

Samarium Cobalt (SmCo) magnet

Samarium Cobalt holds its standard property in higher maximum temperatures than neodymium, although its maximum strength is less. The cost of SmCo material is the most expensive, so SmCo is recommended only when its performance in a high temperature environment is a concern.

The characteristics of Samarium Cobalt Magnet

*Very high magnetic properties with good stability.

*Superior resistance to high temperature, Curie temperature of majority is over 800??

*Excellent corrosion resistance capability, no coating is needed for surface protection.

Typical Magnetic Properties of Samarium Cobalt Materials

Properties of SmCo Permanent Magnet

Grade	Residual Flux Density Br		Coercive Force Hcb		Intrinsic Coercive force Hcj		Max. energy product (BH) _{max}	
	mT	kGs	kA/m	koe	kA/m	koe	kJ/m ³	MGoe
smco- YX6	500~600	5.0~6.0	≥358	4.5~5.5	≥960	≥12.0	47~72	6~9
smco- YX10	600~700	6.0~7.0	≥438	5.5~6.5	≥1200	≥15.0	64~88	8~11
smco- YX12	700~750	7.0~7.5	≥520	6.5~7.3	≥1591	≥20.0	96~120	12~15
smco5- YX16	750~880	7.5~8.8	597±40	7.5±0.5	≥1591	≥20.0	127±16	16±2
smco- YX16A	750~880	7.5~8.8	597±40	7.5±0.5	≥1989	≥25.0	127±16	16±2
smco- YX16B	750~880	7.5~8.8	597±40	7.5±0.5	≥2386	≥30.0	127±16	16±2
sm2co17- YX18	800~930	8.0~9.3	637±40	8.0±0.5	≥1194	≥15.0	143±16	18±2
smco- YX18A	800~930	8.0~9.3	637±40	8.0±0.5	≥1591	≥20.0	143±16	18±2

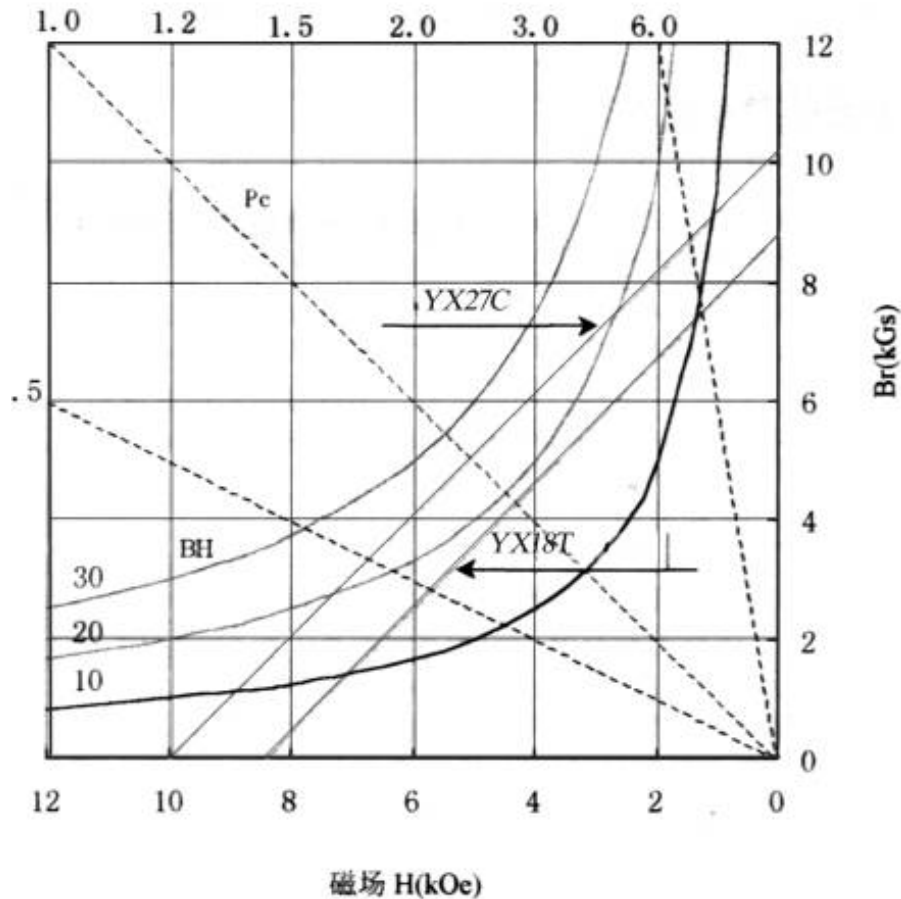
smco-YX18T	800~930	8.0~9.3	637±40	8.0±0.5	≥1591	≥20.0	143±16	18±2
smco-YX18B	800~930	8.0~9.3	637±40	8.0±0.5	≥1989	≥25.0	143±16	18±2
sm2co17-YX20	900~980	9.0~9.8	637±40	8.0±0.5	≥1432	≥18.0	159±16	20±2
smco-YX20	900~950	9.0~9.5	≥670	8.5~9.2	≥1591	≥20.0	159±16	20±2
smco-YX20A	900~980	9.0~9.8	637±40	8.0±0.5	≥1989	≥25.0	159±16	20±2
smco-YX22	900~1030	9.0~10.3	653±40	8.2±0.5	≥1432	≥18.0	175±16	22±2
smco-YX22A	900~1030	9.0~10.3	653±40	8.2±0.5	≥1989	≥25.0	175±16	22±2
smco-YX24	950~1080	9.5~10.8	676±40	8.2±0.5	≥1432	≥18.0	191±16	24±2
smco-YX24A	1000~1100	10.0~11.0	676±40	8.2±0.5	≥1989	≥25.0	191±16	24±2
smco-YX26	1000~1130	10.0~11.3	357~516	4.5~6.5	413~556	5.0~7.0	207±16	26±2
YX26A	1000~1130	10.0~11.3	716±40	9.0±0.5	≥796	≥10.0	207±16	26±2
YX26B	1000~1130	10.0~11.3	716±40	9.0±0.5	≥1194	≥15.0	207±16	26±2
YX26C	1000~1130	10.0~11.3	716±40	9.0±0.5	≥1591	≥20.0	207±16	26±2
YX26D	1000~1080	10.0~10.8	≥732	9.0~10.5	≥2300	≥30.0	207±16	26±2
smco-YX28	1060~1180	10.6~11.8	357~516	4.5~6.5	413~556	5.0~7.0	223±16	28±2
smco-YX28A	1060~1180	10.6~11.8	763±40	9.6±0.5	≥796	≥10.0	223±16	28±2
smco-YX28B	1050~1150	10.5~11.5	≥750	9.4~9.8	≥960	≥12.0	223±16	28±2

