BRITISH STANDARD AEROSPACE SERIES

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Bearings, airframe rolling — Rigid single row ball bearings in corrosion resisting steel, with extended inner ring and flanged alignment bush — Dimensions and loads

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ICS 49.035

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EUROPEAN STANDARD

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EN 4041

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English Version

Aerospace series - Bearings, airframe rolling - Rigid single row ball bearings in corrosion resisting steel, with extended inner ring and flanged alignment bush - Dimensions and loads

Série aérospatiale - Roulements pour structures d'aéronefs - Roulements en acier résistant à la corrosion, rigides, à une rangée de billes, avec bague intérieure à jupe et bague d'alignement à collerette - Dimensions et charges

Luft- und Raumfahrt - Flugwerklager - Einreihige Rillenkugellager aus korrosionsbeständigem Stahl mit einseitig verlängertem Innenring und selbsteinstellendem Flansch - Maße und Belastungen

This European Standard was approved by CEN on 20 April 2006.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This European Standard (EN 4041:2006) has been prepared by the European Association of Aerospace Manufacturers - Standardization (AECMA-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 AECMA, 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of an identical text or by endorsement, at the latest by December 2006, and conflicting national standards shall be withdrawn at the latest by December 2006.

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1 Scope

This standard specifies the characteristics of rigid single row ball bearings in corrosion resisting steel with an extended inner ring and a solid or lightweight flanged alignment bush, designed to withstand only slow rotations and slight oscillations under load.

They are intended for use in airframe fixed and moving elements and in flight control linkages.

The bearings defined in this standard shall be used in the temperature range from – 54 °C to 150 °C.

However, as they are lubricated with the following greases (see EN 3727):

— ester type very high pressure grease (code letter A), operating range from – 73 °C to 121 °C or,

— synthetic hydrocarbons type very high pressure grease general purpose (code letter B) operating range from – 54 °C to 177 °C.

Their field of application when lubricated with code letter A grease is limited to 121 °C.

2 Normative references

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

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

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

EN 2030, *Steel FE-PM43 — Hardened and tempered — Bars D ≤ 150 mm — Aerospace series.* [1)]

EN 2226, *Steel FE-PM43 — Hardened and tempered — Hand and die forgings D_e ≤ 150 mm — Aerospace series.* [1)]

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

EN 2502, *Steel FE-PM66 — 930 ≤ Rm ≤ 1 080 MPa — Bars D_e ≤ 150 mm — Aerospace series.* [1)]

EN 2503, *Steel FE-PM66 — 930 ≤ Rm ≤ 1 080 MPa — Forgings — D_e ≤ 150 mm — Aerospace series.* [1)]

EN 2539[2)], *Aerospace series — Steel FE-PM3801(X5CrNiCu17-4) — Air melted — Solution treated and precipitation treated - Bar — a or D ≤ 200 mm — R_m ≥ 965 MPa.* [3)]

EN 3161, *Aerospace series — Steel FE-PM3801 (X5CrNiCu17-4) — Air melted — Solution treated and precipitation treated — Bar — a or D ≤ 200 mm — R_m ≥ 930 MPa.* [3)]

EN 3727, *Aerospace series — Bearings, airframe rolling rigid with flanged alignment housing — Dimensions and mass.*

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1) Published as AECMA Standard at the date of publication of this standard.

2) Inactive for new design, see EN 3161.

3) Published as AECMA Prestandard at the date of publication of this standard.

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in ISO 1132-1 and the following apply.

