 0.04$
Length	$L \leq 10$	$\pm 0.04$
	$10 < T \leq 25$	$\pm 0.04$
	$25 < T \leq 60$	$\pm 0.04$
	$L > 60$	$\pm 0.06$
Chord length	$W \leq 60$	$\pm 0.05$
	$W > 60$	$\pm 0.05$

Unit: mm

### 4. Ring-shaped Products



Dimensional Range	Dimensional Tolerance	Concentricity
Hole Dimension	$D \leq 3$	$\pm 0.04$
	$3 < D \leq 6$	$\pm 0.05$
	$6 < D \leq 25$	$\pm 0.05$
	$D > 25$	$\pm 0.10$
Thickness Dimension	$T \leq 1$	/
	$1 < T \leq 3$	/
	$T > 3$	/

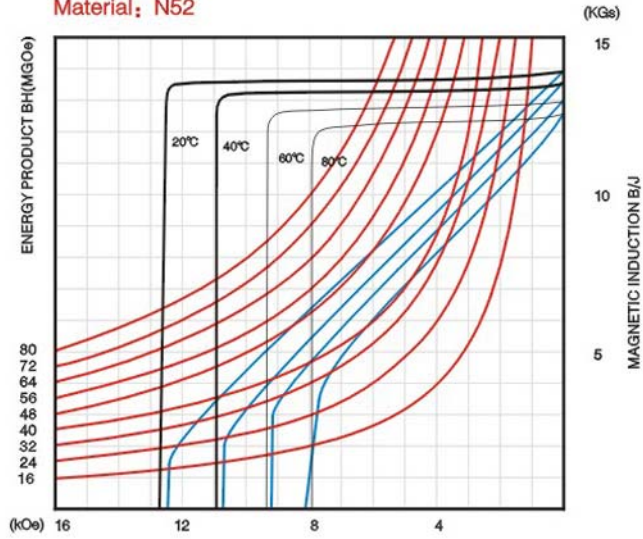
## Surface Treatment

Based on the production of high property magnetic material, Innuovo actively researches and upgrades the techniques of superficial protection. We provide our customer high qualified Zink coating, Tin coating, Nickel coating, electrophoresis, etc. They have excellent performance in the SST test to against humidity and temperature, which guarantee its application in harsh environment.

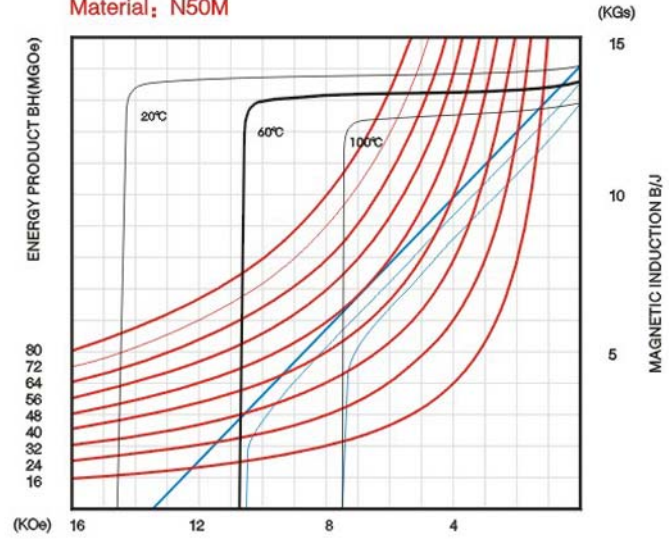
During the production process, environmental protection is highlighted, and all the coating and plating confirm to ROHS standard.

Serial Number	Type of Coating	Coating Thickness	Coating Color	PCT (Hour)	SST (Hour)
1	Zink	Tri-valent Chrome White Zink	Blue And White	/	$> 48$
		Tri-valent Chrome Colored Zink			
2	Nickel	Ni-Cu-Ni	Bright Silvery	$> 96$	$> 72$
		Chemical Ni	Dark Silvery	$> 48$	$> 120$
		Black Ni	Deep Black	$> 48$	$> 72$
3	Nickel + Tin	$10 \sim 30\mu\text{m}$	SilverWhite	/	$> 120$

