



HARD FERRITE

General Information

As important parts of magnetic materials, hard ferrite (ceramic) magnets play an important role in electrical, electronic information, car, motorcycle industries etc. They are also widely used in medical treatment, mining and metallurgy, industrial automation, oil energy and civil industries.



Ceramic magnets are composed of iron oxide, barium and strontium elements. This class of magnets has a higher magnetic flux density, higher coercive force, and higher resistance to demagnetization and oxidation compared to other non-rare earth permanent magnets. The biggest advantage of such magnets is the low cost, which makes the hard ferrite magnets very popular in many permanent magnet applications. Due to their ceramic nature ferrite magnets are very hard and brittle. Special machining techniques must to be utilized for these magnets. Ceramic or hard ferrite magnets come in discs, cylinders, rings, blocks and arcs and are charcoal grey.

Material Information

- Produced by powder metallurgical method with chemical composition of $Ba/SrO.6 Fe_2 O_3$
- Relatively brittle & hard
- Good resistance to demagnetization
- Excellent corrosion resistance
- Raw material is readily available and low in cost
- Good temperature stability
- high coercive force and high electric resistance
- Most widely used permanent magnets.

Typical Physical Properties

Curie Temperature (°C)	450
Maximum Operating Temperature (°C)	250
Hardness (Hv)	480-580
Density (g/cm ³)	4.8 - 4.9
Relative Recoil Permeability (μ_{rec})	1.05 - 1.20
Saturation Field Strength, kOe (kA/m)	10 (800)
Temperature Coefficient of Br (%/°C)	-0.2
Temperature Coefficient of iHc (%/°C)	0.3
Tensile Strength (N/mm)	<100
Transverse Rupture Strength (N/mm)	300



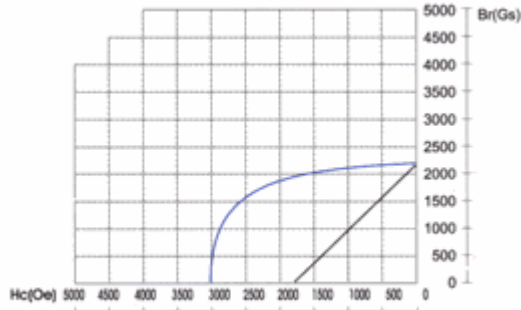
Magnetic Properties of Hard Ferrite (Ceramic) Magnets

