

Table 8.4 Chemical composition of carburizing steel

Brand	Chemical composition								
	C	Si	Mn	Cr	Ni	Mo	Cu	P	S
G20CrMo	0.17 ~0.23	0.20 ~0.35	0.65 ~0.95	0.35 ~0.65		0.08 ~0.15	≤0.25	≤0.030	≤0.030
G20CrNiMo	0.17 ~0.23	0.15 ~0.40	0.60 ~0.90	0.35 ~0.65	0.40 ~0.70	0.15 ~0.30	≤0.25	≤0.030	≤0.030
G20CrNi2Mo	0.17 ~0.23	0.15 ~0.40	0.40 ~0.70	0.35 ~0.65	1.60 ~2.00	0.20 ~0.30	≤0.25	≤0.030	≤0.030
G20Cr2Ni4	0.17 ~0.23	0.15 ~0.40	0.30 ~0.60	1.25 ~1.75	3.25 ~3.75		≤0.25	≤0.030	≤0.030
G10CrNi3Mo	0.08 ~0.13	0.15 ~0.40	0.40 ~0.70	1.00 ~1.40	3.00 ~3.50	0.08 ~0.15	≤0.25	≤0.030	≤0.030
G20Cr2Mn2Mo	0.17 ~0.23	0.15 ~0.40	1.30 ~1.60	1.70 ~2.00	≤0.30	0.20 ~0.30	≤0.25	≤0.030	≤0.030

8.1.3 High-temperature bearing steel

This type of steel, which possesses general quality of bearing steel with specified high temperature hardness, high temperature abrasion resistance, is designed to manufacture bearing parts used in 150°. It usually contains: Cr4Mo4V highest application

temperature 315 °C; Cr4Mo4V highest application temperature 425 °C; W6Mo5Cr4V2 highest application temperature 425 °C.

Table 8.5 chemical composition of high temperature bearing steel

Standard	Brand	Chemical composition									
		C	Si	Mn	Cr	Ni	Mo	V	Cu	P	S
YB/T688	Gr4Mo4V	0.10 ~0.75	≤0.35	≤0.35	3.75 ~4.25	≤0.20	4.00 ~4.50	0.90 ~1.10	≤0.20	≤0.020	≤0.027
YB/T1205	Gr14Mo4V	0.95 ~1.10	0.95 ~1.10	0.95 ~1.10	0.95 ~1.10	0.95 ~1.10	0.95 ~1.10	0.95 ~1.10	≤0.25	≤0.020	≤0.025

8.1.4 Stainless bearing steel

This type of steel is classified to high-alloy steel, therefore, it is of quite high harden ability. Outstanding mechanical property and corrosion resistance. It usually includes: 9Cr18, 9Cr18Mo, 1Cr13, 2Cr13 etc

Table 8.6 Chemical composition of stainless bearing steel.

Standard	Brand	Chemical composition						
		C	Si	Mn	Cr	S	P	Mo
GB/T3086	9Cr18	0.90~1.00	≤0.80	≤0.80	17.0~19.0	≤0.030	≤0.035	—
	9CrMo	0.95~1.10	≤0.80	≤0.80	16.0~18.0	≤0.030	≤0.035	0.40~0.70

8.2 Material for the cage

Cages keep the rolling elements arranged equidistantly, guide or drive rolling elements to rotate. It also helps to prevent rolling elements from dropping when bearing is rotating, cages mostly take friction and stretch, as well as some impact load. Therefore, material for the cages is required to be of these characteristics:

- ◆ Proper obdurability
- ◆ Nice rigidity and flexibility
- ◆ Minor friction coefficient and nice abrasion resistance
- ◆ Good conductivity coefficient
- ◆ Thermal expansivity closed to that of rolling elements
- ◆ Good machining property

8.2.1 Carbon structure steel

This steel can be used to make pressed cages wave shape, case shape, chrysanthemum shape etc. It can also be applied to manufacture shields, shield ring, and seals frame. The temperature scope of this steel applied is quite wide and its chemical oil resistance is very good. Mainly contain: 08, 10, 08F, 10F, or SPCC of JIS standard, and ST 12, ST 14 of DIN standard etc.

Table 8.7 Chemical composition of metallic material of normal cages.

Brand	Chemical composition				
	C	Si	Mn	P	S
08 (GB)	0.15~0.12	0.17~0.37	0.35~0.65	≤0.035	≤0.035
10 (GB)	0.07~0.14	0.17~0.37	0.35~0.65	≤0.035	≤0.035
ST12 (DIN)	≤0.10	≤0.04	≤0.50	≤0.035	≤0.035
ST14 (DIN)	≤0.08	≤0.03	≤0.40	≤0.025	≤0.020
SPCC (JIS)	≤0.12	≤0.04	≤0.50	≤0.04	≤0.045

8.2.2 Copper and copper alloy

Copper and copper alloy are used to make high-strength large size, cages and machined spacers, they usually contain: H62, H69, HPb59-1, H96 etc.

8.2.3 Non-metallic material

This type of material is light, easy to form and have characteristic of shake and noise reduction. Phenolic rubberized fabric is of very high mechanical property. Axial direction compression resistance strength > 180 Mpa, Radial tensile strength > 70 Mpa, axial tensile strength > 100 Mpa. Toughening nylon 66 (PA 66-GF 25) is designed for bearing cage under temperature below 120° C, it is a kind of engineering plastics used to produce bearing cages because of its high strength.