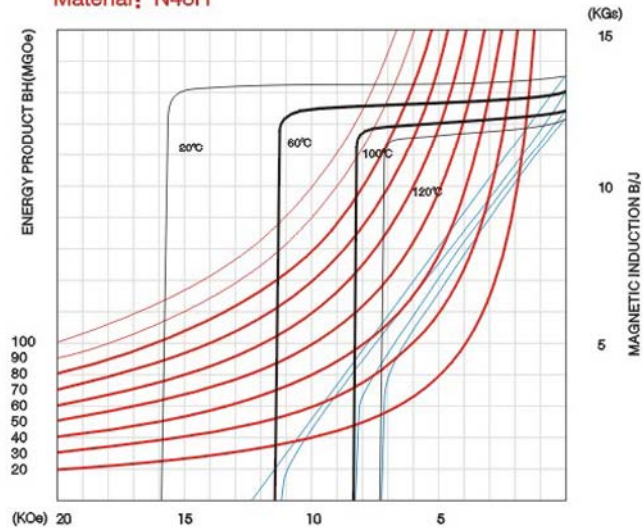
Material: N52



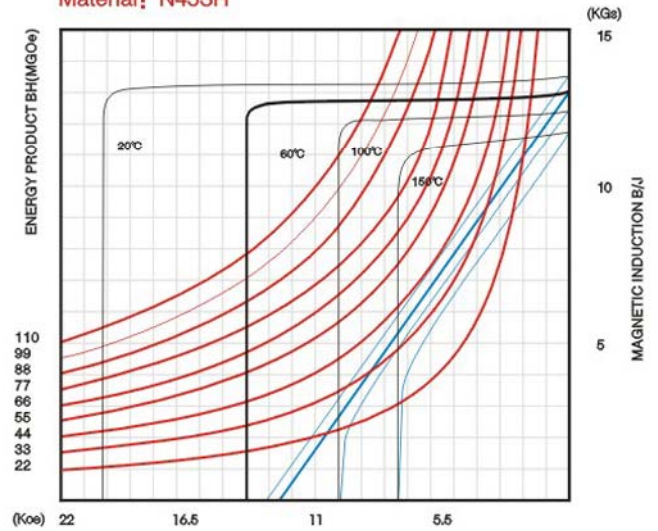
Material: N50M



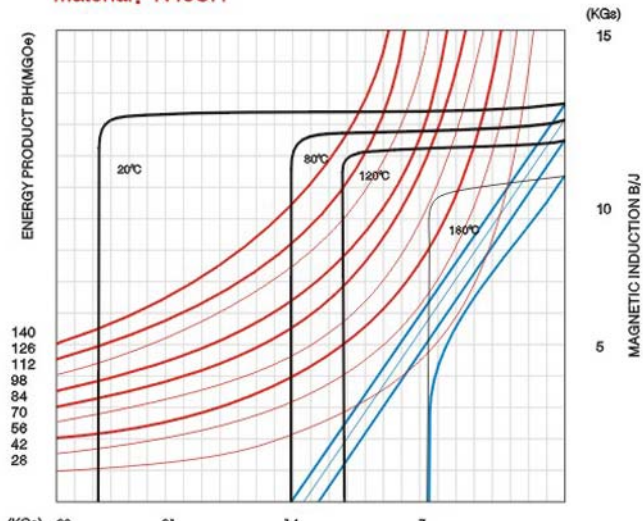
Material: N48H



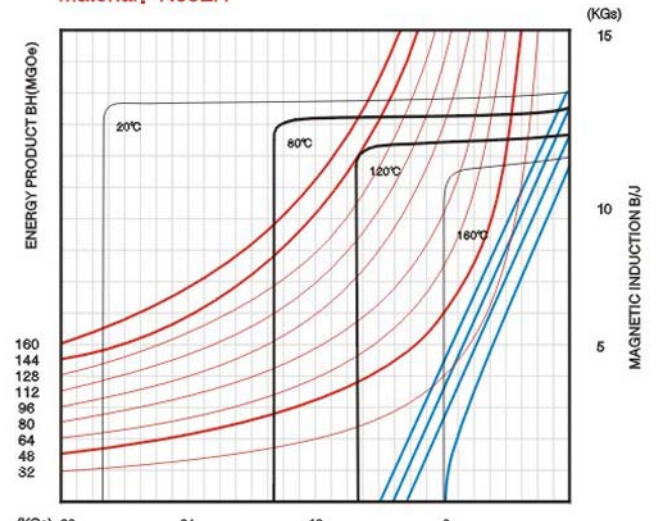
Material: N45SH



Material: N40UH



Material: N38EH



# Magnetic Properties

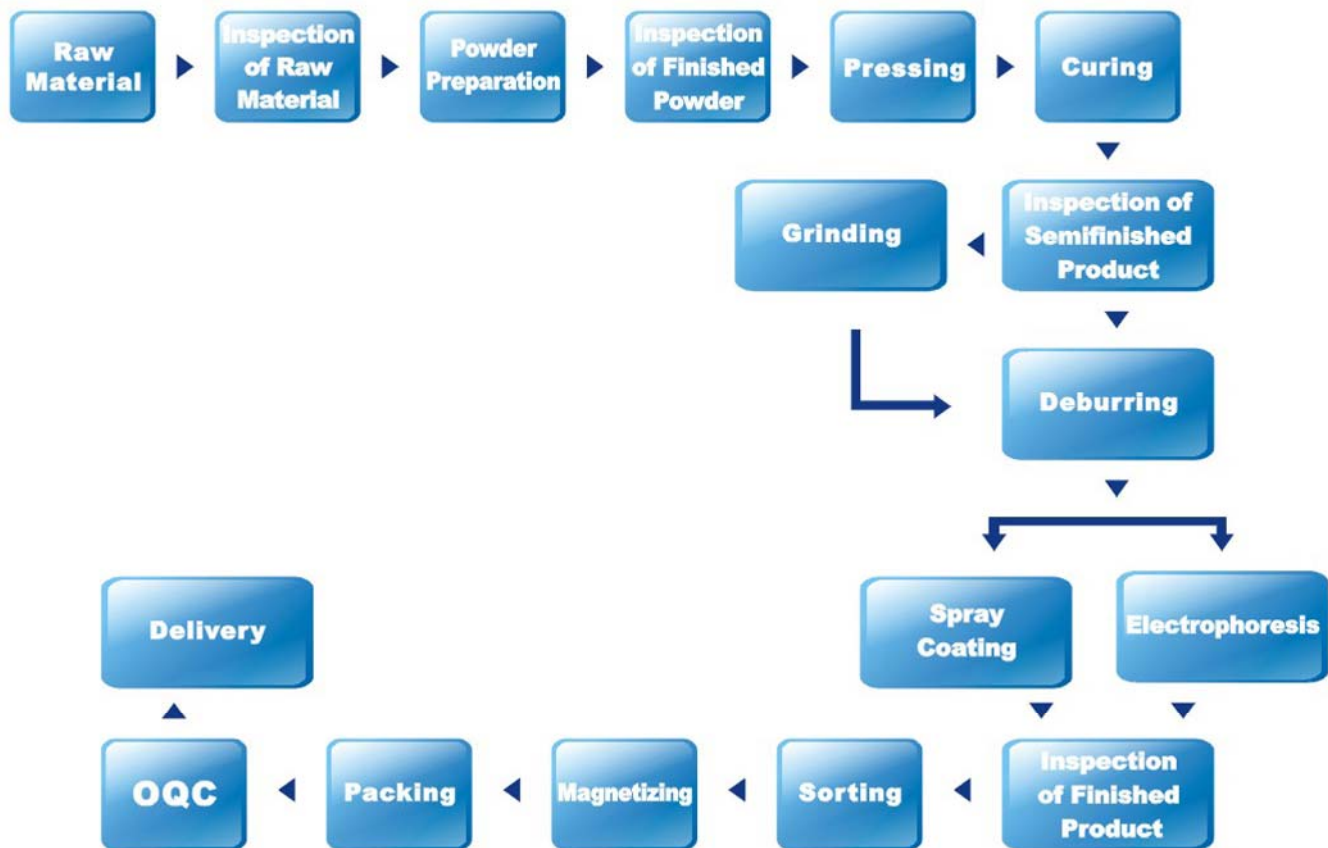
Grade	Remanence (Min)		Magnetic Induction Coercivity(Min)		Intrinsic Coercivity(Min)		Max Magnetic energy Product (Range)		Maximum Working Temperature
	Br		Hcb		Hcj		(BH)max		
	KGs	T	KOe	KA/m	KOe	KA/m	MGOe	KJ/m <sup>3</sup>	°C
N52	14.3	1.43	10.5	836	11	876	49 ~ 53	390 ~ 422	80
N50	14.0	1.40	10.5	836	11	876	48 ~ 51	380 ~ 406	80
N48	13.7	1.37	10.5	836	11	876	46 ~ 49	366 ~ 390	80
N45	13.3	1.33	10.8	860	12	960	42 ~ 46	335 ~ 366	80
N42	13.0	1.30	10.8	860	12	960	40 ~ 43	320 ~ 343	80
N40	12.7	1.27	10.8	860	12	960	38 ~ 41	302 ~ 327	80
N38	12.3	1.23	10.8	860	12	960	36 ~ 39	287 ~ 310	80
