

**TABLE III-1  
TYPICAL MAGNETIC PROPERTIES AND CHEMICAL  
COMPOSITION OF CERAMIC MAGNET MATERIALS**

MMPA Brief Designation	Original MMPA Class	IEC Code Reference	Chemical Composition (M represents Barium, Strontium or combination of the two.)	Magnetic Properties							
				Max. Energy Product $(BH)_{max}$		Residual Induction $B_r$		Coercive Force $H_c$		Intrinsic Coercive Force $H_{cj}$	
				(MGOe)	(kJ/m <sup>3</sup> )	(gauss)	(mT)	(oersteds)	(kA/m)	(oersteds)	(kA/m)
1.0/3.3	Ceramic 1	S1-0-1	MO • 6Fe <sub>2</sub> O <sub>3</sub>	1.05	8.35	2300	230	1860	150	3250	260
3.4/2.5	Ceramic 5	SI-1-6	MO • 6Fe <sub>2</sub> O <sub>3</sub>	3.40	27.1	3800	380	2400	190	2500	200
2.7/4.0	Ceramic 7	SI-1-2	MO • 6Fe <sub>2</sub> O <sub>3</sub>	2.75	21.9	3400	340	3250	260	4000	320
3.5/3.1	Ceramic 8	SI-1-5	MO • 6Fe <sub>2</sub> O <sub>3</sub>	3.50	27.8	3850	385	2950	235	3050	245
3.4/3.9	-		MO • 6Fe <sub>2</sub> O <sub>3</sub>	3.40	27.1	3800	380	3400	270	3900	310
4.0/2.9	-		MO • 6Fe <sub>2</sub> O <sub>3</sub>	4.00	31.8	4100	410	2800	225	2900	230
3.2/4.8	-		MO • 6Fe <sub>2</sub> O <sub>3</sub>	3.20	25.5	3700	370	3500	280	4800	380
3.8/4.0	-		MO • 6Fe <sub>2</sub> O <sub>3</sub>	3.80	30.2	4000	400	3650	290	4000	320

**NOTE FOR ALL MATERIALS:**

Recoil Permeability Range --1.05 to 1.2

To achieve the properties shown in this table, care must be taken to magnetize to Saturation (typically 10,000 to 15,000 oersteds minimum depending on material grade).

**TABLE III-4  
PHYSICAL PROPERTIES OF CERAMIC MAGNETS**

Property	Typical Value	
Density	0.177 lbs/in <sup>3</sup>	4.9 g/cm <sup>3</sup>
Coefficient of thermal expansion (250C to 450'C)		
Perpendicular to orientation	6X10 <sup>-6</sup> Inch/inch • °F	10X10 <sup>-6</sup> cm/cm • °C
Parallel to orientation	8X10 <sup>-6</sup> Inch/inch • °F	14X10 <sup>-6</sup> cm/cm • °C
Thermal conductivity	0.018 cal/inch•sec•°C	0.029 W/cm•°C
Electrical resistivity	10 <sup>6</sup> ohm•cm	10 <sup>6</sup> ohm•cm
Porosity	5%	5%
Modulus of elasticity	2.6X10 <sup>7</sup> psi	1.8X10 <sup>11</sup> Pa
Poisson ratio	0.28	0.28
Compressive strength	130,000 psi	895X10 <sup>6</sup> Pa
Tensile strength	5000 psi	34X10 <sup>6</sup> Pa
Flexural strength	9000 psi	62X10 <sup>6</sup> Pa
Hardness (Mohs)	7	7

**TABLE III-5  
THERMAL PROPERTIES OF CERAMIC MAGNETS**

Property	Typical Value*	
Reversible temperature coefficient of residual Induction	-0.11% / °F	-0.2% / °C
Reversible temperature coefficient of intrinsic coercive force	0.11 to 0.28% / °F	0.2 to 0.5% / °C
Curie temperature	840 °F	450°C
Maximum service temperature*	1470°F	800°C

\* Maximum temperature without structural change. Temperatures greater than 450° C will require remagnetization.

NOTE: The above data is a composite of information from industry and research sources.