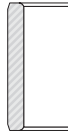


# INNER RINGS

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# Technical features

## Inner rings

When it is impractical to meet the shaft raceway design requirements (hardness, surface finish, case depth, etc.) standard inner rings may be used.

Inner rings are made of rolling bearing steel and after hardening, their bores, raceways and end surfaces are ground.

Inner rings may be used to provide inner raceway surfaces for radial needle roller bearings, needle roller bearings and needle bushes with opened and closed end. For a generic bearing with a given internal diameter, there is a choice of inner rings with the same diameter  $F$  but of different widths. Normally, the width of the inner ring should never be less than that of the bearing. Alternatively, a cylindrical inner ring wider than the bearing may be used to permit the fitting of a sealing ring, which would locate on the extended portion at one end of the bearing. In this case, if the inner ring has an oil hole, care should be taken to ensure that the hole does not coincide with the ends of the needles

### CONSTRUCTION

Inner rings are available in four basic designs and differ only by the chamfers at the ends of the raceway surfaces, the lubricant access holes and the raceway profile. Inner rings of series **JR** have chamfers to assist in bearing installation but are without lubricating holes.

Inner rings of series **JR.JS1** have bearing installation chamfers and lubricating holes (bore diameters 5 to 50 mm). Inner rings of series **JRZ.JS1** are without installation chamfers, allowing for maximum possible raceway contact.

Inner rings series **BIC** and **BICG** are also represented, to completion of the bearings series **NA**, in addition to the **IM 19000** and **IM 20600** for use with combined bearings RAXN and RAXNPZ.

### Inner rings features

| Series         | Lubrication hole | Chamfer |
|----------------|------------------|---------|
| <b>JR</b>      |                  | X       |
| <b>JR.JS1</b>  | X                | X       |
| <b>JRZ.JS1</b> | X                |         |

### Nominal diameter of lubrication hole

| Series                          | Internal diameter of the inner ring mm |    | Nominal diameter of the lubrication hole mm |
|---------------------------------|--|----|---|
|                                 | >                                      | ≤  |   |
| <b>JR.JS1</b><br><b>JRZ.JS1</b> |  | 20 | 2   |
|                                 | 20                                     | 40 | 2,5   |
|                                 | 40                                     | 80 | 3   |
|                                 | 80                                     |    | 3,5   |

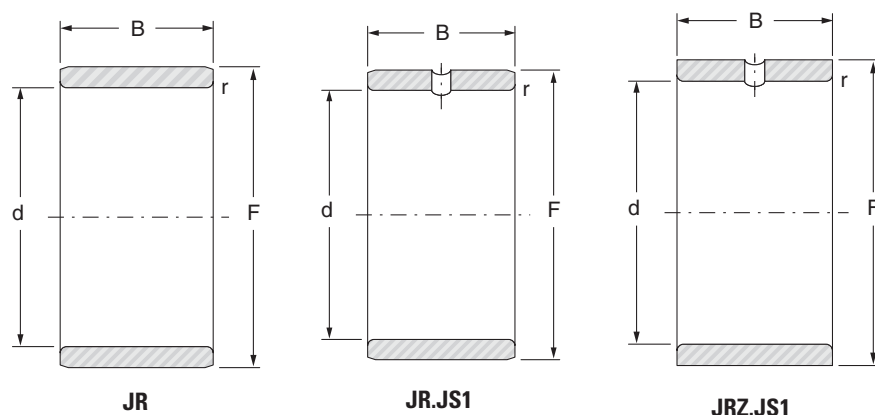
### Construction tolerances of inner rings

| Series                                 | Tolerance on external diameter $F$ | Other tolerances          |
|--|------------------------------------|---------------------------|
| <b>JR</b><br>With suffix <b>P</b>      | h5                                 | According ISO 492         |
| <b>IM 19000</b> and<br><b>IM 20600</b> | +0.000 /- 0.005 mm                 | Contact Technical Service |

In the following tables are listed all the inner rings for needle bushes, cages, needle bearings with cages, with full complement and combined bearings that are showed in this catalogue.

# Inner rings

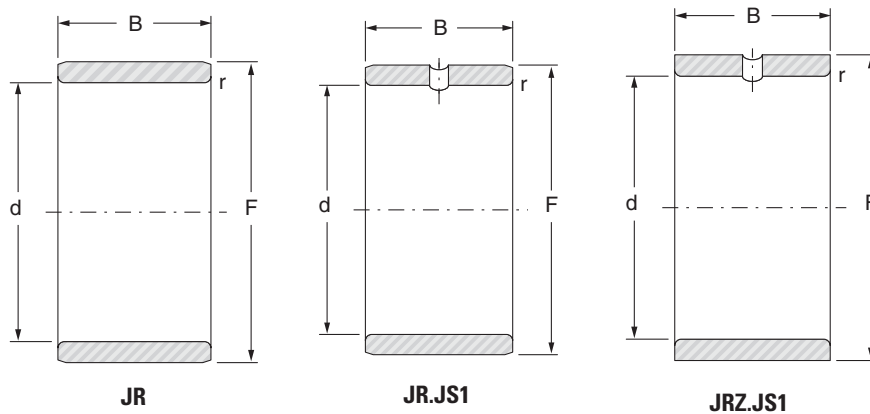
## Summary table



| Shaft<br>∅<br>mm | Designation    | d<br>mm | F<br>mm | B<br>mm | r's min<br>mm | Weight<br>kg |
|------------------|----------------|---------|---------|---------|---------------|--------------|
| 5                | JR5x8x8JS1     | 5       | 8       | 8       | 0.3           | 0.002        |
|                  | JR5x8x12       | 5       | 8       | 12      | 0.3           | 0.003        |
|                  | JR5x8x16       | 5       | 8       | 16      | 0.3           | 0.004        |
| 6                | JR6x9x8JS1     | 6       | 9       | 8       | 0.3           | 0.002        |
|                  | JR6x9x12       | 6       | 9       | 12      | 0.3           | 0.003        |
|                  | JR6x9x16       | 6       | 9       | 16      | 0.3           | 0.004        |
|                  | JR6x10x10      | 6       | 10      | 10      | 0.3           | 0.004        |
|                  | JR6x10x10JS1   | 6       | 10      | 10      | 0.3           | 0.004        |
|                  | JRZ6x10x12JS1  | 6       | 10      | 12      | 0.3           | 0.005        |
| 7                | JR7x10x10.5    | 7       | 10      | 10.5    | 0.3           | 0.003        |
|                  | JR7x10x12      | 7       | 10      | 12      | 0.3           | 0.004        |
|                  | JR7x10x16      | 7       | 10      | 16      | 0.3           | 0.005        |
| 8                | JR8x12x10      | 8       | 12      | 10      | 0.3           | 0.005        |
|                  | JR8x12x10JS1   | 8       | 12      | 10      | 0.3           | 0.005        |
|                  | JR8x12x10.5    | 8       | 12      | 10.5    | 0.3           | 0.005        |
|                  | JRZ8x12x12JS1  | 8       | 12      | 12      | 0.3           | 0.006        |
|                  | JR8x12x12.5    | 8       | 12      | 12.5    | 0.3           | 0.006        |
|                  | JR 8x12x16     | 8       | 12      | 16      | 0.3           | 0.007        |
| 9                | JR9x12x12      | 9       | 12      | 12      | 0.3           | 0.005        |
|                  | JR9x12x16      | 9       | 12      | 16      | 0.3           | 0.006        |
| 10               | JR10x13x12.5   | 10      | 13      | 12.5    | 0.3           | 0.005        |
|                  | JR10x14x11JS1  | 10      | 14      | 11      | 0.3           | 0.007        |
|                  | JR10x14x12     | 10      | 14      | 12      | 0.3           | 0.007        |
|                  | JR10x14x12JS1  | 10      | 14      | 12      | 0.3           | 0.007        |
|                  | JR10x14x13     | 10      | 14      | 13      | 0.3           | 0.007        |
|                  | JRZ10x14x14JS1 | 10      | 14      | 14      | 0.3           | 0.008        |
|                  | JR10x14x16     | 10      | 14      | 16      | 0.3           | 0.009        |
|                  | JR10x14x20     | 10      | 14      | 20      | 0.3           | 0.012        |