N35	11.8	1.18	10.8	860	12	960	33 ~ 37	263 ~ 295	80
N50M	14.0	1.40	13.1	1042	14	1114	48 ~ 51	380 ~ 406	100
N48M	13.6	1.36	12.8	1018	14	1114	46 ~ 49	366 ~ 390	100
N45M	13.3	1.33	12.5	994	14	1114	42 ~ 46	335 ~ 366	100
N42M	13.0	1.30	12.0	955	14	1114	40 ~ 43	320 ~ 343	100
N40M	12.7	1.27	11.8	939	14	1114	38 ~ 41	302 ~ 327	100
N38M	12.3	1.23	11.6	915	14	1114	36 ~ 39	287 ~ 310	100
N35M	11.8	1.18	10.8	860	14	1114	33 ~ 37	263 ~ 295	100
N50H	14.0	1.40	13.1	1042	17	1350	48 ~ 51	380 ~ 406	120
N48H	13.6	1.36	12.8	1018	17	1350	46 ~ 49	366 ~ 390	120
N45H	13.3	1.33	12.5	994	17	1350	42 ~ 46	335 ~ 366	120
N42H	13.0	1.30	12.0	955	17	1350	40 ~ 43	320 ~ 343	120
N40H	12.7	1.27	11.8	939	17	1350	38 ~ 41	302 ~ 327	120
N38H	12.3	1.23	11.6	915	17	1350	36 ~ 39	287 ~ 310	120
N35H	11.8	1.18	11.0	876	17	1350	33 ~ 37	263 ~ 295	120
N33H	11.4	1.14	10.6	844	17	1350	31 ~ 35	247 ~ 279	120
N30H	10.8	1.08	10.0	795	17	1350	28 ~ 32	223 ~ 255	120

