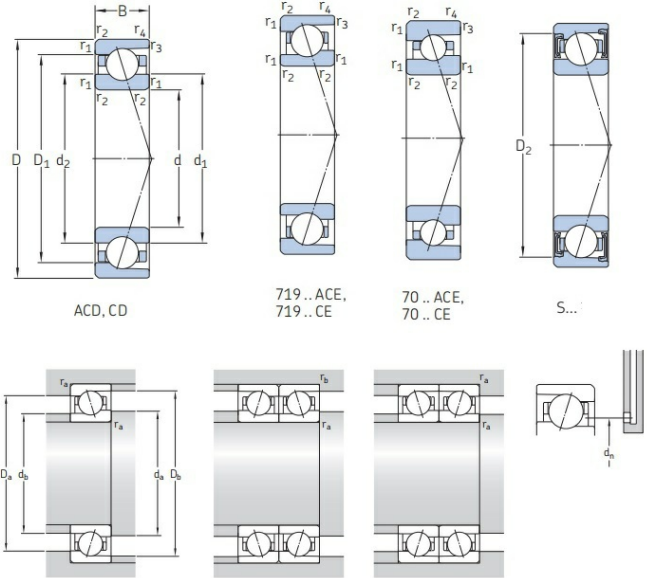


7009ACDGB/P4A

super-precision angular contact ball bearings



Technical sheet of 7009ACDGB/P4A

What are the Benefits of choosing 7009ACDGB/P4A bearings?

- **High simultaneous load-bearing capacity:** Capable of simultaneously withstanding combined radial and axial loads and operating at high speeds.
- **High speed limit:** Optimized contact angle and cage design suitable for ultra-high-speed operation (e.g., machine tool spindles).
- **Rigidity and precision:** Provides extremely high rotational accuracy and system rigidity, ensuring precision in machining or operation.
- **Preload adjustment:** Precise preload adjustment is possible through paired installation (back-to-back/face-to-face), eliminating backlash and improving system stability.
- **Versatile design:** Offers different contact angles (e.g., 15°, 25°) to accommodate different speeds and load requirements.

| | | |
|--------------------------|--|------------------------------------|
| Type : | Angular contact ball bearings, super-precision | |
| Model : | 7009ACDGB/P4A | |
| Main demensions : | 45 mm × 75 mm × 16 mm | Bore Dia × Outside Dia × Width Dia |
| M kg: | 0.24 | Mass |
| HS Code : | 8482103000 | Bearing customs code |
| d mm: | 45 | inner ring diameter |

| | | |
|----------------------|--------|----------------------------|
| D mm: | 75 | Outer ring diameter |
| B(T) mm: | 16 | Overall Width |
| Cr kN: | 27.496 | Radial dynamic load rating |
| COr kN: | 21.464 | Radial static load rating |
| Grease r/min: | 16941 | Reference speed |
| Oil r/min: | 25948 | Limiting speed |

Detailed parameters and installation dimensions:

| | |
|-----------------------------|---|
| Part Number | 7009ACDGB/P4A |
| Bearing Type | super-precision angular contact ball bearings |
| Internal design | ACD = 25° contact angle, high-capacity design |
| Series | 70..-ACDGB/P4A |
| Accuracy class | P4A |
| Rows NO. | 1 |
| Cage | Cotton fabric reinforced phenolic resin or carbon fibre reinforced PEEK, outer ring centred |
| Dimension series | ISO dimension series 10 |
| Ball material | GCr15SiMn |
| Contact angle - α | 25 ° |
| Manufacturer Part Code | 7009 ACDGB/P4A |
| Dimension | |
| Inside - d ϕ | 45 mm 1.772 inch |
| Outside - D Φ | 75 mm 2.953 inch |
| Width - B | 16 mm 0.630 inch |
| Chamfer - r_1, r_2 (min.) | 1 mm 0.039 inch |
| Chamfer - r_3, r_4 (min.) | 0.3 mm 0.012 inch |
| Fillet - r_a (max.) | 1 mm 0.039 inch |
| Fillet - r_b (max.) | 0.3 mm 0.012 inch |
| d_1 | 54.2 mm 2.134 inch |
| d_2 | 54.2 mm 2.134 inch |
| D_1 | 65.8 mm 2.591 inch |
| D_2 | 68.3 mm 2.689 inch |
| Balls diameter | 9.525 mm 0.375 inch |
| Properties | |
| Bore Type | Z = Cylindrical Bore |
| Ring material | Carbon chromium steel |
| Balls qty [single] | 17 |
| Temperature - T(min) | -30 °C |
| Temperature - T(max) | +110 °C |
| Bearing Mass - m | 0.24 kg 0.529 lb |
| Units | Metric |
| Contact type | 2-point contact |