# Inner rings

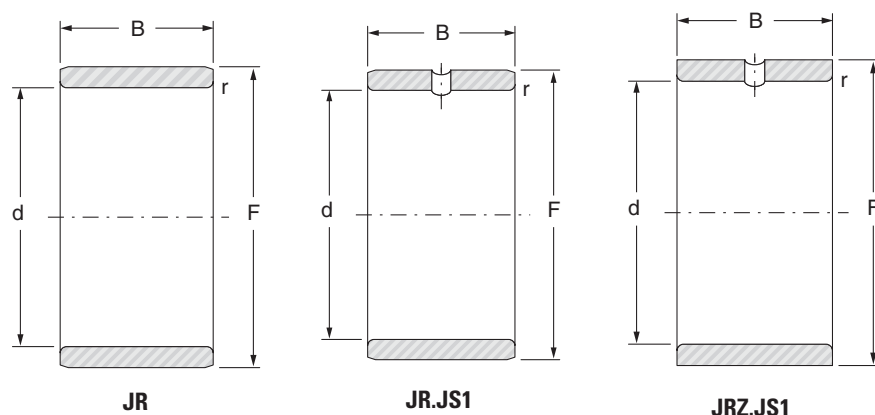
## Summary table



| Shaft<br>∅<br>mm | Designation    | d<br>mm | F<br>mm | B<br>mm | r's min<br>mm | Weight<br>kg |
|------------------|----------------|---------|---------|---------|---------------|--------------|
| 12               | JR12x15x12.5   | 12      | 15      | 12.5    | 0.3           | 0.006        |
|                  | JR12x15x16     | 12      | 15      | 16      | 0.3           | 0.008        |
|                  | JR12x15x16.5   | 12      | 15      | 16.5    | 0.3           | 0.008        |
|                  | JR12x15x18.5   | 12      | 15      | 18.5    | 0.3           | 0.009        |
|                  | JR12x15x22.5   | 12      | 15      | 22.5    | 0.3           | 0.011        |
|                  | JR12x16x12     | 12      | 16      | 12      | 0.3           | 0.008        |
|                  | JR12x16x12JS1  | 12      | 16      | 12      | 0.3           | 0.008        |
|                  | JR12x16x13     | 12      | 16      | 13      | 0.3           | 0.008        |
|                  | JRZ12x16x14JS1 | 12      | 16      | 14      | 0.3           | 0.010        |
|                  | JR12x16x16     | 12      | 16      | 16      | 0.3           | 0.011        |
|                  | JR12x16x20     | 12      | 16      | 20      | 0.3           | 0.014        |
|                  | JR12x16x22     | 12      | 16      | 22      | 0.3           | 0.015        |
| 14               | JR14x17x17     | 14      | 17      | 17      | 0.3           | 0.009        |
| 15               | JR15x18x16.5   | 15      | 18      | 16.5    | 0.3           | 0.010        |
|                  | JR15x19x16     | 15      | 19      | 16      | 0.3           | 0.013        |
|                  | JR15x19x20     | 15      | 19      | 20      | 0.3           | 0.017        |
|                  | JR15x20x12     | 15      | 20      | 12      | 0.3           | 0.012        |
|                  | JR15x20x12JS1  | 15      | 20      | 12      | 0.3           | 0.012        |
|                  | JR15x20x13     | 15      | 20      | 13      | 0.3           | 0.014        |
|                  | JRZ15x20x14JS1 | 15      | 20      | 14      | 0.3           | 0.015        |
|                  | JR15x20x16     | 15      | 20      | 16      | 0.3           | 0.017        |
|                  | JR 15x20x20    | 15      | 20      | 20      | 0.35          | 0.021        |
|                  | JR15x20x23     | 15      | 20      | 23      | 0.3           | 0.025        |
|                  | JR15x20x26     | 15      | 20      | 26      | 0.3           | 0.028        |

# Inner rings

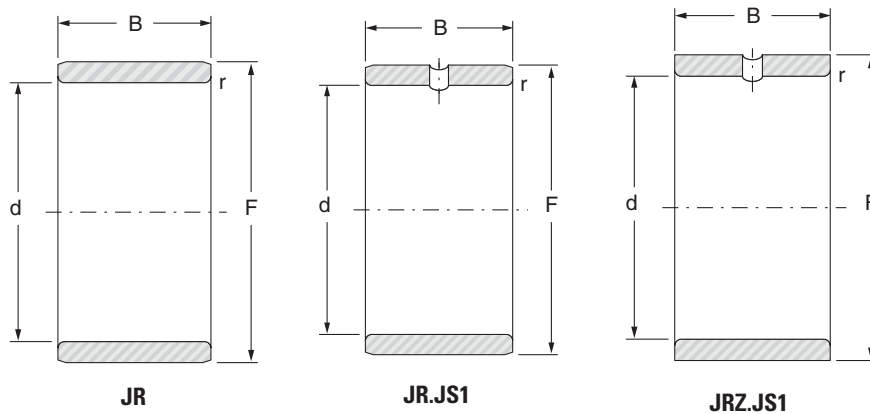
## Summary table



| Shaft<br>∅<br>mm | Designation    | d<br>mm | F<br>mm | B<br>mm | r's min<br>mm | Weight<br>kg |
|------------------|----------------|---------|---------|---------|---------------|--------------|
| 17               | JR17x20x16.5   | 17      | 20      | 16.5    | 0.3           | 0.011        |
|                  | JR17x20x20     | 17      | 20      | 20      | 0.3           | 0.014        |
|                  | JR17x20x20.5   | 17      | 20      | 20.5    | 0.3           | 0.014        |
|                  | JR17x20x30.5   | 17      | 20      | 30.5    | 0.3           | 0.021        |
|                  | JR17x21x16     | 17      | 21      | 16      | 0.3           | 0.015        |
|                  | JR17x21x20     | 17      | 21      | 20      | 0.3           | 0.019        |
|                  | JR17x22x13     | 17      | 22      | 13      | 0.3           | 0.015        |
|                  | JR17x22x16     | 17      | 22      | 16      | 0.3           | 0.019        |
|                  | JR17x22x16JS1  | 17      | 22      | 16      | 0.3           | 0.019        |
|                  | JRZ17x22x16JS1 | 17      | 22      | 16      | 0.3           | 0.019        |
|                  | JR17x22x20     | 17      | 22      | 20      | 0.35          | 0.023        |
|                  | JR17x22x23     | 17      | 22      | 23      | 0.3           | 0.028        |
|                  | JR17x22x26     | 17      | 22      | 26      | 0.3           | 0.031        |
|                  | JR17x22x32     | 17      | 22      | 32      | 0.3           | 0.038        |
| 20               | JR20x24x16     | 20      | 24      | 16      | 0.3           | 0.018        |
|                  | JR20x24x20     | 20      | 24      | 20      | 0.3           | 0.022        |
|                  | JR20x25x16     | 20      | 25      | 16      | 0.3           | 0.022        |
|                  | JR20x25x16JS1  | 20      | 25      | 16      | 0.3           | 0.022        |
|                  | JR20x25x17     | 20      | 25      | 17      | 0.3           | 0.023        |
|                  | JRZ20x25x18JS1 | 20      | 25      | 18      | 0.3           | 0.025        |
|                  | JR20x25x20     | 20      | 25      | 20      | 0.3           | 0.028        |
|                  | JR20x25x20.5   | 20      | 25      | 20.5    | 0.3           | 0.029        |
|                  | JR20x25x26     | 20      | 25      | 26      | 0.3           | 0.036        |
|                  | JR20x25x26.5   | 20      | 25      | 26.5    | 0.3           | 0.037        |
|                  | JR20x25x30     | 20      | 25      | 30      | 0.3           | 0.042        |
|                  | JR20x25x32     | 20      | 25      | 32      | 0.3           | 0.044        |
|                  | JR20x25x38.5   | 20      | 25      | 38.5    | 0.3           | 0.054        |

