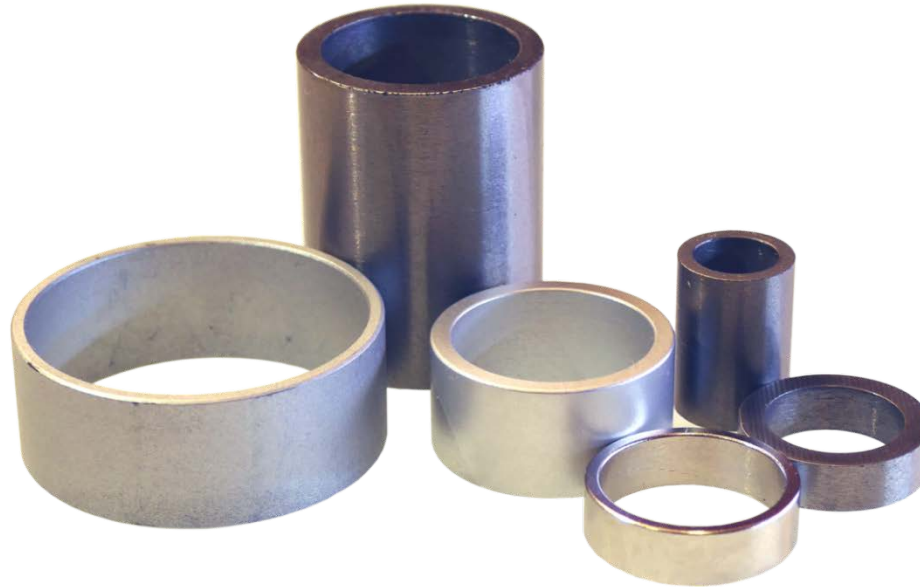
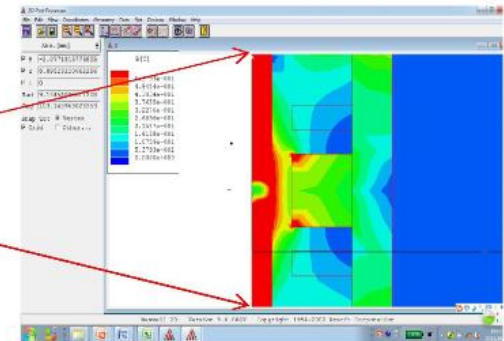
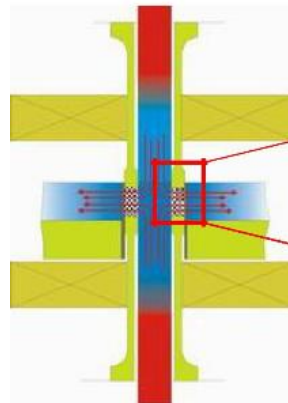
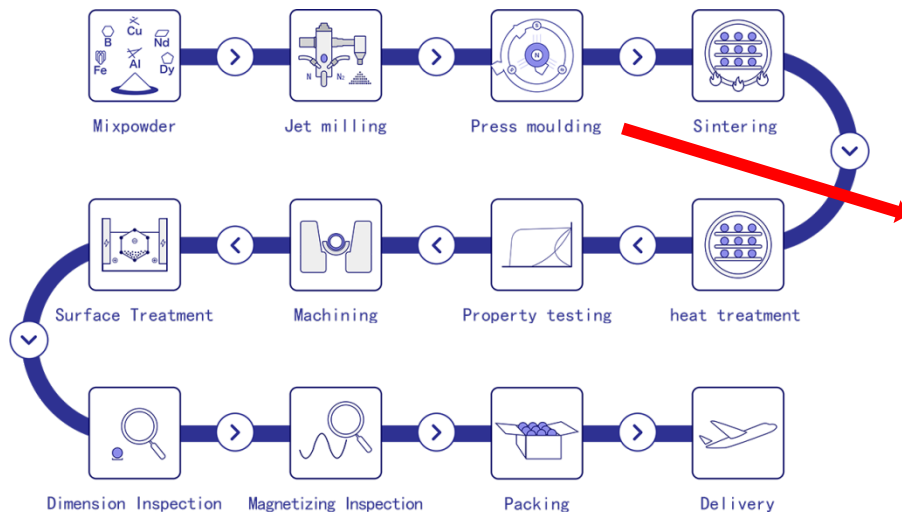


