BS EN 4265:2013

BSI Standards Publication

Aerospace series — Bearing spherical plain, metal to metal in corrosion resisting steel — Wide series — Dimensions and loads — Inch series

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National foreword

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A list of organizations represented on this committee can be obtained on request to its secretary.

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Luft- und Raumfahrt - Gelenklager, Metall auf Metall aus korrosionsbeständigem Stahl - Breite Reihe - Maße und Belastungen - Inch-Reihe

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 4265:2013) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2013, and conflicting national standards shall be withdrawn at the latest by July 2013.

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1 Scope

This European Standard specifies the characteristics of spherical plain bearings, metal to metal, in corrosion resisting steel, passivated, wide series, inch series for aerospace applications.

They are intended for use in fixed or moving parts of the aircraft structure and their control mechanisms.

They shall be used in the temperature range – 54 °C to 150 °C. As they are lubricated by means of the following greases:

Code A: Grease as per MIL-PRF-23827C, operating temperature range – 73 °C to 121 °C.

Code B: Grease as per MIL-PRF-81322G, operating temperature range – 54 °C to 177 °C.

The range of application for bearings lubricated with grease per code A is limited to 121 °C.

In both cases the spherical surface of the outer or inner ring have to be provided with a dry-film lubricant as per MIL-PRF-46010G or equivalent (anti-seizing protection).

The slide hole treatment either at the outer ring or inner ring.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 2030, *Aerospace series - Steel FE-PM3501 (X105CrMo17) - Hardened and tempered - Bars D ≤ 150 mm*[1)]

EN 2337, *Aerospace series — Spherical plain bearings — Technical specification*

EN 2424, *Aerospace series — Marking of aerospace products*

EN 3161, *Aerospace series — Steel FE-PM3801 (X5CrNiCu17-4) — Air melted — Solution treated and precipitation treated — Bar — a or D ≤ 200 mm — $R_m \geq 930$ MPa*

ISO 1132-1, *Rolling bearings — Tolerances — Part 1: Terms and definitions*

ISO 8075, *Aerospace — Surface treatment of hardenable stainless steel parts*

TR 4475, *Aerospace series — Bearings and mechanical transmissions for airframe applications — Vocabulary* [1)]

MIL-PRF-23827C, *Grease — Aircraft and instrument — Gear and actuator screw — NATO code number G-354* [2)]

MIL-PRF-46010G, *Lubricant — Solid film — Heat cured — Corrosion inhibiting* [2)]

MIL-PRF-81322G, *Grease — Aircraft — General purpose — Wide temperature range — NATO code number G-395* [2)]

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1) Published as ASD-STAN Technical Report at the date of publication of this standard, (www.asd-stan.org).

2) Published by: Department of Defense (DoD), http://www.defenselink.mil/

3 Terms and definitions

For the purposes of this document, the terms and definitions given in TR 4475 apply.

4 Symbols and abbreviations

Symbols of limit deviations are in accordance with definitions of ISO 1132-1.

α is the maximum angle of tilt of the outer ring with respect to the inner ring, with the spherical surface of the outer ring being completely in contact with the inner ring;

C_a is the permissible static axial load;

C_s is the permissible static radial load;

Δ_{dmp} is the single plane mean bore diameter deviation;

Δ_{Dmp} is the single plane mean outside diameter deviation;

Δ_{ds} is the deviation of a single bore diameter;

Δ_{Ds} is the deviation of a single outside diameter.

Definitions and vocabulary according to TR 4475.

5 Requirements

5.1 Configuration, dimensions, tolerances and mass

According to Figures 1 and 2 and Table 1. Dimensions and tolerances are expressed in millimetres (inches).

Values apply after to surface treatment.

5.2 Surface roughness

In accordance with Figures 1 and 2. Values in micrometres (micro inches), apply prior to surface treatment.

5.3 Material

Inner ring: According to EN 2030, hardness 55 < HRC < 62.

