

# Angular Contact Ball Bearings

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## ● Design

Angular Contact Ball Bearings can sustain combined loads of simultaneously acting radial and axial loads because they have a contact angle ( $\alpha$ ).

The contact angle is defined as the angle between the line joining the points of contact between the ball and the raceways in the radial plane.

## 1. Single-row Angular Contact Ball Bearings

These bearings are designed with three contact angle classifications as shown in Table 1. Normally, contact angle A design and B design are fitted with a cage as shown in Table 2-1. High precision (JIS/ISO class 5 or higher) may be fitted with a machined cage of bronze or

phenolic resin or a polyamide cage. Contact angle C design are generally applied high precision, JIS (ISO) class 5 or higher, and are fitted with a machined phenolic resin cage or a polyamide cage.

**Table 1. Contact Angle and Characteristics of Single-row Angular Contact Ball Bearings**

Contact Angle Symbol	Example Bearing No.	Contact Angle ( $\alpha$ )	Speed	Load capability comparison <sup>(2)</sup>		Cross section
				Radial Load Direction (X)	Axial Load Direction (Y)	
A	7205 <sup>(1)</sup>	30°	—	—	—	
B	7205B	40°	Less	Less	Greater	
C	7205C	15°	Greater	Greater	Less	

Notes: <sup>(1)</sup> Contact angle symbol "A" is omitted.  
<sup>(2)</sup> Axial load can be accommodated in one direction only.

**Table 2-1. Angular Contact Ball Bearing Cage for Contact Angle Symbol A and B (For JIS/ISO class 0 or 6)**

	Applicable Bore Diameter Number	
	Pressed Steel	Machined Brass
72, 72B	00~22	24~40
73, 73B	00~19	20~40

**Table 2-2. Angular Contact Ball Bearing Cage for Contact Angle Symbol C**

	Applicable Bore Diameter Number	
	Machined Synthetic Resin	Polyamide
70C	00~40	00~20
72C	00~26	00~20
73C	00~22	—

## 2. Combination Angular Contact Ball Bearings

Single-row Angular Contact Ball Bearings are seldom used as a single unit. Normally they are used as a combination of two and more units. High precision paired combination Angular Contact Ball Bearings (JIS/ISO class 5 or higher) are used for applications such as machine tool spindles and are usually preloaded. Three types of combinations are available:

- 1) DB, back - to - back
- 2) DF, face - to - face

3) DT, tandem


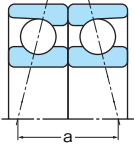

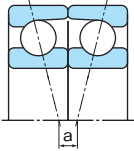

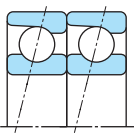
Because clearance of matched set parts is adjusted before shipment, care should be taken to prevent mixing of parts from other sets.

Load-carrying capability of combined Angular Contact Bearings are shown in Table 3.

Flush ground bearings or Universal matching bearings are also available.

DU can be mounted as back-to-back, face-to-face or in tandem.

**Table 3. Load-carrying Characteristics of Combination Angular Contact Ball Bearings**

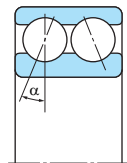
Configuration	Load Center Distance (a)	Load Capability	Moment Load Rigidity	Cross Section
Back - to -Back (DB)	Long		Greater	
Face - to -Face (DF)	Short		Less	
Tandem (DT)	—		—	

## 3. Double-row Angular Contact Ball Bearings

This type bearings is made in two contact angle levels as shown in Table 4. They are selected according to sustained axial and moment load. Pressed steel cage are used for them. Some sizes of Double-row Angular Contact Ball Bearing are available with contact seals (2NS) or shields (ZZ).

**Table 4. Double-row Angular Contact Ball Bearing Contact Angles and Symbols**

Contact Angle Symbol	Contact Angle ( $\alpha$ )	Example Bearing No.
None	20°	5205
A	30°	5205A



### ● Flush ground set combinations (Universal matching)

NACHI Angular Contact Ball Bearings with a suffix U are flush ground to permit the use of random combinations where two or more bearings are mounted.

7206B U

7206CY U P4

Flush ground (free set matching)

### ● Speed Limits

With respect to single-row or combination bearings, the dimension tables show limiting speed for bearings made with machined cages or a polyamide cages. For bearings made with pressed-cages, multiply the table limit by 0.8. For contact angle C design bearings, the table limiting speeds are applied to high precision bearings of class 5 or higher.

These limiting speeds can be applied when a

high quality grease or oil is supplied in proper quantity under light load conditions. When Angular Contact Ball Bearings are used in combination of two or more units, or with larger preload to improve rigidity, the limiting speed must be decreased. Please contact NACHI for design assistance.

### ● Attention

- (1) If bearings are operated under severe conditions such as close to limiting speed, high temperature, or vibrating load, please consult NACHI.
- (2) Bearings with polyamide cage should be use at less than 120°C.
- (3) Combination Angular Contact Ball Bearings should not be mixed with those of other bearings.
- (4) When combination bearings with a optional preload is required, please contact NACHI.