

ISO/TC 39

Secretariat: SNV

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Ball screws —

Part 2: Nominal diameters and nominal leads — Metric series

Vis à billes —

Partie 2: Diamètres et pas hélicoïdaux/nominaux — Série métrique

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 39, *Machine tools*, in collaboration with Technical Committee ISO/TC 4, *Rolling bearings*, Subcommittee SC 11, *Linear motion rolling bearings*.

This second edition cancels and replaces the first edition (ISO 3408-2:1991), which has been technically revised.

The main changes compared to the previous edition are as follows:

- the technical state of the art has been substantially reviewed;
- three series of ball screws reflecting different international standards have been defined;
- dimensions reflecting current market situations have been added; and
- different types of flanges reflecting state of the art have been defined.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

A list of all parts in the ISO 3408 series can be found on the ISO website.

Ball screws —

Part 2:

Nominal diameters and nominal leads — Metric series

1 Scope

This document specifies the nominal diameters and nominal leads, mounting dimensions for ball screw nuts and mounting bolts for metric ball screws. It also gives preferred combinations of nominal diameter and nominal lead and a general plan which includes the additional combinations to be used when it becomes necessary to deviate from the preferred combinations.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 3408-1, *Ball screws — Part 1: Vocabulary and designation*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in ISO 3408-1 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

4 Symbols

Symbol	Description	Units
d_0	Nominal diameter	mm
D_1	Ball screw nut outer diameter	mm
D_4	Mounting bolt pitch circle diameter	mm
D_5	Flange mounting bolt diameter	mm
D_6	Flange outer diameter	mm
D_7	Screw head counter bore diameter	mm
$F_{a\ max}$	Axial load at the opening limit of the nut flange	kN
L_1	Centring diameter length	mm
L_3	Collar length	mm

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L_7	Flange length	mm
L_8	Flat flange width	mm
L_9	Counter bore depth	mm
L_{10}	Lubrication port thread length	mm
P_{ho}	Nominal lead	mm
Q	Thread for lubrication port	
T_a	Tightening torque of one bolt	Nm

5 Nominal diameters, nominal leads and their combinations

Nominal diameters, nominal leads and their combinations are shown in [Table 1](#). Preferred combination of nominal diameter and lead are highlighted in grey and bold.

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Table 1 — Nominal diameters, nominal leads and their combinations

Nominal diameter d_0 [mm]	Nominal lead P_{ho} [mm]																		
	1	1,5	2	2,5	3	4	5	6	8	10	12	15	16	20	25	30	32	40	50
4	1																		
5	1	1,5																	
6	1	1,5	2	2,5															
8	1	1,5	2	2,5	3	4	5	6	8	10	12								
10	1	1,5	2	2,5	3	4	5	6	8	10	12								
12			2	2,5	3	4	5	6	8	10	12	15	16	20	25	30			
14			2	2,5	3	4	5	6	8	10	12	15	16	20	25	30			
16			2	2,5	3	4	5	6	8	10	12	15	16	20	25	30			
20					3	4	5	6	8	10	12	15	16	20	25	30	32	40	50
25						4	5	6	8	10	12	15	16	20	25	30	32	40	50
28						4	5	6	8	10	12	15	16	20	25	30	32	40	50
32						4	5	6	8	10	12	15	16	20	25	30	32	40	50
36						4	5	6	8	10	12	15	16	20	25	30	32	40	50
40							5	6	8	10	12	15	16	20	25	30	32	40	50
45							5	6	8	10	12	15	16	20	25	30	32	40	50
50							5	6	8	10	12	15	16	20	25	30	32	40	50
63							5	6	8	10	12	15	16	20	25	30	32	40	50
80								6	8	10	12	15	16	20	25	30	32	40	50
100										10	12	15	16	20	25	30	32	40	50
125										10	12	15	16	20	25	30	32	40	50
160											12	15	16	20	25	30	32	40	50

