ZEN™

BEARINGS FOR YOUR FUTURE

# Roulements hybrides et céramiques

BEARINGS FOR YOUR FUTURE

**Les roulements Zen sont fabriqués en accord avec les normes de qualité de plus haut niveau pour des applications standard et non standard. Notre service technique peut ajuster n'importe quel roulement non standard afin de l'adapter à vos nécessités, quelle qu'elle soit la quantité.**

En plus de notre gamme de roulements miniature de plus de 1000 références, entre 1mm. et 10 mm., notre catalogue de produits contient aussi des roulements à section mince, des butées à billes, des roulements série populaire ainsi qu'un infinité de roulements non standard. Nous sommes en mesure de concevoir des roulements en concordance avec vos exigences en utilisant des nouveaux matériaux, tels que : céramiques ou aciers spéciaux pour différentes applications industrielles, médicales, chimiques ou de transformation alimentaire.

N'hésitez pas à contacter notre personnel commercial qualifié si jamais vous avez besoin d'une référence qui n'apparaît pas sur notre catalogue.

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L'entreprise Zen Ball Bearings Shanghai a été gratifiée du certificat Aleman de qualité ISO TUV Rheinland pour l'inspection de ses propres produits Zen.

Ce certificat est l'une des plus hautes reconnaissances qu'une entreprise puisse atteindre dans notre secteur. Il s'agit d'un prix reconnu internationalement qui authentifie un haut niveau de qualité, orientation client et amélioration continue.

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## Roulements hybrides et céramiques

- Résistant aux intempéries*
- Résistant aux basses températures*
- Résistant aux hautes températures*
- Résistant à des dissolvants chimiques*
- Conçu pour des applications de haute vitesse*
- Sans lubrification*
- Lubrification à l'huile
- Lubrification graisse
- Version avec flasques en gomme disponible
- Version avec flasques métalliques disponible

*Roulements céramiques uniquement

# Specifications



### General Details

| Material | Components | | Details | Application |
|---|---|---|---|---|
| | Rings | Balls | | |
| Ball Bearing Chrome Steel 100 Cr6 (Nr. 1.3505) | X | X | Hard wearing<br>Good shock and corrosive resistance | Standard |
| Stainless Steel AISI 440 C (Nr. 1.4125) † | X | X | Very good corrosive resistance | Food industry, pharmaceutical industry, ship building and other corrosive surroundings |
| AISI304 | X | X | Very good corrosive resistance | Corrosive surroundings |
| AISI316 | X | X | Excellent corrosive resistance | Corrosive surroundings |
| AISI 316L | X | X | Excellent corrosive resistance | Corrosive surroundings |
| Si3N4 | X | X | High temperature<br>Insulation<br>Excellent corrosive resistance | Chemistry, electronic, food, marine, medical |
| Zr02 | X | X | High temperature<br>Insulation<br>Excellent corrosive resistance | Chemistry, electronic, food, marine, medical |
| Al203 | | X | High temperature<br>Insulation<br>Excellent corrosive resistance | Chemistry, electronic, food, marine, medical |

†The static and dynamic load rating of AISI 440 C - ball bearings is approximatly 75-80% of the 100 Cr6 - ball bearings.

### Technical Details

| Material | Hardness | Max. Temp. | C | Si | Mn | P | S | Cr | Mo | Ni |
|---|---|---|---|---|---|---|---|---|---|---|
| 100 Cr6 (Nr. 1.3505) | 60-64HRC | max. 150°C | 0,5~1,10 | 0,15~0,35 | ≤0,5 | ≤0,025 | ≤0,025 | 1,3~1,6 | ≤0,08 | |
| AISI 440 C (Nr. 1.4125) | ≥58HRC | Max. 230°C | 0,95~1,2 | ≤1,1 | ≤1,0 | ≤0,04 | ≤0,03 | 16,0~18,0 | ≤0,75 | |
| AISI304 | 15~20HRC | 900 | ≤0.07 | ≤1.00 | ≤2.00 | ≤0.035 | ≤0.030 | 17.0~19.0 | | 8,0~10,0 |
| AISI316 | 15~20HRC | 900 | ≤0.08 | ≤1.00 | ≤2.00 | ≤0.035 | ≤0.030 | 16,0~19,0 | 1.80-2.50 | 10,0~14,0 |
| AISI 316L | 15~20HRC | 450 | ≤0.03 | ≤1.00 | ≤2.00 | ≤0.035 | ≤0.030 | 16,0~18,0 | 2.00-3.00 | 12,0~15,0 |

| Material | Hardness | Max. Temp | Component |
|---|---|---|---|
| Si3N4 | 75~80HRC | 1050 | 88% Si3N4 / 4% Al2O3 / 4% Y2O3 / 4% other |
| Zr02 | 70HRC | 750 | 95% ZrO2 / 5% Y2O3 |
| Al203 | 80HRC | 1750 | 99.5% Al2O3 / 0.5% others |

### Tolerance Class

| Tolerance class | Equivalences | |
|---|---|---|
| ISO / AFBMA | ISO | AFBMA |
| DIN P0 | class 0 | ABEC 1 |
| DIN P6 | class 6 | ABEC 3 |
| DIN P5 | class 5 | ABEC 5 |
| DIN P4 | class 4 | ABEC 7 |
| DIN P2 | class 2 | ABEC 9 |