# Inner rings

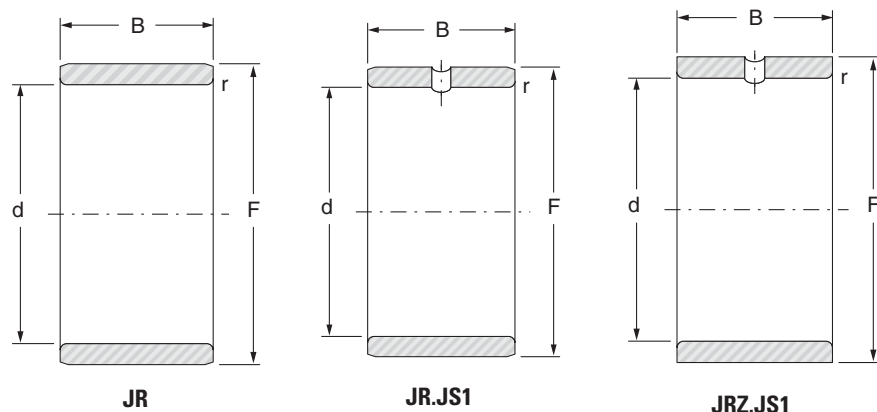
## Summary table



| Shaft<br>∅<br>mm | Designation    | d<br>mm | F<br>mm | B<br>mm | r's min<br>mm | Weight<br>kg |
|------------------|----------------|---------|---------|---------|---------------|--------------|
| 22               | JR22x26x16     | 22      | 26      | 16      | 0.3           | 0.019        |
|                  | JR22x26x20     | 22      | 26      | 20      | 0.3           | 0.023        |
|                  | JR22x28x17     | 22      | 28      | 17      | 0.3           | 0.030        |
|                  | JR22x28x20.5   | 22      | 28      | 20.5    | 0.3           | 0.038        |
|                  | JR22x28x30     | 22      | 28      | 30      | 0.3           | 0.056        |
| 23               | JR23x28x20     | 23      | 28      | 20      | 0.35          | 0.030        |
| 25               | JR25x29x20     | 25      | 29      | 20      | 0.3           | 0.027        |
|                  | JR25x29x30     | 25      | 29      | 30      | 0.3           | 0.040        |
|                  | JR25x30x16     | 25      | 30      | 16      | 0.3           | 0.027        |
|                  | JR25x30x16JS1  | 25      | 30      | 16      | 0.3           | 0.027        |
|                  | JR25x30x17     | 25      | 30      | 17      | 0.3           | 0.028        |
|                  | JRZ25x30x18JS1 | 25      | 30      | 18      | 0.3           | 0.031        |
|                  | JR25x30x20     | 25      | 30      | 20      | 0.3           | 0.034        |
|                  | JR25x30x20.5   | 25      | 30      | 20.5    | 0.3           | 0.035        |
|                  | JR25x30x26     | 25      | 30      | 26      | 0.3           | 0.044        |
|                  | JR25x30x26.5   | 25      | 30      | 26.5    | 0.3           | 0.045        |
|                  | JR25x30x30     | 25      | 30      | 30      | 0.3           | 0.051        |
|                  | JR25x30x32     | 25      | 30      | 32      | 0.3           | 0.054        |
|                  | JR25x30x38.5   | 25      | 30      | 38.5    | 0.3           | 0.066        |
| 28               | JR28x32x17     | 28      | 32      | 17      | 0.3           | 0.028        |
|                  | JR28x32x20     | 28      | 32      | 20      | 0.3           | 0.030        |
|                  | JR28x32x30     | 28      | 32      | 30      | 0.3           | 0.044        |
| 30               | JR30x35x16     | 30      | 35      | 16      | 0.3           | 0.031        |
|                  | JR30x35x17     | 30      | 35      | 17      | 0.3           | 0.033        |
|                  | JRZ30x35x18JS1 | 30      | 35      | 18      | 0.3           | 0.036        |
|                  | JR30x35x20     | 30      | 35      | 20      | 0.3           | 0.039        |
|                  | JRZ30x35x20JS1 | 30      | 35      | 20      | 0.3           | 0.039        |

# Inner rings

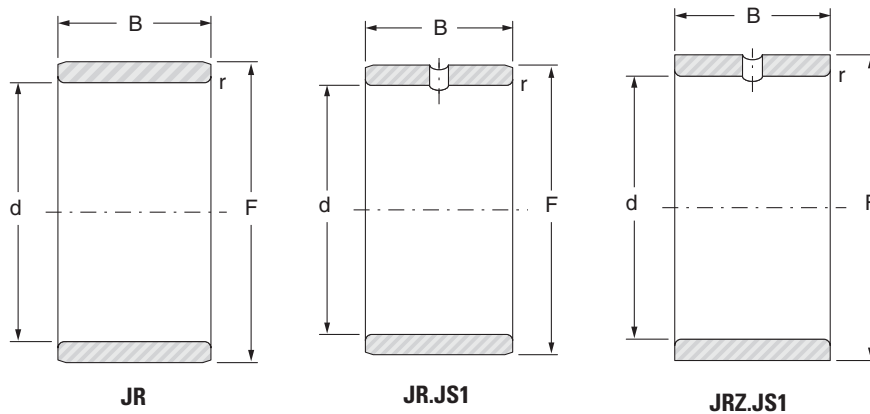
## Summary table



| Shaft<br>∅<br>mm | Designation    | d<br>mm | F<br>mm | B<br>mm | r's min<br>mm | Weight<br>kg |
|------------------|----------------|---------|---------|---------|---------------|--------------|
| 30               | JR30x35x20.5   | 30      | 35      | 20.5    | 0.3           | 0.040        |
|                  | JR30x35x26     | 30      | 35      | 26      | 0.3           | 0.054        |
|                  | JR30x35x30     | 30      | 35      | 30      | 0.3           | 0.057        |
|                  | JR30x35x32     | 30      | 35      | 32      | 0.3           | 0.062        |
|                  | JR30x38x20JS1  | 30      | 38      | 20      | 0.6           | 0.067        |
| 32               | JR32x37x20     | 32      | 37      | 20      | 0.3           | 0.043        |
|                  | JR32x37x30     | 32      | 37      | 30      | 0.3           | 0.064        |
|                  | JR32x40x20     | 32      | 40      | 20      | 0.6           | 0.069        |
|                  | JR32x40x36     | 32      | 40      | 36      | 0.6           | 0.128        |
| 35               | JR35x40x17     | 35      | 40      | 17      | 0.3           | 0.040        |
|                  | JR35x40x20     | 35      | 40      | 20      | 0.3           | 0.046        |
|                  | JR35x40x20.5   | 35      | 40      | 20.5    | 0.3           | 0.049        |
|                  | JR35x40x22     | 35      | 40      | 22      | 0.3           | 0.052        |
|                  | JR35x40x30     | 35      | 40      | 30      | 0.3           | 0.071        |
|                  | JR35x40x34     | 35      | 40      | 34      | 0.3           | 0.080        |
|                  | JR35x40x40     | 35      | 40      | 40      | 0.3           | 0.094        |
|                  | JR35x42x20     | 35      | 42      | 20      | 0.6           | 0.065        |
|                  | JR35x42x20JS1  | 35      | 42      | 20      | 0.6           | 0.065        |
|                  | JRZ35x42x23JS1 | 35      | 42      | 23      | 0.6           | 0.074        |
|                  | JR35x42x36     | 35      | 42      | 36      | 0.6           | 0.122        |
| JR35x44x22       | 35             | 44      | 22      | 0.6     | 0.097         |              |
| 37               | JR37x42x20     | 37      | 42      | 20      | 0.35          | 0.046        |
| 38               | JR38x43x20     | 38      | 43      | 20      | 0.3           | 0.050        |
|                  | JR38x43x30     | 38      | 43      | 30      | 0.3           | 0.075        |

# Inner rings

## Summary table

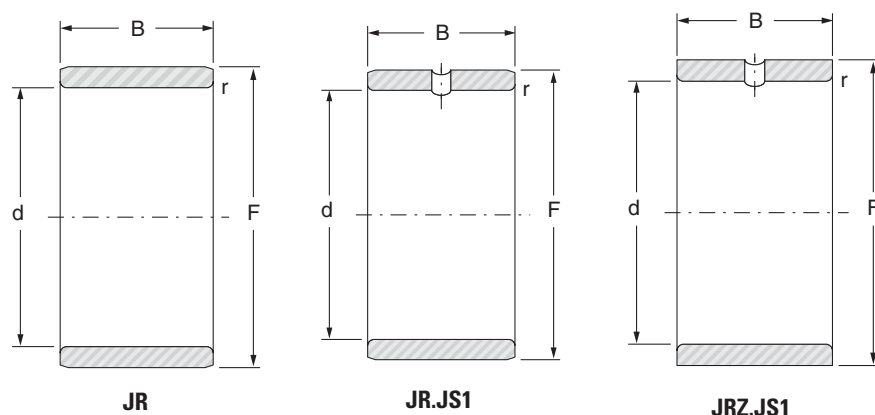


| Shaft<br>∅<br>mm | Designation    | d<br>mm | F<br>mm | B<br>mm | r's min<br>mm | Weight<br>kg |
|------------------|----------------|---------|---------|---------|---------------|--------------|
| 40               | JR40x45x17     | 40      | 45      | 17      | 0.3           | 0.044        |
|                  | JR40x45x20     | 40      | 45      | 20      | 0.3           | 0.052        |
|                  | JR40x45x20.5   | 40      | 45      | 20.5    | 0.3           | 0.054        |
|                  | JR40x45x25     | 40      | 45      | 25      | 0.35          | 0.062        |
|                  | JR40x45x30     | 40      | 45      | 30      | 0.3           | 0.078        |
|                  | JR40x45x34     | 40      | 45      | 34      | 0.3           | 0.089        |
|                  | JR40x45x40     | 40      | 45      | 40      | 0.3           | 0.115        |
|                  | JR40x48x22     | 40      | 48      | 22      | 0.6           | 0.094        |
|                  | JRZ40x48x23JS1 | 40      | 48      | 23      | 0.6           | 0.100        |
|                  | JR40x48x40     | 40      | 48      | 40      | 0.6           | 0.173        |
|                  | JR40x50x20     | 40      | 50      | 20      | 1             | 0.110        |
| 42               | JR42x47x20     | 42      | 47      | 20      | 0.3           | 0.055        |
|                  | JR42x47x30     | 42      | 47      | 30      | 0.3           | 0.083        |
| 45               | JR45x50x20     | 45      | 50      | 20      | 0.3           | 0.058        |
|                  | JR45x50x25     | 45      | 50      | 25      | 0.6           | 0.073        |
|                  | JR45x50x25.5   | 45      | 50      | 25.5    | 0.3           | 0.075        |
|                  | JR45x50x35     | 45      | 50      | 35      | 0.6           | 0.103        |
|                  | JR45x50x40     | 45      | 50      | 40      | 0.3           | 0.117        |
|                  | JR45x52x22     | 45      | 52      | 22      | 0.6           | 0.090        |
|                  | JR45x52x23     | 45      | 52      | 23      | 0.6           | 0.096        |
|                  | JRZ45x52x23JS1 | 45      | 52      | 23      | 0.6           | 0.096        |
|                  | JR45x52x40     | 45      | 52      | 40      | 0.6           | 0.167        |
|                  | JR45x55x20     | 45      | 55      | 20      | 1             | 0.133        |
|                  | JR45x55x20JS1  | 45      | 55      | 20      | 1             | 0.133        |
|                  | JR45x55x22     | 45      | 55      | 22      | 1             | 0.135        |
|                  | JR45x55x40     | 45      | 55      | 40      | 1             | 0.247        |