3.1
bearing
full complement of balls (without retainer), with filling slot

4 Symbols and abbreviations

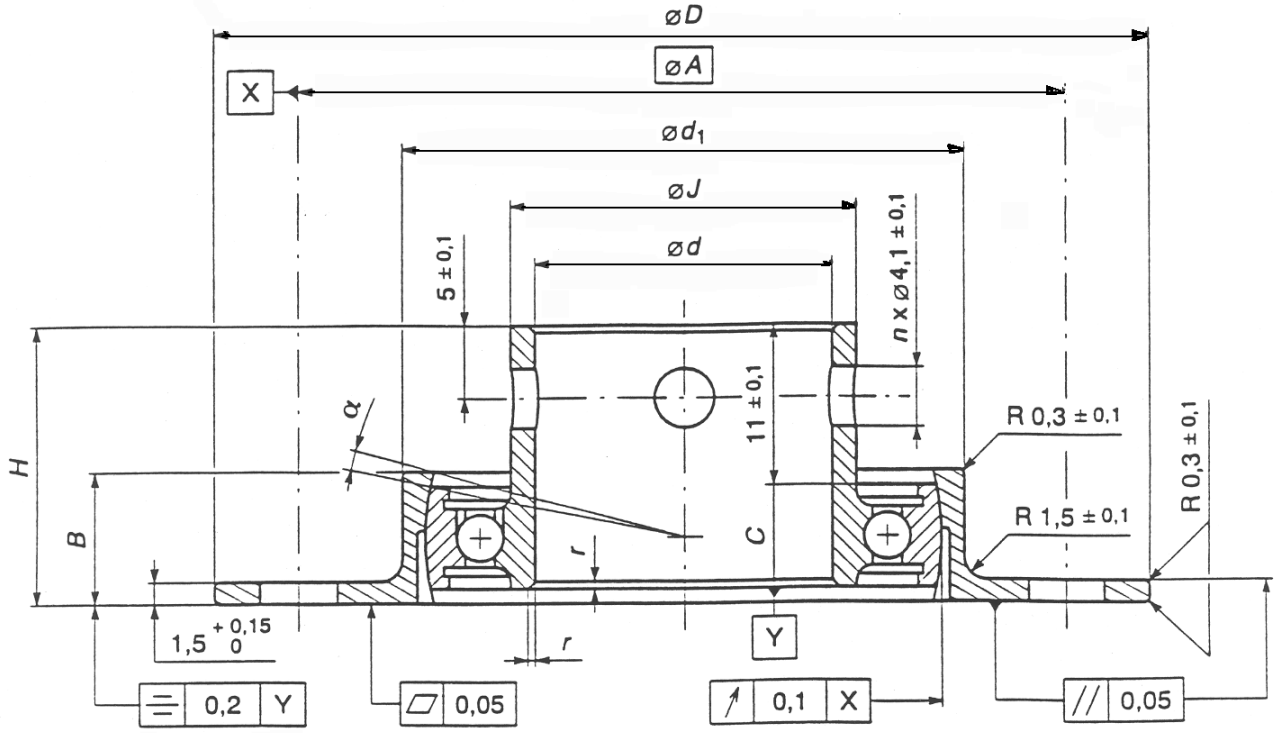
Δ_{dmp} = single plane mean bore diameter deviation
Δ_{ds} = deviation of a single bore diameter
C_s = permissible static radial load
$F_{a\ max.}$ = permissible static axial load
G_a = axial internal clearance
G_r = radial internal clearance
S_{ia} = assembled bearing inner ring face runout with raceway
S_{ea} = assembled bearing outer ring face runout with raceway
K_{ia} = radial runout of assembled bearing inner ring
K_{ea} = radial runout of assembled bearing outer ring

5 Required characteristics

5.1 Configuration, dimensions, tolerances, clearances, torques and masses

Configuration and values: according to Figures 1 to 4 and Table 1; the bearings are fitted either with seals or shields; the flanged alignment bush is either solid or lightweight.

The dimensions and tolerances are expressed in millimetres and apply after surface treatment.



[a] In both positions at 180° from the bearing

NOTE Break sharp edges 0,1 to 0,4; the edges of spherical surfaces shall be carefully rounded off.