Material	Remanence		Coercivity		Intrinsic Coercivity		Max. Energy Product	
	Br (mT)	Br (kGs)	bHc (kA/m)	bHc (kOe)	iHc (kA/m)	iHc (kOe)	(BH) _{max} (KJ/m ³)	(BH) _{max} (MGOe)
Y10	200-235	2.00-2.35	125-160	1.57-2.01	210-280	2.64-3.52	6.5-9.5	0.8-1.2
Y10T	>200	>2.00	128-160	1.60-2.00	128-160	1.60-2.00	6.4-9.6	0.8-1.2
Y20	320-380	3.20-3.80	135-190	1.70-2.38	140-195	1.76-2.45	18.0-22.0	2.3-2.8
Y22H	310-360	3.10-3.60	220-250	2.77-3.14	280-320	3.52-4.02	20.0-24.0	2.5-3.0
Y23	320-370	3.20-3.70	170-190	2.14-2.38	190-230	2.39-2.89	20.0-25.5	2.5-3.2
Y25	360-400	3.60-4.00	135-170	1.70-2.14	140-200	1.76-2.51	22.5-28.0	2.8-3.5
Y25BH	360-390	3.60-3.90	176-216	2.20-2.70	215-231	2.70-2.90	23.9-27.1	3.0-3.4
Y26H	360-390	3.60-3.90	220-250	2.77-3.14	225-255	2.83-3.21	23.0-28.0	2.9-3.5
Y27H	370-400	3.70-4.00	205-250	2.58-3.14	210-255	2.64-3.21	25.0-29.0	3.1-3.7
Y28	370-400	3.70-4.00	175-210	2.20-2.64	180-220	2.26-2.77	26.0-30.0	3.3-3.8
Y30	385-405	3.85-4.05	176-224	2.20-2.80	184-226	2.30-2.84	27.5-30.5	3.45-3.95
Y30BH	380-400	3.80-4.00	230-275	2.89-3.46	235-290	2.95-3.65	27.0-32.5	3.4-4.1
Y32	400-420	4.00-4.20	160-190	2.01-2.38	165-195	2.07-2.45	30.0-33.5	3.8-4.2
Y33	410-430	4.10-4.30	220-250	2.77-3.14	225-255	2.83-3.21	31.5-35.0	4.0-4.4
Y35	400-420	4.00-4.20	160-190	2.01-2.38	165-195	2.07-2.45	30.0-33.5	3.8-4.2
Y35H1	395-415	3.95-4.15	251-259	3.15-3.25	255-271	3.20-3.40	29.6-32.8	3.7-4.1
Y35H2	390-410	3.90-4.10	236-295	3.30-3.70	275-299	3.45-3.75	28.8-32.0	3.6-4.04
Y35H3	405-425	4.05-4.25	223-247	2.80-3.10	231-255	2.90-3.20	30.2-35.4	3.8-4.4
Y35H-4H	370-390	3.70-3.90	270-302	3.40-3.80	326-358	4.10-4.50	25.6-28.8	3.2-3.6
Y38B	410-430	4.10-4.30	251-275	3.15-3.45	255-279	3.20-3.50	31.8-35.0	4.0-4.4
Y38H	395-415	3.95-4.15	287-309	3.60-3.90	311-333	3.90-4.20	29.5-32.7	3.7-4.1
Y40E	370-390	3.70-3.90	279-301	3.50-3.80	382-414	4.80-5.20	25.6-29.4	3.2-3.6
Y40B	410-430	4.10-4.30	290-324	3.65-3.95	307-329	3.85-4.15	32.6-34.4	4.0-4.4
Y45E	420-440	4.20-4.40	318-342	4.00-4.30	386-410	4.85-5.15	33.5-36.5	4.2-4.6
Y45B	430-450	4.30-4.50	247-271	3.10-3.40	251-275	3.15-3.45	35.1-38.3	4.4-4.8

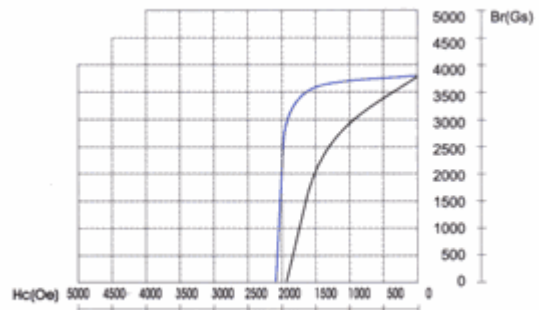


Typical Demagnetization Curves of Ceramic Magnets (Hard Ferrite)