# Seals & Shields

| | Design | Specification | Temp | Advantage/Disadvantage |
|---|---|---|---|---|
|  - | No seals | Open | - | No friction<br>Easy to re-lube<br>No protection against contamination |
|  2Z | Metal shields | Non contact seals | Min. temp -35ºC<br><br>Max. temp 250ºC | No friction<br>Good protection against contamination |
|  2RS | Rubber seals | Contact seals made of synthetic rubber | Min. temp -20ºC<br><br>Max. temp 110ºC | Higher friction<br>Very good protection against contamination |
|  2TS | PTFE seals | Contact seals made of Teflon | Min. temp -40ºC<br><br>Max. temp 250ºC | Low friction<br>Very good protection against contamination<br>Good chemical characteristics |
|  2TZ | PTFE seals with metal shields | Contact seals made of Teflon | Min. temp -40ºC<br><br>Max. temp 250ºC | Low friction<br>Very good protection against contamination<br>Good chemical characteristics |
|  2VS | Viton seals | Seals made of Viton | Min. temp -30ºC<br><br>Max. temp 230ºC | Higher friction<br>High temperature<br>Good chemical characteristics<br>Very good protection against contamination |
|  2DU | Rubber seals | Non contact seal made of synthetic rubber | Min. temp -20ºC<br><br>Max. temp 110ºC | No friction<br>Very good protection against contamination |



**Important**

## Cages

| | Reference | Cage type | Remarks |
|---|---|---|---|
|  | FC | Full Complement / No Cage | Low revolution high load rating |
|  | W | Crown Cage | Light weight, smooth, low friction |
|  | J | Ribbon Cage | Standard cage, good durability |
|  | T9H | Glass Fibre Reinforced Cage | Light weight, strong, high speed |
|  | | Phenolic Cage | Light weight, strong, high speed |
|  | M | Brass Cage | Low friction, good durability |
|  | PEEK | PEEK | High temperature<br>Good durability<br>Corrosion resistant<br>Insulated |
|  | PTFE | PTFE | High temperature<br>Good durability<br>Corrosion resistant<br>Insulated |

## Lubrication

| Lubricant | Remarks | Advantages/Applications |
|---|---|---|
| No lubricant | Only with stainless steel bearings<br>or with the use of corrosion preventive fluid | When the lubrication is provided<br>by the customer |
| Grease | Standard filling 30-40% | Life-time lubrication is possible<br>Good protection against corrosion<br>According to the application a variety of greases can be used |
| Oil | | Low friction<br>High revolution |

# Popular Greases

| Mfg | Brand | Thickener | Base oil | Drop Point °C | Consistency | Operating temperature range | Application |
|---|---|---|---|---|---|---|---|
| Exxon | Beacon 325 | Lithium | Diester | 193 | 290 | -60~+120 | low temp |
| | Andok B | Nathium | Mineral | 260 | 280 | -40~+120 | general purpose |
| | Andok C | Nathium | Mineral | ≥ 260 | 205 | -20~+120 | general purpose |
| Kyodo Yushi | Andok 260 | Nathium | Mineral | 200 | 250 | -30~+150 | general purpose |
| | Multemp PS2 | Lithium | Diester | 189 | 280 | -50~+110 | low temp |
| | Multemp SRL | Lithium | Ester | 191 | 245 | -40~+150 | low temp |
| | Multemp SRH | Lithium | Ester | 250 | 201 | -40~+150 | low temp |
| | Multemp SB-M | Diurea | Synthetic oil | 220 | 260 | -40~+200 | high speed/temp |
| | ET-K | Diurea | Synthetic oil/ester" | 260 | 300 | -40~+200 | high temp/ speed alternator |
| Kluber | Asonic GLY32 | Lithium | Synthetic | 190 | 265-295 | -50~+140 | low temp |
| | Asonic GHY72 | Polyhamstoff | Ester Mineral | 250 | 250-280 | -40~+180 | high temp/low noise |
| | Isoflex Super | | | | | | |
| | LDS18 | Lithium | Diester | 190 | 280 | -60~+130 | low temp |
| | Isoflex LDS18 | | | | | | |
| | Special A | Lithium | Diester | 190 | 280 | -60~+130 | low temp |
| | Isoflex Topas | | | | | | |
| | NB52" | Barium | Synthetic hydrocarbon | 204 | 280 | -60~+170 | low/high temp |
| | Barrierta L55/2 | PTFE | Fluorinated | | 280 | -35~+260 | low/high temp |
| | Barrierta TK44N2 | Na-Komples | Silicone | | | -60~+230 | low/high temp |
| | Isoflex NCA15 | Special Ca | Ester Mineral | 180 | 265-295 | -40~+130 | high speed |
| | Asonic | | | | | | |
| | HQ72-102" | Urea | Ester | 240 | 250-280 | -40~+180 | low/high temp & low noise |
| Dow Corning | Molykote 33M | Lithium | Silicone | 210 | 260 | -70~+180 | low/high temp |
| | Molykote 44M | Lithium | Silicone | 204 | 260 | -40~+200 | high temp |
| | Molykote 55M | Lithium | Silicone | | | -55~+165 | low temp |
| | Molykete BR2 plus | Lithium | Silicone | | 280 | -30~+150 | high speed |
| | Molykete FS1292 | PTFE | Phlorosilicon | ≥ 232 | 310 | -40~+200 | hight speed |
| | Molykete FS3451 | PTFE | Phlorosilicon | ≥ 260 | 285 | -40~+230 | chemical solvent resistant |
| Shell | Alvania No.2 | Lithium | Mineral | 182 | 272 | -25~+120 | general purpose |
| | Alvania No.3 | Lithium | Mineral | 183 | 233 | -20~+135 | general purpose |
| | Alvania RA | Lithium | Mineral | 183 | 252 | -25~+120 | general purpose |
| | Alvania EP2 | Lithium | Mineral | 185 | 276 | -10~+100 | general purpose |
| | Dolium R | | Mineral | 238 | 281 | -20~+140 | general purpose |
| | Aero Shell NO.5 | Microgel | Mineral | ≥ 260 | 282 | -10~+130 | general purpose |
| | Aero Shell NO.7 | Microgel | Mineral | ≥ 260 | 288 | -70~+150 | low temp |
| | Aero Shell RLQ2 | Lithium | Mineral | 195 | 266 | -50~+150 | low noise/ high speed" |
| Mobil Oil | Mobilux2 | Lithium | Mineral | 190 | 280 | -20~+120 | general purpose |
| | Mobil 22 | Lithium | Diester Mineral | 192 | 274 | -50~+140 | low temp |
| | Mobil 28 | Bentonite | syntheic hydrocarbon | ≥ 260 | 280 | -60~+180 | low/high temp |
| | Mobilitemp | | | | | | |
| | SHC22 | Glue-earth | Synthetic oil | 250 | 265-295 | -50~+180 | high speed/temp |
| | Mobiitemp | | | | | | |
| | SHC100 | Glue-earth | Synthetic oil | 250 | 265-295 | -40~+200 | high speed/temp |
| Du Pont | Krytox240AC | PTFE | Fluorinated | | 282 | -35~+280 | high speed/temp |
| Caltex | Chevron SRI-2 | Urea | Mineral | | 293 | -30~+175 | high temp |
| Hangu | Hangu#2 | - | Mineral | - | - | -20~+120 | general purpose |
| Great Wall | Great Wall BLE | Urea | Mineral | 260 | 280 | -30~+200 | low noise/ high temp" |
| Yiping | YP7201 | Synthetic | Mineral | 272 | 272 | -20~+120 | low noise/anti-rust |