Figure 1

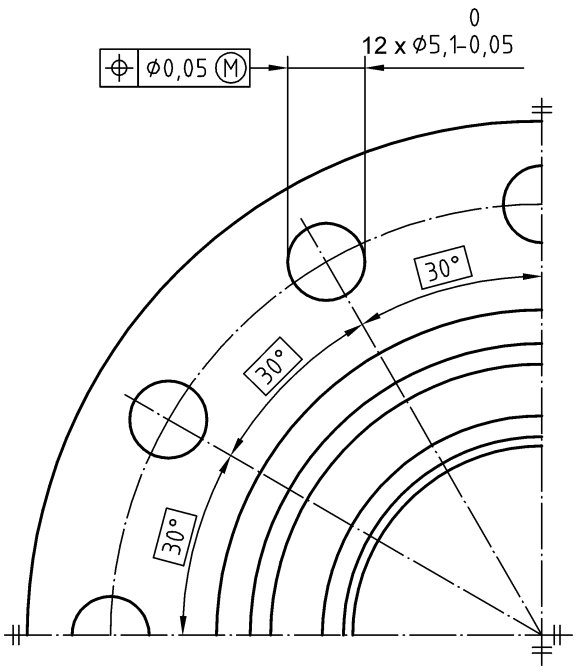
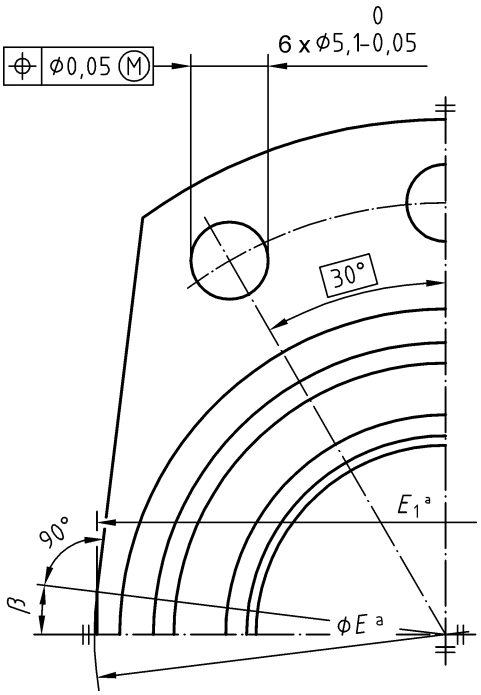
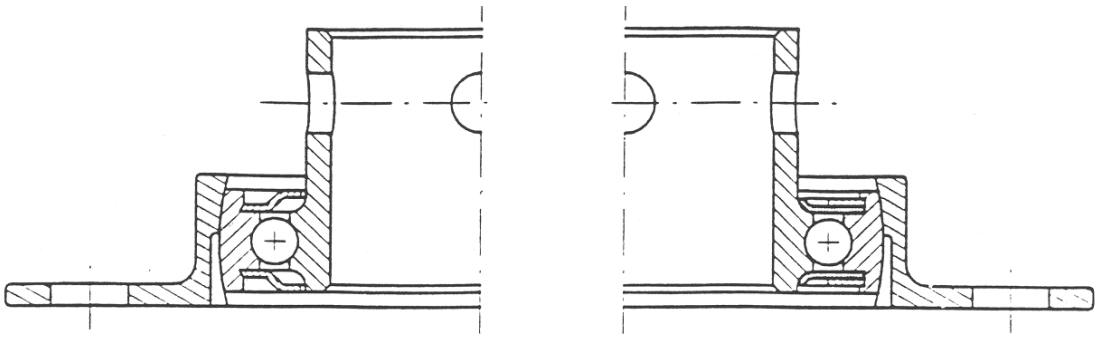


Figure 2 — Solid flanged alignment bush, code letter C



[a] Transition area at the manufacturer's discretion

Figure 3 — Lightweight flanged alignment bush, code letter D



Type with shields code letter P **Type with seals code letter E**

NOTE 1 Installation of seals and shields is at the manufacturer's option.

NOTE 2 The shields shall not extend beyond width C.

Figure 4

Table 1

d		**Tolerances** µm		A	B	C	D	d_1	E	E_1	J	H	n	r	α	β
Code number	nom.	Δ_{dmp}	Δ_{ds}	nom.	± 0,15	0 − 0,12	± 0,2	± 0,05	± 1	± 1	0 − 0,1	± 0,15	Num-ber of holes		min.[a]	± 1°
32	32	0 − 12	+ 3 − 15	66	9	7	77	52	56	55	35	19	4	0,3 to 0,8	2°30'	12°
35	35			69			80	55	59	58	38				2°20'	
40	40			75	10	8	86	61	66	64	43	20			2°	15°
45	45			80			91	66	71	68	48					
50	50			86			97	72	77	74	53		6		1°40'	
63	63	0 − 15	+ 4 − 19	100	11	9	111	86	97	90	67	21			1°30'	22°

d Code number	**Internal clearances** [b] µm		**Runout tolerances** [b] max. µm				**Tilting torque** N.m	**Starting torque** [b] max. mN.m		**Masses** g/pieces ≈	
	Axial max.	Radial	Axial		Radial			Code letter P	Code letter E	Code letter C	Code letter D
	G_a	G_r	S_{ia}	S_{ea}	K_{ia}	K_{ea}					
32	120	2 to 7	40	40	25	40	1 to 4	21	30	107	91
35		2 to 9						27	35	125	97
40							1,3 to 4,5	33	44	143	121
45								39	53	155	136
50							1,5 to 5	48	68	175	152
63							2 to 6	83	113	235	205

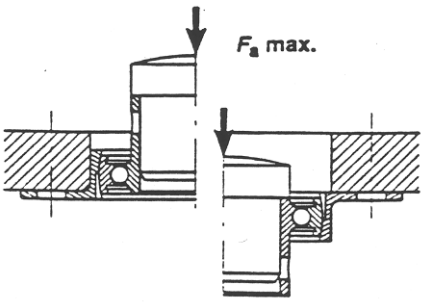
[a] Maximum values for the user.

