INTERNATIONAL STANDARD

ISO 13417

First edition
1997-12-15

Aerospace — Airframe needle track roller, stud type, single-row, sealed — Metric series

Aéronautique et espace — Galets de came à aiguilles sur axe, à une rangée avec joints, pour cellule d'aéronef — Série métrique

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 13417 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 15, *Airframe bearings*.

Annex A of this International Standard is for information only.

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1 Scope

This International Standard specifies the characteristics, boundary dimensions, tolerances, internal clearances and permissible static loads of metric series, single-row, stud type needle track rollers used in airframe applications.

The airframe needle roller bearings covered by this International Standard are designed to operate in the temperature range –54 °C to +121 °C.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 286-2:1988, *ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts.*

ISO 683-17:—[1], *Heat-treated steels, alloy steels and free-cutting steels — Part 17: Ball and roller bearing steels.*

ISO 1132:1980, *Rolling bearings — Tolerances — Definitions.*

ISO 2082:1986, *Metallic coatings — Electroplated coatings of cadmium on iron or steel.*

ISO 3353:1976, *Aerospace — Rolled threads for bolts — Lead and runout requirements.*

ISO 4520:1981, *Chromate conversion coatings on electroplated zinc and cadmium coatings.*

ISO 5593:1997, *Rolling bearings — Vocabulary.*

ISO 5855-1:1988, *Aerospace — MJ threads — Part 1: General requirements.*

ISO 5855-2:1988, *Aerospace — MJ threads — Part 2: Limit dimensions for bolts and nuts.*

ISO 6158:1984, *Metallic coatings — Electroplated coatings of chromium for engineering purposes.*

ISO 13411:1997, *Aerospace — Airframe needle roller, cylindrical roller and track roller bearings — Technical specification.*

AMS 2417E:1993, *Plating, zinc-nickel alloy*[2].

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[1] To be published. (Revision of ISO 683-17:1976)

[2] Available from: SAE International
400 Commonwealth Drive
Warrendale, PA 15096-0001 USA

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 5593 apply.

4 Symbols

4.1 For the purposes of this International Standard, the symbols given in ISO 1132 apply. The symbols (except those for tolerances) shown in the figures and the values given in the tables denote nominal dimensions unless specified otherwise.

4.2 The following additional symbols for bearings covered by this International Standard also apply.

B overall width (over faces of end washers)

C_s permissible static radial load

d_1 stud diameter

d_2 cotter pin hole diameter

d_a clamping face diameter

L_1 length of thread on stud

L_2 distance from centreline of cotter pin hole to end of thread

R crown radius of outer ring

5 Required characteristics

5.1 Dimensions — Tolerances — Internal clearances — Loads

For values, see table 1. For configuration, see figure 1.

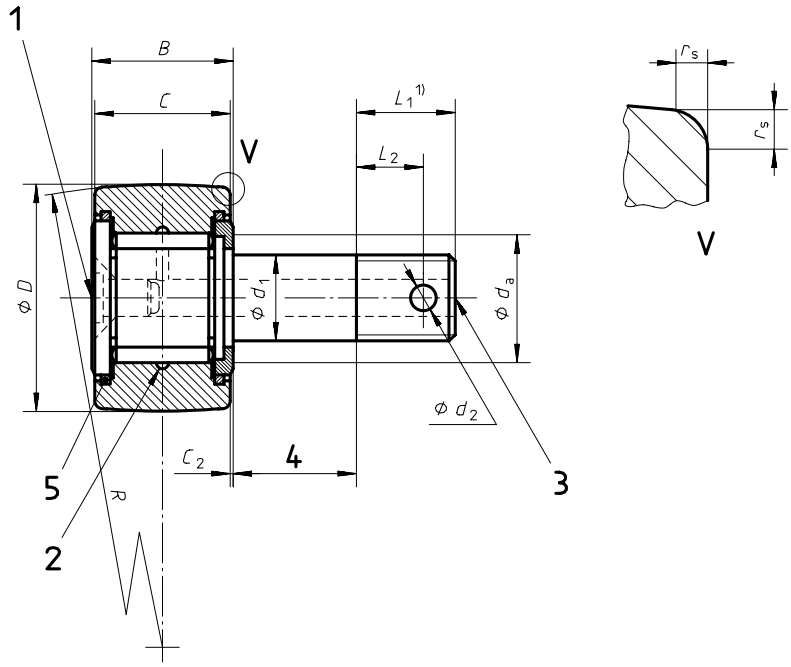
Table 1

Dimensions in millimetres (except thread size), tolerance and clearance values in micrometres