smco-YX28C	1060~1180	10.6~11.8	763±40	9.6±0.5	≥1194	≥15.0	223±16	28±2
smco-YX30	1100~1200	11.0~12.0	438~597	5.5~6.5	454~597	5.7~7.5	238±16	30±2
smco-YX30A	1100~1200	11.0~12.0	≥560	7.0~8.5	≥716	≥12.0	238±16	30±2

Characteristics & application of SmCo permanent magnet

Curie Temp.	T _c	°C	800~850	Coeff. Of thermal expansion	C//	1/°C	~8×10 ⁻⁵
Density	D	g/cm ³	8.3~8.5		C⊥	1/°C	~11×10 ⁻⁵
Recoil Permeability	μ _{rec}		1.00~1.05	Rigidity strength		N/m ²	~1.5×10 ⁸
Max. Working Temp.	T _{max}	°C	350	Compress strength		N/m ²	~8×10 ⁸
Electrical Resistivity		Ω.Cm	~8.6×10 ⁻⁵	Tensile strength		N/m ²	~3.5×10 ⁷
Vickers Hardness	Hv		500~600	Young's Modulus		N/m ²	~1.2×10 ¹¹
Thermal conduct rate		W/mK	~12	Magnetization field Ha		kA/m	≥1600

Typical Characteristic Curve for SmCo permanent magnet



Characteristics & application of SmCo permanent magnet

1. SmCo permanent magnet has high magnetic energy product and high coercive force. Its properties are better than AlNiCo, ferrite permanent magnet. Its max. energy product is up to 239 kJ/m³ (30 MGOe), which is three times of that of AlNiCo8 permanent magnet, eight times of that of ferrite permanent magnet (Y40). So the permanent magnetic component made from SmCo material is small, light and stable in property. It is widely applied to electro acoustic & telecommunication apparatus, electric motors, measure meters, peg-top, electronic watch, microwave apparatus, magnetic mechanism, sensor and other static or dynamic magnetic routes.
2. The Curie temp. of the SmCo permanent magnet is high and its temp. Coeff. is low. So it is suitable for use at 300, high temp.
3. SmCo permanent magnet is hard and brittle. Its rigidity strength, tensile strength and press strength are low. So it is not suitable for framework.
4. The main ingredient of SmCo permanent magnet is metal cobalt (Co \geq 99.95%). So its price is high.

Reference points for application design of permanent magnet

1. What we stated herein are typical grades of SmCo permanent magnet only. We could meet your requirements for various magnetic properties too.
2. For application of permanent magnet at high temp., you need consider the following two important parameters: recoil temp. coeff. ($\frac{\partial B_r}{\partial T}$) and intrinsic coercive force (H_{cj}). Recoil temp. coeff. is a parameter to measure the performance of the permanent magnet with the variation of the temp. When the temp. come back to the initial value, the magnetic properties of the permanent magnet will reversibly return to the initial condition too. More smaller the temperature coefficient is, more lower the magnetic properties are. In the meantime, with the variation of the temperature, the magnetic properties of permanent magnet can change irreversibly. This is called irreversible loss. The irreversible loss descends with the increase of the intrinsic coercive force.
3. The appropriate dimensions of the permanent magnet should be taken into account for the application design. Generally speaking, the demagnetization curve of SmCo permanent magnet is close to a straight line and the difference value between Residual Flux Density B_r & coercive force H_{cb} is relatively small. So we should choose the working point (P_c value) around the Max. energy product, i.e. $(BH)_{max}$. Thus we could utilize the magnetic energy fully and save the cost greatly. Design reference: $0.5 \leq P_c \leq 1$.

4.SmCo permanent magnet is a functional material. It is unsuitable for structure part design. So the usual requirement to the tolerance of the dimensions for structure part is not applicable to it. For the detailed tolerance design, please refer to "permanent magnet supply illustration".

5.SmCo permanent magnet has strong anticorruption function. So it needn't similar surface treatment as that of NdFeB magnet. For the surface protect of SmCo permanent magnet, please turn to "surface protect and protect coating of permanent magnet". The coating will add to the cost in turn.



- 1 [Inspection standard for permanent magnet](#)
- 1 [Purchasing Guide](#)
- 1 [Permanent magnet supply direction](#)
- 1 [Surface protection and surface coating for the permanent magnet](#)
- 1 [Quality warranty](#)
- 1 [Safety principle for manual operation of permanent magnet](#)

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