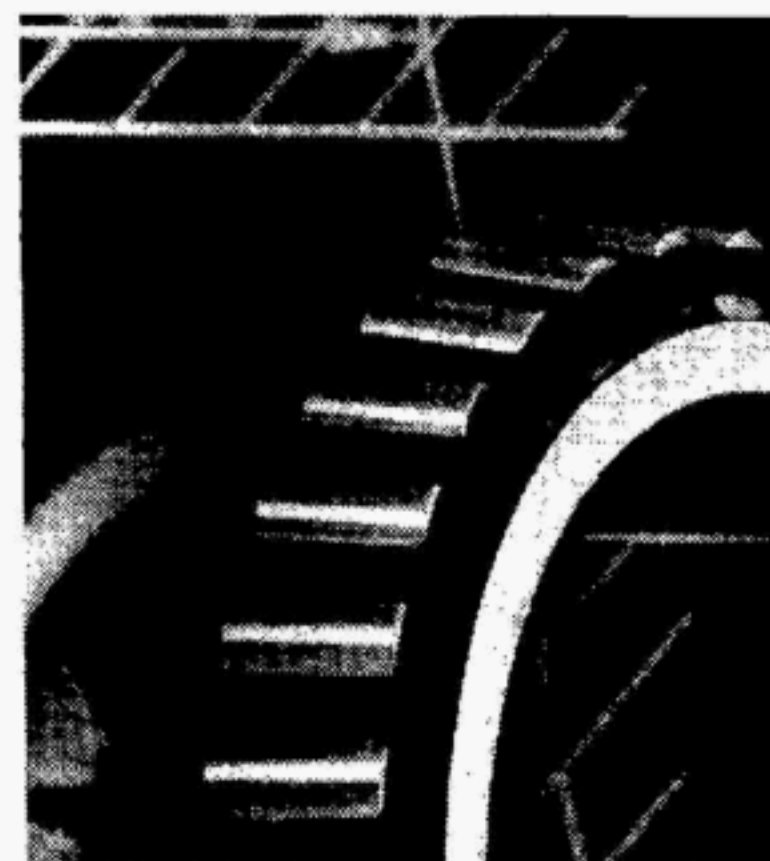
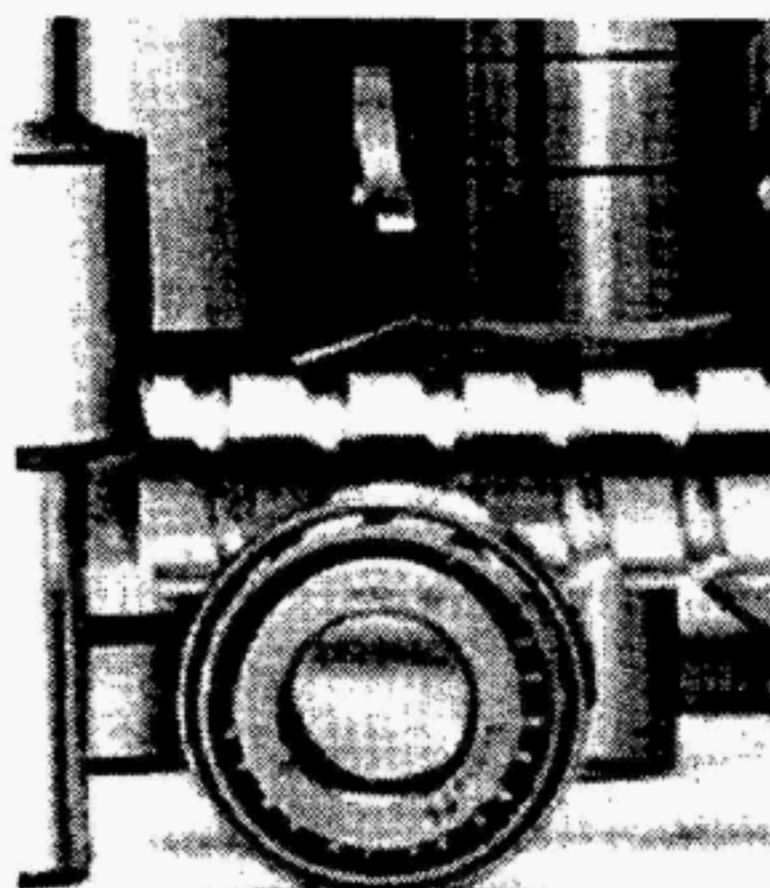
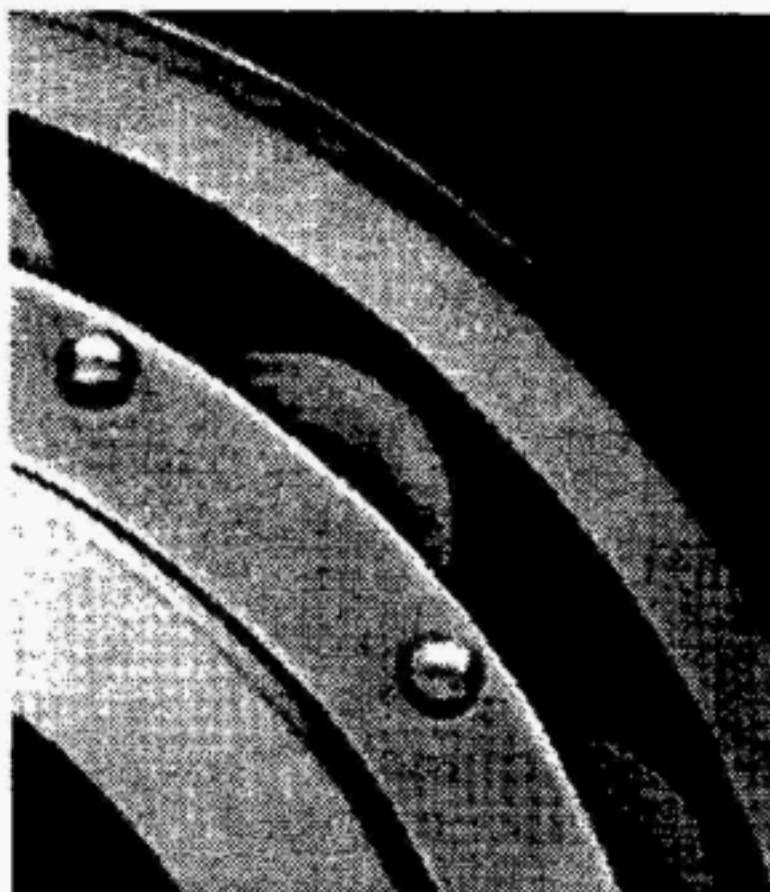


