Magnetic Products Online Brochure

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Product guide

These magnets offer magnetic characteristics that are overwhelmingly superior to those of existing magnets. These products are incredibly powerful.

Our NEOFLUX series

This type of magnet achieves the highest magnetic energy of all permanent magnets now in practical use. The main phase of the magnetism of rare-earth magnets developed conventionally was a two-component alloy. However, neodymium magnets combine neodymium with iron and boron to constitute a three-component, anisotropic-sintered rare-earth magnet with an atomic ratio of Nd 2 Fe 14 B 1.

The neodymium magnet exhibits excellent performance in terms of size reduction, thinning, weight reduction and enhancing the efficiency of applied equipment. However, its magnetic characteristics and corrosion-resistance performance require caution in use of the product at high temperature. For the dynamic characteristics of the product at high temperature, the Br temperature characteristics of the magnet must be sufficiently considered.

■The main characteristics of neodymium magnets are as follows:

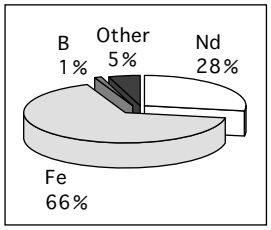
a) Its maximum energy product (BH max) far exceeds that of ferrite (4.5 MGOe) and samarium-cobalt magnets (30 MGOe). Some models even exceed 48 MGOe.
b) Since it consists mainly of relatively inexpensive neodymium and iron, it offers better cost performance than samarium-cobalt magnets that contain much cobalt, and poses no concern over availability.
c) Although these magnets have temperature characteristics inferior to those of samarium-cobalt magnets, heat-resistant materials have been developed with higher magnetic coercive force for the following: NF-H series, NF-SH series and NF-UH series.
d) Of the main components, iron accounts for nearly 70%. To ensure rustproofing, these magnets are equipped with Ni electrolytic plating as standard.

■Caution that you should exercise

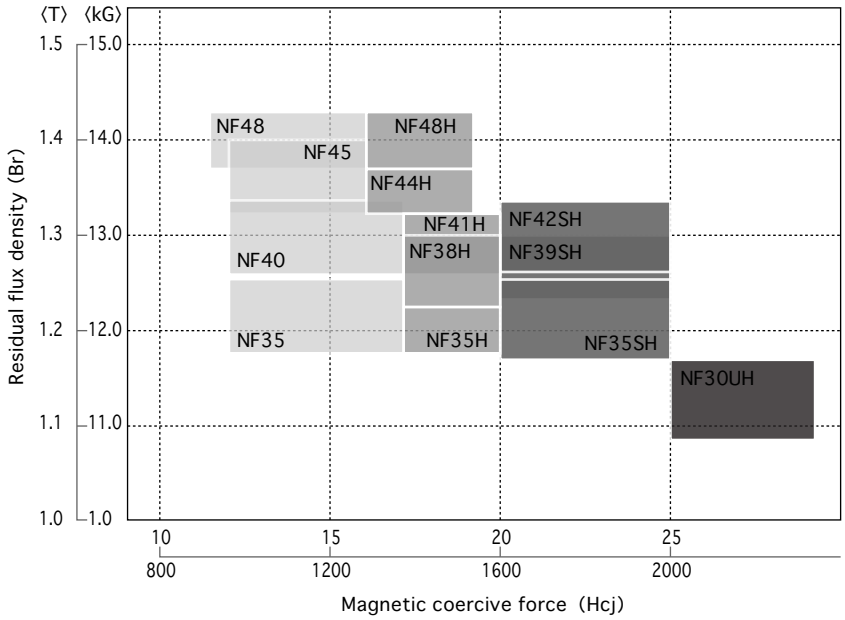
For high-temperature demagnetization, refer to the Hcj temperature characteristics of the magnets. For the NF series, we therefore provide different materials with various Hcj levels. Even with the same material, these magnets vary in demagnetization characteristics according to shape. These materials also make the magnets prone to rusting. Therefore, the products should undergo surface treatment.