# Inner rings

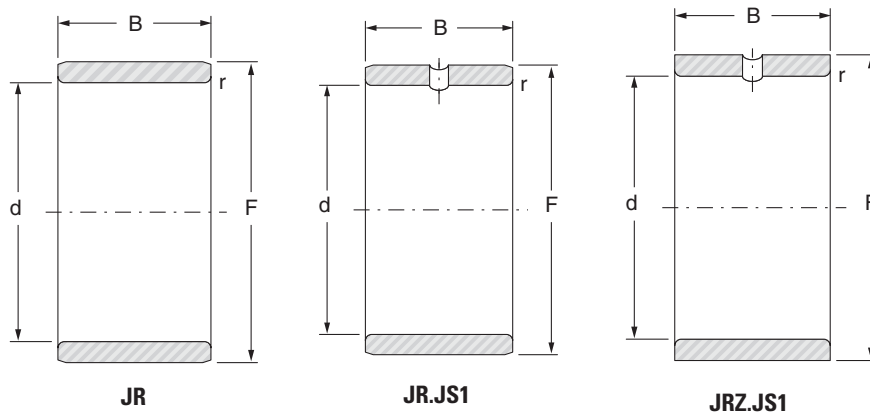
## Summary table



| Shaft<br>Ø<br>mm | Designation    | d<br>mm | F<br>mm | B<br>mm | r's min<br>mm | Weight<br>kg |
|------------------|----------------|---------|---------|---------|---------------|--------------|
| 50               | JR50x55x20     | 50      | 55      | 20      | 0.3           | 0.065        |
|                  | JR50x55x25     | 50      | 55      | 25      | 0.6           | 0.081        |
|                  | JR50x55x35     | 50      | 55      | 35      | 0.6           | 0.113        |
|                  | JR50x55x40     | 50      | 55      | 40      | 0.3           | 0.130        |
|                  | JR50x58x22     | 50      | 58      | 22      | 0.6           | 0.117        |
|                  | JRZ50x58x23JS1 | 50      | 58      | 23      | 0.6           | 0.122        |
|                  | JR50x58x40     | 50      | 58      | 40      | 0.6           | 0.213        |
|                  | JR50x60x20     | 50      | 60      | 20      | 1             | 0.155        |
|                  | JR50x60x20JS1  | 50      | 60      | 20      | 1             | 0.155        |
|                  | JR50x60x25     | 50      | 60      | 25      | 1             | 0.170        |
|                  | JR50x60x40     | 50      | 60      | 40      | 1             | 0.310        |
| 55               | JR55x60x25     | 55      | 60      | 25      | 0.6           | 0.088        |
|                  | JR55x60x35     | 55      | 60      | 35      | 0.6           | 0.124        |
|                  | JR55x63x25     | 55      | 63      | 25      | 1             | 0.141        |
|                  | JR55x63x45     | 55      | 63      | 45      | 1             | 0.286        |
|                  | JR55x65x30     | 55      | 65      | 30      | 1             | 0.222        |
|                  | JR55x65x60     | 55      | 65      | 60      | 1             | 0.444        |
| 60               | JR60x68x25     | 60      | 68      | 25      | 0.6           | 0.153        |
|                  | JR60x68x35     | 60      | 68      | 35      | 0.6           | 0.220        |
|                  | JR60x68x45     | 60      | 68      | 45      | 1             | 0.284        |
|                  | JR60x70x25     | 60      | 70      | 25      | 1             | 0.200        |
|                  | JR60x70x30     | 60      | 70      | 30      | 1             | 0.240        |
|                  | JR60x70x60     | 60      | 70      | 60      | 1             | 0.480        |

# Inner rings

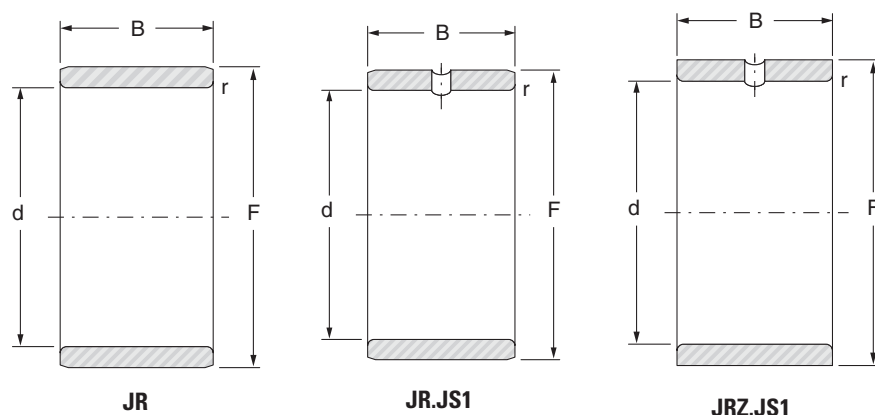
## Summary table



| Shaft<br>∅<br>mm | Designation | d<br>mm | F<br>mm | B<br>mm | r's min<br>mm | Weight<br>kg |
|------------------|-------------|---------|---------|---------|---------------|--------------|
| 65               | JR65x72x25  | 65      | 72      | 25      | 1             | 0.143        |
|                  | JR65x72x45  | 65      | 72      | 45      | 1             | 0.266        |
|                  | JR65x73x25  | 65      | 73      | 25      | 0.6           | 0.170        |
|                  | JR65x73x35  | 65      | 73      | 35      | 0.6           | 0.240        |
|                  | JR65x75x28  | 65      | 75      | 28      | 1             | 0.240        |
|                  | JR65x75x30  | 65      | 75      | 30      | 1             | 0.260        |
|                  | JR65x75x60  | 65      | 75      | 60      | 1             | 0.520        |
| 70               | JR70x80x25  | 70      | 80      | 25      | 1             | 0.230        |
|                  | JR70x80x30  | 70      | 80      | 30      | 1             | 0.270        |
|                  | JR70x80x35  | 70      | 80      | 35      | 1             | 0.320        |
|                  | JR70x80x54  | 70      | 80      | 54      | 1             | 0.500        |
|                  | JR70x80x60  | 70      | 80      | 60      | 1             | 0.556        |
| 75               | JR75x85x25  | 75      | 85      | 25      | 1             | 0.240        |
|                  | JR75x85x30  | 75      | 85      | 30      | 1             | 0.289        |
|                  | JR75x85x35  | 75      | 85      | 35      | 1             | 0.338        |
|                  | JR75x85x54  | 75      | 85      | 54      | 1             | 0.530        |
| 80               | JR80x90x25  | 80      | 90      | 25      | 1             | 0.260        |
|                  | JR80x90x30  | 80      | 90      | 30      | 1             | 0.306        |
|                  | JR80x90x35  | 80      | 90      | 35      | 1             | 0.355        |
|                  | JR80x90x54  | 80      | 90      | 54      | 1             | 0.565        |
| 85               | JR85x95x26  | 85      | 95      | 26      | 1             | 0.290        |
|                  | JR85x95x30  | 85      | 95      | 30      | 1             | 0.334        |
|                  | JR85x95x36  | 85      | 95      | 36      | 1             | 0.397        |
|                  | JR85x100x35 | 85      | 100     | 35      | 1.1           | 0.595        |
|                  | JR85x100x63 | 85      | 100     | 63      | 1.1           | 1.080        |

# Inner rings

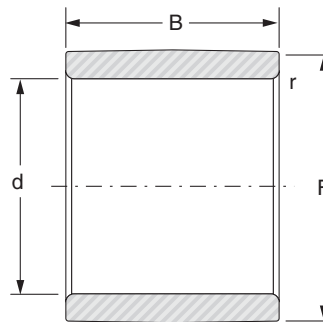
## Summary table



| Shaft<br>∅<br>mm | Designation  | d<br>mm | F<br>mm | B<br>mm | r's min<br>mm | Weight<br>kg |
|------------------|--------------|---------|---------|---------|---------------|--------------|
| 90               | JR90x100x26  | 90      | 100     | 26      | 1             | 0.300        |
|                  | JR90x100x30  | 90      | 100     | 30      | 1             | 0.350        |
|                  | JR90x100x36  | 90      | 100     | 36      | 1             | 0.422        |
|                  | JR90x105x32  | 90      | 105     | 32      | 1.1           | 0.580        |
|                  | JR90x105x35  | 90      | 105     | 35      | 1.1           | 0.624        |
|                  | JR90x105x63  | 90      | 105     | 63      | 1.1           | 1.140        |
| 95               | JR95x105x26  | 95      | 105     | 26      | 1             | 0.310        |
|                  | JR95x105x36  | 95      | 105     | 36      | 1             | 0.430        |
|                  | JR95x110x35  | 95      | 110     | 35      | 1.1           | 0.653        |
|                  | JR95x110x63  | 95      | 110     | 63      | 1.1           | 1.200        |
| 100              | JR100x110x30 | 100     | 110     | 30      | 1.1           | 0.384        |
|                  | JR100x110x40 | 100     | 110     | 40      | 1.1           | 0.510        |
|                  | JR100x115x40 | 100     | 115     | 40      | 1.1           | 0.790        |
| 110              | JR110x120x30 | 110     | 120     | 30      | 1             | 0.425        |
|                  | JR110x125x40 | 110     | 125     | 40      | 1.1           | 0.870        |
| 120              | JR120x130x30 | 120     | 130     | 30      | 1             | 0.460        |
|                  | JR120x135x45 | 120     | 135     | 45      | 1.1           | 1.060        |
| 130              | JR130x145x35 | 130     | 145     | 35      | 1.1           | 0.890        |
|                  | JR130x150x50 | 130     | 150     | 50      | 1.5           | 1.730        |
| 140              | JR140x155x35 | 140     | 155     | 35      | 1.1           | 0.955        |
|                  | JR140x160x50 | 140     | 160     | 50      | 1.5           | 1.860        |
| 150              | JR150x165x40 | 150     | 165     | 40      | 1.1           | 1.170        |
| 160              | JR160x175x40 | 160     | 175     | 40      | 1.1           | 1.240        |
| 170              | JR170x185x45 | 170     | 185     | 45      | 1.1           | 1.480        |
| 180              | JR180x195x45 | 180     | 195     | 45      | 1.1           | 1.560        |