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ANSI/ABMA/ISO 13415:1997

AMERICAN NATIONAL STANDARD

ABMA Standard
ISO Standard

**Aerospace –
Airframe needle track
roller, stud type,
single-row, sealed –
Inch series**

Secretariat
American Bearing Manufacturers Association

Approved July 20, 1999



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Printed in the United States of America

Aerospace –
Airframe needle track
roller, stud type,
single-row, sealed –
Inch series

Secretariat
American Bearing Manufacturers Association

Approved July 20, 1999
American National Standards Institute, Inc.

Foreword

(This foreword is not part of ANSI/ABMA/ISO 13415:1997.)

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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.

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

International Standard 13415 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee 15, *Airframe bearings*.

This standard was processed and approved for submittal to ANSI by Accredited Standards Committee B3 on Ball and Roller Bearings. Committee approval of this standard does not necessarily imply that all committee members voted for its approval.

Suggestions for the improvement of this standard gained through experience with its use will be welcomed. These should be sent to: American Bearing Manufacturers Association Secretariat, ANSI ASC B3, 1200 19th Street, NW, Suite 300, Washington DC 20036-2422.

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

1 Scope

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

The airframe needle track rollers covered by this International Standard are designed to operate in the temperature range -54°C to $+121^{\circ}\text{C}$.

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 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 3161:1996, *Aerospace — UNJ threads, with controlled root radius, for aerospace — Inch series.*

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 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⁾

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.

C_1 track contact width

C_s permissible static radial load

d_1 stud diameter

d_2 cotter pin hole diameter

d_a clamping face diameter

R crown radius of outer ring

L_1 length of thread on stud

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

L_3 distance from bottom of slot to opposite side of stud

L_4 slot length (bottom of slot)

