

**TABLE IV-1
TYPICAL MAGNETIC PROPERTIES--CHEMICAL COMPOSITION OF RARE EARTH MAGNETS**

MMPA Brief Designation	IEC Code Reference	Chemical Composition		Magnetic Properties *							
		Alloys	Possible Elements	Max. Energy Product (BH) _{max}		Residual Induction B _r		Coercive Force H _c		Intrinsic Coercive Force H _{ci}	
				(MGOe)	(kJ/m ³)	(gauss)	(mT)	(oersteds)	(kA/m)	(oersteds)	(kA/m)
16/19	R4-1	RE Co ₅	RE = Sm	16	130	8300	830	7500	600	19000	1510
18/30	R4-1	RE Co ₅	RE = Sm	18	140	8700	870	8500	680	30000	2390
20/16	R4-1	RE Co ₅	RE = Sm, Pr	20	160	9000	900	8500	680	16000	1270
20/30	R4-1	RE Co ₅	RE = Sm, Pr	20	160	9000	900	8800	700	30000	2390
22/16	R4-1	RE Co ₅	RE = Sm, Pr	22	180	9500	950	9000	720	16000	1270
24/7	R4-1	RE ₂ TM ₁₇	RE = Sm, TM = Fe,Cu,Co,Zr,Hf	24	190	10000	1000	6000	480	7000	560
24/26	R4-1	RE ₂ TM ₁₇	RE = Sm, TM = Fe,Cu,Co,Zr,Hf	24	190	10000	1000	9300	740	26000	2070
26/10	R4-1	RE ₂ TM ₁₇	RE = Sm, TM = Fe,Cu,Co,Zr,Hf	26	210	10500	1050	9000	720	10000	800
26/26	R4-1	RE ₂ TM ₁₇	RE = Sm, TM = Fe,Cu,Co,Zr,Hf	26	210	10700	1070	9750	780	26000	2070
28/7	R4-1	RE ₂ TM ₁₇	RE = Sm, TM = Fe,Cu,Co,Zr,Hf	28	220	10900	1090	6500	520	7000	560
28/26	R4-1	RE ₂ TM ₁₇	RE = Sm, TM = Fe,Cu,Co,Zr,Hf	28	220	11000	1100	10300	820	26000	2070
30/24	R4-1	RE ₂ TM ₁₇	RE = Sm, TM = Fe,Cu,Co,Zr,Hf	30	240	11600	1160	10600	840	24000	1910
24/41	R5-1	RE ₂ TM ₁₄ B	RE = Nd,Pr,Dy TM = Fe,Co	24	190	10000	1000	9600	760	41000	3260
26/32	R5-1	RE ₂ TM ₁₄ B	RE = Nd,Pr,Dy TM = Fe,Co	26	210	10500	1050	10090	800	31500	2510
28/23	R5-1	RE ₂ TM ₁₄ B	RE = Nd,Pr,Dy TM = Fe,Co	28	220	10800	1080	10300	820	23000	1830
28/32	R5-1	RE ₂ TM ₁₄ B	RE = Nd,Pr,Dy TM = Fe,Co	28	220	10730	1073	10490	830	31500	2510
30/19	R5-1	RE ₂ TM ₁₄ B	RE = Nd,Pr,Dy TM = Fe,Co	30	240	11300	1130	10800	860	19000	1510
30/27	R5-1	RE ₂ TM ₁₄ B	RE = Nd,Pr,Dy TM = Fe,Co	30	240	11300	1130	10800	860	27000	2150
32/16	R5-1	RE ₂ TM ₁₄ B	RE = Nd,Pr,Dy TM = Fe,Co	32	260	11800	1180	11200	890	16000	1270
32/31	R5-1	RE ₂ TM ₁₄ B	RE = Nd,Pr,Dy TM = Fe,Co	32	260	11600	1160	11100	880	31000	2470
34/22	R5-1	RE ₂ TM ₁₄ B	RE = Nd,Pr,Dy TM = Fe,Co	34	270	11960	1196	11500	920	22250	1770
36/19	R5-1	RE ₂ TM ₁₄ B	RE = Nd,Pr,Dy TM = Fe,Co	36	290	12310	1231	11520	920	19140	1520
36/26	R5-1	RE ₂ TM ₁₄ B	RE = Nd,Pr,Dy TM = Fe,Co	36	290	12200	1220	11700	930	26000	2070
38/15	R5-1	RE ₂ TM ₁₄ B	RE = Nd,Pr,Dy TM = Fe,Co	38	300	12500	1250	12000	950	15000	1190
38/23	R5-1	RE ₂ TM ₁₄ B	RE = Nd,Pr,Dy TM = Fe,Co	38	300	12400	1240	12000	950	23000	1830
40/15	R5-1	RE ₂ TM ₁₄ B	RE = Nd,Pr,Dy TM = Fe,Co	40	320	12800	1280	12000	950	15000	1190
40/23	R5-1	RE ₂ TM ₁₄ B	RE = Nd,Pr,Dy TM = Fe,Co	40	320	12900	1290	12400	990	23000	1830
42/15	R5-1	RE ₂ TM ₁₄ B	RE = Nd,Pr,Dy TM = Fe,Co	42	340	13100	1310	12700	1010	15000	1190
44/15	R5-1	RE ₂ TM ₁₄ B	RE = Nd,Pr,Dy TM = Fe,Co	44	350	13500	1350	13000	1030	15000	1190
48/11	R5-1	RE ₂ TM ₁₄ B	RE = Nd,Pr,Dy TM = Fe,Co	48	380	13750	1375	10300	820	11000	880
50/11	R5-1	RE ₂ TM ₁₄ B	RE = Nd,Pr,Dy TM = Fe,Co	50	400	14100	1410	10300	820	11000	880

* To achieve the properties shown in this table, care must be taken to magnetize to saturation.

**TABLE IV – 3
TYPICAL PHYSICAL PROPERTIES
SINTERED RARE EARTH MAGNETS**

Material	Density		Modulus of elasticity		Ultimate Tensile strength		Coefficient of thermal expansion		Electrical resistivity Ohm-cm x 10 ⁻⁶ (at 20°C)
	g/cm ³	lbs/in ³	psi	Pa x 10 ⁹	psi	Pa x 10 ⁶	Perpendicular To orientation	Parallel To orientation	
							10 ⁻⁶ / °C	10 ⁻⁶ / °C	
1-5 Alloys	8.4	0.303	23 x 10 ⁶	159	6,000	41	13.0	6.0	53
2-17 Alloys	8.4	0.303	17 x 10 ⁶	117	5,000	35	11.0	8.0	86
Nd-Fe-B	7.4	0.267	22 x 10 ⁶	152	12,000	83	4.8	3.4	160

**TABLE IV – 4
TYPICAL THERMAL PROPERTIES
SINTERED RARE EARTH MAGNETS**

Material	Reversible Temperature Coefficient Of Residual Induction (- 100°C to + 100°C) % Change per °C	Curie Temperature		Max. Service Temperature*	
		°C	°F	°C	°F
1-5 Alloys	-0.040	750	1380	300	570
2-17 Alloys	-0.035	825	1520	350	660
Nd-Fe-B	-0.090	310	590	150**	300