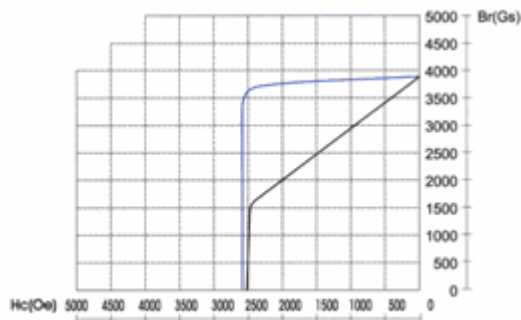
Y10 Isotropic Ferrite Grade



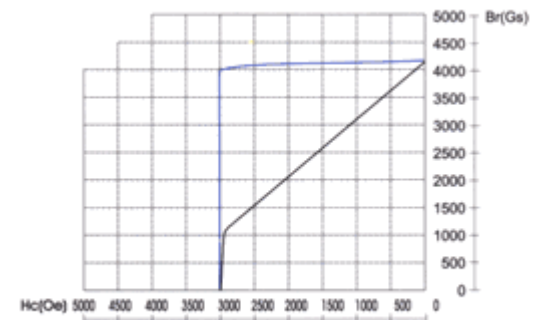
Y25 Anisotropic Ferrite Grade



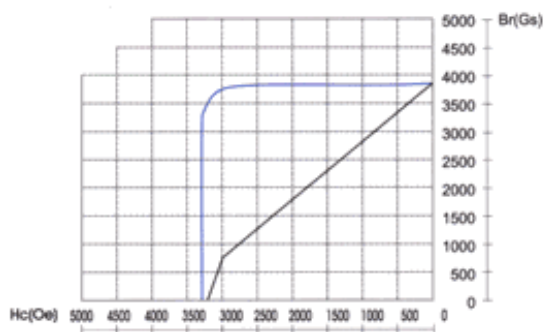
Y30 Anisotropic Ferrite Grade



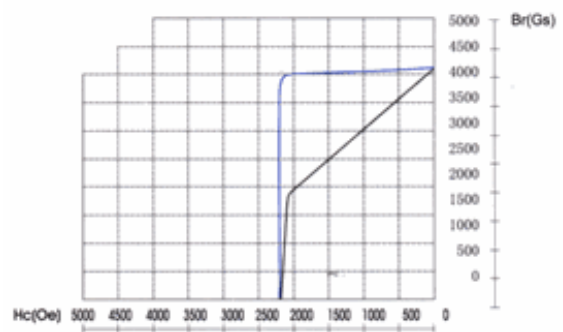
Y33 Anisotropic Ferrite Grade



Y30BH Anisotropic Ferrite Grade



Y35 Anisotropic Ferrite Grade





Dimension Range/Nominal Tolerance of Hard Ferrite (Ceramic) Magnets

Ring Magnet	Outer Diameter (mm)	Inner Diameter (mm)	Thickness (mm)
Maximum	220	110	40
Minimum	2.6	1.8	0.5
Tolerance	±0.2	±0.15	±0.1

Block Magnet	Length (mm)	Width (mm)	Thickness (mm)
Maximum	220	200	40
Minimum	2.0	1.5	0.5
Tolerance	±0.2	±0.15	±0.1

Disc/Cylinder Magnet	Diameter (mm)	Thickness (mm)
Maximum	220	40
Minimum	1.2	0.5
Tolerance	±0.2	±0.1

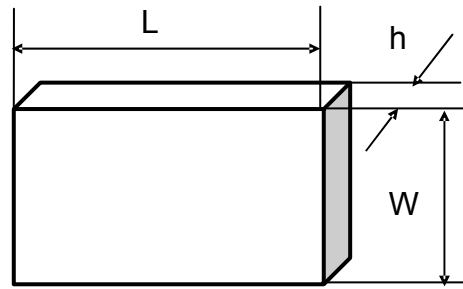
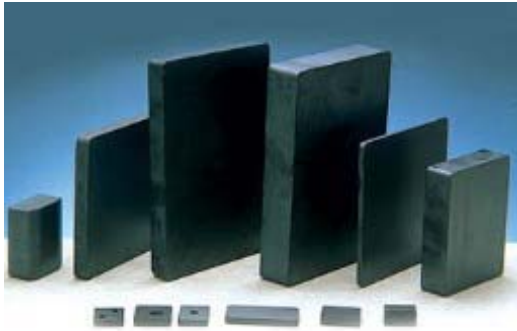
Segment & other irregular shapes can be manufactured according to customer's sample or drawing/blue print.

Lifton Magnets supplies various kinds of sintered hard ferrite magnets in specific sizes and shapes according to the customers' requirements. It allows also its customers to customize characteristics of their magnets. The shapes can be discs, rings, blocks, slabs, cylinders, tiles and other specific shapes.





Standard Ferrite Block Magnets for Many Applications



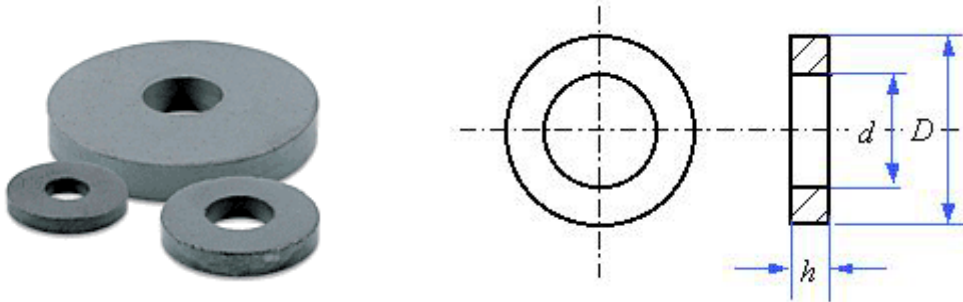
Minimal Order: 20kg for unit weight $\leq 10\text{g/pc}$; 40kg for unit weight $> 10\text{g/pc}$, density 4.8g/cm^3