■ Magnetic characteristics

Material name NF-H NF-SH NF-UH series	Residual flux density (Br) kG ／ T	Residual flux density (H_{CB}) kOe ／ kA/m	Residual flux density (H_{CJ}) kOe ／ kA/m	(BH)max MGOe ／ kJ/m³
NF35H	11.8～12.5 1.18～1.25	≧11.0 ≧875	≧17.0 ≧1353	33～37 263～294
NF38H	12.2～13.0 1.22～1.30	≧11.5 ≧915	≧17.0 ≧1353	36～40 286～318
NF41H	12.6～13.2 1.26～1.32	≧11.8 ≧939	≧17.0 ≧1353	38～42 302～334
NF44H	13.0～13.7 1.30～1.37	≧12.1 ≧963	≧16.0 ≧1274	41～45 326～358
NF48H	13.7～14.3 1.37～1.43	≧12.9 ≦1026	≧16.0 ≧1274	45～49 358～390
NF35SH	11.8～12.5 1.18～1.25	≧11.0 ≧875	≧20.0 ≧1592	33～37 263～294
NF39SH	12.3～13.0 1.23～1.30	≧11.6 ≧923	≧20.0 ≧1592	36～40 287～318
NF42SH	12.8～13.3 1.28～1.33	≧12.0 ≧955	≧20.0 ≧1592	39～43 310～342
NF30UH	10.8～11.6 1.08～1.16	≧10.2 ≧812	≧25.0 ≧1989	28～32 223～255



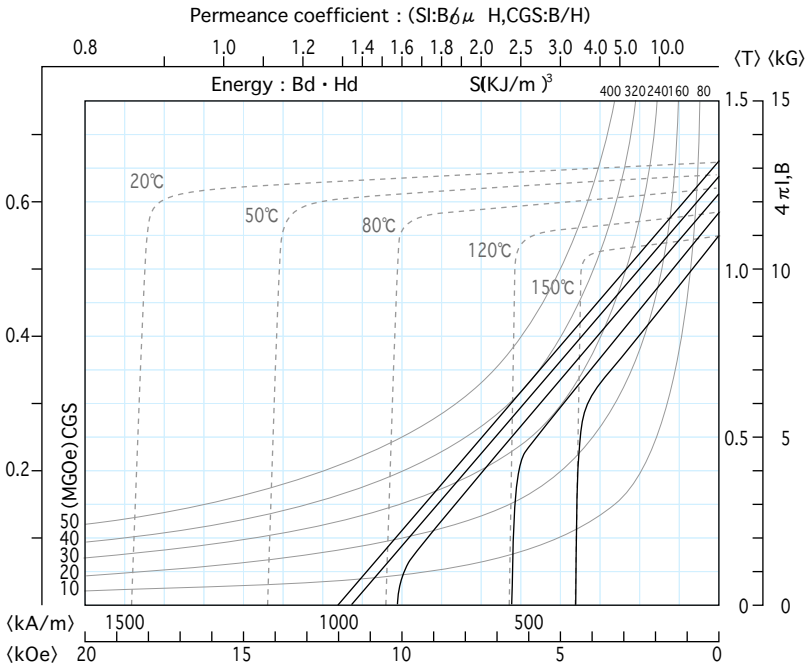
■Characteristic distribution diagram for the NEOFLUX series



■Force of magnets

Magnets support various technologies, including electric vehicles, linear motor cars, mobile phones, and even therapy for stiff shoulders. The Sagami Chemical Metal Group, as an industrial magnet manufacturer, pursues the possibilities of magnets and opens up a new future with magnets. It meets all kinds of needs. For anything about magnets, please do not hesitate to consult us.