Grade	Remanence (Min)		Magnetic Induction Coercivity		Intrinsic Coercivity		Max Magnetic energy Product (Range)		Maximum Working Temperature
	Br		Hcb		Hcj		(BH)max		
	KGs	T	Koe	KA/m	Koe	KA/m	MGOe	KJ/m <sup>3</sup>	°C
N45SH	13.3	1.33	12.5	994	20	1600	42 ~ 46	335 ~ 366	150
N42SH	13.0	1.30	12.0	955	20	1600	40 ~ 43	320 ~ 343	150
N40SH	12.7	1.27	11.8	939	20	1600	38 ~ 41	302 ~ 327	150
N38SH	12.3	1.23	11.6	915	20	1600	36 ~ 39	287 ~ 310	150
N35SH	11.8	1.18	11.0	876	20	1600	33 ~ 37	263 ~ 295	150
N33SH	11.4	1.14	10.6	844	20	1600	31 ~ 35	247 ~ 279	150
N30SH	10.8	1.08	10.0	795	20	1600	28 ~ 32	223 ~ 255	150
N42UH	13.0	1.30	12.0	955	25	2000	40 ~ 43	320 ~ 343	180
N40UH	12.7	1.27	11.8	939	25	2000	38 ~ 41	302 ~ 343	180
N38UH	12.3	1.23	10.6	915	25	2000	36 ~ 39	287 ~ 310	180
N35UH	11.8	1.18	10.8	860	25	2000	33 ~ 37	263 ~ 295	180
N33UH	11.4	1.14	10.6	844	25	2000	31 ~ 35	247 ~ 279	180
N30UH	10.8	1.08	10.0	795	25	2000	28 ~ 32	223 ~ 255	180
N28UH	10.4	1.04	9.5	756	25	2000	26 ~ 29	207 ~ 231	180
N38EH	12.3	1.23	11.6	915	30	2400	36 ~ 39	287 ~ 310	200
N35EH	11.8	1.18	11.0	876	30	2400	33 ~ 37	263 ~ 295	200
N33EH	11.4	1.14	10.6	844	30	2400	31 ~ 35	247 ~ 279	200
N30EH	10.8	1.08	10.0	795	30	2400	28 ~ 32	223 ~ 255	200
N28EH	10.4	1.04	9.5	756	30	2400	26 ~ 29	207 ~ 231	200
N33VH	11.4	1.14	10.6	844	35	2800	31 ~ 35	247 ~ 279	220
N30VH	10.8	1.08	10.0	795	35	2800	28 ~ 32	223 ~ 255	220