Ref. No.	Dimensions (mm) L x W x h	Ref. No.	Dimensions (mm) L x W x h
FB-001	10 × 10 × (2~5)	FB-002	12.5 × 8 × (2~7)
FB-003	12 × 7 × (3~7)	FB-004	12 × 12 × (2~7)
FB-005	12.8 × 9.8 × (2~7)	FB-006	13.3 × 7.8 × (2~6)
FB-007	14.8 × 9.5 × (2~6)	FB-008	15 × 15 × (3~7)
FB-009	15 × 13 × (2~6)	FB-010	16 × 10 × (2~7)
FB-011	16 × 15 × $\varnothing 4.5 \times 4.7$	FB-012	16.9 × 9.6 × (2~6)
FB-013	18 × 13 × (2~7)	FB-014	18 × 15 × $\varnothing 4.75 \times (2~7)$
FB-015	19 × 13 × (2~8)	FB-016	19 × 17.5 × (2~7)
FB-017	19.7 × 10 × (2~7)	FB-018	20 × 20 × (3~10)
FB-019	20 × 10 × (3~6)	FB-020	20 × 12 × (3~7)
FB-021	20 × 13.5 × (3~10)	FB-022	20 × 15 × (3~6)
FB-023	21 × 15 × (4~6)	FB-024	21 × 19 × (2~7)
FB-025	23.5 × 13.5 × $\varnothing 5 \times (2~8)$	FB-026	24 × 13.4 × $\varnothing 4.5 \times (2~6)$
FB-027	24 × 24 × $\varnothing 5.5 \times (2~18)$	FB-028	24 × 24 × $\varnothing 8 \times (2~8)$
FB-029	25 × 8 × (2~6)	FB-030	25 × 10 × (2~6)
FB-031	25 × 14 × (3~6)	FB-032	25 × 10 × $\varnothing 3.2 \times (2~6)$
FB-033	25 × 20 × (2~10)	FB-034	25 × 19 × (2~7)
FB-035	27 × 20 × (4~6)	FB-036	27 × 22 × (3~7)
FB-037	30 × 10 × (3~7)	FB-038	30 × 20 × (3~24)
FB-039	30 × 30 × (3~24)	FB-040	35 × 15 × (3~6)
FB-041	40 × 12 × (2~7)	FB-042	40 × 20 × (3~20)
FB-043	40 × 25 × (3~24)	FB-044	40 × 40 × (3~17)
FB-045	42 × 25 × (3~15)	FB-046	44 × 22 × (3~10)
FB-047	45 × 25 × (3~20)	FB-048	47.6 × 9.5 × (3~15)
FB-049	47.6 × 22.2 × (3~7)	FB-050	49 × 19 × (3~20)
FB-051	50 × 19 × (3~20)	FB-052	50 × 25 × (3~20)
FB-053	50 × 50 × (3~24)	FB-054	50.8 × 25.4 × (3~26)
FB-055	57.5 × 32.5 × (3~18)	FB-056	59 × 24 × (3~20)
FB-057	59.3 × 29.5 × (3~25)	FB-058	60 × 20 × (3~24)
FB-059	60 × 25 × (3~20)	FB-060	60 × 30 × (3~25)
FB-061	75 × 50 × (3~23)	FB-062	76 × 41 × (3~26)
FB-063	82 × 30.6 × $\varnothing 6.3 \times (3~20)$	FB-064	85 × 65 × (3~28)
FB-065	87 × 66 × (3~22)	FB-066	90 × 34 × (3~24)
FB-067	100 × 100 × (3~27)	FB-068	105 × 105 × (5~25)
FB-069	127 × 50 × (3~26)	FB-070	131 × 51 × (3~24)
FB-071	150 × 100 × (3~30)	FB-072	160 × 80 × (3~30)
FB-073	152.4 × 101.6 × (3~29)	FB-074	101.6 × 76.2 × (3~30)
FB-075	152.4 × 50.8 × (3~30)	FB-076	270 × 90 × (5~32)

Dimension tolerance: Length $\pm 2\%$, Width $\pm 2\%$, Thickness $\pm 0.1\text{mm}$