Diameter code	D	C	d_1	Tolerance values			C_2	B	R	d_2	r_s	d_a	Thread size 2)	Short thread		Medium thread	
		+50 −96		Δ_{Dmp}	K_{ea} max.	Δ_{d1mp}		max.	min.	H13 1)	min.	min.		L_1	L_2 min.	L_1	L_2 min.
06	13	9	6	+50 −26	40	+24 −2	0,5	10,1	156	1,5	0,3	10	MJ6 × 1 − 4h6h	10	7	14	8,5
08	16	11	8			+24 −5		12,1	192	1,9		12	MJ8 × 1 − 4h6h	11,5	7,5	16,5	10
10	19		10						228	2,4		15	MJ10 × 1,25 − 4h6h	14,5	9	20,5	12,5
12	24	14	12			+24 −8		15,1	288			18	MJ12 × 1,25 − 4h6h	16	10	22,5	14
14	32	17	14					18,1	384	3	0,6	24	MJ14 × 1, 5 − 4h6h	19	12	26	17
16	37	20	16					21,1	444			29	MJ16 × 1, 5 − 4h6h	20,5	12,5	28,5	18,5
20	42	22	20			+24 −11	1	24,1	504	3,8	1	32	MJ20 × 1,5 − 4h6h	24,5	14,5	33,5	21,5
24	47	25	24					27,1	564			36	MJ24 × 2 − 4h6h	29,5	18	41	25,5
30	58	32	30					34,1	696			44	MJ30 × 2 − 4h6h	35	20	48,5	30,5
36	72	38	36			+24 −15		40,1	864	3,8		55	MJ36 × 2 − 4h6h	40,5	22,5	56	35

1) For tolerance limits, see ISO 286-2.
2) In accordance with ISO 5855-1 and ISO 5855-2.

Diameter code	Internal clearance		Install torque	C_s	Thread factor		Mass
	Radial, G_r max.	Axial, G_a max	Nm max.	kN	Short thread	Medium thread	kg ≈
06	40	76	2	3,8	0,01	0,02	thread factor + (grip length in mm × 0,000 20)
08			3,4	6,88	0,02	0,02	thread factor + (grip length in mm × 0,000 36)
10			9,6	8,8	0,03	0,03	thread factor + (grip length in mm × 0,000 56)
12			20	13,7	0,06	0,06	thread factor + (grip length in mm × 0,000 80)
14			27	24,8	0,12	0,13	thread factor + (grip length in mm × 0,001 09)
16			45	28,8	0,18	0,19	thread factor + (grip length in mm × 0,001 43)
20			90	39,5	0,27	0,29	thread factor + (grip length in mm × 0,002 23)
24			130	48,2	0,4	0,44	thread factor + (grip length in mm × 0,003 21)
30			210	80,8	0,78	0,84	thread factor + (grip length in mm × 0,005 02)
36			230	126	1,39	1,5	thread factor + (grip length in mm × 0,007 23)



1) In accordance with ISO 5855-1 and ISO 5855-2.

Key

1 All track rollers have lubrication fitting in flanged end of stud
2 Lubrication groove optional
3 Lubrication fitting in threaded end of stud optional
4 Grip length
5 Seals

Figure 1

5.2 Surface roughness

Rollers: R_a = 0,2 µm max.

Inner ring raceway: R_a = 0,4 µm max.

Outer ring raceway: R_a = 1,0 µm max.

End washers: R_a = 1,6 µm max. at roller contact area.

6 Materials

Ring/stud: bearing steel - ISO 683-17, type 1, raceways and stud flange hardness 58 HRC to 66 HRC (670 HV to 860 HV), stud core hardness 36 HRC to 44 HRC (354 HV to 434 HV).

Rollers: bearing steel - ISO 683-17, type 1, heat treated to 58 HRC to 66 HRC (670 HV to 860 HV).

End washers: steel heat treated to 51 HRC to 60 HRC (528 HV to 697 HV) at roller contact area.

Seals: acetal resin, nylon or equivalent.

7 Surface treatment

7.1 Bearings made of conventional rolling bearing steel shall have the external surfaces of the outer ring chromium plated, and all other external surfaces shall be cadmium or zinc-nickel plated.

7.2 If made of corrosion resisting steel, cadmium plating (code letter H) shall be subject to agreement between the customer and the manufacturer.