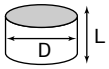
■Demagnetization curve



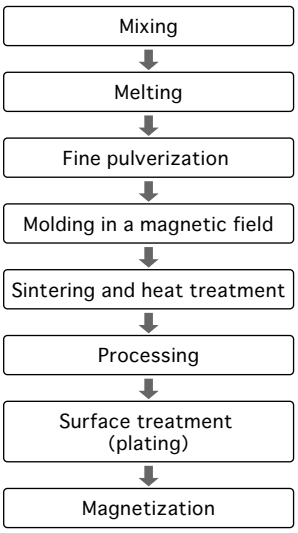
■Physical characteristics

Series name	Temperature coefficient (20℃～Tw) −%／℃ αBr	αH	Density (D) g／m³	Curie temperature (Tc) ℃	Vickers hardness (HV)	＊Operating temperature (℃) Tw
NF-H series	0.11	0.6	7.3～7.5	320～340	500～600	＜ 120
NF-SH series	0.1	0.6	7.3～7.5	340～400	500～600	＜ 150
NF-UH series	0.09	0.6	7.3～7.5	350～400	500～600	＜ 180

＊This is when cylinder L/D = 0.7 (Pc≒2). If the L/D level is low (small thickness), other considerations are necessary.



■Manufacturing process for magnets (outline)



1.Mix the ingredients.

2.Dissolve the mixture at high temperature and prepare an alloy.

3.Turn the alloy into fine powder.

4.When pressing the fine powder, apply a magnetic field to it and prepare a molded product of powder with aligned directions of magnetization.

5.Sinter the product at about 1,100℃, and then subject it to heat treatment at about 600℃ to increase its magnetic characteristics.

6.Process the manufactured magnet base material and finish it into the product shape.

7.Subject the product to surface treatment in order to make it rustproof.

8.Apply a magnetic field to give the magnet magnetism.

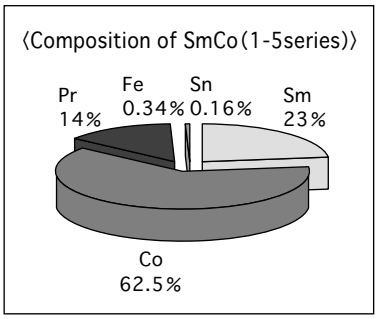
Product guide

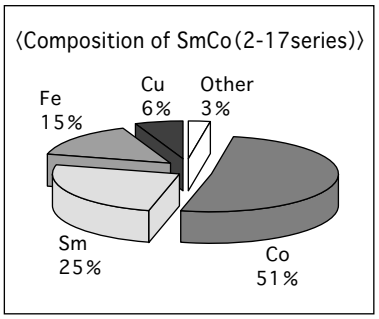
These magnets are characterized by high magnetism, and are also resistant to both rust and high temperature. These magnets represent the highest magnetic energy product after neodymium magnets. They are also highly corrosion-resistant without being rustproofed and offer excellent temperature characteristics as well. These are rare-earth magnets resistant to high temperature.

These sintered products consist mainly of samarium (Sm) and cobalt (Co), and are available with two kinds of material: 1-5 series and 2-17 series. The 1-5 series has high magnetic coercive force (Hcj), but is easy to magnetize and adjust magnetism. Magnets of this series also exhibit relatively stable performance under changing temperature. The 2-17 series has high magnetism and offers excellent temperature stability in magnetic characteristics as well.
Samarium-cobalt magnets are relatively low in mechanical strength. Caution should therefore be exercised in handling these magnets to prevent chipping and cracking.

