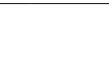# Suitability of rolling bearings for industrial applications
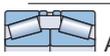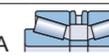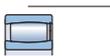
Symbols

+++ excellent
++ good
+ fair
- poor
–– unsuitable

↔ double direction
← single direction
□ non-locating displacement on the seat
■ non-locating displacement within the bearing
✓ yes
✗ no

Bearing type	Load carrying capability			Misalignment		Arrangement				Suitable for					Design features			
	Radial load	Axial load	Moment load	Static misalignment	Dynamic misalignment (few tenths of a degree)	Locating	Non-locating	Adjusted	Floating	Long grease life	High speed	Low run-out	High stiffness	Low friction	Integral sealing	Separable ring mounting	Tapered bore	Standard housings and accessories available
Deep groove ball bearings	+	+ ↔	A –, B +	–	––	↔	□	✗	✓	A +++ B ++	A +++ B +	A +++ B ++	+	+++	A ✓	✗	✗	✗
Insert bearings	+	+ ↔	––	++	––	↔	↔	✗	✗	+++	++	A, B + C ++	+	++	✓	✗	✗	✓
Angular contact ball bearings, single row	+[1]	++ ←	––	–	––	✗	✗	✓	✗	++	++	+++	++	++	✓	✗	✗	✗
matched single row	A, B ++ C ++[1]	A, B ++ ↔ C ++ ←	A ++, B + C ––	A, C ––, B –	––	A, B ↔ C ←	A, B □ C ✗	✗	✗	++	++	+++	++	++	✗	✗	✗	✗
double row	++	++ ↔	++	––	––	↔	□	✗	✗	++	++	++	++	++	A ✓	B ✓	✗	✗
four-point contact	+[1]	++ ↔	––	––	––	↔[1]	––	––	––	+	+++	++	++	++	✗	✓	✗	✗
Self-aligning ball bearings	+	–	––	+++	+[2]	↔	□	✗	✓	+++	++	++	+	+++	✓	✗	✓	✓
Cylindrical roller bearings, with cage	++	––	––	–	––	✗	■	✗	✗	++	+++	+++	++	+++	✗	✓	✗	✗
	++	A, B + ← C, D + ↔	––	–	––	A, B ← C, D ↔	A, B ■ ← C, D ✗	✗	A ✓ B, C, D ✗	++[3]	+++	++	++	+++	✗	✓	✗	✗
full complement, single row	+++	+ ←	––	–	––	←	A, B ←	✗	✓	–	+	+	+++	–	✗	A ✗ B ✓	✗	✗
full complement, double row	+++	A –, B + ← C, D + ↔	––	–	––	B ← C, D ↔	A ■ ↔ B ■ ←	✗	✗	–	+	+	+++	–	D ✓	✗	✗	✗
Needle roller bearings, with steel rings	++	––	––	A, B – C ++	––	✗	■ ↔	✗	✗	++	++	+	++	+	A ✓	✓	✗	✗
assemblies / drawn cups	++	A, B –– C –	––	–	––	A, B ✗ C ←	A, B ■ C ■ ←	✗	✗	++	++	+	++	+	B, C ✓	✓	✗	✗
combined bearings	++	A –, B + C ++	––	––	––	←	✗	✓	✗	+	+	+	++	+	✗	✓	✗	✗
Tapered roller bearings, single row	+++[1]	++ ←	––	–	––	←	✗	✓	✗	+	++	+++	++	+	✗	✓	✗	✗
matched single row	A, B +++ C +++[1]	A, B ++ ↔ C ++ ←	A +, B ++ C ––	A – B, C ––	––	A, B ↔ C ←	A, B □ C ✗	A, B ✗ C ✓	✗	+	+	++	+++	+	✗	✓	✗	✗
double row	+++	++ ↔	A + B ++	A –, B ––	––	↔	□	✗	✗	+	+	++	+++	+	✓	✓	B ✓	✗
Spherical roller bearings	+++	+ ↔	––	+++	+[2]	↔	□	✗	✓	+	++	+++	++	+	✓	✗	✓	✓
CARB toroidal roller bearings, with cage	+++	––	–	++	–	✗	■	✗	✗	+	++	+++	++	+	✗	✗	✓	✓
full complement	+++	––	–	++	–	✗	■	✗	✗	–	+	+++	++	–	✓	✗	✓	✓
Thrust ball bearings	––	A + ← B + ↔	––	––	––	A ← B ↔	✗	✗	✗	+	–	++	+	+	✗	✓	✗	✗
with sphered housing washer	––	A + ← B + ↔	––	++	––	A ← B ↔	✗	✗	✗	+	–	+	+	+	✗	✓	✗	✗
Cylindrical roller thrust bearings	––	++ ←	––	––	––	←	✗	✗	✗	–	–	+	+++	+	✗	✓	✗	✗
Needle roller thrust bearings	––	++ ←	––	––	––	←	✗	✗	✗	–	–	+	+++	+	✗	✓	✗	✗
Spherical roller thrust bearings	+[1]	+++ ←	––	+++	+[2]	←	✗	✓	✗	–	+	+	+++	+	✗	✓	✗	✗

[1] Provided the F_a/F_r ratio requirement is met   [2] Reduced misalignment angle – contact SKF   [3] Depending on cage and axial load level