Radial Sintered NdFeB



Radial Sintered NdFeB Process



Sintered Radial NdFeB rings are made by compressing a Rare Earth powder into a cylindrical cavity while a rotating magnetic field is applied to provide the radial magnetic orientation during the pressing operation

Magnetic Properties

序号 S. N	牌号 Grade	Br		Hcb		Hcj		(BH)max	
		T	kGs	kA/m	kOe	kA/m	kOe	kJ/m^3	MGOe
		范围 Range		最小 Min		最小 Min		范围 Range	
1	N35R	1.18-1.29	11.8-12.9	756	9.5	876	11	247-296	31-37
2	N38R	1.20-1.32	12.0-13.2	764	9.6	876	11	255-318	32-40
3	N42R	1.22-1.35	12.2-13.5	772	9.7	876	11	271-334	34-42
4	N35MR	1.18-1.29	11.8-12.9	756	9.5	995	12.5	247-295	31-37
5	N38MR	1.20-1.32	12.0-13.2	764	9.6	995	12.5	255-318	32-40
6	N42MR	1.22-1.35	12.2-13.5	772	9.7	995	12.5	271-334	34-42
7	N35HR	1.18-1.29	11.8-12.9	764	9.6	1114	14	247-295	31-37
8	N38HR	1.20-1.32	12.0-13.2	772	9.7	1114	14	255-318	32-40
9	N40HR	1.21-1.33	12.1-13.3	772	9.7	1114	14	263-326	33-41
10	N42HR	1.22-1.35	12.2-13.5	780	9.8	1114	14	271-334	34-42
11	N45HR	1.25-1.39	12.5-13.9	788	9.9	1114	14	287-358	36-45
12	N35SHR	1.18-1.29	11.8-12.9	772	9.7	1274	16	247-295	31-37
13	N38SHR	1.20-1.32	12.0-13.2	780	9.8	1274	16	255-318	32-40
14	N40SHR	1.21-1.33	12.1-13.3	780	9.8	1274	16	263-326	33-41
15	N42SHR	1.22-1.35	12.2-13.5	796	10	1274	16	271-334	34-42
16	N35UHR	1.18-1.29	11.8-12.9	780	9.8	1512	19	247-295	31-37
17	N38UHR	1.20-1.32	12.0-13.2	796	10	1512	19	255-318	32-40