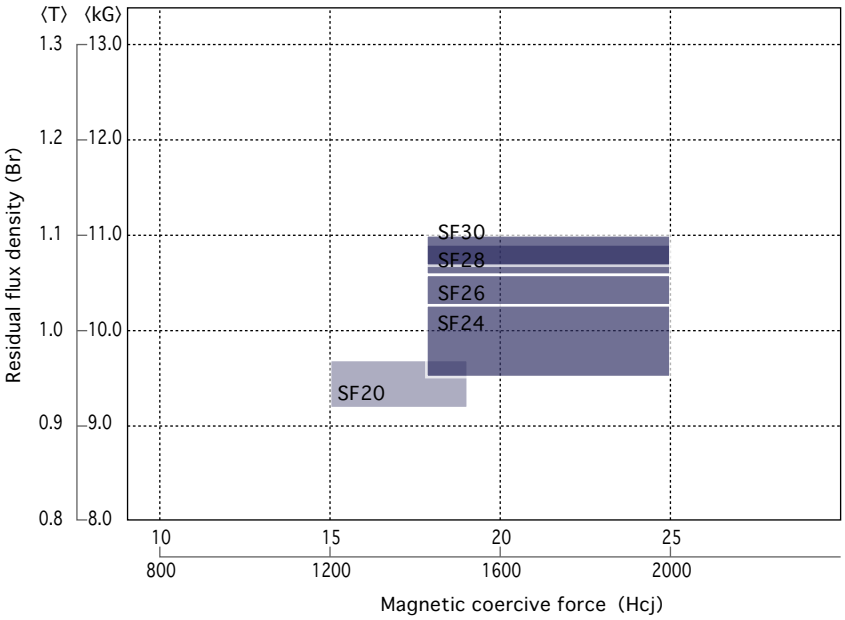
■Magnetic characteristics

Material name	Residual flux density (Br) kG ／ T	Magnetic coercive force (H_{CB}) kOe ／ kA/m	Magnetic coercive force (H_{CJ}) kOe ／ kA/m	Maximum energy product (BH)max MGOe ／ kJ/m³
SF20 1-5series	≧9.0 ≧0.90	≧8.5 ≧676	≧15 ≧1194	19～21 150～167
SF24 2-17series	≧9.5 ≧0.95	≧8.7 ≧692	≧18 ≧1433	22～24 175～191
SF26 2-17series	≧10.2 ≧1.02	≧9.4 ≧748	≧18 ≧1433	24～26 191～215
SF28 2-17series	≧10.3 ≧1.03	≧9.5 ≧756	≧18 ≧1433	26～28 205～220
SF30 2-17series	≧10.8 ≧1.08	≧9.9 ≧788	≧18 ≧1433	28～30 220～240