# Inner rings for machine-tool quality combined bearings - Summary table

IM 19000 B  
and IM 20600 series

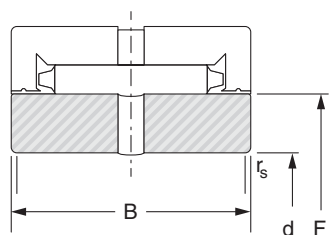


IM

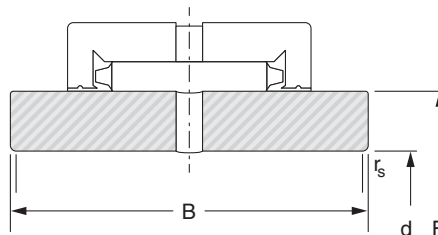
| Shaft<br>∅<br>mm | Designation | d<br>mm | F<br>mm | B<br>mm | r<br>mm | Weight<br>kg |
|------------------|-------------|---------|---------|---------|---------|--------------|
| 17               | IM 19017    | 17      | 20      | 27.5    | 0.2     | 0.019        |
|                  | IM 20617    | 17      | 20      | 32      | 0.2     | 0.021        |
| 20               | IM 19020    | 20      | 25      | 27.5    | 0.35    | 0.038        |
|                  | IM 20620    | 20      | 25      | 32      | 0.35    | 0.044        |
| 25               | IM 19025    | 25      | 30      | 27.5    | 0.35    | 0.042        |
|                  | IM 20625    | 25      | 30      | 32      | 0.35    | 0.052        |
| 30               | IM 19030    | 30      | 35      | 27.5    | 0.35    | 0.053        |
|                  | IM 20630    | 30      | 35      | 32      | 0.35    | 0.061        |
| 35               | IM 19035    | 35      | 40      | 27.5    | 0.35    | 0.063        |
|                  | IM 20635    | 35      | 40      | 32      | 0.35    | 0.072        |
| 40               | IM 19040    | 40      | 45      | 27.5    | 0.35    | 0.069        |
|                  | IM 20640    | 40      | 45      | 32      | 0.35    | 0.080        |
| 45               | IM 19045    | 45      | 50      | 30.5    | 0.65    | 0.085        |
|                  | IM 20645    | 45      | 50      | 35      | 0.65    | 0.096        |

# Cylindrical inner rings with hole for RNA bearings - Summary table

BIC and BICG series



**BIC**

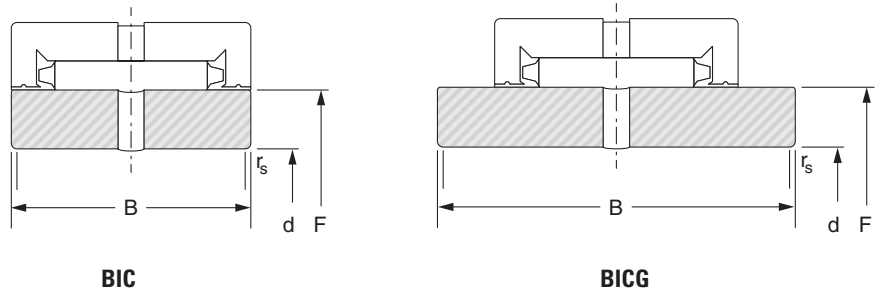


**BICG**

| Shaft<br>Ø<br>mm | Designation | d<br>mm | F<br>mm | B<br>mm | r <sub>s</sub> min<br>mm | Weight<br>kg |
|------------------|-------------|---------|---------|---------|--------------------------|--------------|
| 12               | BIC 1012    | 12      | 17.6    | 15      | 1                        | 0.016        |
| 15               | BIC 1015    | 15      | 20.8    | 15      | 1                        | 0.018        |
|                  | BIC 2015    | 15      | 22.1    | 22      | 1                        | 0.035        |
| 17               | BIC 1017    | 17      | 23.9    | 15      | 1                        | 0.026        |
| 20               | BIC 1020    | 20      | 28.7    | 18      | 1                        | 0.046        |
|                  | BIC 2020    | 20      | 28.7    | 22      | 1                        | 0.056        |
| 25               | BIC 1025    | 25      | 33.5    | 18      | 1                        | 0.054        |
|                  | BIC 2025    | 25      | 33.5    | 22      | 1                        | 0.065        |
|                  | BIC 22025   | 25      | 33.5    | 30      | 1                        | 0.500        |
| 30               | BIC 1030    | 30      | 38.2    | 18      | 1                        | 0.060        |
|                  | BIC 2030    | 30      | 38.2    | 22      | 1                        | 0.074        |
|                  | BIC 3030    | 30      | 44.0    | 30      | 1                        | 0.188        |
| 35               | BIC 1035    | 35      | 44.0    | 18      | 1                        | 0.077        |
|                  | BIC 2035    | 35      | 44.0    | 22      | 1                        | 0.093        |
| 40               | BIC 1040    | 40      | 49.7    | 18      | 1.5                      | 0.094        |
|                  | BIC 2040    | 40      | 49.7    | 22      | 1.5                      | 0.115        |
|                  | BIC 3040    | 40      | 55.4    | 36      | 1.5                      | 0.321        |
| 45               | BIC 1045    | 45      | 55.4    | 18      | 1.5                      | 0.113        |
|                  | BIC 2045    | 45      | 55.4    | 22      | 1.5                      | 0.139        |
|                  | BIC 3045    | 45      | 62.1    | 38      | 1.5                      | 0.422        |

# Cylindrical inner rings with hole for RNA bearings - Summary table

BIC and BICG series



| Shaft<br>∅<br>mm | Designation | d<br>mm | F<br>mm | B<br>mm | r <sub>s</sub> min<br>mm | Weight<br>kg |
|------------------|-------------|---------|---------|---------|--------------------------|--------------|
| 50               | BIC 1050    | 50      | 62.1    | 20      | 2                        | 0.163        |
|                  | BIC 11050   | 50      | 62.1    | 24      | 2                        | 0.196        |
|                  | BIC 2050    | 50      | 62.1    | 28      | 2                        | 0.228        |
|                  | BIC 3050    | 50      | 68.8    | 38      | 2                        | 0.515        |
| 55               | BIC 1055    | 55      | 68.8    | 20      | 2                        | 0.205        |
|                  | BIC 3055    | 55      | 72.6    | 38      | 2                        | 0.525        |
|                  | BICG 3055   | 55      | 72.6    | 48      | 2                        | 0.660        |
| 60               | BIC 2060    | 60      | 72.6    | 28      | 2                        | 0.282        |
|                  | BIC 3060    | 60      | 78.3    | 38      | 2                        | 0.583        |
|                  | BICG 2060   | 60      | 72.6    | 38      | 2                        | 0.385        |
| 65               | BIC 3065    | 65      | 83.1    | 38      | 2                        | 0.623        |
| 70               | BIC 3070    | 70      | 88.0    | 38      | 2                        | 0.662        |
| 75               | BIC 2075    | 75      | 88.0    | 32      | 2                        | 0.410        |
| 80               | BIC 1080    | 80      | 96.0    | 24      | 2                        | 0.410        |
|                  | BIC 2080    | 80      | 96.0    | 32      | 2                        | 0.545        |
|                  | BIC 3080    | 80      | 99.5    | 38      | 2                        | 0.805        |
| 90               | BIC 2090    | 90      | 104.7   | 32      | 2                        | 0.531        |
|                  | BIC 3090    | 90      | 109.1   | 43      | 2                        | 0.990        |
| 95               | BIC 2095    | 95      | 109.1   | 32      | 2                        | 0.548        |
|                  | BIC 3095    | 95      | 114.7   | 43      | 2                        | 1.075        |
| 100              | BIC 3100    | 100     | 119.2   | 43      | 2                        | 1.090        |
| 105              | BIC 2105    | 105     | 119.2   | 32      | 2                        | 0.615        |
| 110              | BIC 2110    | 110     | 124.7   | 34      | 2                        | 0.705        |
| 125              | BICG 2125   | 125     | 142.5   | 44      | 2                        | 1.340        |
| 130              | BIC 3130    | 130     | 158.0   | 52      | 2                        | 2.530        |