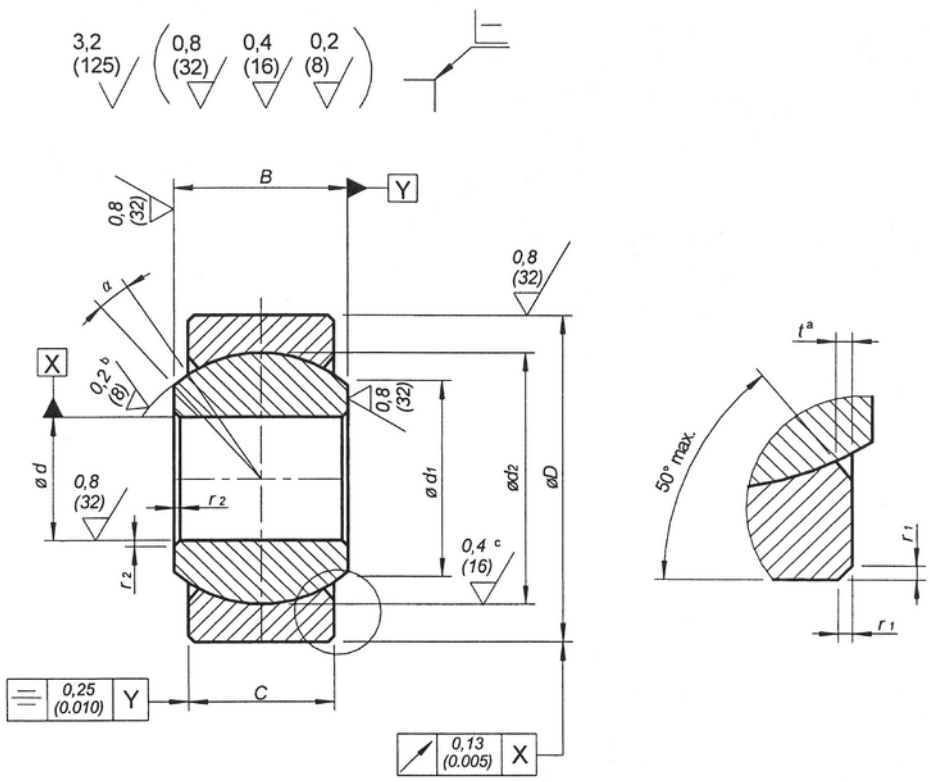
Outer ring: According to EN 3161, hardness 28 < HRC < 38 before swaging.

5.4 Surface treatment

Surface treatment according to ISO 8075 for inner ring before swaging.

5.5 Loads and clearances

According to Tables 2 and 3.