| | |
|---|---|
| Single bearing - execution and preload | GB = Single, universally matchable, light preload |
| Ring type | inner rings(1 piece), outer rings(1 piece) |
| Load Direction | Angular Contact |
| Seal | open |
| Grease quantity - G_{ref} | 3.3 cm ³ |
| Performance (Load Capacity and speeds) | |
| Dynamic Radial - C_r | 27496 N 6181 lbf |
| Static Radial - C_{0r} | 21464 N 4825 lbf |
| Fatigue Radial - P_u | 871 N 195 lbf |
| Attainable speeds (Grease) | 16941 r/min |
| Attainable speeds (Oil-air) | 25948 r/min |
| Abutment dimensions | |
| d_a (min.) | 49.6 mm 1.953 inch |
| d_b (min.) | 49.6 mm 1.953 inch |
| D_a (max.) | 70.4 mm 2.772 inch |
| D_b (max.) | 73 mm 2.874 inch |
| d_n | 56.2 mm 2.213 inch |

What are the applications of the 7009ACDGB/P4A bearing?

- **Machine tool manufacturing (spindles, grinding heads):** Achieve extremely high speeds and machining accuracy, improving surface quality and production efficiency.
- **Aerospace (accessory gearboxes, gyroscopes):** Maintain high reliability and long lifespan during high-speed operation, adapting to harsh environments.
- **Precision instruments (measuring equipment, optical instruments):** Provide extremely low vibration and smooth operation, ensuring measurement accuracy.
- **High-speed motors (electric spindles, permanent magnet motors):** Support ultra-high speed operation, reducing temperature rise and power consumption.
- **Semiconductor equipment (wafer dicing machines, lithography machines):** Ensure micron-level positioning accuracy and long-term stability, improving yield.
- **Medical devices (CT scanners, surgical robots):** Achieve quiet and smooth rotation, meeting medical safety standards.
- **Robotics (joint reducers):** Improve joint response speed and repeatability, enhancing dynamic performance.

How should choose the right model for a Angular contact ball bearings, super-precision?

Step 1: Select Series by Size

Determine the ISO size series based on installation space and load requirements:

718 Series: Ultra-light, extremely low cross-section height, suitable for space-constrained applications.

719 Series: Extremely light, a general-purpose choice, balancing rigidity and speed.

70 Series: Light, the most commonly used series, with a wide range of applications.

72 Series: Robust, largest cross-section, suitable for heavy-duty, relatively low-speed applications.

Step 2: Select Internal Design by Working Condition (Crucial)

This is the core of SKF selection; different suffixes correspond to different performance orientations:
High Load Capacity D Design: Suffix CD (15° contact angle) or ACD (25° contact angle). Utilizes a large ball design, offering the highest rigidity and load-bearing capacity, suitable for general-purpose machine tool spindles such as machining centers and lathes.

High Speed E Design: Suffix CE (15°), FE (18°), or ACE (25°). Featuring a small, multi-ball design, this bearing boasts higher speed capabilities than the D design, suitable for ultra-high-speed applications such as electric spindles and PCB drilling.

High-Speed B Design: Suffixes CB (15°), FB (18°), or ACB (25°). Smaller and lighter balls, suitable for extremely high speeds and light loads.