# Ceramic Bearings

**Material:**
Silicon Nitride (Si3N4), Zirconia (ZrO2) and Alumina (A12O3)

**Specification:**
1/64” ~ 3/2” with different gauge

**Precision:**
G3 ~ G20

**Usage:**
For bearings, inspection and other rolling conditions.

**Advantages of ceramic balls compared to steel:**

1. Lighter than steel
2. Larger elastic modulus
3. Lower friction coefficient, rolls more freely
4. Lower coefficient of thermal expansion
5. Suoerior surface finish
6. Higher high temperature hardness
7. Rust proof, rolls without oil or grease
8. Corrosion resistant than steel



Black Silicon Nitride Balls

Grey Silicon Nitride Balls

Zirconia Balls

Alumina Balls

# Ceramic Bearings



## Bearing class

ZEN Ball Bearings can produce both complete ceramic ball bearings and hybrid stainless steel or chrome steel ball bearings.

Complete ceramic bearing = The inner ring, outer ring and balls are composed of ceramic materials, including zirconia and silicon nitride.

Hybrid bearings = The balls are ceramic, while the outer ring and inner ring are chrome/stainless steel. Hybrid ball bearings, normally have the identical structure as steel bearings.

## Properties advantages, compared with steel ball bearing

1. Higher limiting speeds: Ceramic is lighter than steel and can effectively restrain the centrifugal force, therefore enhances the limiting speeds.

2. Higher precision usage: Ceramic has a higher hardness and elastic modulus than steel, which means ceramic bearings are more rigid than steel bearings, so therefore can be used in higher precision conditions.

3. Longer life: Lighter ceramic leads to a lower centrifugal force, this will extend the life of the bearing. Furthermore, friction coefficient of ceramic is lower than steel, which also extends the life of the bearing.

4. Higher temperature usage: Ceramic is more mechanically stable at elevated temperatures, therefore they could be used under higher temperatures.

5. Temperature-variation usage: Ceramic has a lower thermal expansion coefficient, the clearance and the tolerance variation is lower than those of steel bearings, which leads to a greater variation in temperature range.

6. Better seizure resistance: Ceramic has a smaller thermal expansion coefficient; indicating less thermal deformation, therefore enhancing seizure resistance.

7. Could run without oil or grease: Ceramic never rusts and is self-lubricated, therefore can be used in applications that require no oil or grease.

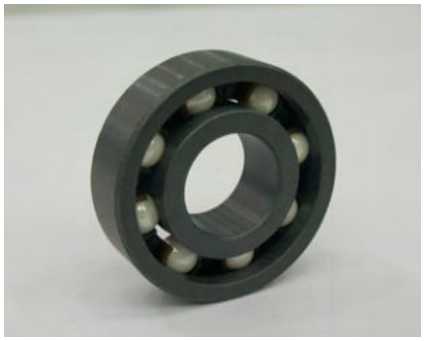
8. Resistant to acid, alkali and salt: The chemical industry is the largest potential application industry of ceramic bearings to be exploited.

9. More suitable for magnetic applications: Our ceramic bearings are non-magnetic, which means it is difficult for magnetic particles to adhere on the race, therfore reducing particle-abrasion.

Full Zirconia Bearing

Full Zirconia Bearing

Full Silicon Nitride Bearing



Full Ceramic Bearing
Silicon nitride inner and outer ring. Silicon nitride rolling element. Zirconia ball.

Full Ceramic Bearing
Zirconia inner and outer ring. Zirconia rolling element. Silicon nitride ball

Full Ceramic Bearing
Zirconia inner ring, outer ring and rolling element. Silicon nitride ball

# Ceramic Bearings



## Bearing class

ZEN Ball Bearings can produce full ceramic bearing and hybrid ball bearing.

Full ceramic bearing = The inner ring, out ring and ball is composed of ceramic materials, including zirconia and silicon nitride.

Hybrid bearing = The ball is ceramic, while the out ring and inner ring are steel. Hybrid ball bearing, normally have the identical structure as steel bearing.

## Cages used in Ceramic bearings

- Beside the standard steel cages, TPFE and PEEK cages are used for full ceramic or hybrid ball bearings.
- Both cages types are temperature resistant up to 260 C.
- The Peek material is a harder material and its advantage is high temperature resistance, good mechanical properties, self-lubricating, and anti-chemical properties. The advantage of PTFE is low friction, high temperature, and good wearable.

## Facts

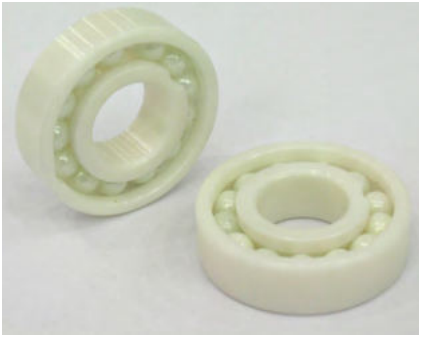
Full ceramic bearings have only a load rating (including hybrid ceramic bearing) of about 60% of chrome steel bearing.