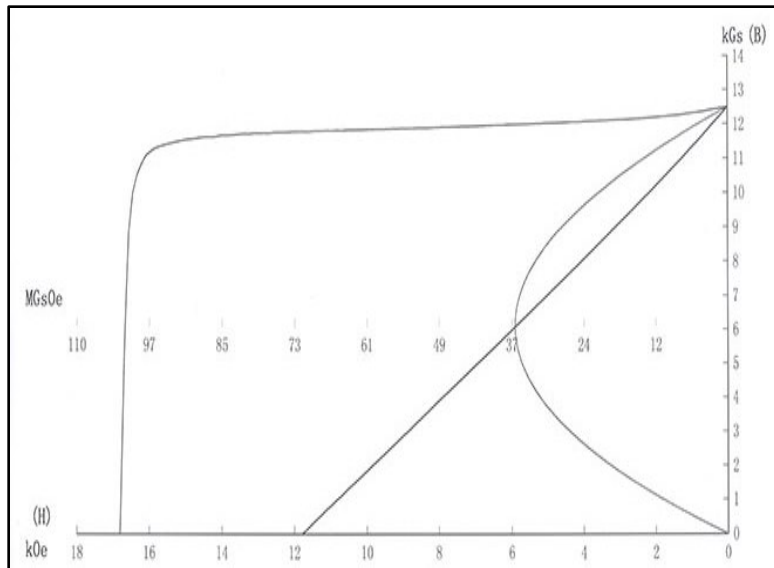
Radial NdFeB Grades

Grade	Remanence Induction	Coercive Force	Intrinsic Coercive Force	Maximum Energy Product
	Br	Hcb	Hcj	(BH)max
	kGs	kOe	kOe	MGOe
N42	12.9-13.2	≥ 10.5	≥ 12	40-43
N38	12.2-12.6	≥ 10.8	≥ 12	36-38
N35	11.7-12.2	≥ 10.8	≥ 12	33-36
N42M	12.9-13.2	≥ 12.0	≥ 14	40-42
N40M	12.6-12.9	≥ 11.8	≥ 14	38-40
N38M	12.2-12.6	≥ 11.5	≥ 14	36-38
N35M	11.7-12.2	≥ 11.0	≥ 14	33-36
N45H	13.2-13.8	≥ 12.4	≥ 17	42-46
N42H	12.9-13.2	≥ 12.0	≥ 17	40-42
N40H	12.6-12.9	≥ 11.8	≥ 17	38-40
H38H	12.2-12.6	≥ 11.6	≥ 17	36-38
N35H	11.7-12.2	≥ 11.0	≥ 17	33-36
N42SH	12.9-13.2	≥ 12.1	≥ 20	40-42
N40SH	12.6-12.9	≥ 11.7	≥ 20	38-40
N38SH	12.2-12.6	≥ 11.3	≥ 20	36-38
N35SH	11.7-12.2	≥ 11.0	≥ 20	33-36
N38UH	12.2-12.6	≥ 11.5	≥ 25	36-38
N35UH	11.7-12.2	≥ 11.0	≥ 25	33-36

Traditional NdFeB Grades

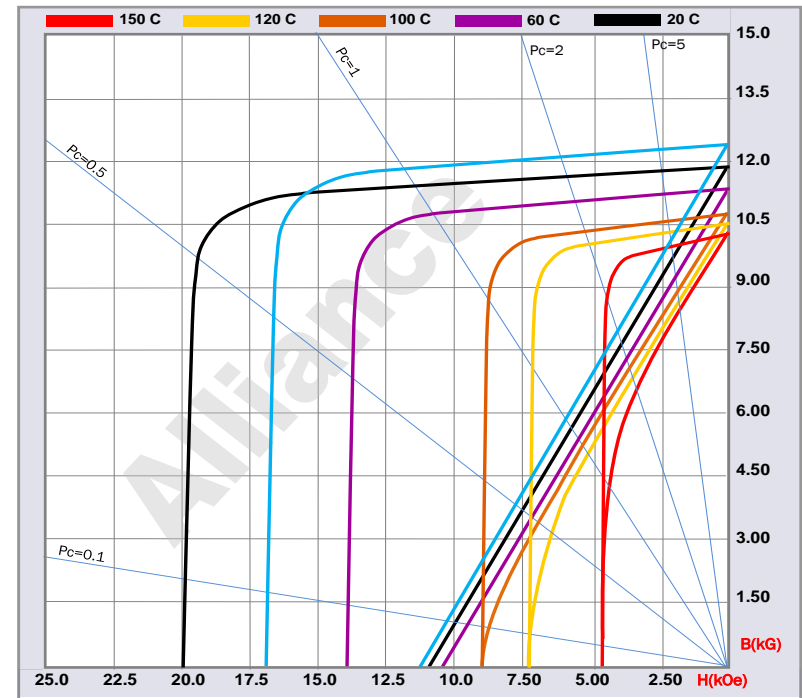
Magnetic Properties: BH Curve

BH CURVE FOR 35SHR AT 21.3 C:



Br 12.49 T
 Hc 11.65 kOe
 Hci 17.23 kOe
 BHmax 35.92 MGOe

Sample: OD 22.84 x ID 18.24 x L 16.00 mm



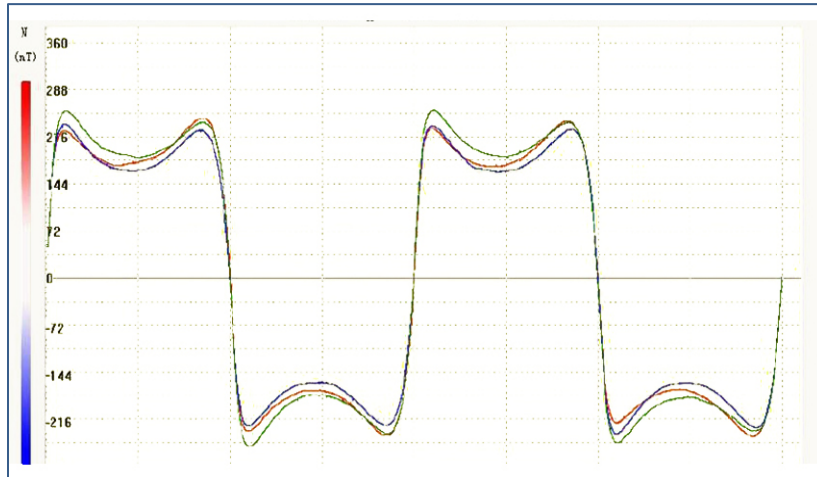
20C Comparison of 35SHR (light blue) to 35SH (black)