# MANUFACTURING TOLERANCES OF BEARING RINGS

## Standard tolerance class P0 <sup>(1)</sup>

Inner ring

| ∅ bore nominal d mm |     | $d_m$<br>$\left(\frac{d \text{ min.} + d \text{ max.}}{2}\right)$<br>μm |      | Out of round μm max. | Width        |      |                            |
|---------------------|-----|---|------|----------------------|--------------|------|----------------------------|
|                     |     |   |      |                      | tolerance μm |      | Max variation on a ring μm |
| from                | to  | max.  | min. | max.                 | min.         |      |                            |
| 2,5                 | 10  | 0   | -8   | 10                   | 0            | -120 | 15                         |
| 10                  | 18  | 0   | -8   | 10                   | 0            | -120 | 20                         |
| 18                  | 30  | 0   | -10  | 13                   | 0            | -120 | 20                         |
| 30                  | 50  | 0   | -12  | 15                   | 0            | -120 | 20                         |
| 50                  | 80  | 0   | -15  | 20                   | 0            | -150 | 25                         |
| 80                  | 120 | 0   | -20  | 25                   | 0            | -200 | 25                         |
| 120                 | 180 | 0   | -25  | 30                   | 0            | -250 | 30                         |
| 180                 | 250 | 0   | -30  | 40                   | 0            | -300 | 30                         |
| 250                 | 315 | 0   | -35  | 50                   | 0            | -350 | 35                         |
| 315                 | 400 | 0   | -40  | 60                   | 0            | -400 | 40                         |

Outer ring

| ∅ external diameter nominal D mm |     | $D_m$<br>$\left(\frac{D \text{ min.} + D \text{ max.}}{2}\right)$<br>μm |      | Out of round μm max. | Width   |
|----------------------------------|-----|---|------|----------------------|---|
|                                  |     |   |      |                      |   |
| from                             | to  | max.  | min. |                      |   |
| 6                                | 18  | 0   | -8   | 15                   | Tolerance variations on a ring are identical to those of the inner ring for the corresponding bearing |
| 18                               | 30  | 0   | -9   | 15                   |   |
| 30                               | 50  | 0   | -11  | 20                   |   |
| 50                               | 80  | 0   | -13  | 25                   |   |
| 80                               | 120 | 0   | -15  | 35                   |   |
| 120                              | 150 | 0   | -18  | 40                   |   |
| 150                              | 180 | 0   | -25  | 45                   |   |
| 180                              | 250 | 0   | -30  | 50                   |   |
| 250                              | 315 | 0   | -35  | 60                   |   |
| 315                              | 400 | 0   | -40  | 70                   |   |

(1) According to ISO 1206 (DIN 620 Class 0).

## Tolerance class P6 <sup>(2)</sup>

Inner ring

| ∅ bore nominal d mm |     | $d_m$<br>$\left(\frac{d \text{ min.} + d \text{ max.}}{2}\right)$<br>μm |      | Out of round μm max. | Width        |      |                            |
|---------------------|-----|---|------|----------------------|--------------|------|----------------------------|
|                     |     |   |      |                      | tolerance μm |      | Max variation on a ring μm |
| from                | to  | max.  | min. | max.                 | min.         |      |                            |
| 2,5                 | 10  | 0   | -7   | 6                    | 0            | -120 | 15                         |
| 10                  | 18  | 0   | -7   | 7                    | 0            | -120 | 20                         |
| 18                  | 30  | 0   | -8   | 8                    | 0            | -120 | 20                         |
| 30                  | 50  | 0   | -10  | 10                   | 0            | -120 | 20                         |
| 50                  | 80  | 0   | -12  | 10                   | 0            | -150 | 25                         |
| 80                  | 120 | 0   | -15  | 13                   | 0            | -200 | 25                         |
| 120                 | 180 | 0   | -18  | 18                   | 0            | -250 | 30                         |
| 180                 | 250 | 0   | -22  | 20                   | 0            | -300 | 30                         |
| 250                 | 315 | 0   | -25  | 25                   | 0            | -350 | 35                         |
| 315                 | 400 | 0   | -30  | 30                   | 0            | -400 | 40                         |

Outer ring

| ∅ external diameter nominal D mm |     | $D_m$<br>$\left(\frac{D \text{ min.} + D \text{ max.}}{2}\right)$<br>μm |      | Out of round μm max. | Width   |
|----------------------------------|-----|---|------|----------------------|---|
|                                  |     |   |      |                      |   |
| from                             | to  | max.  | min. |                      |   |
| 6                                | 18  | 0   | -7   | 9                    | Tolerance variations on a ring are identical to those of the inner ring for the corresponding bearing |
| 18                               | 30  | 0   | -8   | 9                    |   |
| 30                               | 50  | 0   | -9   | 10                   |   |
| 50                               | 80  | 0   | -11  | 13                   |   |
| 80                               | 120 | 0   | -13  | 18                   |   |
| 120                              | 150 | 0   | -15  | 20                   |   |
| 150                              | 180 | 0   | -18  | 23                   |   |
| 180                              | 250 | 0   | -20  | 25                   |   |
| 250                              | 315 | 0   | -25  | 30                   |   |
| 315                              | 400 | 0   | -28  | 35                   |   |

## Tolerance class P5 <sup>(2)</sup>

Inner ring

| ∅ bore nominal d mm |     | $d_m$<br>$\left(\frac{d \text{ min.} + d \text{ max.}}{2}\right)$<br>μm |      | Out of round μm max. | Width        |      |                            |
|---------------------|-----|---|------|----------------------|--------------|------|----------------------------|
|                     |     |   |      |                      | tolerance μm |      | Max variation on a ring μm |
| from                | to  | max.  | min. | max.                 | min.         |      |                            |
| 2,5                 | 10  | 0   | -5   | 3,5                  | 0            | -40  | 5                          |
| 10                  | 18  | 0   | -5   | 3,5                  | 0            | -80  | 5                          |
| 18                  | 30  | 0   | -6   | 4                    | 0            | -120 | 5                          |
| 30                  | 50  | 0   | -8   | 5                    | 0            | -120 | 5                          |
| 50                  | 80  | 0   | -9   | 5                    | 0            | -150 | 6                          |
| 80                  | 120 | 0   | -10  | 6                    | 0            | -200 | 7                          |
| 120                 | 180 | 0   | -13  | 8                    | 0            | -250 | 8                          |
| 180                 | 250 | 0   | -15  | 10                   | 0            | -300 | 10                         |
| 250                 | 315 | 0   | -18  | 13                   | 0            | -350 | 13                         |
| 315                 | 400 | 0   | -23  | 15                   | 0            | -400 | 15                         |

Outer ring

| ∅ external diameter nominal D mm |     | $D_m$<br>$\left(\frac{D \text{ min.} + D \text{ max.}}{2}\right)$<br>μm |      | Out of round μm max. | Width   |
|----------------------------------|-----|---|------|----------------------|---|
|                                  |     |   |      |                      |   |
| from                             | to  | max.  | min. |                      |   |
| 6                                | 18  | 0   | -5   | 5                    | Tolerance variations on a ring are identical to those of the inner ring for the corresponding bearing |
| 18                               | 30  | 0   | -6   | 6                    |   |
| 30                               | 50  | 0   | -7   | 7                    |   |
| 50                               | 80  | 0   | -9   | 8                    |   |
| 80                               | 120 | 0   | -10  | 10                   |   |
| 120                              | 150 | 0   | -11  | 11                   |   |
| 150                              | 180 | 0   | -13  | 13                   |   |
| 180                              | 250 | 0   | -15  | 15                   |   |
| 250                              | 315 | 0   | -18  | 18                   |   |
| 315                              | 400 | 0   | -20  | 20                   |   |

(2) According to ISO/R 492 (DIN 620). For tolerances of class 4 information on request.

NOTE- For the particular tolerances of a bearing type, please consult the corresponding chapter. In view of the relative thinness of inner and outer rings of needle bearings, their circularity (or ovality) is of little significance, because it is influenced by the shape of the appropriate shafts and housings after installation. This characteristic does not figure in the tables above.