## Usage

For rough service environment, such as chemical, metallurgy, food, electric, medical industry etc. Our bearing products have been used as high-speed motor spindle bearing, high precision machine sprindle bearing, dental drill bearing, high speed wheel head bearing, instrument bearing, hard drive bearing, skating bearing, fishing bearing, etc.

| Item | Unit | Steel | Si3N4 | Zr0_ | Al_0_ |
|---|---|---|---|---|---|
| Destiny | g/cm_ | 7.85 | 3.20~3.30 | 6.05 | 3.95 |
| Thermal Expansion Coefficient | 10-6/k | 10 | 3.2 | 10.5 | 9.1 |
| Elastic Modulus | Gpa | 208 | 300~320 | 210 | 380 |
| Passion Ratio | | 0.3 | 0.26 | 0.3 | 0.27 |
| Hardness | (HV) | 700 | 1500~1800 | 1200 | 1800 |
| | (HRC) | 62 | 75~80 | 70 | 80 |
| Bending Strength (800°C) | Mpa | 2400 | 200 | 300 | 220 |
| Crushing Strength (800°C) | Mpa | / | 1400 | 2100 | 1500 |
| Fracture Toughness | MPa-m_ | 25 | 6.0~7.0 | 10 | 3.5 |
| Thermal Conductivity (500°C) | W/mk | 30~40 | 18 | 2 | 25 |
| Specific Resistivity (600°C) | _.mm2/m | 0.1~1 | 1018 | 1015 | 108 |
| Max Usage Temperature | °C | 300 | 800 | 550 | 1850 |
| Corrosion Resistance | | Worse | Better | Better | Better |
| Fatigue Stress Recycles (50%Fail) | Times | 107 | 107~109 | 105 | / |
| Dimension Stability with Temperature | | Large | Little | / | / |
| Centrifugal Force | | Large | Little | Large | Medium |
| Non-lubrication Friction | | Large | Little | Little | Little |
| Magnetism | | Exist | Naught | Naught | Naught |

Full Ceramic Bearing
Silicon nitride outer ring and rolling element.
Zirconia inner ring.



Full Zirconia Bearing without retainer

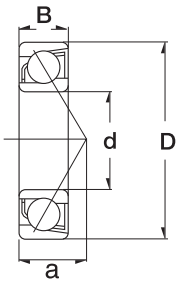
UC204. Full Zirconia Bearing

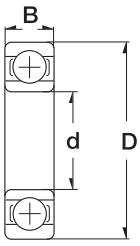
UC205. Full Ceramic Bearing
Zirconia inner ring, outer ring and rolling element.
Silicon nitride ball

Hybrid Ball Bearing

Hybrid Ball Bearing

# Roulements full céramiques

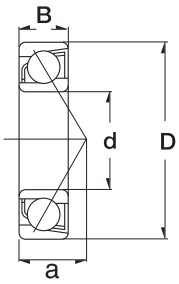


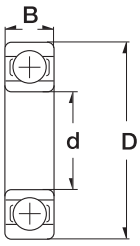






| Dimension (mm) | | | Designation/Type | * Load Rating | | Weight (g) approx. |
|---|---|---|---|---|---|---|
| d | D | B | | C, dyn. N | C, stat. N | |
| 8.0 | 22.0 | 7.0 | 608 | 1976 | 827 | 14 g |
| 9.0 | 24.0 | 7.0 | 609 | 2014 | 866 | 16 g |
| 8.0 | 24.0 | 8.0 | 628 | 2000 | 854 | 18 g |
| 9.0 | 26.0 | 8.0 | 629 | 2745 | 1190 | 22 g |
| 8.0 | 16.0 | 5.0 | 688 | 751 | 355 | 4 g |
| 9.0 | 17.0 | 5.0 | 689 | 796 | 401 | 5 g |
| 8.0 | 19.0 | 6.0 | 698 | 1342 | 550 | 8 g |
| 9.0 | 20.0 | 6.0 | 699 | 1480 | 649 | 8 g |
| | | | | | | |
| 10.0 | 26.0 | 8.0 | 6000 | 2730 | 1182 | 18 g |
| 10.0 | 30.0 | 9.0 | 6200 | 3060 | 1434 | 32 g |
| 10.0 | 35.0 | 11.0 | 6300 | 4860 | 2070 | 52 g |
| 12.0 | 28.0 | 8.0 | 6001 | 3060 | 1422 | 22 g |
| 12.0 | 32.0 | 10.0 | 6201 | 4080 | 1830 | 37 g |
| 12.0 | 37.0 | 12.0 | 6301 | 5820 | 2520 | 60 g |
| 15.0 | 32.0 | 9.0 | 6002 | 3360 | 1698 | 31 g |
| 15.0 | 35.0 | 11.0 | 6202 | 4590 | 2250 | 45 g |
| 15.0 | 42.0 | 13.0 | 6302 | 6840 | 3270 | 83 g |
| 17.0 | 35.0 | 10.0 | 6003 | 3600 | 1950 | 41 g |
| 17.0 | 40.0 | 12.0 | 6203 | 5730 | 2880 | 67 g |
| 17.0 | 47.0 | 14.0 | 6303 | 8160 | 3990 | 113 g |
| 17.0 | 62.0 | 17.0 | 6403 | 13740 | 6480 | 270 g |
| 20.0 | 42.0 | 12.0 | 6004 | 5640 | 3000 | 68 g |
| 20.0 | 47.0 | 14.0 | 6204 | 7680 | 3960 | 107 g |
| 20.0 | 52.0 | 15.0 | 6304 | 9540 | 4740 | 145 g |