Standard Speaker/Ring Magnets for Loudspeakers and Motors



Minimal Order: 50kg for unit weight $\leq 50\text{g/pc}$; 100kg for unit weight $> 50\text{g/pc}$, density 4.8g/cm^3

Ref. No.	Dimensions (mm)	Ref. No.	Dimensions (mm)
FR-001	D8 x d4 x 3	FR-002	D10.2 x d6 x 9
FR-003	D12 x d4 x 12	FR-004	D12 x d4 x 24
FR-005	D13 x d4.5 x 20	FR-006	D14.6 x d8 x 12
FR-007	D15 x d4.5 x 20	FR-008	D15 x d4.5 x 28
FR-009	D16 x d7 x 4	FR-010	D18 x d5 x 8
FR-011	D18 x d7 x 6	FR-012	D18 x d6 x 24
FR-013	D18 x d6 x 40	FR-014	D18.3 x d6 x 32
FR-015	D19 x d6 x 30	FR-016	D21 x d7 x 32
FR-017	D22 x d8 x 45	FR-018	D23.4 x d11 x 8
FR-019	D23.4 x d12 x 9	FR-020	D25 x d8 x 50
FR-021	D25.6 x d17 x 20	FR-022	D26 x d10 x 9
FR-023	D28 x d8 x 8	FR-024	D30 x d10 x 60
FR-025	D32 x d18 x (5-8)	FR-026	D35 x d18 x (6-8)
FR-027	D39 x d22.5 x (7-10)	FR-028	D40 x d19 x (6-10)
FR-029	D40 x d22 x (6-10)	FR-030	D45 x d19(22) x (6-10)
FR-031	D50 x d22 x (6-12)	FR-032	D50 x d24 x (6-12)
FR-033	D55 x d24 x (6-12)	FR-034	D55 x d26 x (6-12)
FR-035	D60 x d24 x (8-16)	FR-036	D60 x d30 x (8-16)
FR-037	D60 x d32 x (8-16)	FR-038	D65 x d32 x (6-16)
FR-039	D70 x d32 x (8-18)	FR-040	D70 x d45 x (8-18)
FR-041	D71.1 x d32.5 x 15	FR-042	D72 x d32 x (8-18)
FR-043	D75 x d32 x (10-15)	FR-044	D75 x d40 x (10-15)
FR-045	D80 x d32 x (10-20)	FR-046	D80 x d40 x (10-20)
FR-047	D80 x d60 x (10-20)	FR-048	D85 x d32 x (8-20)
FR-049	D85 x d44 x (8-20)	FR-050	D85 x d45 x (8-20)
FR-051	D90 x d32 x (10-18)	FR-052	D90 x d35 x (10-18)
FR-053	D90 x d45 x (10-18)	FR-054	D90 x d50 x (10-18)
FR-055	D100 x d45 x (12-20)	FR-056	D100 x d50 x (12-20)
FR-057	D100 x d60 x (12-20)	FR-058	D110 x d60 x (15-20)
FR-059	D110 x d62 x (15-20)	FR-060	D119 x d56 x (14-20)
FR-061	D119 x d60 x (14-20)	FR-062	D116 x d56.8 x (15-20)



FR-063	D116 × d60 × (15-20)	FR-064	D120 × d45 × (12.5-20)
FR-065	D120 × d60 × (12.5-20)	FR-066	D126 × d60 × (12.5-20)
FR-067	D126 × d65 × (12.5-20)	FR-068	D128.3 × d58.8 × (15-20)
FR-069	D133.3 × d59 × (15-20)	FR-070	D135 × d60 × (15-20)
FR-071	D140 × d62 × (12.5-20)	FR-072	D140 × d65 × (12.5-20)
FR-073	D140 × d75 × (12.5-20)	FR-074	D145 × d70 × (20-24)
FR-075	D145 × d75 × (20-24)	FR-076	D156 × d60 × (20-25)
FR-077	D156 × d80 × (20-25)	FR-078	D165 × d86.4 × (15-25)
FR-079	D169 × d85 × (20-25)	FR-080	D180 × d80 × (20-25)
FR-081	D180 × d85 × (20-25)	FR-082	D180 × d95 × (20-25)
FR-083	D190 × d89 × (20-25)	FR-084	D190 × d90 × (20-25)
FR-085	D200 × d86 × (20-25)	FR-086	D211 × d89 × (20-25)
FR-087	D210 × d110 × (20-25)	FR-088	D220 × d110 × (20-25)