Testing Limitations for BH

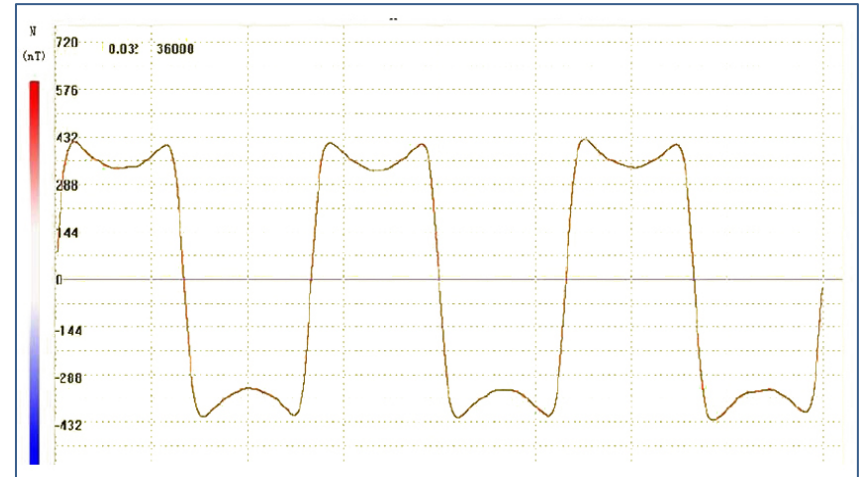
Radial Sintered Neo Magnet Test for Elevated Temp BH Curve:

- The following test can be performed to measure high temperature demagnetization curves:
- Assemble and install in a motor and then test the motor performance parameters at various temperatures (This is the normal practice for customers of this product)
- About test method:
- At present, there is no unified standard for testing of a radial oriented ring. The current BH curves are obtained by wire EDM cutting the radial ring into 30 deg arcs. Then the two arcs are stacked together and placed into a Permeameter. This method is not accurate because the field is not uniform between the Permeameter poles and can only be used as a reference.
- Our method for testing of the radial ring performance parameter is:
- Radial ring is assembled with other component and magnetized, measure the magnetic flux (This value is related to B_r at ambient temperature)
- Repeat the same test at elevated temperatures to obtain the H_{ci} and reversible T coefficient.
- Tests conducted by customers:
- Assemble the motor. Conduct generated voltage tests to provide a value related to the B_r of the magnet.
- Back-EMF test at various temperatures. The change in value at 22C and 120C will provide data for the H_{ci} and the rev. T coefficient.

Magnetic Properties: Surface Gauss



4 POLE GAUSS DISTRIBUTION AT SURFACE (mT)



6 POLE GAUSS DISTRIBUTION AT SURFACE (mT)

Physical Properties

Dimension Limitations

OD \leq 150mm, Majority of products are under 60mm

ID \geq 9mm

Height \leq 100mm, Max 10 x thickness

Tolerances (mm)

OD: Normal: ± 0.05 , Min: ± 0.03

ID: Normal: ± 0.05 , Min: ± 0.04

Height: Normal: ± 0.1 , Min ± 0.06

Concentricity: Normal: ≤ 0.1 , Min: ≤ 0.05

Surface Runout: for OD \leq 30mm, runout ≤ 0.1 mm. OD increases 10mm, runout will increase by 0.1mm

Physical Properties

Bending Strength 290-310 MPa

Density 7.30-7.65 gr/cm³

Hardness (Vickers) 570

Electrical Resistivity 150 $\mu\Omega$ -cm (10C-120C)

Compressive Strength 780 N/mm²

Coefficient of heat expansion (Perpendicular to orientation): -4.8×10^{-6} K

Coefficient of heat expansion (Parallel to orientation): 3.4×10^{-6} K

Coating and Plating Options



Coating Layer Test	Test Condition	Ni-Cu-Ni	Epoxy	IVD Aluminum
PCT	Temp: 120° ± 2°C Humidity: 100% Pressure: 2 ATM	> 24 Hours	> 24 Hours	> 48 Hours
Salt Spray	35°C at 5% NaCl PH at 6.5 - 7.2	> 24 Hours	> 48 Hours	> 24 Hours
Thickness	X Ray Method	20-25 µm	10-15 µm	8-12 µm

Magnetization



Magnetization pattern is Radial and cannot be Lateral due to magnet thickness.