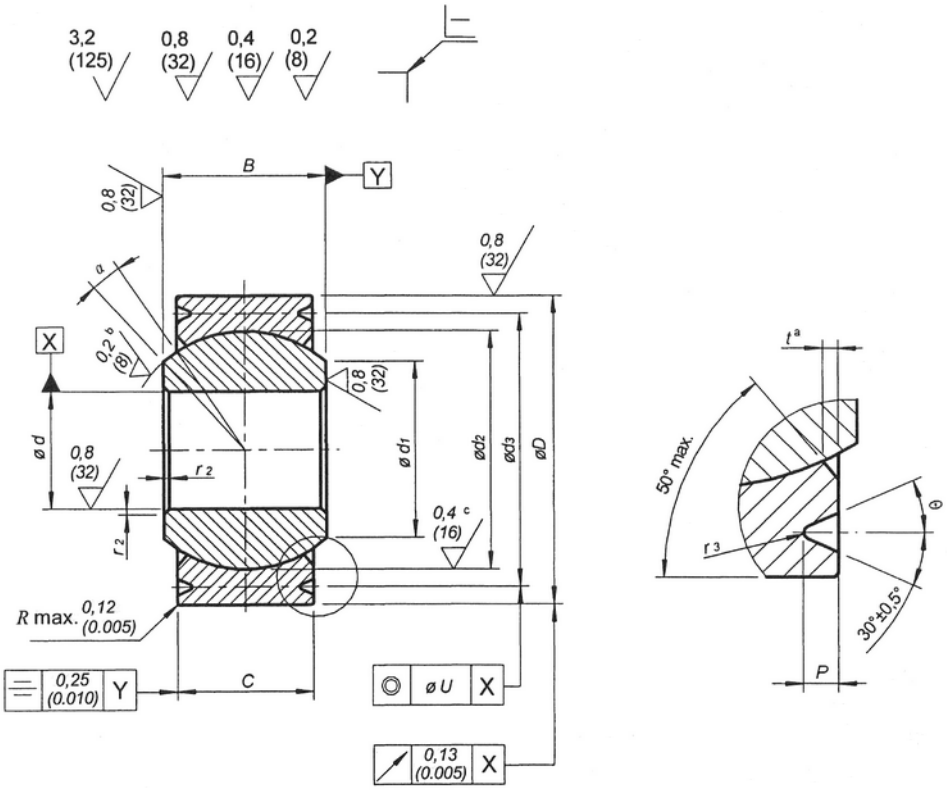


[a] Set back

[b] For the inner ring

[c] For the outer ring

Figure 1 — Code S – Without swaging grooves



a Set back

b For the inner ring

c For the outer ring

Figure 2 — Code R – With swaging grooves

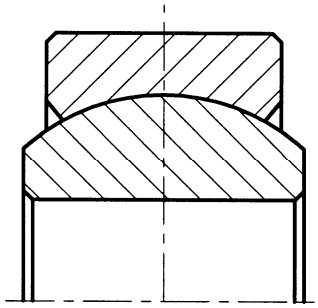
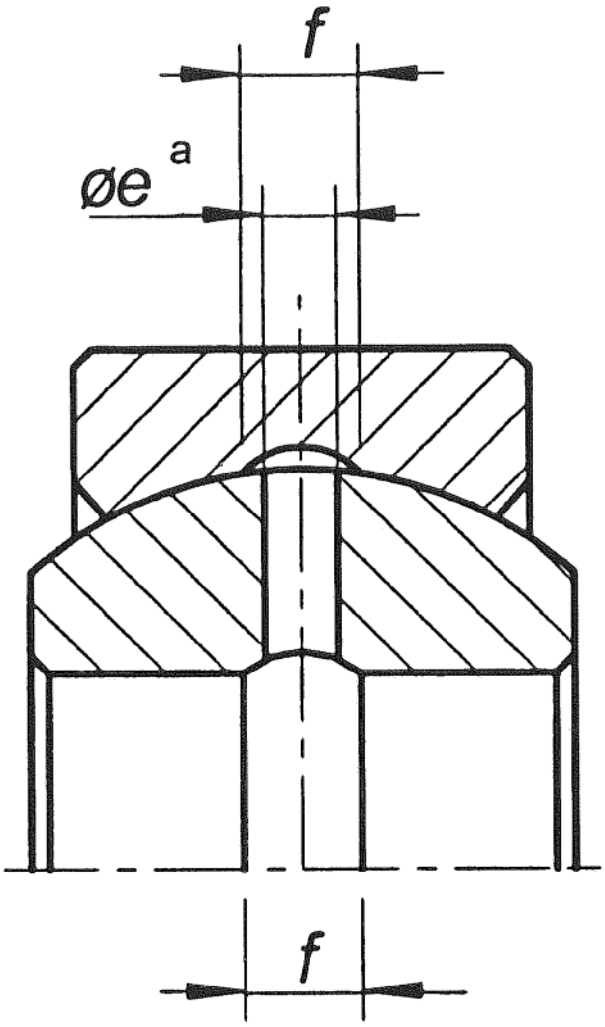
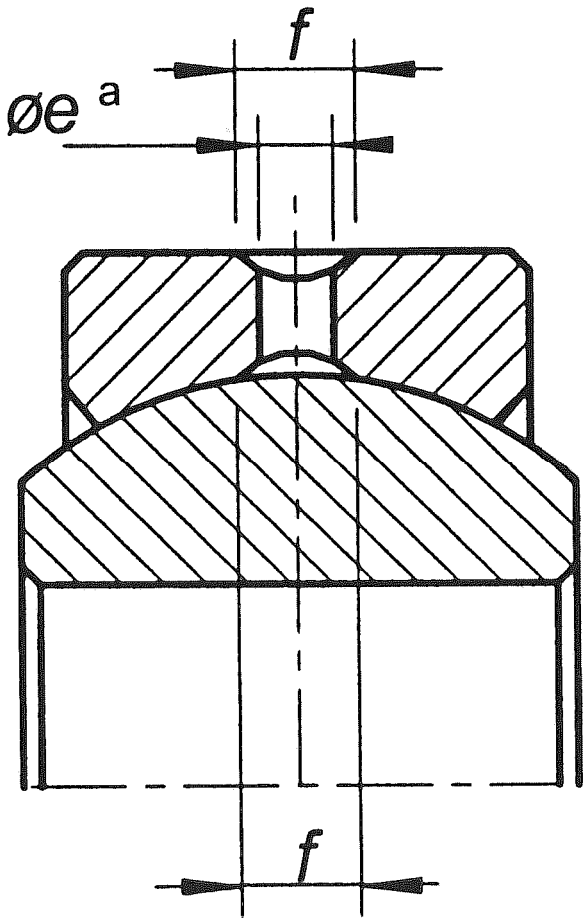