**Note:**

1. The above-mentioned data of magnetic parameters and physical properties are given at room temperature.
2. The maximum service temperature of magnet is changeable due to the ratio of length and diameter, coating and environmental factors.
3. Density: 7.4-7.65g/cm<sup>3</sup> Reversible Temperature Coefficient:  $\alpha$ : 0.13~-0.09%/°C;  $\beta$ : 0.80~-0.50%/°C; Hardness: HV600

## Process Flow Chart of Bonded Nd-Fe-B Magnet



**Powder Preparation**



**Pressing**



**Curing**



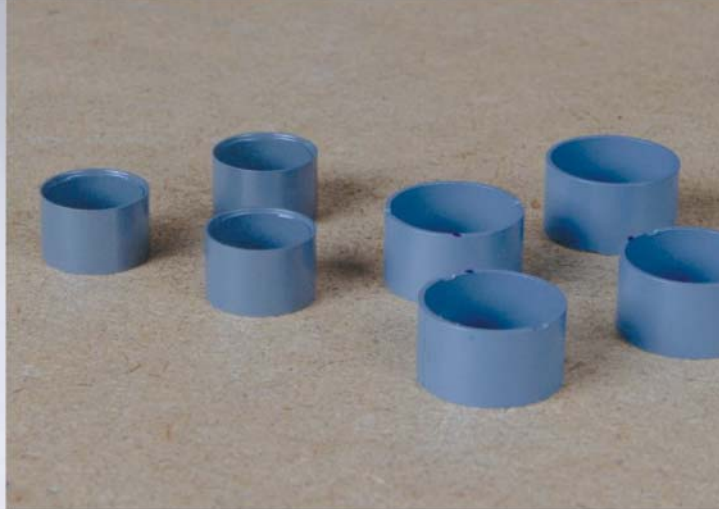
**Electrophoresis**



**Inspection**



**Sorting**



## Bonded Nd-Fe-B Products

Bonded Nd-Fe-B Magnet is a new kind of composite permanent magnetic material which is made by bonding rapidly-quenched nano-crystalline Nd-Fe-B powder with polymer binding material. The application area involves mainly in motors and sensors.

### Screw-Type Magnetization

Innuovo Magnetics provides customers various kinds of multi-pole magnetization products. With self-designed magnetizing yokes, we are able to magnetize multi-poles on the inner side and outside, plane side of the magnet, and also screw-type magnetization, especially for products that have limited space between each pole, and products require screw-type magnetization.

### A Whole Line of Specifications.

Innuovo owns a complete set of equipment. We have a whole line of pressing machine, for instance 3T-6T-16T-40T-100T-315T, which made us capable of producing products with all kind of dimensions.

## The range of dimensional tolerance for Bonded Nd-Fe-B

Unit: mm

Diameter Range	Diameter Tolerance	Circularity	Concentricity
≤4	0.03	0.02	0.04
4-10	0.04	0.02	0.05
10-18	0.06	0.03	0.05
18-30	0.08	0.04	0.06
30-50	0.10	0.05	0.06
50-80	0.10	0.06	0.08
> 80	0.12	0.06	0.08

Unit: mm

Height Range	Height Tolerance	Parallelism	Rectangularity
≤4	0.06	0.04	0.04
4-10	0.08	0.05	0.06
10-18	0.10	0.06	0.08
18-30	0.15	0.08	0.10
30-50	0.20	0.10	0.12
> 50	0.30	0.12	0.15