H bottom of slot to opposite side of stud grip

b slot width

5 Required characteristics

5.1 Dimensions — Tolerances — Internal clearances — Loads

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

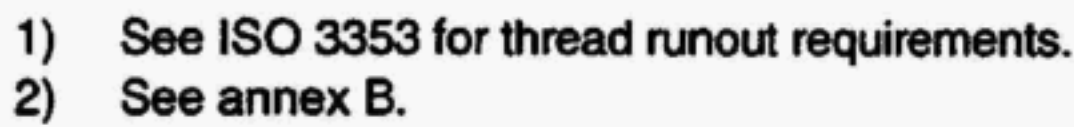
Table 1

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

| Diameter code | D | C | d ₁ | Tolerance values | | C ₁ | C ₂ | C ₃ | R | d ₂ | r _s | d _a | Thread size UNJF class 3A(1) in | L ₁ | L ₂ | L ₃ | L ₄ | H | b |
|------------------|--------|-------|----------------|------------------|----------|----------------|----------------|----------------|-----|----------------|----------------|----------------|--|----------------|----------------|----------------|----------------|--------|-------|
| 3 | 12,7 | 7,14 | 4,83 | +25 -38 | 0 -38 | 5,84 | 0,15 | 1,27 | 254 | 1,8 | 0,25 | 7,55 | 0,19 - 32 | 8,74 | 5,35 | — | — | — | — |
| 4 | 17,462 | 7,14 | 6,35 | | | 5,84 | | | | | | 9,12 | 0,25 - 28 | 8,74 | 5,68 | 13,56 | 9,52 | 5,443 | 1,613 |
| 5 | 19,05 | 8,74 | 7,93 | | | 7,36 | | | | | | 10,72 | 0,312 5 - 24 | 9,12 | 5,94 | 13,87 | 9,9 | 7,031 | — |
| 6 | 22,225 | 11,92 | 9,53 | | | 9,65 | | | | | | 12,7 | 0,375 - 24 | 9,12 | 6,73 | 14,53 | — | 8,219 | — |
| 7 | 25,4 | 13,49 | 11,1 | | | 10,92 | | | | | | 14,28 | 0,437 5 - 20 | 10,72 | 7,18 | 16,13 | 11,5 | 9,807 | 2,405 |
| 8 | 28,575 | 16,67 | 12,7 | | | 13,46 | | | | | 1,02 | 15,88 | 0,5 - 20 | 10,72 | 7,97 | 16,81 | — | 10,998 | 3,2 |

1) See ISO 3161.

| Diameter code | Internal clearance | | Install torque | C _s | Mass |
|------------------|--------------------------------|-------------------------------|-------------------|----------------|---|
| | Radial, G _r max. | Axial, G _a max. | Nm max. | kN | kg |
| 3 | 43 | 635 | 0,9 | 3,51 | 0,006 + (Grip length code no. x 0,000 23) |
| 4 | | | 2,25 | 4,18 | 0,014 + (Grip length code no. x 0,000 41) |
| 5 | | | 4,51 | 7,38 | 0,02 + (Grip length code no. x 0,000 64) |
| 6 | | | 6,21 | 12,09 | 0,037 + (Grip length code no. x 0,000 91) |
| 7 | | | 16,94 | 15,16 | 0,057 + (Grip length code no. x 0,001 18) |
| 8 | | | 23,16 | 23,04 | 0,086 + (Grip length code no. x 0,001 59) |



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 cadmium or zinc-nickel plated.

7.2 Where cadmium plating is specified (code letters D and M), 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 letter D only).

7.3 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.

7.4 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 and not more than 15 µm.

8 Optional features

8.1 Lubrication fitting/cotter pin hole and slot in threaded end of stud

Bearings may be supplied with a suitable lubrication fitting (see annex B) in the flanged or the threaded end of the stud. They may also be supplied with a cotter pin hole. Bearings may be supplied with a slot in the threaded end of the stud to receive a tang in the bore of a mounting washer. These features are specified through a designation code in the part number as noted below.

| Code | Feature |
|------|--|
| S | lubrication fitting in flanged end of stud, no cotter pin hole, no slot in threaded end of stud |
| R | lubrication fitting in flanged end of stud, no cotter pin hole, slot in threaded end of stud |
| P | lubrication fitting in flanged end of stud, with cotter pin hole, no slot in threaded end of stud |
| J | lubrication fitting in flanged end of stud, with cotter pin hole, slot in threaded end of stud |
| T | lubrication fitting in threaded end of stud, no cotter pin hole, no slot in threaded end of stud |
| U | lubrication fitting in threaded end of stud, no cotter pin hole, slot in threaded end of stud |
| L | lubrication fitting in both threaded and flanged ends of stud, no cotter pin hole, no slot in threaded end of stud |
| W | lubrication fitting in both threaded and flanged ends of stud, no cotter pin hole, slot in threaded end of stud |

8.2 Outer ring profile

Bearings may be supplied with the outside surface of the outer ring crowned. This feature is specified through a designation code in the part number as noted below.

| Code | Feature |
|------|-------------------------|
| N | no crown (cylindrical) |
| C | crown on the outer ring |

8.3 Grip length

Bearings shall be supplied with grip lengths designated by a two-digit code as specified in table 2.