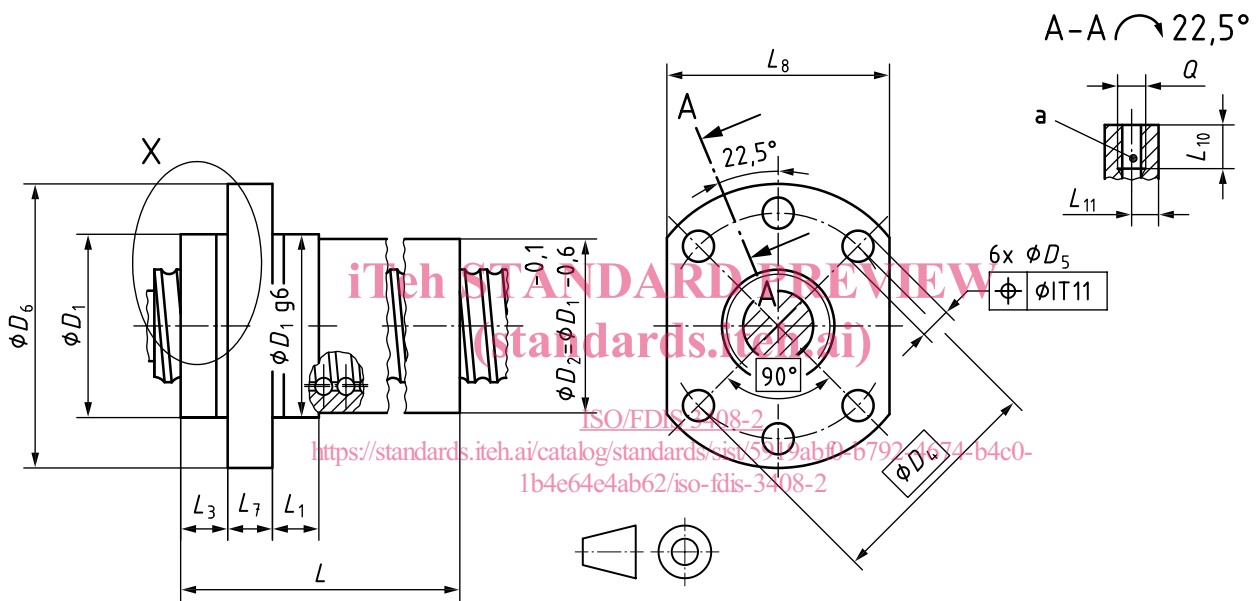
6 Mounting dimensions for ball screw nuts, type B6, B8 and B4, A6 and C6

There are three series of standardized ball screw nut dimensions. In [Tables 2, 3](#) and [4](#), different types of ball screw nuts are shown. The following list shows these series of ball screws along with the corresponding figures and dimension tables.

- Series 1 (internal recirculation): depicted in [Figure 1](#) to [3](#); dimensions are shown in [Table 2](#);
- Series 2 (internal recirculation): depicted in [Figure 3](#) to [5](#); dimensions are shown in [Table 3](#);
- Series 3 (external recirculation): depicted in [Figure 3](#) to [5](#); dimensions are shown in [Table 4](#).

Further design detail alternatives are given in [Figure 6](#).

NOTE The character B in the type description, e.g. B4, represents the flange type and is based on the previous definition, where A represents round type, B two flats and C one flat flange type. The corresponding numbers represent the number of mounting holes on the flange (e.g. two flats flange type with 4 holes would be B4).

