Image may differ from product. See technical specification for details.

# 7013 ACD/P4A

## Super-precision, high-capacity, single row angular contact ball bearing

These super-precision, high-capacity, single row angular contact ball bearings, with 25° contact angle, accommodate radial and axial loads acting simultaneously, where the axial load acts in one direction only. They are designed to accommodate heavy loads at relatively high speeds under low to moderate operating temperatures.

- Very high running accuracy
- Very high load carrying capacity
- Relatively high speed and stiffness

# Overview

## Dimensions

| | |
|---|---|
| Bore diameter | 65 mm |
| Outside diameter | 100 mm |
| Width | 18 mm |
| Contact angle | 25 ° |

## Performance

| | |
|---|---|
| Basic dynamic load rating | 39 kN |
| Basic static load rating | 35.5 kN |
| Attainable speed for grease lubrication | 12 000 r/min |
| Attainable speed for oil-air lubrication | 19 000 r/min |

## Properties

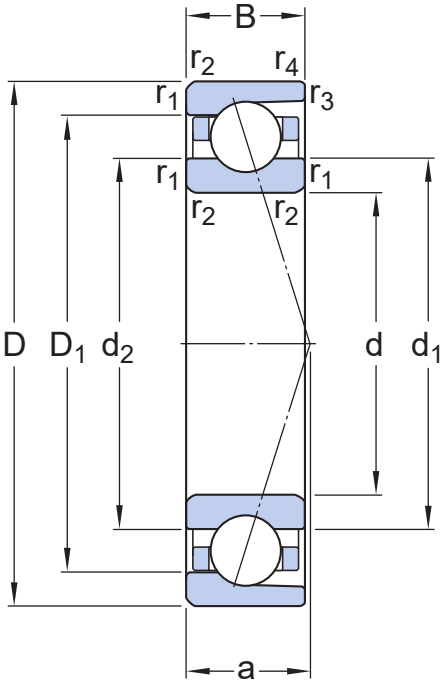
| | |
|---|---|
| Contact type | Normal contact (two-point contact) |
| Number of rows | 1 |
| Ring type | One-piece inner and outer rings |
| Design | High-capacity D |
| Universal matching bearing | No |
| Matched arrangement | No |
| Matched condition (axial clearance/ preload) | Not applicable |
| Tolerance class | P4A |
| Material, bearing | Bearing steel |
| Coating | Without |
| Sealing | Without |
| Lubricant | None |

## Logistics

| | |
|---|---|
| Product net weight | 0.42 kg |
| eClass code | 23-05-08-04 |
| UNSPSC code | 31171531 |