Table 2

| Grip length code | Nominal grip length mm | Grip length code | Nominal grip length mm |
|---------------------|------------------------------|---------------------|------------------------------|
| 01 | 1,588 | 41 | 65,088 |
| 02 | 3,175 | 42 | 66,675 |
| 03 | 4,762 | 43 | 68,262 |
| 04 | 6,35 | 44 | 69,85 |
| 05 | 7,938 | 45 | 71,438 |
| 06 | 9,525 | 46 | 73,025 |
| 07 | 11,112 | 47 | 74,612 |
| 08 | 12,7 | 48 | 76,2 |
| 09 | 14,288 | 49 | 77,788 |
| 10 | 15,875 | 50 | 79,375 |
| 11 | 17,462 | 51 | 80,962 |
| 12 | 19,05 | 52 | 82,55 |
| 13 | 20,638 | 53 | 84,138 |
| 14 | 22,225 | 54 | 85,725 |
| 15 | 23,812 | 55 | 87,312 |
| 16 | 25,4 | 56 | 88,9 |
| 17 | 26,988 | 57 | 90,488 |
| 18 | 28,575 | 58 | 92,075 |
| 19 | 30,162 | 59 | 93,662 |
| 20 | 31,75 | 60 | 95,25 |
| 21 | 33,338 | 61 | 96,838 |
| 22 | 34,925 | 62 | 98,425 |
| 23 | 36,512 | 63 | 100,012 |
| 24 | 38,1 | 64 | 101,6 |
| 25 | 39,688 | 65 | 103,188 |
| 26 | 41,275 | 66 | 104,775 |
| 27 | 42,862 | 67 | 106,362 |
| 28 | 44,45 | 68 | 107,95 |
| 29 | 46,038 | 69 | 109,538 |
| 30 | 47,625 | 70 | 111,125 |
| 31 | 49,212 | 71 | 112,712 |
| 32 | 50,8 | 72 | 114,3 |
| 33 | 52,388 | 73 | 115,888 |
| 34 | 53,975 | 74 | 117,475 |
| 35 | 55,562 | 75 | 119,062 |
| 36 | 57,15 | 76 | 120,65 |
| 37 | 58,738 | 77 | 122,238 |
| 38 | 60,325 | 78 | 123,825 |
| 39 | 61,912 | 79 | 125,412 |
| 40 | 63,5 | 80 | 127 |