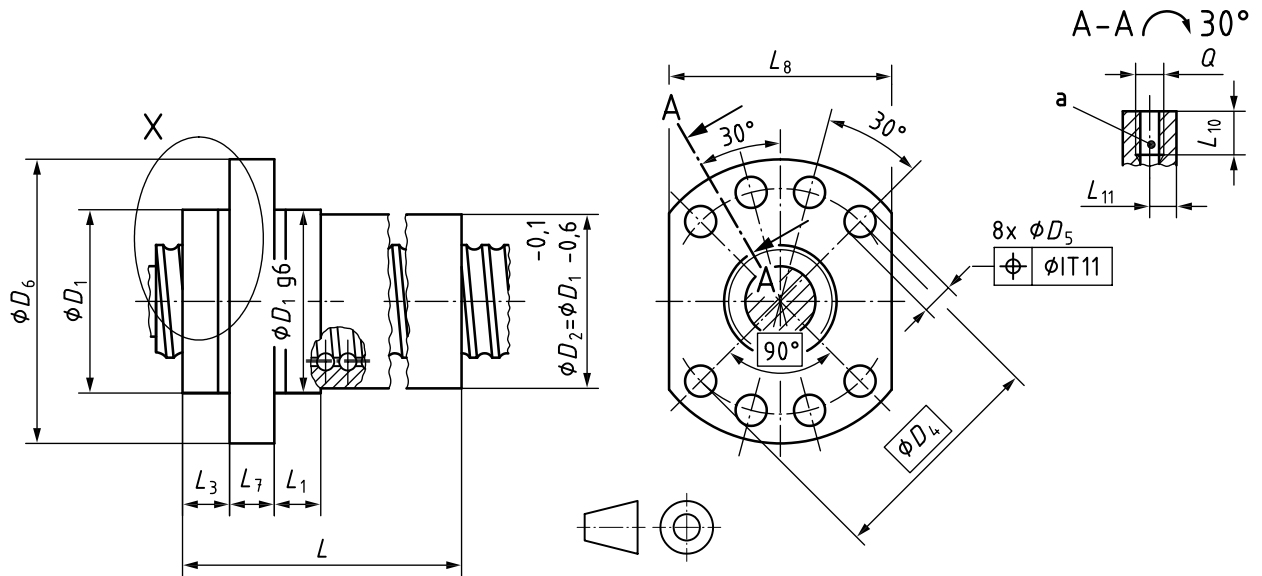


Key

- ^a If the position of the lubrication port is not sufficient, it can be sealed and replaced by a new axial hole on either side of the flange. Details need to be defined separately.
- L* manufacturer-specific length of the ball screw nut
- L₁₁* manufacturer-specific position of the thread for the lubrication port of the ball screw nut

NOTE See [Figure 6](#) for detail X and all dimensions in [Table 2](#).

Figure 1 — Mounting dimensions for ball screw nuts, type B6



Key

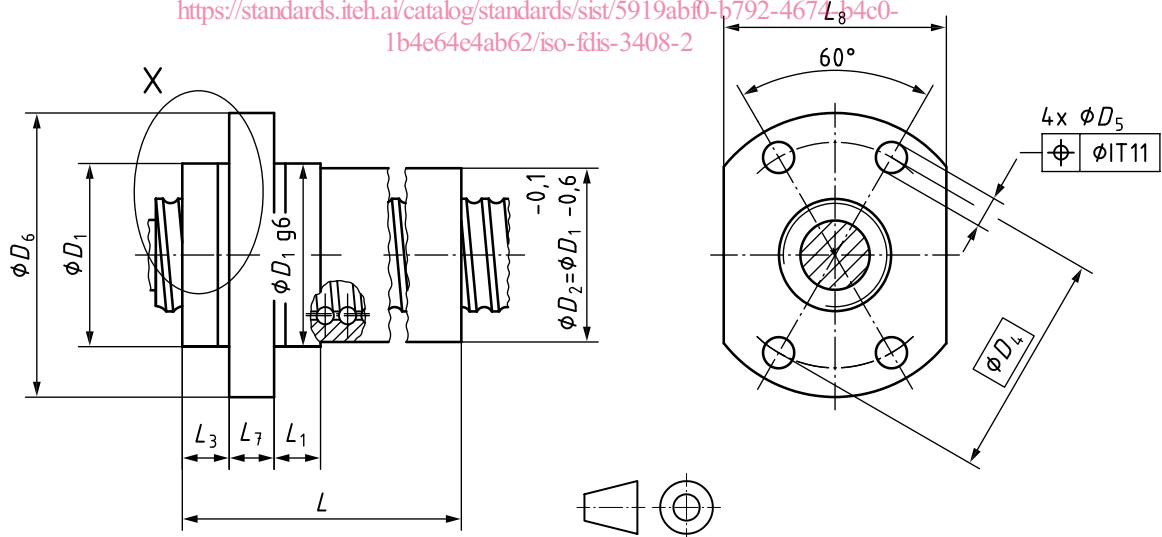
- a If the position of the lubrication port is not sufficient, it can be sealed and replaced by a new axial hole on either side of the flange. Details need to be defined separately.
- L manufacturer-specific length of the ball screw nut
- L_{11} manufacturer-specific position of the thread for the lubrication port of the ball screw nut