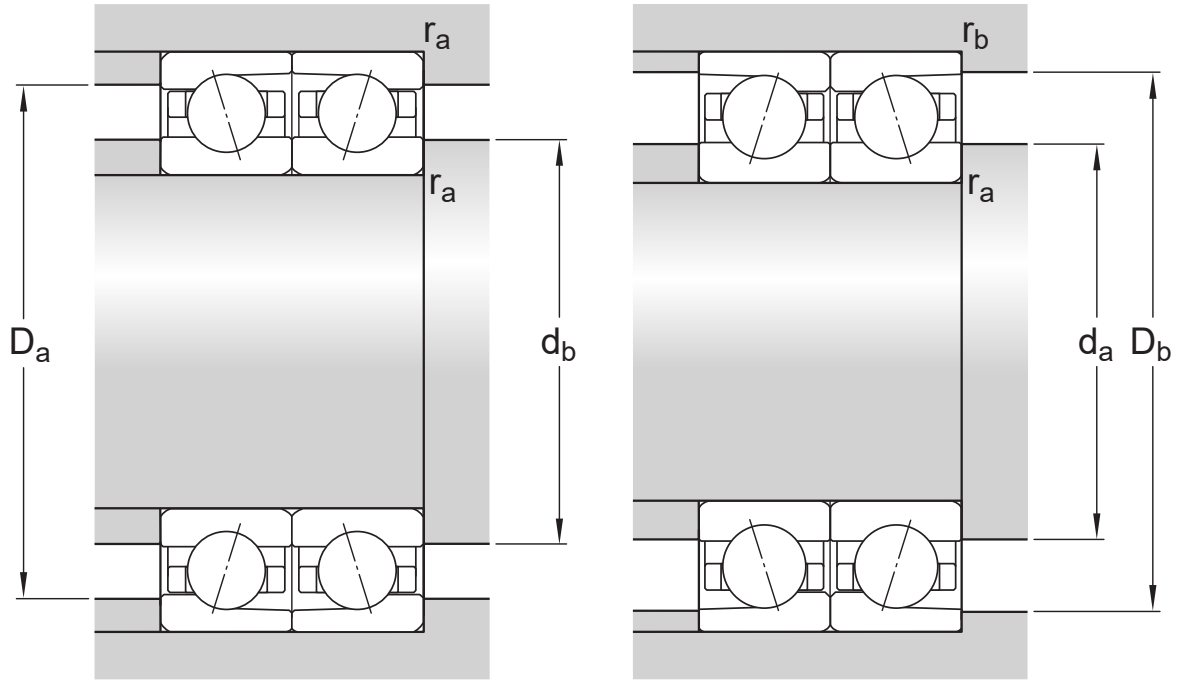
# Technical specification

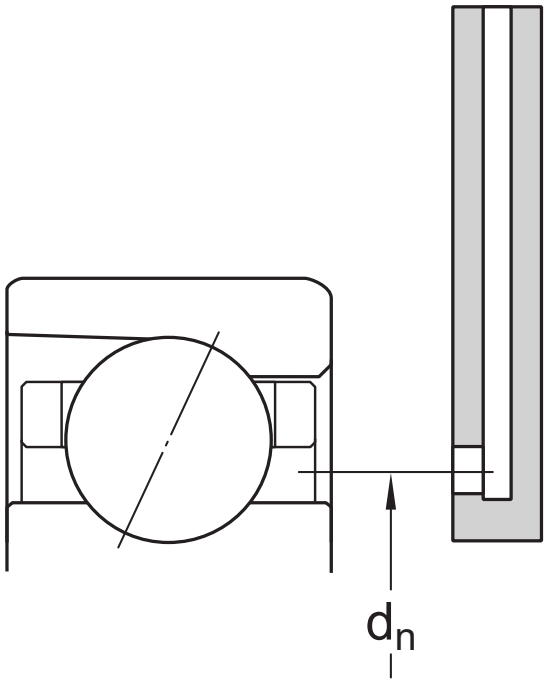
| | |
|---|---|
| Universal matching bearing(s) | No |




## Dimensions

| | | |
|---|---|---|
| d | 65 mm | Bore diameter |
| D | 100 mm | Outside diameter |
| B | 18 mm | Width |
| $d_1$ | 75.8 mm | Shoulder diameter of inner ring (large side face) |
| $d_2$ | 75.8 mm | Shoulder diameter of inner ring (small side face) |
| $D_1$ | 89.2 mm | Shoulder diameter of outer ring (large side face) |
| $r_{1,2}$ | min. 1.1 mm | Chamfer dimension |
| $r_{3,4}$ | min. 0.6 mm | Chamfer dimension |
| a | 28.3 mm | Distance from side face to pressure point |




## Abutment dimensions

| | | |
|---|---|---|
| $d_a$ | min. 71 mm | Diameter of shaft abutment |
| $d_b$ | min. 71 mm | Diameter of shaft abutment |
| $D_a$ | max. 94 mm | Diameter of housing abutment |
| $D_b$ | max. 96.8 mm | Diameter of housing abutment |
| $r_a$ | max. 1 mm | Radius of fillet |
| $r_b$ | max. 0.6 mm | Radius of fillet |
| $d_n$ | 78.1 mm | Position of oil nozzle |

## Calculation data

| | | |
|---|---|---|
| Basic dynamic load rating | C | 39 kN |
| Basic static load rating | $C_0$ | 35.5 kN |
| Fatigue load limit | $P_u$ | 1.5 kN |
| Attainable speed for grease lubrication | | 12 000 r/min |
| Attainable speed for oil-air lubrication | | 19 000 r/min |
| Contact angle | α | 25 ° |
| Ball diameter | $D_w$ | 11.112 mm |
| Number of rows | i | 1 |
| Number of balls (per bearing) | z | 20 |
| Reference grease quantity (per bearing) | $G_{ref}$ | 5.7 $cm^3$ |

## PRELOAD AND STIFFNESS (BACK-TO-BACK, FACE-TO-FACE)

| | | |
|---|---|---|
| Preload, class A | $G_A$ | 240 N |
| Axial stiffnes for preload A (sets of two brgs back to back or face to face) | | 174 N/µm |
| Preload, class B | $G_B$ | 480 N |
| Axial stiffness for preload B (sets of two brgs back-to-back or face-to-face) | | 227 N/µm |
| Preload, class C | $G_C$ | 960 N |
| Axial stiffness for preload C (sets of two brgs back-to-back or face-to-face) | | 302 N/µm |
| Preload, class D | $G_D$ | 1 920 N |
| Axial stiffness for preload D (sets of two brgs back-to-back or face-to-face) | | 409 N/µm |