7.3 Where cadmium plating is specified (code letters D, M and H), it shall be in accordance with ISO 2082. The thickness of the plating shall not be less than 7 µm and not more than 15 µm. The bearing shall be embrittlement-relieved within 4 h of plating by heat treatment at 140 °C ± 10 °C for a minimum of 8 h followed by chromate treatment in accordance with ISO 4520 (code letters D and H only).

7.4 Where chromium plating is specified (code letters D, M and Z), it shall be in accordance with ISO 6158. The thickness of the plating shall be not less than 10 µm, 8 µm on faces and ring chamfers, and not more than 25 µm.

7.5 Where zinc-nickel plating is specified (code letter Z), it shall be in accordance with AMS 2417E, type 2. The thickness of the plating shall not be less than 7 µm or not more than 15 µm.

8 Optional features

8.1 Lubrication fitting/cotter pin hole

In addition to the lubrication fitting in the flanged end of the stud, these track rollers may also be supplied with a suitable lubrication fitting (see annex A) in the threaded end of the stud. They may also be supplied with a cotter pin hole. These features are specified in the designation as noted below.

Code	Feature
S	lubrication fitting in flanged end of stud, no cotter pin hole
P	lubrication fitting in flanged end of stud, with cotter pin hole
L	lubrication fitting in both threaded and flanged ends of stud, no cotter pin hole

8.2 Grip length

Bearings shall be supplied in the grip lengths shown in table 2. Several grip lengths are available for each diameter code. The grip length is specified through a two digit designation code using the grip lengths shown in table 2.

Table 2

Dimensions in millimetres

	Diameter code									
	06	08	10	12	14	16	20	24	30	36
Grip length	06	08	10	12	14	16	20	24	30	36
	11	13	20	22	24	26	30	39	45	51
	16	18	30	32	34	36	40	54	60	66
						46	50	69	75	81
							60		90	96

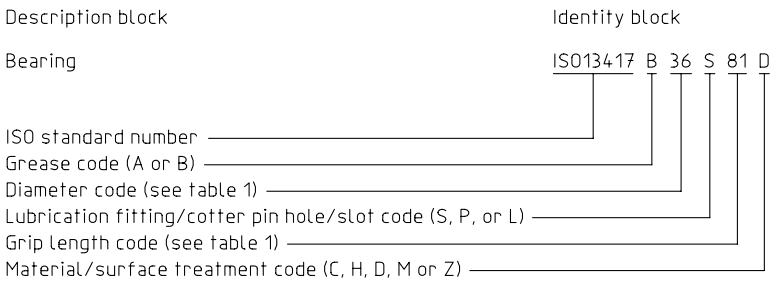
9 Lubrication

The bearing shall be prelubricated with either grease A or B as specified by the customer.

NOTE — Descriptions of grease A and grease B are given in ISO 13411:1997, annex I.

10 Designation

Bearings covered by this International Standard shall be designated only in the manner shown in the following example:



where the following codes are applied:

— greases:

A = ester type grease;

B = synthetic hydrocarbon type grease;

— lubrication fitting/cotter pin holes:

S = lubrication fitting in flanged end of stud, no cotter pin hole;

P = lubrication fitting in flanged end of stud, with cotter pin hole;

L = lubrication fitting in both the flanged end and the threaded end of stud, no cotter pin hole;

— materials/surface treatments:

C = material: corrosion-resisting stainless steel;

surface treatment: none;

H = material: corrosion resisting stainless steel;

surface treatment: outer ring - none;

washer - cadmium plate with chromate conversion coating;

stud/inner ring - cadmium plate with chromate conversion coating;

D = material: low alloy bearing steel;

surface treatment: outer ring - chromium plated;

washer - cadmium plated with chromate conversion coating;

stud/inner ring - cadmium plated with chromate conversion coating;

M = material: low alloy bearing steel;

surface treatment: outer ring - chromium plated;

washer - cadmium plate without chromate conversion coating;

stud/inner ring - cadmium plated without chromate conversion coating;

Z = material: low alloy bearing steel;

surface treatment: outer ring - chromium plated;

washer - zinc-nickel plated;

stud/inner ring - zinc-nickel plated.

11 Identification marking

In addition to the manufacturer's name or trademark, each bearing shall be permanently and legibly marked, using the identity block as defined in clause 10. Marking position and method shall be at the manufacturer's option.

12 Technical specification

Airframe needle roller bearings supplied to this International Standard shall conform to the requirements of ISO 13411.