1. Bearing materials

1.1 Raceway and rolling element materials

1.1.1 High/mid carbon alloy steel
In general, steel varieties which can be hardened not just on the surface but also deep hardened by the so-called "through hardening method" are used for the raceways and rolling elements of bearings. Foremost among these is high carbon chromium bearing steel, which is widely used.

1.1.2 Mid-carbon chromium steel
Mid-carbon chromium steel incorporating silicone and manganese, which gives it hardening properties comparable to high carbon chromium steel.

1.2 Cage materials
Bearing cage materials must have the strength to withstand rotational vibrations and shock loads. These materials must also have a low friction coefficient, be light weight, and be able to withstand bearing operation temperatures.

1.2.1 Pressed cages
For small and medium sized bearings, pressed cages of cold or hot rolled steel with a low carbon content of approx. 0.1% are used. However, depending on the application, austenitic stainless steel is also used.

1.2.2 Plastic cages
Injection molded plastic cages are now widely used: most are made from fiber glass reinforced heat resistant polyamide resin. Plastic cages are light weight, corrosion resistant and have excellent dampening and sliding properties. Heat resistant polyamide resins now enable the production of cages that perform well in applications ranging between −40°C – 120°C. However, they are not recommended for use at temperatures exceeding 120°C.

2. Bearing tolerances

2.1 Standard of tolerances
Ball bearing "tolerances" or dimensional accuracy and running accuracy, are regulated by ISO and JIS standards (rolling bearing tolerances). For dimensional accuracy, these standards prescribe the tolerances necessary when installing bearings on shafts or in housings. Running accuracy is defined as the allowable limits for bearing runout during operation.

Table 2.1 Bearings types and applicable tolerance

Bearing type		Applicable standard	Applicable tolerance class				Applicable table
Needle roller bearing		JIS B 1514 ISO 492 (NIKO standard)	class change	class 6	class 5	class 4	Table 3.2
Complex bearing	Radial bearing		class 0	class 6	class 5	—	Table 3.2
	Thrust bearing		NIKO class 0	NIKO class 6	NIKO class 5	NIKO class 4	Table 3.3
Needle roller bearing with double-direction thrust roller bearing	Radial bearing		—	—	class 5	class 4	Table 3.2
	Thrust bearing		—	—	NIKO class 5	NIKO class 4	Table 3.3
Thrust roller bearings			NIKO class 0	NIKO class 6	NIKO class 5	NIKO class 4	Table 3.3
Roller follower/cam follower			class 0	—	—	—	Table 3.2

Note: JIS B 1514 and ISO 492 have the same specification level.