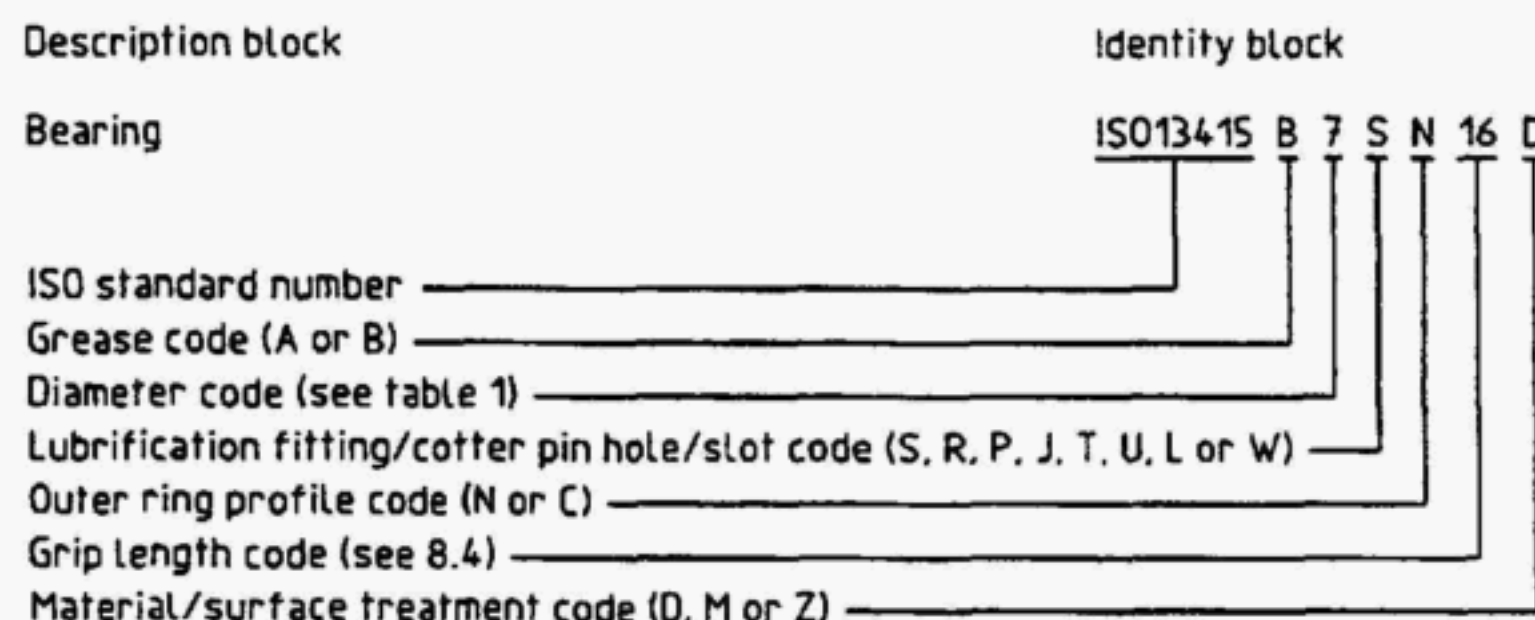
9 Lubrication

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 hole and slot in threaded end of stud (see 8.1):

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

R = lubrication fitting in flanged end of stud, no cotter pin hole, slot in threaded end of stud;

P = lubrication fitting in flanged end of stud, with cotter pin hole, no slot in threaded end of stud;

J = lubrication fitting in flanged end of stud, with cotter pin hole, slot in threaded end of stud;

T = lubrication fitting in threaded end of stud, no cotter pin hole, no slot in threaded end of stud;

U = lubrication fitting in threaded end of stud, no cotter pin hole, slot in threaded end of stud;

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

W = lubrication fitting in both threaded and flanged ends of stud, no cotter pin hole, slot in threaded end of stud;

— outer ring profiles:

N = no crown (cylindrical);

C = crown on outer ring;

— materials/surface treatments:

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, or black oxide coated;

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 track rollers supplied to this International Standard shall conform to the requirements of ISO 13411.

Annex A

(informative)

Imperial (non-SI) units

Tables A.1 and A.2 give the imperial (non-SI) unit information that is the basis for this International Standard.

Table A.1

Dimensions in inches,
tolerance and clearance values in 0,000 1 in

| Diameter code | D | C | d ₁ | Tolerance values | | C ₁ | C ₂ | C ₃ | R | d ₂ | r _s | d _a | Thread size UNJF class 3A ¹⁾ in | L ₁ | L ₂ | L ₃ | L ₄ | H | b |
|---------------|---------|-------|----------------|------------------|---|----------------|----------------|----------------|----|----------------|----------------|----------------|--|----------------|----------------|----------------|----------------|---------|---------|
| 3 | 0,5 | 0,281 | 0,19 | | | 0,23 | | | | 0,007 | | 0,297 | 0,190 0 – 32 | 0,344 | 0,211 | — | — | — | — |
| 4 | 0,687 5 | 0,281 | 0,25 | | | | | | | 0,076 | 0,01 | 0,359 | 0,250 0 – 28 | | 0,224 | 0,534 | 0,375 | 0,214 3 | 0,063 5 |
| 5 | 0,75 | 0,344 | 0,312 | + 10 – 15 | 0 | 0,29 | 0,006 | 0,05 | 10 | | | 0,422 | 0,312 5 – 24 | 0,359 | 0,234 | 0,546 | 0,39 | 0,276 8 | |
| 6 | 0,875 | 0,469 | 0,375 | | | 0,38 | | | | | 0,025 | 0,5 | 0,375 0 – 24 | | 0,265 | 0,572 | | 0,323 6 | 0,094 7 |
| 7 | 1 | 0,531 | 0,437 | | | 0,43 | | | | 0,106 | | 0,562 | 0,437 5 – 20 | 0,422 | 0,283 | 0,635 | 0,453 | 0,386 1 | |
| 8 | 1,125 | 0,656 | 0,5 | | | 0,53 | | | | | 0,04 | 0,625 | 0,500 0 – 20 | | 0,314 | 0,662 | | 0,433 | 0,126 |

