

Raceway and Rolling Element Materials

While the contact surface of a bearing’s raceway and rolling elements are subjected to repeated heavy stress they still must maintain precision and rotational accuracy. To accomplish this, the raceway and rolling elements must be made of a material, which has high hardness, resistance to fatigue, wear resistance and good dimensional stability.

In case of normal applications and operating conditions, a low alloy chromium steel proved to be particularly suitable for rolling bearings.

Through-hardening steels of same or similar compositions are predominantly used worldwide by most of the manufactures of rolling bearings. And the most commonly used steel is SAE 52100 and the hardness maintained is 58~64 HRC.

Chemical compositions for bearings steels used in various countries

Country	STD.	Steel type	C	Si (%)	Mn	P	S	Cr	Ni	Mo
USA	AISI	SAE51100	0.95-1.10	0.20-0.35	0.25-0.45	<0.025	<0.025	0.90-1.15	<0.25	<0.08
		SAE52100	0.95-1.10	0.20-0.35	0.25-0.45	<0.025	<0.025	1.30-1.60	<0.25	<0.08
JAPAN	JIS	SUJ-2	0.95-1.10	0.15-0.35	<0.50	<0.025	<0.025	1.30-1.60	-	-
		SUJ-3	0.95-1.10	0.40-0.70	0.90-1.15	<0.025	<0.025	0.90-1.20	-	-
		SUJ-5	0.95-1.10	0.40-0.70	0.90-1.15	<0.025	<0.025	0.90-1.20	-	<0.06
GERMANY	DIN	105Cr5	1.00-1.10	0.15-0.35	0.25-0.40	<0.030	<0.025	0.90-1.15	-	-
		100Cr6	0.90-1.05	0.15-0.35	0.25-0.40	<0.025	<0.025	1.40-1.65	-	-
		100CrMn6	0.90-1.05	0.50-0.70	1.00-1.20	<0.025	<0.020	1.40-1.65	-	-
ROMANIA	RUL	Rul 1V	0.95-1.10	0.17-0.37	0.20-0.45	<0.027	<0.020	1.30-1.65	<0.30	<0.08
		Rul 2V	0.95-1.10	0.40-0.65	0.90-1.20	<0.027	<0.020	1.30-1.65	<0.30	<0.08
		Rul 3V	0.95-1.10	0.20-0.35	1.05-1.35	<0.027	<0.020	1.10-1.50	<0.30	0.45-0.60
CHINA	GB307.1	GCr15	0.95-1.05	0.15-0.35	0.20-0.40	<0.027	<0.020	1.30-1.65	<0.30	-

Chemical compositions for bearings steels in accordance with ISO 683

Steel type	C	Si	Mn (%)	P	S	Cr	Ni	Mo	Cu
100 Cr6	0.90-1.05	0.15-0.35	0.25-0.45	-	-	1.40-1.65	-	-	-
100CrMn6	0.90-1.05	0.50-0.70	1.00-1.20	<0.030	<0.025	1.40-1.65	<0.30	-	<0.30
100CrMo6	0.90-1.05	0.20-0.40	0.60-0.80	-	-	1.65-1.95	-	0.20-0.35	-
100CrMnMo8	0.90-1.05	0.40-0.60	0.80-1.10	-	-	1.80-2.05	-	0.50-0.60	-

Standard material used in various countries for applications

Country	ISO	USA	Germany	Japan	China
Bearing steel	683	SAE52100	100Cr6	SUJ2	GCr15

Cage Materials

Bearing cages have high importance in bearing. The main property of a cage is keeping the rolling element at equal distance, separate the neighbouring rolling element from colliding with each other and to keep the friction and heat development at a minimum.

Type of cages used

- Pressed CRCA (cold rolled cold annealed) sheet strip are used in manufacturing of cages for small and normal application bearings.
- Polyamide cages (Glass fiber reinforced polyamide 6.6) are used for small and medium size bearings, due its properties of low density, high elasticity, low wear at sliding movement and low inertia movement, this type of cage has a maximum operating temperature of + 120°C.
- Machine steel and brass cages are generally used for large-size bearings.