# Roulements full céramiques

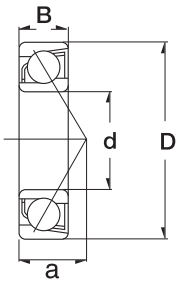


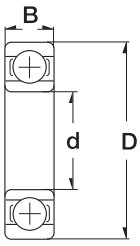






| Dimension (mm) | | | Designation/Type | * Load Rating | | Weight (g) approx. |
|---|---|---|---|---|---|---|
| d | D | B | | C, dyn. N | C, stat. N | |
| 20.0 | 72.0 | 19.0 | 6404 | 18420 | 9000 | 400 g |
| 25.0 | 47.0 | 12.0 | 6005 | 6060 | 3510 | 79 g |
| 25.0 | 52.0 | 15.0 | 6205 | 840 | 4710 | 129 g |
| 25.0 | 62.0 | 17.0 | 6305 | 12360 | 6720 | 235 g |
| 25.0 | 80.0 | 21.0 | 6405 | 21000 | 11460 | 530 g |
| 30.0 | 55.0 | 13.0 | 6006 | 7920 | 4980 | 116 g |
| 30.0 | 62.0 | 16.0 | 6206 | 11700 | 6780 | 199 g |
| 30.0 | 72.0 | 19.0 | 6306 | 16020 | 9000 | 345 g |
| 30.0 | 90.0 | 23.0 | 6406 | 26100 | 14280 | 740 g |
| 35.0 | 62.0 | 14.0 | 6007 | 9600 | 6180 | 151 g |
| 35.0 | 72.0 | 17.0 | 6207 | 15420 | 9180 | 284 g |
| 35.0 | 80.0 | 21.0 | 6307 | 20100 | 11520 | 464 g |
| 35.0 | 100.0 | 25.0 | 6407 | 33120 | 18900 | 950 g |
| 40.0 | 68.0 | 15.0 | 6008 | 10080 | 6900 | 190 g |
| 40.0 | 80.0 | 18.0 | 6208 | 17460 | 10740 | 366 g |
| 40.0 | 90.0 | 23.0 | 6308 | 24300 | 14400 | 636 g |
| 40.0 | 110.0 | 27.0 | 6408 | 37800 | 21600 | 1250 g |
| | | | | | | |
| 10.0 | 19.0 | 5.0 | 6800 | 1030 | 504 | 5.5 g |
| 10.0 | 22.0 | 6.0 | 6900 | 1617 | 764 | 10 g |
| 12.0 | 21.0 | 5.0 | 6801 | 1149 | 625 | 6.3 g |
| 12.0 | 24.0 | 6.0 | 6901 | 1732 | 880 | 11 g |
| 15.0 | 24.0 | 5.0 | 6802 | 1244 | 752 | 7.4 g |
| 15.0 | 28.0 | 7.0 | 6902 | 2593 | 1355 | 16 g |
| 17.0 | 26.0 | 5.0 | 6803 | 1340 | 874 | 8.2 g |

# Roulements full céramiques

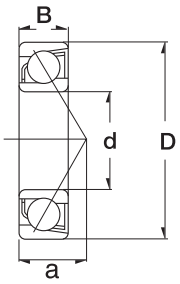


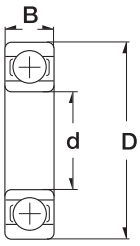






| Dimension (mm) | | | Designation/Type | * Load Rating | | Weight (g) approx. |
|---|---|---|---|---|---|---|
| d | D | B | | C, dyn. N | C, stat. N | |
| 17.0 | 30.0 | 7.0 | 6903 | 2753 | 1539 | 18 g |
| 20.0 | 32.0 | 7.0 | 6804 | 2409 | 1477 | 18 g |
| 20.0 | 37.0 | 9.0 | 6904 | 3829 | 2209 | 38 g |
| 25.0 | 37.0 | 7.0 | 6805 | 2582 | 1759 | 22 g |
| 25.0 | 42.0 | 9.0 | 6905 | 4201 | 2724 | 45 g |
| 30.0 | 42.0 | 7.0 | 6806 | 2723 | 2041 | 27 g |
| 30.0 | 47.0 | 9.0 | 6906 | 4345 | 3002 | 51 g |
| 35.0 | 47.0 | 7.0 | 6807 | 2837 | 2293 | 30 g |
| 35.0 | 55.0 | 10.0 | 6907 | 6540 | 4691 | 80 g |
| 40.0 | 52.0 | 7.0 | 6808 | 2954 | 2507 | 34 g |
| | | | | | | |
| 10.0 | 26.0 | 8.0 | 7000 | 2268 | 1290 | 18 g |
| 10.0 | 30.0 | 9.0 | 7200 | 3120 | 1530 | 30 g |
| 12.0 | 28.0 | 8.0 | 7001 | 2448 | 1452 | 20 g |
| 12.0 | 32.0 | 10.0 | 7201 | 3390 | 1890 | 35 g |
| 15.0 | 32.0 | 9.0 | 7002 | 2880 | 1770 | 28 g |
| 15.0 | 35.0 | 11.0 | 7202 | 4980 | 2580 | 43 g |
| 17.0 | 35.0 | 10.0 | 7003 | 3048 | 1932 | 36 g |
| 17.0 | 40.0 | 12.0 | 7203 | 5028 | 3228 | 62 g |
| 20.0 | 42.0 | 12.0 | 7004 | 6300 | 3612 | 67 g |
| 20.0 | 47.0 | 14.0 | 7204 | 8760 | 4920 | 100 g |
| 25.0 | 47.0 | 12.0 | 7005 | 5832 | 3750 | 89 g |
| 25.0 | 52.0 | 15.0 | 7205 | 8400 | 5232 | 146 g |
| 30.0 | 55.0 | 13.0 | 7006 | 7500 | 5172 | 130 g |
| 30.0 | 62.0 | 16.0 | 7206 | 11700 | 7500 | 222 g |