UltraFast A Design: Suffix AB (20° contact angle). Available only with hybrid ceramic balls, designed specifically for electric spindles demanding extreme speeds.

Sealed W Design: Suffix FW (18° contact angle). Available only with hybrid ceramic balls, featuring double-sided sealing and lifetime lubrication, suitable for medium-to-high-speed, maintenance-free equipment such as woodworking machinery.

Step 3: Identifying the Seal and Suffix

Seal Identification (Prefix): Models starting with S indicate double-sided sealing (e.g., S7010), pre-filled with grease at the factory, requiring no maintenance for life. Those without S are open bearings.

Material: HC indicates hybrid ceramic balls (ceramic balls + steel rings), enabling higher speeds, electrical insulation, and longer lifespan.

Preload (universal pairing): GA (ultra-light preload), GB (light preload), GC (medium preload). This is a suffix for a single bearing, indicating that the bearing can be arbitrarily paired and combined to achieve a specified preload.

Precision: P4 (ISO Class 4, standard ultra-precision), P4A (operating precision higher than P4), P2 (highest grade).

Arrangement (pair/group suffix): DB (back-to-back), DF (face-to-face), DT (tandem), QBC (quadruple, tandem back-to-back configuration), etc.

Typical Model Explanation

Taking S7010 ACD/HCP4A QBC C as an example:

S: Double-sided seal (lifetime lubrication)

7010: 70 series, 50mm inner diameter

ACD: 25° contact angle, D design (high load capacity)

HC: Hybrid ceramic balls

P4A: Precision grade (super P4)

QBC: Quadruple bearing assembly, tandem back-to-back configuration

C: Medium preload (for heavy preload)

Taking 71922 CDGB TNHA/PA9A L as an example:

71922: 719 series, 110mm inner diameter

CD: 15° contact angle, D design (high load capacity)

GB: Light preload (universal matching)

TNHA: Glass fiber reinforced PEEK cage, outer ring centering

PA9A: Precision grade (ISO) Level 2)

L: Light preload (for triple/quadruple units only)

Selection Key Points Summary

First determine the series: 718/719/70/72

Then determine the design: CD/ACD (high load capacity) or CE/ACE (high speed) or FW (sealing) or AB (UltraFast)

Confirm the seal: Select the S prefix for lifetime lubrication

Optional suffixes: Material HC, Preload GA/GB/GC, Accuracy P4/P4A, Arrangement DB/DF/DT/QBC

What is the mounting procedure for 7009ACDGB/P4A bearings?

Cleaning and Inspection: Clean the bearing in a dust-free environment. After a rough wash to remove contaminants, perform a fine wash until the bearing feels smooth and responsive to the touch. Simultaneously check the accuracy of the mating surfaces of the shaft and bearing housing.

Measurement and Fitting: Precisely measure the bearing's inner and outer diameters. Mark the corresponding positions on the shaft and housing bores for alignment during assembly to compensate for any deviations.

Installation and Positioning: Apply pressure evenly using a specialized tool, focusing only on the interference fit rings. If heat fitting is used, tighten the inner ring during cooling to prevent clearance from affecting the preload.

Preload Adjustment: When installing in pairs, ensure the parallelism of the inner and outer spacers is $\leq 1\mu\text{m}$. Adjust the preload force to the specified value by grinding the spacers.

Lubrication Inspection: Add the specified amount of grease or oil mist lubricant. After installation, manually rotate the bearing to check its flexibility and operating noise.

Special Note for mounting 7009ACDGB/P4A bearings?

Clean Environment: Operation must be performed in a dust-free cleanroom with humidity $\leq 65\%$ to prevent dust and impurities from affecting accuracy.

No Striking: Direct striking of the bearings is strictly prohibited. Special tools must be used, and force must be applied evenly.

Matching Marks: Bearings used in pairs are not interchangeable. Installation must strictly follow the factory matching marks.

Rust-Proof Storage: Long-term storage requires regular rust-proofing treatment. Maintain ventilation and avoid corrosive gases.

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