[b] See EN 3727.

5.2 Loads

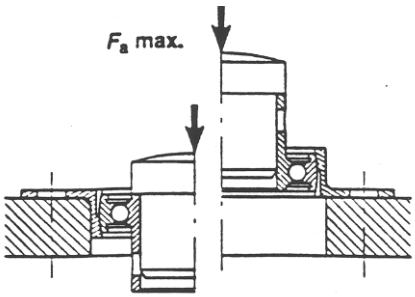
See Tables 2 and 3.

Table 2 — Loads for bearings with code letter C alignment bush

d Code number	Permissible static loads [a] kN Axial  for a displacement of max.:			for a displacement of max.:			Radial C_s
	0,1 mm	0,15 mm	0,2 mm	0,1 mm	0,15 mm	0,2 mm	
32	1,32	1,78	2,16	1,8	2,5	3,2	24,5
35							25,5
40	1,3	1,75	2,13	1,78	2,48	3,18	29,5
45	1,27	1,72	2,08	1,75	2,44	3,13	32,4
50	1,2	1,67	2	1,68	2,37	3,03	35,3
63	0,92	1,11	1,29	1,16	1,46	1,78	39,2

[a] Axial and radial loads may be applied simultaneously.
For ultimate static loads, see EN 3727.

Table 3 — Loads for bearings with code letter D alignment bush

d Code number	Permissible static loads [a] kN Axial  for a displacement of max.:			for a displacement of max.:			Radial C_s
	0,1 mm	0,15 mm	0,2 mm	0,1 mm	0,15 mm	0,2 mm	
32	0,84	1,1	1,3	1,06	1,37	1,57	24,5
35							25,5
40							29,5
45							32,4
50							35,3
63	0,99	1,17		1,18			39,2

[a] Axial and radial loads may be applied simultaneously.
For ultimate static loads, see EN 3727.

5.3 Surface roughness

Raceways and balls: $R_a = 0{,}2$ µm

Bore, side faces of bearing and bearing/bush swivelling surfaces: $R_a = 0{,}8$ µm

Embedding diameter and support face of the bush: $R_a = 1{,}6$ µm

General state: $R_a = 3{,}2$ µm

The values apply prior to surface treatment.

5.4 Materials

Bush: EN 2502 or EN 2503 or EN 2539, 29 HRC to 37 HRC

Inner ring: EN 2030 or EN 2226, on the side with raceway ≥ 58 HRC, on the side with fixing holes 20 HRC to 30 HRC

Outer ring: EN 2030 or EN 2226, ≥ 58 HRC

Balls: EN 2030, ≥ 58 HRC

Shields: corrosion resisting material

Seals: polytetrafluoroethylene (PTFE) or polytetrafluoroethylene (PTFE) reinforced with glass fabric.

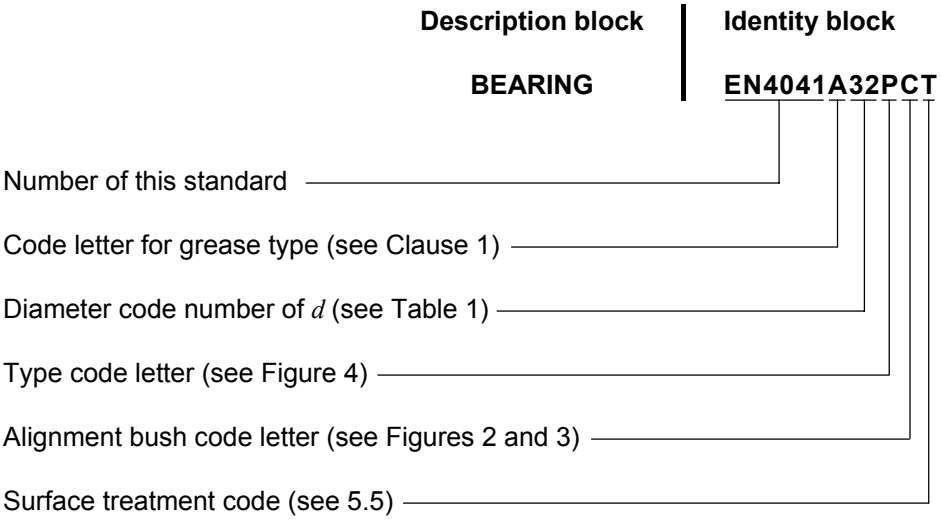
5.5 Surface treatment

Passivation according to ISO 8075: code T

With no surface treatment: without code

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, category A

The marking position is at the manufacturer's option.

8 Technical specification

According to EN 3727

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