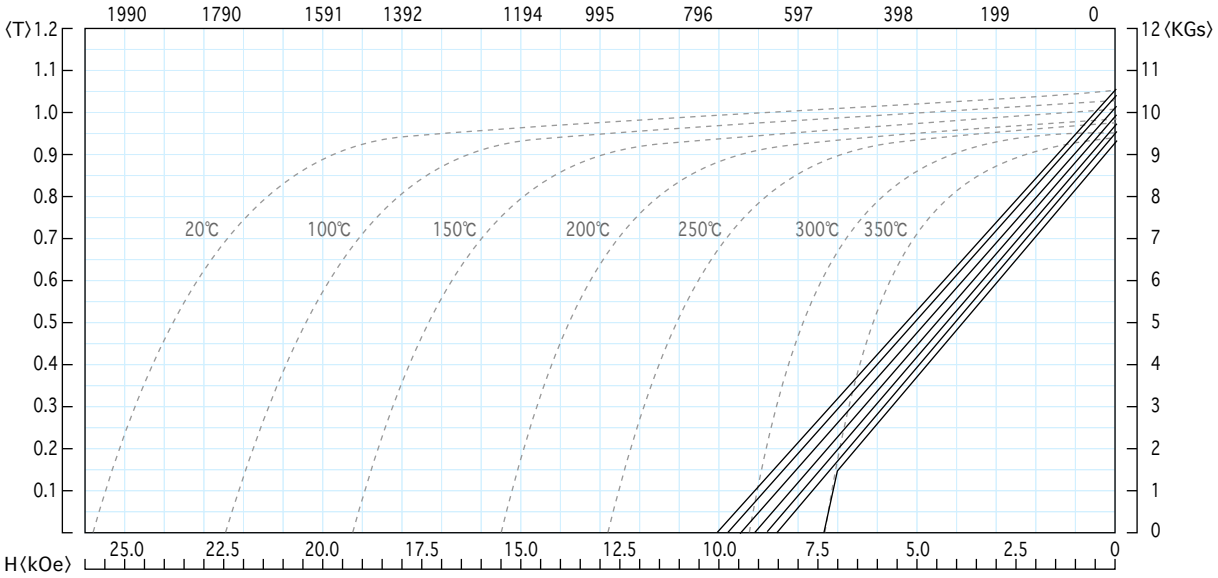




■Characteristic distribution chart for the SmCoFLUX series



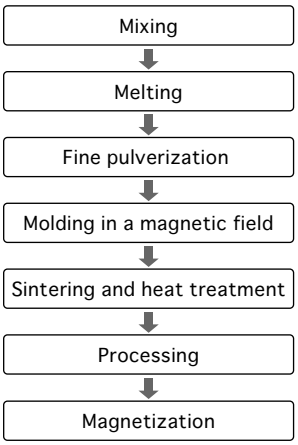
■Demagnetization curve



■Physical characteristics

Series name	Product name	Temperature coefficient (20℃~Tw) −%／℃ αBr	αH	Density (D) g／m³	Curie temperature (Tc) ℃	Vickers hardness (HV)	＊Operating temperature (℃) Tw
Sm1Co5 series	SF20	0.05	0.3	8.3	750	450～500	250
Sm2Co17 series	SF24	0.025	0.2	8.4	800	550～600	300
	SF26	0.03	0.2	8.4	800	550～600	300
	SF28	0.035	0.2	8.4	800	550～600	300
	SF30	0.035	0.2	8.4	800	550～600	300

■Manufacturing process for magnets (outline)



1.Mix the ingredients.

2.Dissolve the mixture at high temperature and prepare an alloy.

3.Turn the alloy into fine powder.

4.When pressing the fine powder, apply a magnetic field to it and prepare a molded product of powder with aligned directions of magnetization.

5.Sinter the product at about 1,200℃, and then subject it to heat treatment at about 1,000℃ in order to increase its magnetic characteristics.

6.Process the manufactured magnet base material and finish it into the product shape.

7.Surface-treat it for rustproofing.

Product guide

These magnets offer stable performance and excellent cost performance.

Iron oxide is used as the main material of these ceramic magnets, with strontium carbonate or barium carbonate used as an auxiliary material. These magnets are also manufactured by powder metallurgy.

Ferrite magnets offer the most excellent cost performance of all magnets. Made of ceramics, these magnets are advantageous in terms of chemical stability and not being subject to rust. Since the temperature changes of Br are relatively large, these magnets require a design that allows for the temperature environment. The temperature changes of Hcj are opposite those of rare-earth magnets and other metal magnets, thereby requiring sufficient caution regarding demagnetization at low temperature.

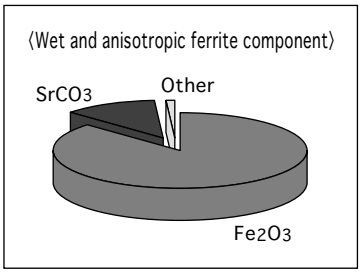
We can supply molds for ring-type, segment-type or other types of products needed by our clients by taking full advantage of our domestic and international network. Molds can be manufactured at surprisingly low cost.