# Roulements full céramiques



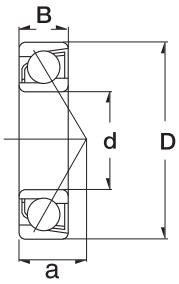



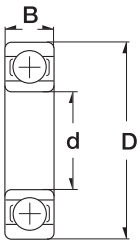



| Dimension (mm) | | | Designation/Type | * Load Rating | | Weight (g) approx. |
|---|---|---|---|---|---|---|
| d | D | B | | C, dyn. N | C, stat. N | |
| 35.0 | 62.0 | 14.0 | 7007 | 9660 | 6960 | 173 g |
| 35.0 | 72.0 | 17.0 | 7207 | 15420 | 10200 | 318 g |
| 40.0 | 68.0 | 15.0 | 7008 | 10260 | 8040 | 215 g |
| 40.0 | 80.0 | 18.0 | 7208 | 19500 | 13620 | 406 g |
| 45.0 | 75.0 | 16.0 | 7009 | 12720 | 10140 | 271 g |
| 45.0 | 85.0 | 19.0 | 7209 | 20340 | 14940 | 467 g |
| 50.0 | 80.0 | 16.0 | 7010 | 14040 | 11400 | 288 g |
| 50.0 | 90.0 | 20.0 | 7210 | 21420 | 16020 | 521 g |

| Dimension (mm) | | | | Designation/Type | * Load Rating | |
|---|---|---|---|---|---|---|
| d | D | B1 | B2 | | C, dyn. N | C, stat. N |
| 12.00 | 47.00 | 17.00 | 31.00 | UC 201 | 7500 | 4500 |
| 15.00 | 47.00 | 17.00 | 31.00 | UC 202 | 7500 | 4500 |
| 17.00 | 47.00 | 17.00 | 31.00 | UC 203 | 7500 | 4500 |
| 20.00 | 47.00 | 17.00 | 31.00 | UC 204 | 10000 | 6300 |
| 25.00 | 52.00 | 17.00 | 34.10 | UC 205 | 11000 | 7100 |
| 30.00 | 62.00 | 19.00 | 38.10 | UC 206 | 15200 | 10200 |
| 35.00 | 72.00 | 20.00 | 42.90 | UC 207 | 20100 | 18100 |

# Roulements Hybrides

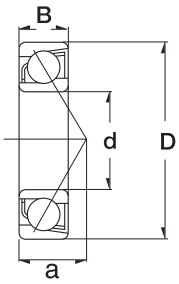


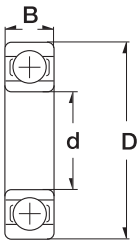






| Dimension (mm) | | | Designation/Type | * Load Rating | | Weight (g) approx. |
|---|---|---|---|---|---|---|
| d | D | B | | C, dyn. N | C, stat. N | |
| 3.0 | 7.0 | 2.0 | HYB 683 | 187 | 67 | 1 g |
| 3.0 | 8.0 | 3.0 | HYB 693 | 335 | 108 | 1 g |
| 4.0 | 8.0 | 2.0 | HYB MR 84 | 237 | 85 | 1 g |
| 4.0 | 9.0 | 2.5 | HYB 684 | 385 | 136 | 2 g |
| 4.0 | 10.0 | 3.0 | HYB MR 104 | 427 | 163 | 2 g |
| 4.0 | 11.0 | 4.0 | HYB 694 | 574 | 210 | 2 g |
| 5.0 | 8.0 | 2.0 | HYB MR 85 | 131 | 54 | 1 g |
| 5.0 | 10.0 | 3.0 | HYB MR 105 | 259 | 101 | 2 g |
| 5.0 | 11.0 | 3.0 | HYB 685 | 430 | 169 | 2 g |
| 5.0 | 11.0 | 4.0 | HYB MR 115 | 430 | 169 | 1 g |
| 5.0 | 13.0 | 4.0 | HYB 695 | 646 | 259 | 3 g |
| 6.0 | 10.0 | 2.5 | HYB MR 106 | 298 | 131 | 1 g |
| 6.0 | 12.0 | 3.0 | HYB MR 126 | 430 | 177 | 2 g |
| 6.0 | 13.0 | 3.5 | HYB 686 | 649 | 265 | 3 g |
| 6.0 | 15.0 | 5.0 | HYB 696 | 804 | 314 | 4 g |
| 7.0 | 14.0 | 3.5 | HYB 687 | 704 | 308 | 4 g |
| 7.0 | 17.0 | 5.0 | HYB 697 | 963 | 431 | 6 g |
| 8.0 | 12.0 | 2.5 | HYB MR 128 | 326 | 164 | 1 g |
| 8.0 | 14.0 | 3.5 | HYB MR 148 | 490 | 232 | 3 g |
| 8.0 | 16.0 | 4.0 | HYB 688 | 751 | 355 | 4 g |
| 8.0 | 19.0 | 6.0 | HYB 698 | 1342 | 550 | 8 g |
| | | | | | | |
| 2.38 | 4.763 | 1.588 | HYB R 133 | 86 | 32 | 1 g |
| 3.175 | 6.35 | 2.38 | HYB R 144 | 170 | 58 | 1 g |
| 3.175 | 7.938 | 2.779 | HYB R 2-5 | 335 | 108 | 1 g |