Figure 3 — Grease hole code “E” – Without grease hole and lubricating groove



[a] Three holes Ø *e* distributed over the circumference at distance of 120°

Figure 4 — Grease hole code “F” – With grease hole on inner ring and lubricating groove on:
– Bore of inner ring
– Spherical surface of the outer ring
– The hole should allow the passage of the grease



a Three holes Ø *e* distributed over the circumference at distance of 120°

Figure 5 — Grease hole code "G" – With grease hole on outer ring and lubricating groove on:
– Outer surface of outer ring
– Spherical surface of the outer ring
– The hole should allow the passage of the grease

Table 1 — Dimensions, tolerances and mass *(1 of 2)*

Dimensions in millimetres (in inches)

Diameter code [a]	Diameter						B	C	d_1	d_2	d_3
	d	D	Limit deviation				0 − 0,05 (0 − 0.002)	+ 0,13 0 (+ 0.005 0)	min.	≈	0 − 0,20 (0 − 0.008)
			Δ_{dmp}	Δ_{ds}	Δ_{Dmp}	Δ_{Ds}					
03 [c]	4,826 (0.190 0)	15,875 (0.625 0)	0 − 0,013 (0 − 0.000 5)	0 − 0,013 (0 − 0.000 5)	0 − 0.008 (0 − 0.000 3)	0 − 0,013 (0 − 0.000 5)	11,10 (0.437)	8,31 (0.327)	7,62 (0.300)	13,5 (0.53)	14,30 (0.563)
04 [c]	6,350 (0.250 0)										
05 [c]	7,938 (0.312 5)	19,5 (0.687 5)						8,05 (0.317)	9,14 (0.360)	14,4 (0.57)	15,88 (0.625)
06 [c]	9,525 (0.375 0)	20,638 (0.812 5)			0 − 0,009 (0 − 0.000 4)		12,70 (0.500)	10,31 (0.405)	11,84 (0.466)	17,4 (0.69)	18,08 (0.712)
07	11,113 (0.437 5)	23,813 (0.937 5)					14,27 (0.562)	11,23 (0.442)	13,64 (0.537)	19,7 (0.78)	21,26 (0.837)
07A		23,017 (0.906 2)									20,52 (0.808)
08	12,700 (0.500 0)	25,400 (1.000 0)					15,88 (0.625)	12,83 (0.505)	15,42 (0.607)	22,1 (0.87)	22,86 (0.900)
09	14,288 (0.562 5)	28,575 (1.125 0)					17,45 (0.687)	13,61 (0.536)	18,31 (0.721)	25,4 (1.00)	26,04 (1.025)
10	15,875 (0.625 0)	30,163 (1.187 5)					19,05 (0.750)	14,40 (0.567)	18,97 (0.747)	26,9 (1.06)	27,61 (1.087)
12	19,050 (0.750 0)	34,925 (1.375 0)			0 − 0,011 (0 − 0.000 4)		22,23 (0.875)	16,00 (0.630)	21,46 (0.845)	31,0 (1.22)	31,78 (1.251)
14	22,225 (0.875 0)	41,275 (1.625 0)						19,18 (0.755)	25,27 (0.995)	33,7 (1.33)	38,13 (1.501)
16	25,400 (1.000 0)	53,975 (2.125 0)		+ 0,003 − 0,015 (+ 0.000 1 − 0.000 6)	0 − 0,013 (0 − 0.000 5)	+ 0,003 − 0,015 (+ 0.000 1 − 0.000 6)	34,93 (1.375)	25,53 (1.005)	32,23 (1.269)	47,5 (1.87)	50,83 (2.001)
20	31,750 (1.250 0)	60,325 (2.375 0)					38,10 (1.500)	28,70 (1.130)	37,13 (1.462)	53,2 (2.09)	57,18 (2.251)
24	38,100 (1.500 0)	68,263 (2.687 5)					42,85 (1.687)	31,06 (1.223)	43,10 (1.697)	60,8 (2.39)	65,10 (2.563)
28	44,450 (1.750 0)	76,200 (3.00)					46,02 (1.812)	33,45 (1.317)	49,91 (1.965)	67,9 (2.67)	73,05 (2.876)
32	50,800 (2.000 0)	82,550 (3.250 0)					49,20 (1.937)	35,05 (1.380)	56,10 (2.209)	74,6 (2.94)	79,35 (3.124)