## Grade of Bonded Nd-Fe-B Magnet

Grade	Remanence		Intrinsic Coercivity		Magnetic Induction Coercivity		Max Magnetic Energy Product		Maximum Working Temperature
	Br		Hcj		Hcb		(BH)max		°C
	KGs	mT	KOe	KA/m	KOe	KA/m	MGOe	KJ/m <sup>3</sup>	
BNM-5	5.7-6.2	570-620	7.0-9.0	560-720	3.6-4.0	288-320	5.0-6.0	40-48	120-140
BNM-6	5.8-6.3	580-630	8.0-10.0	640-800	4.0-4.7	322-376	6.0-7.0	48-56	120-140
BNM-7	5.9-6.4	590-640	8.0-10.0	640-800	4.5-5.2	360-416	7.0-8.0	56-64	120-140
BNM-8	6.2-6.7	620-670	8.5-10.0	680-800	5.0-5.8	400-464	8.0-9.0	64-72	120-140
BNM-9	6.4-6.9	640-690	8.5-10.0	680-800	5.2-5.6	416-448	8.5-9.5	68-76	120-140
BNM-10	6.7-7.2	670-720	8.5-10.0	680-800	5.2-6.0	416-480	9.0-10.0	72-80	120-140
BNM-11	6.9-7.4	690-740	9.0-10.5	720-840	5.0-5.8	400-464	10.0-11.0	80-88	120-140
BNM-12	7.4-7.6	740-760	9.0-10.5	720-840	5.7-6.4	456-512	11.0-12.0	88-96	120-140
BNM-11L	7.0-7.5	700-750	6.5-8.0	520-640	5.0-5.8	400-464	10.0-11.0	80-88	120-140
BNM-12L	7.5-8.0	750-800	6.5-8.0	520-640	5.4-6.2	432-496	10.5-11.5	84-92	120-140
BNM-8SR	6.2-6.7	620-670	11.0-14.0	880-1120	5.0-5.8	400-464	8.0-9.0	64-72	140-160

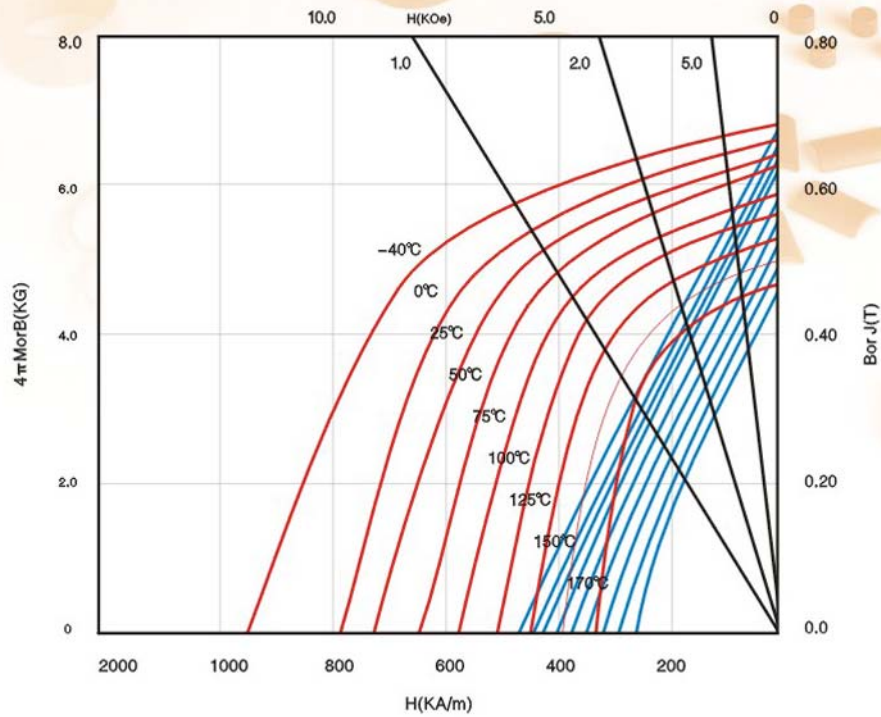
Grade	Recoil Permeability	Saturation Magnetizing Force		Density	Reversible Temp Coefficient
	$\mu_{rec}$	Hs		g/cm <sup>3</sup>	Br
		KOe	KA/m		%/°C
BNM-5	1.1-1.2	≥20	≥1600	5.8-6.2	-0.1~-0.13
BNM-6	1.1-1.2	≥20	≥1600	5.8-6.2	-0.1~-0.13
BNM-7	1.1-1.2	≥20	≥1600	5.8-6.2	-0.1~-0.13
BNM-8	1.1-1.2	≥20	≥1600	5.8-6.2	-0.1~-0.13
BNM-9	1.1-1.2	≥20	≥1600	5.8-6.2	-0.1~-0.13
BNM-10	1.1-1.2	≥20	≥1600	5.8-6.2	-0.1~-0.13
BNM-11	1.1-1.2	≥20	≥1600	5.8-6.2	-0.1~-0.13
BNM-12	1.1-1.2	≥20	≥1600	6.0-6.4	-0.1~-0.13
BNM-11L	1.1-1.2	≥20	≥1600	5.8-6.2	-0.1~-0.13
BNM-12L	1.1-1.2	≥20	≥1600	5.8-6.2	-0.08~-0.13
BNM-8SR	1.1-1.2	≥20	≥1600	5.8-6.2	-0.1~-0.13