Dimension tolerance: D ± 2%, d ± 1.5%, h ± 0.15mm

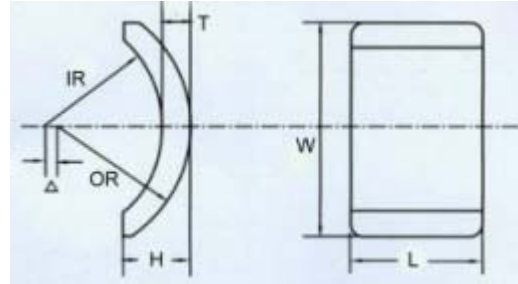
Rotor Magnets with Multipole Magnetization

Minimal Order: 20kg for unit weight ≤ 20g/pc; 40kg for unit weight > 20g/pc, density 4.8g/cm³

Ref. No.	Dimensions (mm)	Magnetic Pole	Surface flux density (mT)
RM001	D8 x d4 x 3	6	90
RM002	D10.2 x d6 x 9	6	100
RM003	D12 x d4 x 12	2	130
RM004	D12 x d4 x 24	2	130
RM005	D13 x d4.5 x 20	2	130
RM006	D14.6 x d8 x 12	6	110
RM007	D15 x d4.5 x 20	2	130
RM008	D15 x d4.5 x 28	2	135
RM009	D16 x d7 x 4	24	110
RM010	D18 x d5 x 8	8	145
RM011	D18 x d7 x 6	8	130
RM012	D18 x d6 x 24	2	140
RM013	D18 x d6 x 40	2	140
RM014	D18.3 x d6 x 32	2	140
RM015	D19 x d6 x 30	2	140
RM016	D21 x d7 x 32	2	150
RM017	D22 x d8 x 45	2	150
RM018	D23.4 x d11 x 8	8	150
RM019	D23.4 x d12 x 9	8	155
RM020	D25 x d8 x 50	2	150
RM021	D25.6 x d17 x 20	24	110
RM022	D26 x d10 x 9	24	110
RM023	D28 x d8 x 8	8	160
RM024	D30 x d10 x 60	2	150



Arc/Segment Magnets for Applications to Motors and Generators



Minimal Order: 30kg for unit weight $\leq 30\text{g/pc}$; 50kg for unit weight $> 30\text{g/pc}$, density 4.8g/cm^3

Ref. No.	Dimensions (mm)				
	OR	IR	W	L	H
AM-001	12.0-16.0	8.2-10.2	16.0-18.0	24.0-26.0	6.0-8.0
AM-002	14.0-18.0	7.0-9.0	25.5-27.5	36.0-38.0	11.0-13.0
AM-003	15.0-19.0	11.0-13.0	29.3-31.3	27.0-37.0	11.0-13.0
AM-004	18.0-22.0	13.0-15.0	34.0-36.0	38.0-40.0	13.0-15.0
AM-005	18.0-22.0	13.0-15.0	26.0-28.0	49.0-51.0	10.0-12.0
AM-006	19.0-23.0	14.0-16.0	34.0-36.0	28.0-31.0	14.0-16.0
AM-007	22.0-26.0	17.0-19.0	39.0-41.0	25.0-60.0	15.0-17.0
AM-008	26.0-30.0	20.0-22.0	45.0-50.0	37.0-50.0	18.0-21.0
AM-009	26.0-30.0	19.0-22.0	44.0-46.0	35.0-63.0	15.5-17.5
AM-010	28.0-32.0	22.0-24.0	49.0-54.0	38.0-40.0	17.0-20.0
AM-011	28.0-32.0	22.0-24.0	32.0-34.0	47.0-49.0	10.0-13.0
AM-012	32.0-36.0	24.0-27.0	57.0-59.0	40.0-55.0	19.8-21.8
AM-013	33.0-37.0	27.0-29.0	23.0-25.0	42.0-48.0	7.4-9.4
AM-014	32.0-36.0	26.0-28.0	63.0-66.0	32.0-51.0	24.2-26.2
AM-015	32.0-36.0	28.0-31.0	57.0-59.0	38.0-40.0	21.0-23.0
AM-016	57.0-62.0	39.0-43.0	100.0-105.0	83.0-84.0	39.4-41.4
AM-017	50.0-54.0	40.0-42.0	52.0-54.0	38.0-40.0	14.5-16.5
AM-018	49.0-53.0	41.0-45.0	39.0-54.0	21.0-33.0	15.0-17.0
AM-019	53.0-57.0	47.0-49.0	75.0-93.0	24.0-27.0	19.0-21.0
AM-020	65.0-69.0	53.0-55.0	71.0-72.0	33.0-35.0	23.0-25.0
AM-021	78.0-81.0	62.0-64.0	62.0-64.0	130.0-132.0	17.5-19.5
AM-022	93.0-97.0	68.0-70.0	91.0-94.0	62.0-64.0	34.0-36.0
AM-023	78.0-82.0	69.0-72.0	64.0-66.0	26.0-35.0	7.0-9.0
AM-024	103.0-106.0	95.0-97.0	64.0-66.0	24.0-26.0	13.0-15.0