Table 1 *(2 of 2)*

Dimensions in millimetres (in inches)

Diameter code [a]	P $^{0}_{-0,25}$ $\left(^{0}_{-0.010}\right)$	ø e ± 0,20 (± 0.008)	f ± 0,20 (± 0.008)	r_1 $^{0}_{-0,25}$ $\left(^{0}_{-0.010}\right)$	r_2	r_3	α [b] degree min.	θ degree ± 0,5	U	t max.	**Mass** g/piece ≈
03 [c]	0,64 (0.025)	—	—	0,64 (0.025)	0,13 to 0,38 (0.005 0 to 0.015 0)	0,127 to 0,254 (0.005 0 to 0.010 0)	16,0	20	0,08 (0.003)	0,5 (0.02)	13
04 [c]											12
05 [c]							15,5	30			13
06 [c]	0,89 (0.035)	1,50 (0.059)	2,80 (0.110)	0,76 (0.030)		0,254 to 0,432 (0.010 0 to 0.017 0)	9,5		0,12 (0.005)	0,8 (0.03)	23
07				0,76 (0.030)			11,0				33
07A				—							30
08				0,76 (0.030)			9,5				40
09							10,5				56
10		2,00 (0.079)					12,0				63
12	1,40 (0.055)			1,02 (0.040)			14,0			1,2 (0.05)	92
14		2,50 (0.098)	4,00 (0.157)				6,0				146
16							14,5				392
20							12,5				499
24							14,0				668
28							13,0				859
32											1 005

[a] The diameter code corresponds to bore diameter d in 1/16 inch.

[b] The acceptance value is the maximum value for the user.

[c] Not available with lubrification code F or code G.

Table 2 — Loads

Diameter code [a]	Permissible static load kN				Ultimate static load kN			
	Radial [b c] C_s		Axial [b d e] C_a		Radial [b]		Axial [b d]	
	Code E	Code F/G	Code E	Code F/G	Code E	Code F/G	Code E	Code F/G
03 [f]	10,7 [g]	—	19,3	—	16,1 [g]	—	29,0	—
04 [f]	24,5 [g]				36,7 [g]			
05 [f]	47,8 [g]		18,0		71,6 [g]		26,9	
06 [f]	72,1 [g]		27,4		108,2 [g]		41,1	
07	100,8	71,5	33,5	30,7	151,1	107,2	50,3	46,0
07A								
08	131,7	99,0	45,6	42,7	197,6	148,3	68,3	64,1
09	161,0	123,5	52,1	49,3	241,5	185,2	78,2	73,9
10	182,4	142,5	59,2	56,4	273,6	213,7	88,8	84,5
12	222,7	176,8	66,8	64,0	334,1	265,3	100,2	96,0
14	299,3	228,0	101,7	96,0	449,0	342,0	152,6	143,9
16	497,4 [g]	481,9	193,3	187,5	746,1 [g]	722,8	289,9	281,3
20	741,6	628,8	249,9	244,1	1 112,3	943,2	374,8	366,2
24	923,2	794,3	296,8	291,0	1 384,8	1 191,5	445,1	436,5
28	1 117,2	973,3	348,3	342,5	1 675,8	1 460,0	522,5	513,8
32	1 291,2	1 133,0	385,1	379,4	1 936,8	1 699,6	577,7	569,0

[a] The diameter code corresponds to bore diameter d in 1/16 inch.

[b] Definition and testing for permissible and ultimate static loads according to EN 2337 and TR 4475.

[c] Permissible surface pressure 530 MPa, definition per TR 4475.

[d] These values apply to loose spherical bearings. For installed bearings, the push-out loads may be smaller than these values.

[e] Permissible surface pressure 460 MPa, definition per TR 4475.