1) See ISO 3161.

| Diameter code | Internal clearance | | Install torque | C _s | Mass |
|---------------|-----------------------------|---------------------------|----------------|----------------|--|
| | Radial, G _r max. | Axial, G _a max | Nm max. | kN | kg |
| 3 | 17 | 250 | 8 | 790 | 0,014 + (Grip length code no. x 0,000 5) |
| 4 | | | 20 | 940 | 0,031 + (Grip length code no. x 0,000 9) |
| 5 | | | 40 | 1 660 | 0,043 + (Grip length code no. x 0,001 4) |
| 6 | | | 55 | 2 720 | 0,081 + (Grip length code no. x 0,002) |
| 7 | | | 150 | 3 860 | 0,125 + (Grip length code no. x 0,002 6) |
| 8 | | | 205 | 6 080 | 0,19 + (Grip length code no. x 0,003 5) |

Table A.2

| Grip length code | Grip length in | Grip length code | Grip length in |
|---------------------|-------------------|---------------------|-------------------|
| 01 | 0,062 5 | 41 | 2,562 5 |
| 02 | 0,125 | 42 | 2,625 |
| 03 | 0,187 5 | 43 | 2,687 5 |
| 04 | 0,25 | 44 | 2,75 |
| 05 | 0,312 5 | 45 | 2,812 5 |
| 06 | 0,375 | 46 | 2,875 |
| 07 | 0,437 5 | 47 | 2,937 5 |
| 08 | 0,5 | 48 | 3 |
| 09 | 0,562 5 | 49 | 3,062 5 |
| 10 | 0,625 | 50 | 3,125 |
| 11 | 0,687 5 | 51 | 3,187 5 |
| 12 | 0,75 | 52 | 3,25 |
| 13 | 0,812 5 | 53 | 3,312 5 |
| 14 | 0,875 | 54 | 3,375 |
| 15 | 0,937 5 | 55 | 3,437 5 |
| 16 | 1 | 56 | 3,5 |
| 17 | 1,062 5 | 57 | 3,562 5 |
| 18 | 1,125 | 58 | 3,625 |
| 19 | 1,187 5 | 59 | 3,687 5 |
| 20 | 1,25 | 60 | 3,75 |
| 21 | 1,312 5 | 61 | 3,812 5 |
| 22 | 1,375 | 62 | 3,875 |
| 23 | 1,437 5 | 63 | 3,937 5 |
| 24 | 1,5 | 64 | 4 |
| 25 | 1,562 5 | 65 | 4,062 5 |
| 26 | 1,625 | 66 | 4,125 |
| 27 | 1,687 5 | 67 | 4,187 5 |
| 28 | 1,75 | 68 | 4,25 |
| 29 | 1,812 5 | 69 | 4,312 5 |
| 30 | 1,875 | 70 | 4,375 |
| 31 | 1,937 5 | 71 | 4,437 5 |
| 32 | 2 | 72 | 4,5 |
| 33 | 2,062 5 | 73 | 4,562 5 |
| 34 | 2,125 | 74 | 4,625 |
| 35 | 2,187 5 | 75 | 4,687 5 |
| 36 | 2,25 | 76 | 4,75 |
| 37 | 2,312 5 | 77 | 4,812 5 |
| 38 | 2,375 | 78 | 4,875 |
| 39 | 2,437 5 | 79 | 4,937 5 |
| 40 | 2,5 | 80 | 5 |

Annex B (informative)

Lubrication fitting

B.1 General

This annex provides the description of the lubrication fitting used with the inch series single row, stud type sealed needle track roller covered in this International Standard. This lubrication fitting conforms to United States National Aerospace Standard NAS 516-1A¹⁾.

B.2 Description

The lubrication fitting shall be made of steel with the outer body cadmium plated. It shall be press fitted into the stud as defined by the bearing designation.

B.3 Characteristics — Dimensions — Tolerances

Values: see figure B.1

Configuration: see figure B.1

Tolerances: $\pm 0,254$ mm and $\pm 2^\circ$ unless otherwise shown in figure B.1.

The lubrication fitting shall be press fit in holes 3,175 mm to 3,231 mm in diameter.