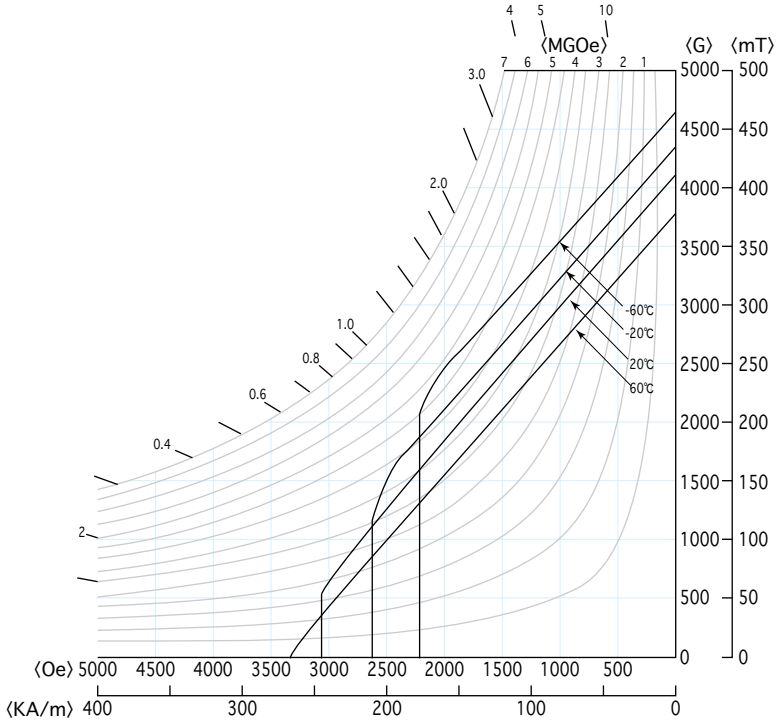
■Magnetic characteristics

Material name	Residual flux density (Br) kG ／ T	Magnetic coercive force (H_{CB}) kOe ／ kA/m	Magnetic coercive force (H_{CJ}) kOe ／ kA/m	(BH)max MGOe ／ kJ/m³
Isotropic	22 0.22	1.8 143		1.0 8.0
Dry and anisotropic	37 0.37	2.8 224	3.0 240	3.2 25.6
Wet and anisotropic	4.05 0.405	3.62 288	4.06 323	3.7 29.5
	4.0 0.4	3.1 24.7	3.15 251	3.75 29.8
	4.05 0.405	3.75 298	4.05 322	3.9 31.0
	4.0 0.4	2.8 224	2.85 224	4.0 31.8
	42 0.42	2.96 235	3.02 240	4.2 33.4
	42 0.42	3.8 303	4.0 319	4.2 33.4

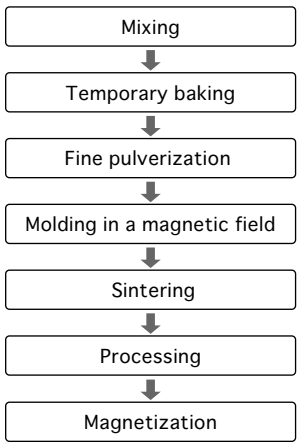
The material values indicated above are representative ones. We can also provide other materials.



■Demagnetization curve



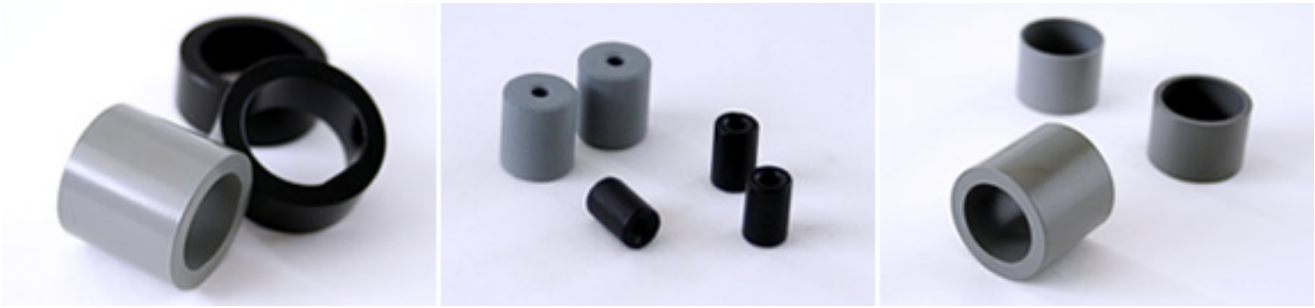
■Manufacturing process for magnets (outline)



Product guide

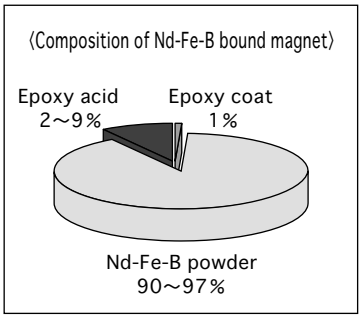
As formed, these magnets achieve high dimensional accuracy and complex shaping.