## Superficial Coating

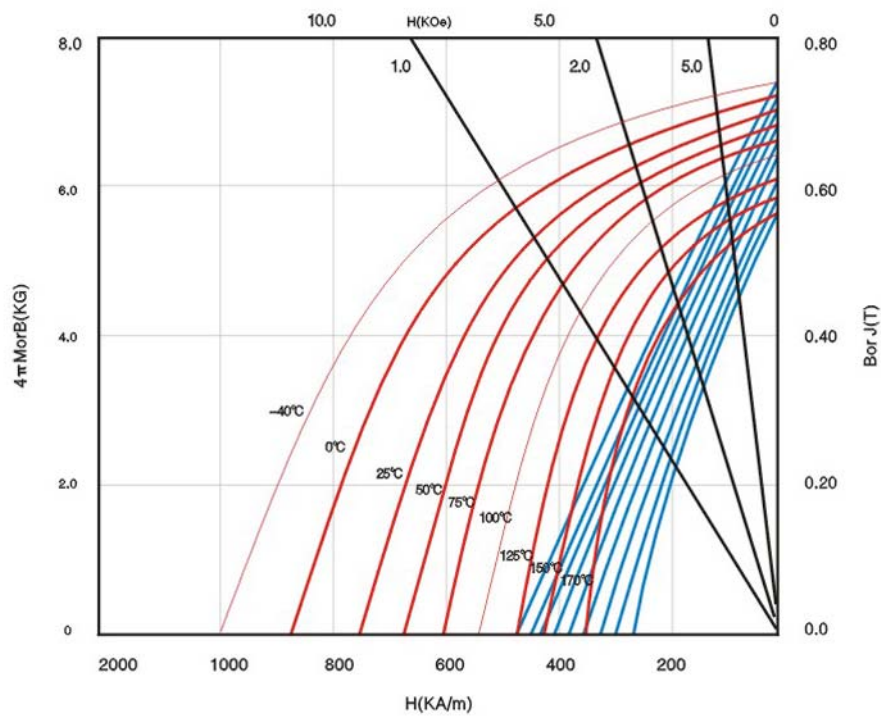
Serial Number	Type of Coating	Coating Thickness	Anticorrosive ability	Adhesion Force	Note
1	Electrophoresis	10-30um	Strong	Strong	Mount Point
2	Spray Coating	5-20um	Normal	Normal	Restriction of Specification
3	Impregnation	1-3um	Weak	Weak	/
4	Parylene	5-20um	Strong	Strong	High Cost



# BH Curve of Bonded Nd-Fe-B Magnet



**BNM8**



**BNM10**

**By Bus:**

YIWU — HENGDIAN : 30 minutes

HANGZHOU Airport — HENGDIAN: 1 and half hours

SHANGHAI Pudong Airport — HENGDIAN: 3 and half hours

NINGBO Airport — HENGDIAN: 2 hours

**By Bullet Train**

From HANGZHOU, through YIWU, arrived our company: 1 and half hours

From SHANGHAI, through YIWU, arrived our company: 2 and half hours





Innuovo Magnetics is dedicated to a path of brand building. We commit to provide highly qualified products and considerate services to our customers. Innuovo would like to bring the cooperative strength together to serve the global market.



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