Dimensions in millimetres

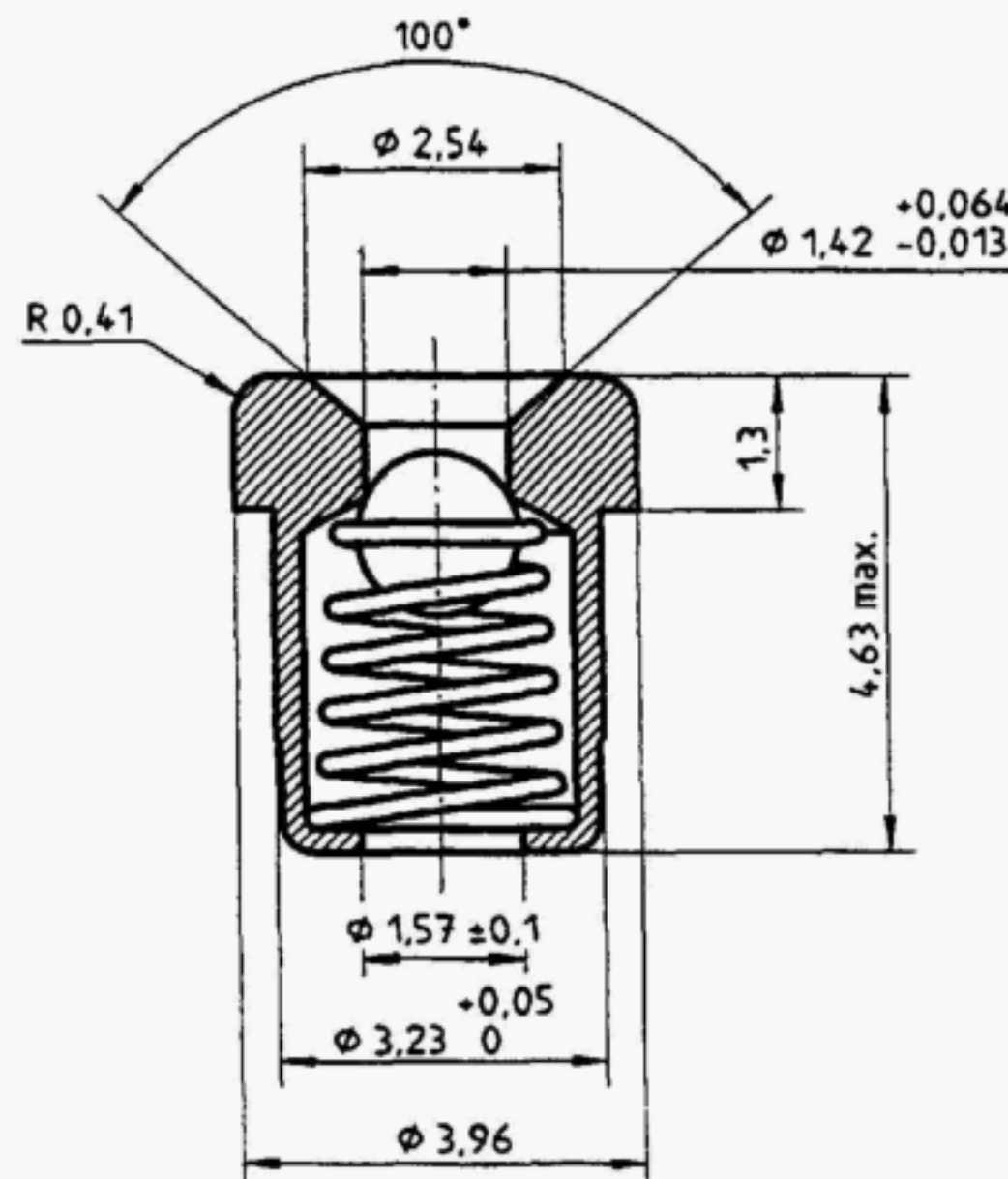


Figure B.1

¹⁾ Available from: Aerospace Industries Association of America, Inc.
National Aerospace Standards Committee
1250 Eye Street, N.W.
Washington, D.C. 20005
U.S.A.

ICS 49.035

Descriptors: aircraft industry, bearings, airframe bearings, roller bearings, needle bearings, single-row bearings, specifications, materials specifications, characteristics, load capacity, dimensions, overall dimensions, dimensional tolerances, clearances, designation, marking imperial system.

Price based on 11 pages