# Roulements Hybrides

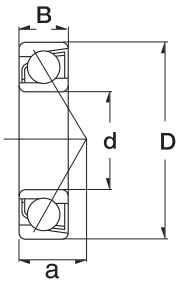


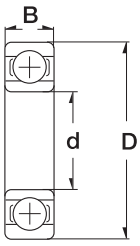






| Dimension (mm) | | | Designation/Type | * Load Rating | | Weight (g) approx. |
|---|---|---|---|---|---|---|
| d | D | B | | C, dyn. N | C, stat. N | |
| 3.175 | 9.525 | 3.967 | HYB R 2 | 379 | 131 | 2 g |
| 3.967 | 7.938 | 2.779 | HYB R 155 | 215 | 90 | 1 g |
| 4.763 | 9.525 | 3.175 | HYB R 166 | 425 | 163 | 1 g |
| 4.763 | 12.7 | 3.967 | HYB R 3 | 781 | 293 | 3 g |
| 6.35 | 9.525 | 3.175 | HYB R 168 | 224 | 103 | 1 g |
| 6.35 | 12.7 | 3.175 | HYB R 188 | 649 | 265 | 3 g |
| 6.35 | 15.875 | 4.978 | HYB R 4 | 888 | 373 | 5 g |
| 9.525 | 22.225 | 5.558 | HYB R 6 | 1994 | 853 | 12 g |
| | | | | | | |
| 8.0 | 22.0 | 7.0 | HYB 608 | 1976 | 827 | 14 g |
| 9.0 | 24.0 | 7.0 | HYB 609 | 2014 | 866 | 16 g |
| 8.0 | 24.0 | 8.0 | HYB 628 | 2000 | 854 | 18 g |
| 9.0 | 26.0 | 8.0 | HYB 629 | 2745 | 1190 | 22 g |
| 8.0 | 16.0 | 5.0 | HYB 688 | 751 | 355 | 4 g |
| 9.0 | 17.0 | 5.0 | HYB 689 | 796 | 401 | 5 g |
| 8.0 | 19.0 | 6.0 | HYB 698 | 1342 | 550 | 8 g |
| 9.0 | 20.0 | 6.0 | HYB 699 | 1480 | 649 | 8 g |
| | | | | | | |
| 10.0 | 26.0 | 8.0 | HYB 6000 | 2730 | 1182 | 18 g |
| 10.0 | 30.0 | 9.0 | HYB 6200 | 3060 | 1434 | 32 g |
| 10.0 | 35.0 | 11.0 | HYB 6300 | 4860 | 2070 | 52 g |
| 12.0 | 28.0 | 8.0 | HYB 6001 | 3060 | 1422 | 22 g |
| 12.0 | 32.0 | 10.0 | HYB 6201 | 4080 | 1830 | 37 g |
| 12.0 | 37.0 | 12.0 | HYB 6301 | 5820 | 2520 | 60 g |
| 15.0 | 32.0 | 9.0 | HYB 6002 | 3360 | 1698 | 31 g |

# Roulements Hybrides

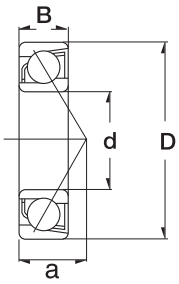


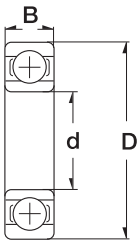






| Dimension (mm) | | | Designation/Type | * Load Rating | | Weight (g) approx. |
|---|---|---|---|---|---|---|
| d | D | B | | C, dyn. N | C, stat. N | |
| 15.0 | 35.0 | 11.0 | HYB 6202 | 4590 | 2250 | 45 g |
| 15.0 | 42.0 | 13.0 | HYB 6302 | 6840 | 3270 | 83 g |
| 17.0 | 35.0 | 10.0 | HYB 6003 | 3600 | 1950 | 41 g |
| 17.0 | 40.0 | 12.0 | HYB 6203 | 5730 | 2880 | 67 g |
| 17.0 | 47.0 | 14.0 | HYB 6303 | 8160 | 3990 | 113 g |
| 17.0 | 62.0 | 17.0 | HYB 6403 | 13740 | 6480 | 270 g |
| 20.0 | 42.0 | 12.0 | HYB 6004 | 5640 | 3000 | 68 g |
| 20.0 | 47.0 | 14.0 | HYB 6204 | 7680 | 3960 | 107 g |
| 20.0 | 52.0 | 15.0 | HYB 6304 | 9540 | 4740 | 145 g |
| 20.0 | 72.0 | 19.0 | HYB 6404 | 18420 | 9000 | 400 g |
| 25.0 | 47.0 | 12.0 | HYB 6005 | 6060 | 3510 | 79 g |
| 25.0 | 52.0 | 15.0 | HYB 6205 | 840 | 4710 | 129 g |
| 25.0 | 62.0 | 17.0 | HYB 6305 | 12360 | 6720 | 235 g |
| 25.0 | 80.0 | 21.0 | HYB 6405 | 21000 | 11460 | 530 g |
| 30.0 | 55.0 | 13.0 | HYB 6006 | 7920 | 4980 | 116 g |
| 30.0 | 62.0 | 16.0 | HYB 6206 | 11700 | 6780 | 199 g |
| 30.0 | 72.0 | 19.0 | HYB 6306 | 16020 | 9000 | 345 g |
| 30.0 | 90.0 | 23.0 | HYB 6406 | 26100 | 14280 | 740 g |
| 35.0 | 62.0 | 14.0 | HYB 6007 | 9600 | 6180 | 151 g |
| 35.0 | 72.0 | 17.0 | HYB 6207 | 15420 | 9180 | 284 g |
| 35.0 | 80.0 | 21.0 | HYB 6307 | 20100 | 11520 | 464 g |
| 35.0 | 100.0 | 25.0 | HYB 6407 | 33120 | 18900 | 950 g |
| 40.0 | 68.0 | 15.0 | HYB 6008 | 10080 | 6900 | 190 g |
| 40.0 | 80.0 | 18.0 | HYB 6208 | 17460 | 10740 | 366 g |