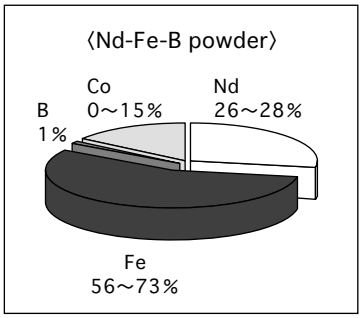
These magnets are made by combining plastics with metal powder having a combination (Nd-Fe-B) similar to that of sintered neodymium magnets and then forming the mixture. Since the magnets contain plastics, the magnetism is much lower. As formed, however, these magnets offer the advantage of being processed into thin products with high dimensional precision and products of complex shaping. Moreover, isotropic magnets are easily magnetized radially and can be magnetized in many varieties as well. Their temperature characteristics are a little lower than those of neodymium magnets, and are unsuited for use at 80° C or higher.



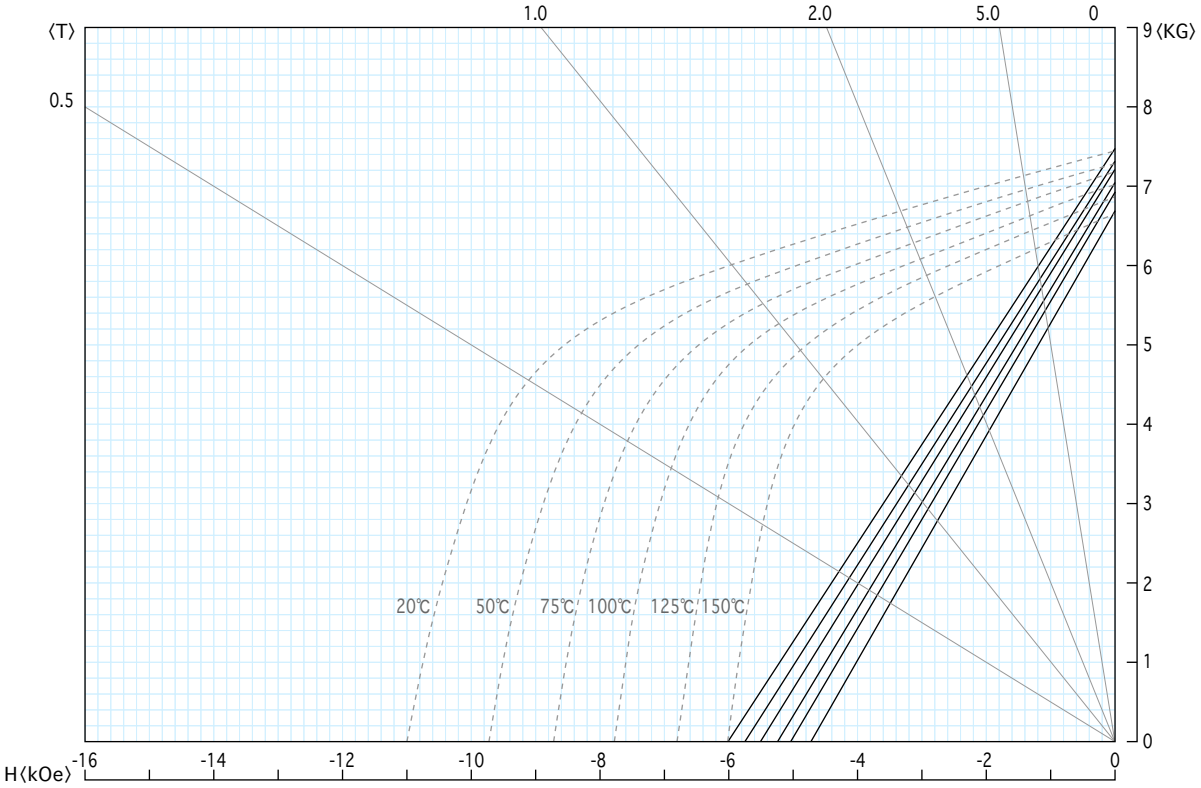
■Magnetic characteristics

Material name	Residual flux density (Br) kG ／ T	Magnetic coercive force (H_{CB}) kOe ／ kA/m	Magnetic coercive force (H_{CJ}) kOe ／ kA/m	(BH)max MGOe ／ kJ/m³
GPM-8	6.0～6.5 0.60～0.65	4.5～5.5 360～440	8.0～10.0 640～800	7.5～8.5 60～68
GPM-8L	6.2～6.8 0.62～0.68	6.2～6.8 0.62～0.68	8.0～10.0 640～800	8.0～9.0 64～72
GPM-10	6.8～7.1 0.68～0.71	5.0～6.0 400～480	8.0～10.0 640～800	9.5～10.5 76～84
GPM-10H	7.0～7.2 0.70～0.72	5.0～6.0 400～480	9.0～11.0 720～880	10～11 80～88
GPM-12	7.2～7.7 0.72～0.77	5.5～6.5 440～520	9.0～11.0 720～880	11～12 88～96
GPM-12D	7.2～7.7 0.72～0.77	5.5～6.5 440～520	10.0～12.0 800～960	11～12 88～96
GPM-13L	7.5～8.3 0.75～0.83	5.0～6.0 400～480	7.0～8.0 540～640	12～13 96～104





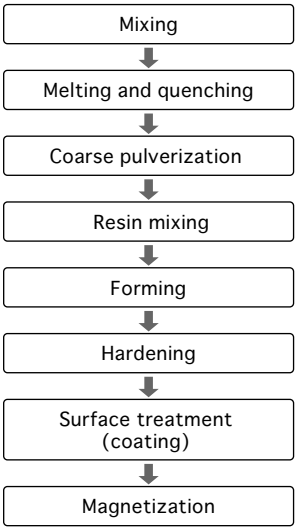
■Demagnetization curve



■Physical characteristics

Product name	Temperature coefficient (20℃~Tw) −%／℃ αBr	Density (D) g／m³	Curie temperature (Tc) ℃	Vickers hardness (HV)	＊Operating temperature (℃) Tw
GPM-8	0.11	6.0	350	78～80	160