# ISO HOUSING TOLERANCES, in $\mu\text{m}$

| Nominal diameter<br>mm |            | F          |             |             | G          | H        |          |          |           |           |            | J         |            |           | K         | M          |          |            | N          |           |            | P            | R           |  |
|------------------------|------------|------------|-------------|-------------|------------|----------|----------|----------|-----------|-----------|------------|-----------|------------|-----------|-----------|------------|----------|------------|------------|-----------|------------|--------------|-------------|--|
|                        |            | F6         | F7          | F8          | G6         | H6       | H7       | H8       | H10       | H11       | H12        | J6        | J7         | Js12      | K6        | M6         | M7       | N6         | N7         | N11       | P7         | R6           | R7          |  |
| from                   | to         |            |             |             |            |          |          |          |           |           |            |           |            |           |           |            |          |            |            |           |            |              |             |  |
| <b>6</b>               | <b>10</b>  | +22<br>+13 | +28<br>+13  | +35<br>+13  | +14<br>+5  | +9<br>0  | +15<br>0 | +22<br>0 | +58<br>0  | +90<br>0  | +150<br>+0 | +5<br>-4  | +8<br>-7   | $\pm 75$  | +2<br>-7  | -3<br>-12  | 0<br>-15 | -7<br>-16  | -4<br>-19  | 0<br>-90  | -9<br>-24  | -16<br>-25   | -13<br>-28  |  |
| <b>10</b>              | <b>18</b>  | +27<br>+16 | +34<br>+16  | +43<br>+16  | +17<br>+6  | +11<br>0 | +18<br>0 | +27<br>0 | +70<br>0  | +110<br>0 | +180<br>0  | +6<br>-5  | +10<br>-8  | $\pm 90$  | +2<br>-9  | -4<br>-15  | 0<br>-18 | -9<br>-20  | -5<br>-23  | 0<br>-110 | -11<br>-29 | -20<br>-31   | -16<br>-34  |  |
| <b>18</b>              | <b>30</b>  | +33<br>+20 | +41<br>+20  | +53<br>+20  | +20<br>+7  | +13<br>0 | +21<br>0 | +33<br>0 | +64<br>0  | +130<br>0 | +210<br>0  | +8<br>-5  | +12<br>-9  | $\pm 105$ | +2<br>-11 | -4<br>-17  | 0<br>-21 | -11<br>-21 | -7<br>-26  | 0<br>-130 | -14<br>-35 | -24<br>-37   | -20<br>-41  |  |
| <b>30</b>              | <b>50</b>  | +41<br>+25 | +50<br>+25  | +64<br>+25  | +25<br>+9  | +16<br>0 | +25<br>0 | +39<br>0 | +100<br>0 | +160<br>0 | +250<br>0  | +10<br>-6 | +14<br>-11 | $\pm 125$ | +3<br>-13 | -4<br>-20  | 0<br>-25 | -12<br>-28 | -8<br>-33  | 0<br>-160 | -17<br>-42 | -29<br>-45   | -25<br>-50  |  |
| <b>50</b>              | <b>65</b>  | +49<br>+30 | +60<br>+30  | +76<br>+30  | +29<br>+10 | +19<br>0 | +30<br>0 | +46<br>0 | +120<br>0 | +190<br>0 | +300<br>0  | +13<br>-6 | +18<br>-12 | $\pm 150$ | +4<br>-15 | -5<br>-24  | 0<br>-30 | -14<br>-33 | -9<br>-39  | 0<br>-190 | -21<br>-51 | -35<br>-54   | -30<br>-60  |  |
| <b>65</b>              | <b>80</b>  | +49<br>+30 | +60<br>+30  | +76<br>+30  | +29<br>+10 | +19<br>0 | +30<br>0 | +46<br>0 | +120<br>0 | +190<br>0 | +300<br>0  | +13<br>-6 | +18<br>-12 | $\pm 150$ | +4<br>-15 | -5<br>-24  | 0<br>-30 | -14<br>-33 | -9<br>-39  | 0<br>-190 | -21<br>-51 | -35<br>-54   | -30<br>-62  |  |
| <b>80</b>              | <b>100</b> | +58<br>+36 | +71<br>+36  | +90<br>+36  | +34<br>+12 | +22<br>0 | +35<br>0 | +54<br>0 | +140<br>0 | +220<br>0 | +350<br>0  | +16<br>-6 | +22<br>-13 | $\pm 175$ | +4<br>-18 | -6<br>-28  | 0<br>-35 | -16<br>-38 | -10<br>-45 | 0<br>-220 | -24<br>-59 | -44<br>-69   | -38<br>-76  |  |
| <b>100</b>             | <b>120</b> | +58<br>+36 | +71<br>+36  | +90<br>+36  | +34<br>+12 | +22<br>0 | +35<br>0 | +54<br>0 | +140<br>0 | +220<br>0 | +350<br>0  | +16<br>-6 | +22<br>-13 | $\pm 175$ | +4<br>-18 | -6<br>-28  | 0<br>-35 | -16<br>-38 | -10<br>-45 | 0<br>-220 | -24<br>-59 | -47<br>-69   | -41<br>-76  |  |
| <b>120</b>             | <b>140</b> | +68<br>+43 | +83<br>+43  | +106<br>+43 | +39<br>+14 | +25<br>0 | +40<br>0 | +63<br>0 | +160<br>0 | +250<br>0 | +400<br>0  | +18<br>-7 | +26<br>-14 | $\pm 200$ | +4<br>-21 | -8<br>-33  | 0<br>-40 | -20<br>-45 | -12<br>-52 | 0<br>-250 | -28<br>-68 | -56<br>-81   | -48<br>-88  |  |
| <b>140</b>             | <b>160</b> | +68<br>+43 | +83<br>+43  | +106<br>+43 | +39<br>+14 | +25<br>0 | +40<br>0 | +63<br>0 | +160<br>0 | +250<br>0 | +400<br>0  | +18<br>-7 | +26<br>-14 | $\pm 200$ | +4<br>-21 | -8<br>-33  | 0<br>-40 | -20<br>-45 | -12<br>-52 | 0<br>-250 | -28<br>-68 | -58<br>-83   | -50<br>-90  |  |
| <b>160</b>             | <b>80</b>  | +68<br>+43 | +83<br>+43  | +106<br>+43 | +39<br>+14 | +25<br>0 | +40<br>0 | +63<br>0 | +160<br>0 | +250<br>0 | +400<br>0  | +18<br>-7 | +26<br>-14 | $\pm 200$ | +4<br>-21 | -8<br>-33  | 0<br>-40 | -20<br>-45 | -12<br>-52 | 0<br>-250 | -28<br>-68 | -61<br>-86   | -53<br>-93  |  |
| <b>180</b>             | <b>200</b> | +79<br>+50 | +96<br>+50  | +122<br>+50 | +44<br>+15 | +29<br>0 | +46<br>0 | +72<br>0 | +185<br>0 | +290<br>0 | +460<br>0  | +22<br>-7 | +30<br>-16 | $\pm 230$ | +5<br>-24 | -8<br>-37  | 0<br>-46 | -22<br>-51 | -14<br>-60 | 0<br>-290 | -33<br>-79 | -68<br>-97   | -60<br>-106 |  |
| <b>200</b>             | <b>225</b> | +79<br>+50 | +96<br>+50  | +122<br>+50 | +44<br>+15 | +29<br>0 | +46<br>0 | +72<br>0 | +185<br>0 | +290<br>0 | +460<br>0  | +22<br>-7 | +30<br>-16 | $\pm 230$ | +5<br>-24 | -8<br>-37  | 0<br>-46 | -22<br>-51 | -14<br>-60 | 0<br>-290 | -33<br>-79 | -71<br>-100  | -63<br>-109 |  |
| <b>225</b>             | <b>250</b> | +79<br>+50 | +96<br>+50  | +122<br>+50 | +44<br>+15 | +28<br>0 | +46<br>0 | +72<br>0 | +185<br>0 | +290<br>0 | +460<br>0  | +22<br>-7 | +30<br>-16 | $\pm 230$ | +5<br>-24 | -8<br>-37  | 0<br>-46 | -22<br>-51 | -14<br>-60 | 0<br>-290 | -33<br>-79 | -75<br>-104  | -67<br>-113 |  |
| <b>250</b>             | <b>280</b> | +88<br>+56 | +108<br>+56 | +137<br>+56 | +49<br>+17 | +32<br>0 | +52<br>0 | +81<br>0 | +210<br>0 | +320<br>0 | +520<br>0  | +25<br>-7 | +36<br>-16 | $\pm 260$ | +5<br>-27 | -9<br>-41  | 0<br>-52 | -25<br>-57 | -14<br>-66 | 0<br>-320 | -36<br>-88 | -85<br>-117  | -74<br>-126 |  |
| <b>280</b>             | <b>315</b> | +88<br>+56 | +108<br>+56 | +137<br>+56 | +49<br>+17 | +32<br>0 | +52<br>0 | +81<br>0 | +210<br>0 | +320<br>0 | +520<br>0  | +25<br>-7 | +36<br>-16 | $\pm 260$ | +5<br>-27 | -9<br>-41  | 0<br>-52 | -25<br>-57 | -14<br>-66 | 0<br>-320 | -36<br>-88 | -89<br>-121  | -76<br>-130 |  |
| <b>315</b>             | <b>355</b> | +98<br>+62 | +119<br>+62 | +151<br>+62 | +54<br>+18 | +36<br>0 | +57<br>0 | +89<br>0 | +230<br>0 | +360<br>0 | +570<br>0  | +29<br>-7 | +39<br>-18 | $\pm 285$ | +7<br>-29 | -10<br>-46 | 0<br>-57 | -26<br>-62 | -16<br>-73 | 0<br>-360 | -41<br>-98 | -97<br>-133  | -87<br>-144 |  |
| <b>355</b>             | <b>400</b> | +98<br>+62 | +119<br>+62 | +151<br>+62 | +54<br>+18 | +36<br>0 | +57<br>0 | +89<br>0 | +230<br>0 | +360<br>0 | +570<br>0  | +29<br>-7 | +39<br>-18 | $\pm 285$ | +7<br>-29 | -10<br>-46 | 0<br>-57 | -26<br>-62 | -16<br>-73 | 0<br>-360 | -41<br>-98 | -103<br>-139 | -93<br>-150 |  |