[f] Not available with lubrification code F or code G.

[g] Limit by bolt bending.
Definition: — solid shaft;
— rigid clamping on both sides;
— uniform load;
— permissible bending stress 1 350 MPa;
— permissible shear stress 1 200 MPa.

Table 3 — Clearance

Dimensions in millimetres (in inches)

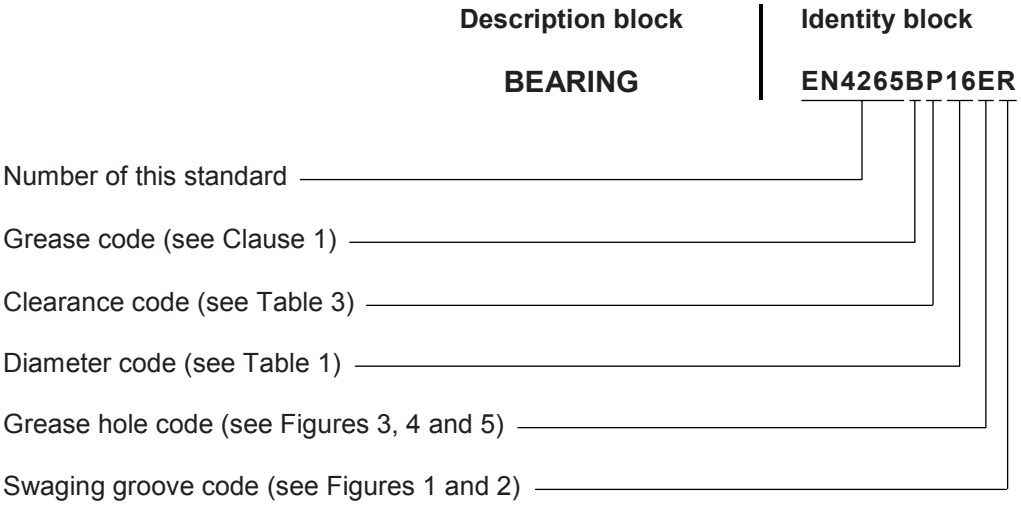
<table>
<tr><th rowspan="3">Diameter code [a]</th><th colspan="4">Clearance [b]</th></tr>
<tr><th colspan="2">Radial</th><th colspan="2">Axial</th></tr>
<tr><th>Normal
Code N</th><th>Reduced
Code P</th><th>Normal
Code N
max.</th><th>Reduced
Code P
max.</th></tr>
<tr><td>03</td><td rowspan="6">0,010 to 0,030
(0.000 4 to 0.001 2)</td><td rowspan="7">0,002 to 0,010
(0.0001 to 0.0004)</td><td rowspan="6">0,12
(0.005)</td><td rowspan="7">0,035
(0.001 4)</td></tr>
<tr><td>04</td></tr>
<tr><td>05</td></tr>
<tr><td>06</td></tr>
<tr><td>07</td></tr>
<tr><td>07A</td></tr>
<tr><td>08</td><td rowspan="11">0,010 to 0,050
(0.000 4 to 0.002 0)</td><td rowspan="11">0,229
(0.009 0)</td></tr>
<tr><td>09</td><td rowspan="2">0,003 to 0,012
(0.000 1 to 0.000 5)</td><td rowspan="2">0,040
(0.001 6)</td></tr>
<tr><td>10</td></tr>
<tr><td>12</td><td rowspan="7">0,004 to 0,015
(0.000 15 to 0.000 6)</td><td rowspan="7">0,050
(0.002 0)</td></tr>
<tr><td>14</td></tr>
<tr><td>16</td></tr>
<tr><td>20</td></tr>
<tr><td>24</td></tr>
<tr><td>28</td></tr>
<tr><td>32</td><td>0,005 to 0,020
(0.000 2 to 0.000 8)</td><td>0,060
(0.002 4)</td></tr>
</table>

[a] The diameter code corresponds to nominal diameter d in 1/16 inch.

[b] Definition and testing for clearance according to EN 2337.

6 Designation

EXAMPLE



NOTE If necessary, the code I9005 shall be placed between the description block and the identity block.

7 Marking

According to EN 2424, style A. In addition, the bearing may be marked with manufacturer's part number.

Marking position and method are at manufacturer's option.

8 Technical specification

According to EN 2337.

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