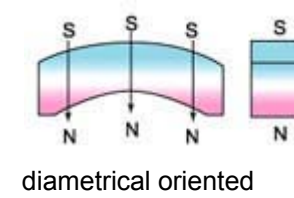
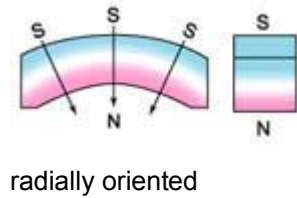
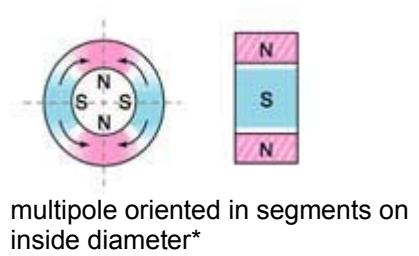
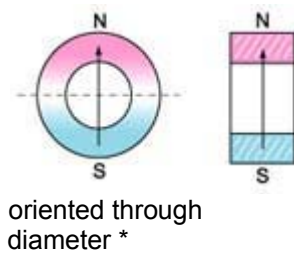
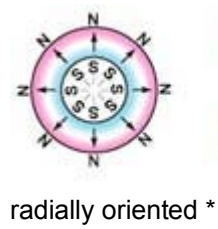
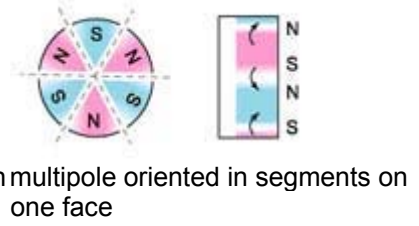
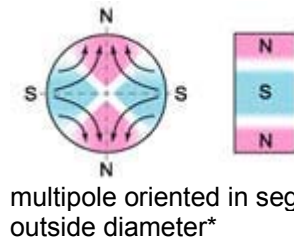
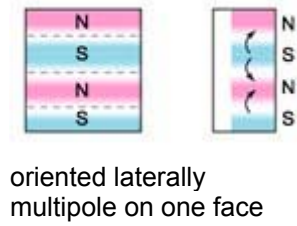
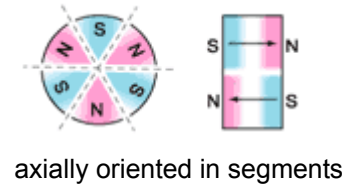
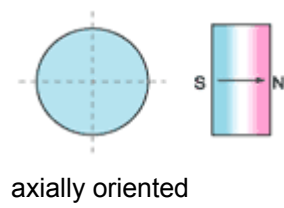
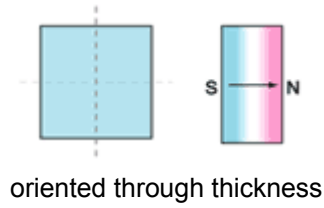
Dimension tolerance:

Outer radius OR, Inner radius IR and thickness H/T: $\pm 0.15\text{mm}$

Width W and length L: $\pm 0.2\text{mm}$ for ground surfaces and $\pm 2\%$ for unground surfaces.



Magnetization Directions of Permanent Magnets



all available as isotropic or
anisotropic material
* only available in isotropic and
certain anisotropic materials
only