Also available: skewed for low cogging



Temperature Effects

Permanent Br Loss after Heat Exposure to 130 C			
Radial Oriented Ring: 42SH, OD22.59 x ID18.2 x L15.7 mm			
Sample #	Flux (Before heating)	Flux (After heating)	Flux reduction
1	-14.9	-13.52	9.26%
2	-14.85	-13.64	8.14%
3	-14.87	-13.65	8.20%
4	-14.8	-13.35	9.79%
5	-14.67	-13.53	7.77%
6	-14.74	-13.74	6.78%
7	-14.67	-13.45	8.31%
8	-14.77	-13.46	8.86%
9	-14.78	-13.17	10.89%
10	-14.75	-13.12	11.05%
11	-14.8	-13.51	8.71%
12	-14.76	-13.28	10.02%

Parts were heated to 130 C for 120 minutes, then cooled to 22 C and tested

Permanent losses are higher than in traditional sintered Neo which would typically lose up to 4% at 20-150 cycle

Irreversible losses are the same between Radial and traditional Neo (310°C Curie T)

Typical Adhesives



- EMS substitutes
- Eccobond A359
- Loctite E-214HP
- 3M Scotchweld

Dow Corning® 730 Solvent Resistant Adhesive/Sealant

- **Primary Use** – Sealing and bonding where resistance to fuels, oils and solvents is required.
- **Applications** – Assembling and repairing fuel lines and tanks; bonding components exposed to fuels, oils, solvents; making formed-in-place gaskets for chemical compressors, fluid-filled distributors and transformers; repairing rubber linings exposed to corrosive conditions; sealing pipe joints on lines carrying corrosive chemicals.¹

Cure Type	Dow Corning® Product	Special Features	Temperature Range [°C] (Intermittent)*	Color(s)	Skin-Over Time [min.]	Tack Free Time [min.]	Extrusion Rate [g/min.] at 23°C	Viscosity [mPa-s] at 23°C	Durometer [Shore A]	Tensile [MPa]	Elongation [%]	Specific Gravity	Listing/ Specifications
Acetoxy	Silicone AP	Multi-purpose	-50 to +180	clear, white, grey, black	11	21	450	—	25	2.2	540	1.03	
	730	Solvent resistant	-65 to +200	white	5	25	420	—	37	2.3	240	1.40	
	732	Multi-purpose, FDA, UL, MIL	-60 to +180 (205)	clear, white, black	7	20	350	—	25	2.3	540	1.04	FDA 177.2600, UL94-HB, NSF51, NSF81, MIL-A-46106
	734	Flowable	-65 to +180	clear, white	7	13	—	45,000	27	1.5	315	1.03	FDA 177.2600, UL94-HB, NSF51, MIL-A-46106
	736	High temperature resistant	-60 to +260 (315)	red	10	17	350	—	28	2.4	600	1.04	FDA 177.2600, UL94-HB, NSF51, MIL-A-46106
	Q3-1566	Very high temperature resistant	-50 to +275 (350)	black	5	12	270	—	43	3.8	340	1.06	
	Q3-3379	High temperature resistant, Flowable	-50 to +250 (275)	red	8	20	—	73,500	34	3.2	290	1.30	
Neutral	7091	Multi-purpose	-55 to +180	white, grey, black	15	28	350	—	37	2.5	880	1.40	
	7093	Multi-purpose, Low modulus	-50 to +180	white, grey, black	15	28	210	—	30	1.7	700	1.50	
	AS 7096	Multi-purpose, Translucent	-50 to +150	clear	10	30	250	—	18	1.3	500	1.03	
	748	Multi-purpose, Food contact	-55 to +177	white	15	48	145	—	35	1.9	350	1.30	FDA 177.2600, UL94-HB, MIL-A-46106
	3140	Flowable	-50 to +180	clear	15	70	—	30,000	32	3.1	425	1.03	UL94 V-1, MIL-A-46148
	3559	Fast cure, High temperature resistant, Oxime cure type	-50 to +220	black	5	24	143	—	40	1.7	450	1.30	
	HM-2500	Immediate green strength, Alkoxy cure type	-32 to +93	clear	—	—	—	—	60	2.4	1000	1.06	

Typical Packing



Sintered Radial NdFeB rings have strong magnetic attraction in the radial field and must be packaged with certain minimum distances from each other in a non collapsible packing material