# ISO SHAFT TOLERANCES, in $\mu\text{m}$

| Nominal diameter<br>mm |            | f          | g          |            | h        |          |          |          |           |           | j         |            | k         |           | m          |            | n          | p          |
|------------------------|------------|------------|------------|------------|----------|----------|----------|----------|-----------|-----------|-----------|------------|-----------|-----------|------------|------------|------------|------------|
|                        |            | f6         | g5         | g6         | h5       | h6       | h7       | h8       | h10       | h13       | j5        | j6         | k5        | k6        | m5         | m6         | n6         | p6         |
| from                   | to         |            |            |            |          |          |          |          |           |           |           |            |           |           |            |            |            |            |
| <b>3</b>               | <b>6</b>   | -10<br>-18 | -4<br>-9   | -4<br>-12  | 0<br>-5  | 0<br>-8  | 0<br>-12 | 0<br>-18 | 0<br>-48  | 0<br>-180 | +3<br>-2  | +6<br>-2   | +8<br>+1  | +9<br>+1  | +9<br>+4   | +12<br>+4  | +16<br>+8  | +20<br>+12 |
| <b>6</b>               | <b>10</b>  | -13<br>-22 | -5<br>-11  | -5<br>-14  | 0<br>-6  | 0<br>-9  | 0<br>-15 | 0<br>-22 | 0<br>-58  | 0<br>-220 | +4<br>-2  | +7<br>-2   | +7<br>+1  | +10<br>+1 | +12<br>+6  | +15<br>+6  | +19<br>+10 | +24<br>+15 |
| <b>10</b>              | <b>18</b>  | -16<br>-27 | -6<br>-14  | -6<br>-17  | 0<br>-8  | 0<br>-11 | 0<br>-18 | 0<br>-27 | 0<br>-70  | 0<br>-270 | +5<br>-3  | +8<br>-3   | +9<br>+1  | +12<br>+1 | +15<br>+7  | +18<br>+7  | +23<br>+12 | +29<br>+19 |
| <b>18</b>              | <b>30</b>  | -20<br>-33 | -7<br>-16  | -7<br>-20  | 0<br>-9  | 0<br>-13 | 0<br>-21 | 0<br>-33 | 0<br>-84  | 0<br>-330 | +5<br>-4  | +9<br>-4   | +11<br>+2 | +15<br>+2 | +17<br>+9  | +21<br>+9  | +29<br>+15 | +35<br>+22 |
| <b>30</b>              | <b>50</b>  | -25<br>-41 | -9<br>-20  | -9<br>-25  | 0<br>-11 | 0<br>-18 | 0<br>-25 | 0<br>-39 | 0<br>-100 | 0<br>-390 | +6<br>-5  | +11<br>-5  | +13<br>+2 | +19<br>+2 | +20<br>+9  | +25<br>+9  | +33<br>+17 | +42<br>+28 |
| <b>50</b>              | <b>80</b>  | -30<br>-49 | -10<br>-23 | -10<br>-29 | 0<br>-13 | 0<br>-19 | 0<br>-30 | 0<br>-46 | 0<br>-120 | 0<br>-460 | +6<br>-7  | +12<br>-7  | +15<br>+2 | +21<br>+2 | +24<br>+11 | +30<br>+11 | +39<br>+20 | +51<br>+32 |
| <b>80</b>              | <b>120</b> | -36<br>-58 | -12<br>-27 | -12<br>-34 | 0<br>-15 | 0<br>-22 | 0<br>-35 | 0<br>-54 | 0<br>-140 | 0<br>-540 | +6<br>-9  | +13<br>-9  | +18<br>+3 | +25<br>+3 | +28<br>+13 | +35<br>+13 | +45<br>+23 | +59<br>+37 |
| <b>120</b>             | <b>180</b> | -43<br>-99 | -14<br>-32 | -14<br>-39 | 0<br>-19 | 0<br>-25 | 0<br>-40 | 0<br>-63 | 0<br>-160 | 0<br>-630 | +7<br>-11 | +14<br>-11 | +21<br>+3 | +28<br>+3 | +33<br>+15 | +40<br>+15 | +52<br>+27 | +68<br>+43 |
| <b>180</b>             | <b>250</b> | -50<br>-79 | -15<br>-39 | -15<br>-44 | 0<br>-20 | 0<br>-29 | 0<br>-46 | 0<br>-72 | 0<br>-188 | 0<br>-720 | +7<br>-13 | +16<br>-13 | +24<br>+4 | +33<br>+4 | +37<br>+17 | +45<br>+17 | +50<br>+31 | +79<br>+80 |
| <b>250</b>             | <b>315</b> | -56<br>-88 | -17<br>-40 | -17<br>-49 | 0<br>-23 | 0<br>-32 | 0<br>-52 | 0<br>-81 | 0<br>-210 | 0<br>-610 | +7<br>-18 | +15<br>-15 | +27<br>+4 | +35<br>+4 | +43<br>+20 | +52<br>+20 | +66<br>+34 | +88<br>+55 |
| <b>315</b>             | <b>400</b> | -62<br>-99 | -18<br>-43 | -16<br>-54 | 0<br>-25 | 0<br>-38 | 0<br>-87 | 0<br>-89 | 0<br>-230 | 0<br>-890 | +7<br>-19 | +19<br>-16 | +29<br>+4 | +40<br>+4 | +46<br>+21 | +57<br>+21 | +73<br>+37 | +99<br>+92 |





## INTERNAL RADIAL PLAY OF BEARING <sup>(1)</sup>

| Nominal dimension of the hole<br>mm |         | Class of play C2<br>mm |       | Class of play C0<br>(standard) mm |       | Class of play C3<br>mm |       | Class of play C4<br>mm |       |
|-------------------------------------|---------|------------------------|-------|-----------------------------------|-------|------------------------|-------|------------------------|-------|
| >                                   | ≥       | min                    | max   | min                               | max   | min                    | max   | min                    | max   |
| –                                   | 30.000  | –                      | 0.025 | 0.020                             | 0.045 | 0.035                  | 0.060 | 0.050                  | 0.075 |
| 30.000                              | 40.000  | 0.005                  | 0.030 | 0.025                             | 0.050 | 0.045                  | 0.070 | 0.060                  | 0.085 |
| 40.000                              | 50.000  | 0.005                  | 0.035 | 0.030                             | 0.060 | 0.050                  | 0.080 | 0.070                  | 0.100 |
| 50.000                              | 65.000  | 0.010                  | 0.040 | 0.040                             | 0.070 | 0.060                  | 0.090 | 0.080                  | 0.110 |
| 65.000                              | 80.000  | 0.010                  | 0.045 | 0.040                             | 0.075 | 0.065                  | 0.100 | 0.090                  | 0.125 |
| 80.000                              | 100.000 | 0.015                  | 0.050 | 0.050                             | 0.085 | 0.075                  | 0.110 | 0.105                  | 0.140 |
| 100.000                             | 120.000 | 0.015                  | 0.055 | 0.050                             | 0.090 | 0.085                  | 0.125 | 0.125                  | 0.165 |
| 120.000                             | 140.000 | 0.015                  | 0.060 | 0.060                             | 0.105 | 0.100                  | 0.145 | 0.145                  | 0.190 |
| 140.000                             | 160.000 | 0.020                  | 0.070 | 0.070                             | 0.120 | 0.115                  | 0.165 | 0.165                  | 0.215 |
| 160.000                             | 180.000 | 0.025                  | 0.075 | 0.075                             | 0.125 | 0.120                  | 0.170 | 0.170                  | 0.220 |
| 180.000                             | 200.000 | 0.035                  | 0.090 | 0.090                             | 0.145 | 0.140                  | 0.195 | 0.195                  | 0.250 |
| 200.000                             | 225.000 | 0.045                  | 0.105 | 0.105                             | 0.165 | 0.160                  | 0.220 | 0.220                  | 0.280 |
| 225.000                             | 250.000 | 0.045                  | 0.110 | 0.110                             | 0.175 | 0.170                  | 0.235 | 0.235                  | 0.300 |
| 250.000                             | 280.000 | 0.055                  | 0.125 | 0.125                             | 0.195 | 0.190                  | 0.260 | 0.260                  | 0.330 |
| 280.000                             | 315.000 | 0.055                  | 0.130 | 0.130                             | 0.205 | 0.200                  | 0.275 | 0.275                  | 0.350 |
| 315.000                             | 355.000 | 0.065                  | 0.145 | 0.145                             | 0.225 | 0.225                  | 0.305 | 0.305                  | 0.385 |
| 355.000                             | 400.000 | 0.100                  | 0.190 | 0.190                             | 0.280 | 0.280                  | 0.370 | 0.370                  | 0.460 |
| 400.000                             | 450.000 | 0.110                  | 0.210 | 0.210                             | 0.310 | 0.310                  | 0.410 | 0.410                  | 0.510 |
| 450.000                             | 500.000 | 0.110                  | 0.220 | 0.220                             | 0.330 | 0.330                  | 0.440 | 0.440                  | 0.550 |

(1) According to **ISO 5753** only for needle bearings with cage and precision combined bearings with adjustable preload. For internal radial play of other products see the specific chapters.