## CORRECTION FACTORS FOR PRELOAD CALCULATION

| | | |
|---|---|---|
| Correction factor dependent on bearing series and size | f | 1.13 |
| Correction factor dependent on contact angle | $f_1$ | 0.99 |
| Correction factor, preload class A | $f_{2A}$ | 1 |
| Correction factor, preload class B | $f_{2B}$ | 1.02 |
| Correction factor, preload class C | $f_{2C}$ | 1.05 |
| Correction factor, preload class D | $f_{2D}$ | 1.08 |

| | | |
|---|---|---|
| Correction factor for hybrid bearings | $f_{HC}$ | 1 |

### FACTORS FOR EQUIVALENT BEARING LOAD CALCULATION

| | | |
|---|---|---|
| Limiting value | e | 0.68 |
| Axial load factor (single, tandem) | $Y_2$ | 0.87 |
| Axial load factor (single, tandem) | $Y_0$ | 0.38 |
| Radial load factor (single, tandem) | $X_2$ | 0.41 |
| Axial load factor (back-to-back, face-to-face) | $Y_1$ | 0.92 |
| Axial load factor (back-to-back, face-to-face) | $Y_2$ | 1.41 |
| Axial load factor (back-to-back, face-to-face) | $Y_0$ | 0.76 |
| Radial load factor (back-to-back, face-to-face) | $X_2$ | 0.67 |

## Tolerances and clearances

### GENERAL BEARING SPECIFICATIONS

- Tolerances: P4A, P4B, P4, PA9A, P2

### PRINCIPLES OF BEARING SELECTION AND APPLICATION

- Chamfer dimensions
- Seat tolerances for standard conditions: shafts, housings
- Values for ISO tolerance classes: shafts, housings
- Speed dependent initial grease fill → Initial grease fill
- Clamping and fitting forces: D design, E design, B design
- Designation suffixes H, H1, L and L1 identify variants for direct oil-air lubrication.

### FACTORS FOR EQUIVALENT BEARING LOAD CALCULATION

- Note 1: Single bearings and bearings arranged in tandem
- Note 2: Bearings paired back-to-back or face-to-face

## SPEED REDUCTION FACTORS FOR SPEED CALCULATION

| Number of bearings | Arrangement | Designation suffix | Speed reduction factors | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | for matched sets | for bearings in the series | | | | | | | | | | | | | | |
| | | | 718 .. D, 719 .. E, and 70 .. E | | | | | | S70 .. W | 719 .. A and 70 .. A | 719 .. B and 70 .. B | | | 719 .. D, 70 .. D and 72 .. D | | | |
| | | | for preload class | | | | | | | | for preload class | | | for preload class | | | |
| | | | A | L | B | M | C | F | – | – | A | B | C | A | B | C | D |
| 2 | Back-to-back | DB | 0,8 | – | 0,65 | – | 0,4 | – | 0,81 | 0,8 | 0,83 | 0,78 | 0,58 | 0,81 | 0,75 | 0,65 | 0,4 |
| | Face-to-face | DF | 0,77 | – | 0,61 | – | 0,36 | – | – | – | 0,8 | 0,74 | 0,54 | 0,77 | 0,72 | 0,61 | 0,36 |
| 3 | Back-to-back and tandem | TBT | 0,69 | 0,72 | 0,49 | 0,58 | 0,25 | 0,36 | – | – | 0,72 | 0,66 | 0,4 | 0,7 | 0,63 | 0,49 | 0,25 |
| | Face-to-face and tandem | TFT | 0,63 | 0,66 | 0,42 | 0,49 | 0,17 | 0,24 | – | – | 0,64 | 0,56 | 0,3 | 0,63 | 0,56 | 0,42 | 0,17 |
| 4 | Tandem back-to-back | QBC | 0,64 | – | 0,53 | – | 0,32 | – | – | – | 0,67 | 0,64 | 0,48 | 0,64 | 0,6 | 0,53 | 0,32 |
| | Tandem face-to-face | QFC | 0,62 | – | 0,48 | – | 0,27 | – | – | – | 0,64 | 0,6 | 0,41 | 0,62 | 0,58 | 0,48 | 0,27 |

For spring-loaded tandem sets, designation suffix DT, a speed reduction factor of 0,9 should be applied.

# Compatible products

## Aftermarket replacement

| | |
|---|---|
| Super-precision, high-capacity, universally matchable single row angular contact ball bearing | 7013 ACDGA/P4A |

## More Information

### Product details

- Designs and variants
- Markings on bearings and bearing sets
- General bearing specifications
- Preload, clearance, and stiffness
- Loads
- Attainable speeds
- Mounting
- Designation system

### Engineering information

- Principles of bearing selection and application
- General bearing knowledge
- Bearing selection process
- Bearing failure and how to prevent it

### Tools

- SimPro Quick
- SimPro Spindle
- Bearing Frequency Calculator
- LubeSelect for SKF greases
- Heater selection tool
- Super-precision manager tool

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