NOTE See Figure 6 for detail X and all dimensions in Table 2.

Figure 2 — Mounting dimensions for ball screw nuts, type B8

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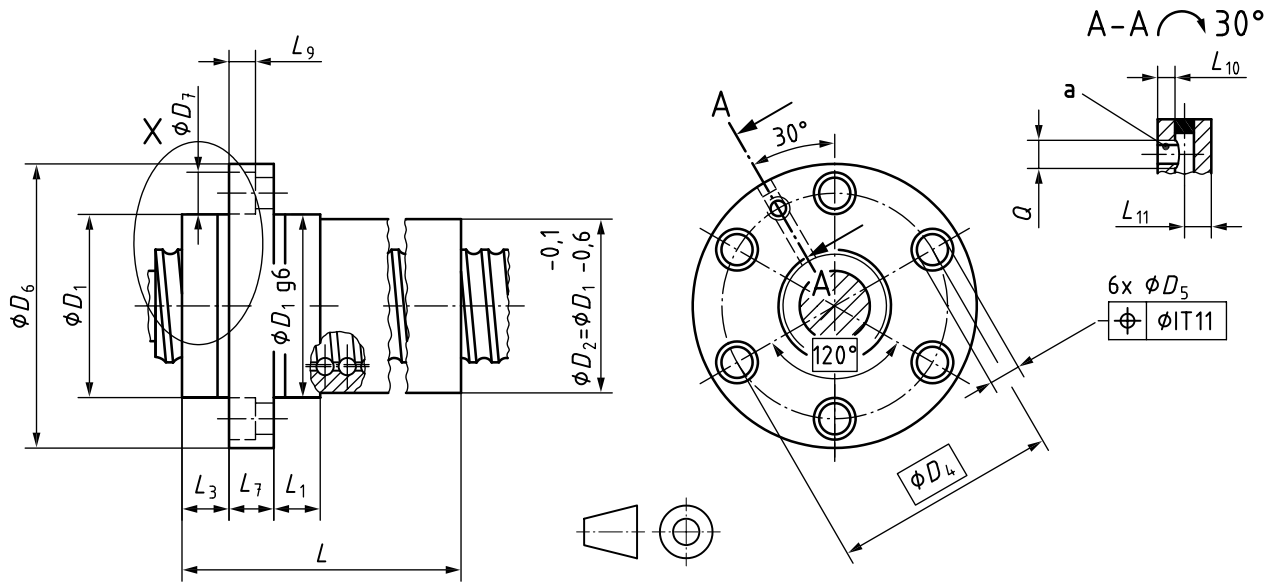


Key

- L manufacturer-specific length of the ball screw nut

NOTE See Figure 6 for detail X and all dimensions in Table 2, Table 3 and Table 4.