GPM-8L	0.12	6.0	300	78～80	160
GPM-10	0.10	6.0	350	78～80	160
GPM-10H	0.10	6.2	350	78～80	160
GPM-12	0.10	6.3	350	78～80	160
GPM-12D	0.08	6.3	400	78～80	170
GPM-13L	0.11	6.3	320	78～80	150

■Manufacturing process for magnets (outline)



Product guide

These magnets are based mainly on iron (Fe), aluminum (Al), nickel (Ni) and cobalt (Co). The magnets are fragile and not ductile. Therefore, after the raw metal is melted at high temperature and turned into an alloy, it is cast into a casting mold. These magnets are therefore also known as cast magnets.

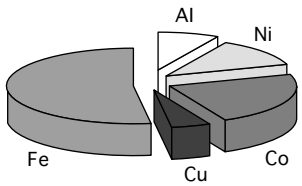
Al-Ni-Co magnets achieve high Br values and high temperature stability, readily cause low-temperature demagnetization and thermal demagnetization, achieve high mechanical strength, and offer other advantages. However, these magnets have low magnetic coercive force (Hcj) and readily undergo demagnetization due to an external magnetic field, are unsuited for thin products, and placed under other constraints. In the design process, it is therefore important to select a method of magnetization that allows for sufficient shape and magnetic characteristics, and a method of assembly in which consideration is given to demagnetization.



■Magnetic characteristics

Material name Cast	Residual flux density (Br) kG ／ T	Magnetic coercive force (H_{CB}) kOe ／ kA/m	(BH)max MGOe ／ kJ/m³	Density g ／ cm³
Al-Ni-Co 5	12.0 1.20	0.60 48	4.63 36.9	7.3
Al-Ni-Co 6	10.0 1.00	0.72 56	3.50 27.9	7.3
Al-Ni-Co 8	8.0 0.80	1.38 110	4.75 37.8	7.3
Material name Sintered				
Al-Ni-Co 5	10.5 1.05	0.58 46	3.50 27.9	7.0
Al-Ni-Co 8	7.8 0.78	1.34 107	3.90 31.0	7.0

〈Al-Ni-Co composition 〉



■Manufacturing process for magnets (outline)