# Roulements Hybrides

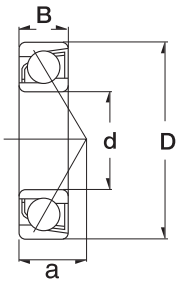


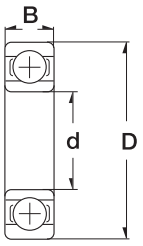






| Dimension (mm) | | | Designation/Type | * Load Rating | | Weight (g) approx. |
|---|---|---|---|---|---|---|
| d | D | B | | C, dyn. N | C, stat. N | |
| 40.0 | 90.0 | 23.0 | HYB 6308 | 24300 | 14400 | 636 g |
| 40.0 | 110.0 | 27.0 | HYB 6408 | 37800 | 21600 | 1250 g |
| | | | | | | |
| 10.0 | 19.0 | 5.0 | HYB 6800 | 1030 | 504 | 5.5 g |
| 10.0 | 22.0 | 6.0 | HYB 6900 | 1617 | 764 | 10 g |
| 12.0 | 21.0 | 5.0 | HYB 6801 | 1149 | 625 | 6.3 g |
| 12.0 | 24.0 | 6.0 | HYB 6901 | 1732 | 880 | 11 g |
| 15.0 | 24.0 | 5.0 | HYB 6802 | 1244 | 752 | 7.4 g |
| 15.0 | 28.0 | 7.0 | HYB 6902 | 2593 | 1355 | 16 g |
| 17.0 | 26.0 | 5.0 | HYB 6803 | 1340 | 874 | 8.2 g |
| 17.0 | 30.0 | 7.0 | HYB 6903 | 2753 | 1539 | 18 g |
| 20.0 | 32.0 | 7.0 | HYB 6804 | 2409 | 1477 | 18 g |
| 20.0 | 37.0 | 9.0 | HYB 6904 | 3829 | 2209 | 38 g |
| 25.0 | 37.0 | 7.0 | HYB 6805 | 2582 | 1759 | 22 g |
| 25.0 | 42.0 | 9.0 | HYB 6905 | 4201 | 2724 | 45 g |
| 30.0 | 42.0 | 7.0 | HYB 6806 | 2723 | 2041 | 27 g |
| 30.0 | 47.0 | 9.0 | HYB 6906 | 4345 | 3002 | 51 g |
| 35.0 | 47.0 | 7.0 | HYB 6807 | 2837 | 2293 | 30 g |
| 35.0 | 55.0 | 10.0 | HYB 6907 | 6540 | 4691 | 80 g |
| 40.0 | 52.0 | 7.0 | HYB 6808 | 2954 | 2507 | 34 g |
| | | | | | | |
| 10.0 | 26.0 | 8.0 | HYB 7000 | 2268 | 1290 | 18 g |
| 10.0 | 30.0 | 9.0 | HYB 7200 | 3120 | 1530 | 30 g |
| 12.0 | 28.0 | 8.0 | HYB 7001 | 2448 | 1452 | 20 g |
| 12.0 | 32.0 | 10.0 | HYB 7201 | 3390 | 1890 | 35 g |

# Roulements Hybrides






| Dimension (mm) | | | Designation/Type | * Load Rating | | Weight (g) approx. |
|---|---|---|---|---|---|---|
| d | D | B | | C, dyn. N | C, stat. N | |
| 15.0 | 32.0 | 9.0 | HYB 7002 | 2880 | 1770 | 28 g |
| 15.0 | 35.0 | 11.0 | HYB 7202 | 4980 | 2580 | 43 g |
| 17.0 | 35.0 | 10.0 | HYB 7003 | 3048 | 1932 | 36 g |
| 17.0 | 40.0 | 12.0 | HYB 7203 | 5028 | 3228 | 62 g |
| 20.0 | 42.0 | 12.0 | HYB 7004 | 6300 | 3612 | 67 g |
| 20.0 | 47.0 | 14.0 | HYB 7204 | 8760 | 4920 | 100 g |
| 25.0 | 47.0 | 12.0 | HYB 7005 | 5832 | 3750 | 89 g |
| 25.0 | 52.0 | 15.0 | HYB 7205 | 8400 | 5232 | 146 g |
| 30.0 | 55.0 | 13.0 | HYB 7006 | 7500 | 5172 | 130 g |
| 30.0 | 62.0 | 16.0 | HYB 7206 | 11700 | 7500 | 222 g |
| 35.0 | 62.0 | 14.0 | HYB 7007 | 9660 | 6960 | 173 g |
| 35.0 | 72.0 | 17.0 | HYB 7207 | 15420 | 10200 | 318 g |
| 40.0 | 68.0 | 15.0 | HYB 7008 | 10260 | 8040 | 215 g |
| 40.0 | 80.0 | 18.0 | HYB 7208 | 19500 | 13620 | 406 g |
| 45.0 | 75.0 | 16.0 | HYB 7009 | 12720 | 10140 | 271 g |
| 45.0 | 85.0 | 19.0 | HYB 7209 | 20340 | 14940 | 467 g |
| 50.0 | 80.0 | 16.0 | HYB 7010 | 14040 | 11400 | 288 g |
| 50.0 | 90.0 | 20.0 | HYB 7210 | 21420 | 16020 | 521 g |

# Material properties



| Item | | Unit | Steel | $Si^3N^4$ | $Zr0^2$ | $Al^20^3$ |
|---|---|---|---|---|---|---|
| Destiny | | g/cm_ | 7.85 | 3.20~3.30 | 6.05 | 3.95 |
| Thermal Expansion Coefficient | | 10-6/k | 10 | 3.2 | 10.5 | 9.1 |
| Elastic Modulus | | Gpa | 208 | 300~320 | 210 | 380 |
| Passion Ratio | | | 0.3 | 0.26 | 0.3 | 0.27 |
| Hardness | (HV) | | 700 | 1500~1800 | 1200 | 1800 |
| | (HRC) | | 62 | 75~80 | 70 | 80 |
| Bending Strength (800°C) | | Mpa | 2400 | 200 | 300 | 220 |
| Crushing strength(800°C) | | Mpa | - | 1400 | 2100 | 1500 |
| Fracture Toughness | | MPa-m | 25 | 6.0~7.0 | 10 | 3.5 |
| Thermal Conductivity(500°C) | | W/mk | 30~40 | 18 | 2 | 25 |
| Specific Resistivity(600°C) | | _.mm2/m | 0.1~1 | 1018 | 1015 | 108 |
| Max Usage Temperature | | °C | 300 | 800 | 550 | 1850 |
| Corrosion Resistance | | | Worse | Better | Better | Better |
| Fatigue Stress Recycles(50%Fail) | | Times | 107 | 107~109 | 105 | - |
| Dimension Stability with Temperature | | | Large | Little | - | - |
| Centrifugal Force | | | Large | Little | Large | Medium |
| Non-lubrication Friction | | | Large | Little | Little | Little |
| Magnetism | | | Exist | Naught | Naught | Naught |

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