Figure 3 — Mounting dimensions for ball screw nuts, type B4



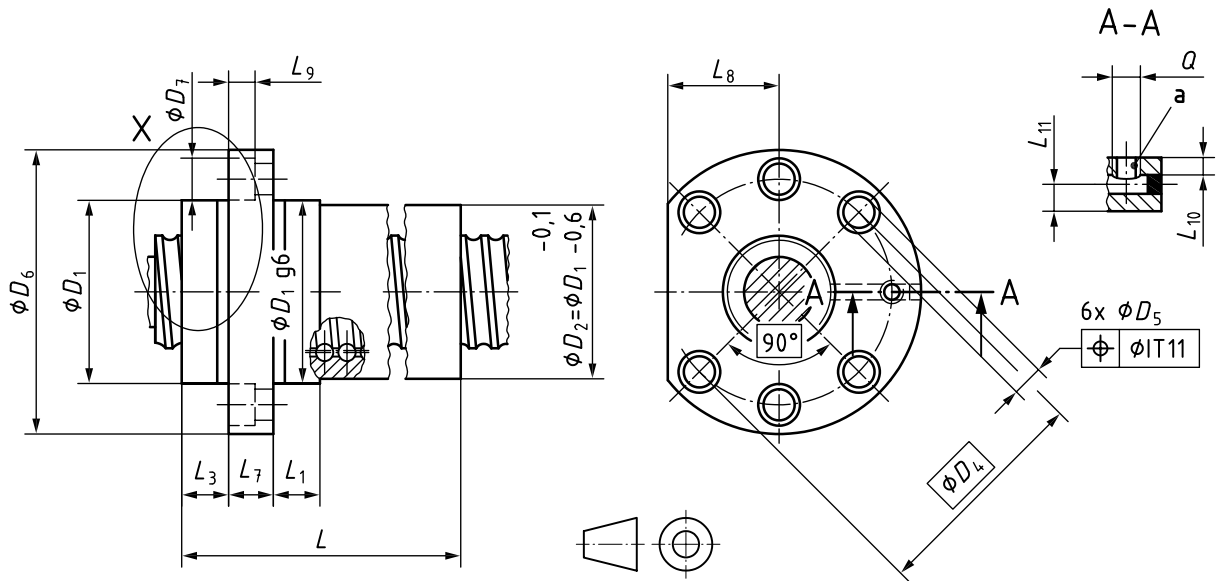
Key

- ^a If the position of the lubrication port is not sufficient, it can be sealed and replaced by a new axial hole on either side of the flange. Details need to be defined separately.
- L manufacturer-specific length of the ball screw nut
- L_{10} manufacturer-specific depth of the lubrication port
- L_{11} manufacturer-specific position of the thread for the lubrication port of the ball screw nut

NOTE See [Figure 6](#) for detail X and all dimensions in [Table 3](#) and [4](#).

Figure 4 — Mounting dimensions for ball screw nuts, type A6

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Key

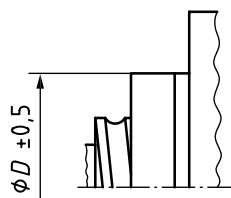
- ^a If the position of the lubrication port is not sufficient, it can be sealed and replaced by a new axial hole on either side of the flange. Details need to be defined separately.
- L manufacturer-specific length of the ball screw nut
- L_{10} manufacturer-specific depth of the lubrication port
- L_{11} manufacturer-specific position of the thread for the lubrication port of the ball screw nut

NOTE See Figure 6 for detail X and all dimensions in Tables 3 and 4.

Figure 5 — Mounting dimensions for ball screw nuts, type C6

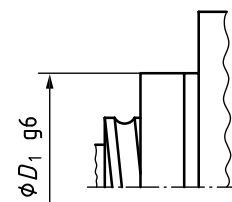
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Detail X



$$0 \leq L_3 \leq sL_{3max}$$

a) Collar without centring



b) Collar with centring

Figure 6 — Alternatives for detail X (in Figures 1 to 5)