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ISO/TC 39

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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*

ICS: 25.060.99

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## Foreword

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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](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

The committee responsible for this document is ISO/TC 39 and ISO/TC 4, which revised this document in the Joint Working Group 7 (JWG 7).

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

The changes to the previous version are:

- Substantial review of technical state of the art;
- Definition of three series of ball screws reflecting different international standards;
- Addition of dimensions reflecting current market situations and
- Defining different types of flanges reflecting state of the art.

ISO 3408 consists of the following parts:

Ball screws – Part 1: Vocabulary and designation

Ball screws – Part 2: Nominal diameters, leads, nut dimensions and nominal leads – Metric series

Ball screws – Part 3: Acceptance conditions and acceptance tests

Ball screws – Part 4: Static axial rigidity

Part 5: Ball screws - Part 5: Static and dynamic axial load ratings and operational life

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# 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*

ISO 4762, *Hexagon socket head cap screws*

## 3 Terms and definitions

ISO/DIS 3408-2

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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 <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

## 4 Symbols

Symbol	Description	Units
$\alpha$	Contact angle	degrees, °
$\gamma$	Geometry factor	–
$\varphi$	Lead angle	degrees, °
$C_s$	Dynamic axial load rating for the ball screw shaft per single loaded turnN	
$d_0$	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
$D_{pw}$	Ball pitch circle diameter	mm
$D_{pw}$	Ball diameter	mm
$F_{a\max}^b$	Axial load at the opening limit of the nut flange	kN
$F_{pr}$	Preload	N
$l$	Number of loaded turns	–
	Characteristic of basic static axial load rating	–
$L_1$	Centering diameter length	mm
$L_3$	Collar length	mm
$L_7$	Flange length	mm
$L_8$	Flat flange width	mm
$L_9$	Counter bore depth	mm
$L, L_h$	Lubrication port thread length	mm
$P_{ho}$	Nominal lead	mm
$Q$	Thread of lubrication port	ISO/DIS 3408-2
$T_a^b$	Tightening torque of one bolt	<a href="https://standards.iteh.ai/catalog/standards/sist/5919abf0-b792-4674-b4c0-104e64e4ab62/iso-dis-3408-2">https://standards.iteh.ai/catalog/standards/sist/5919abf0-b792-4674-b4c0-104e64e4ab62/iso-dis-3408-2</a>

## 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.



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									6	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

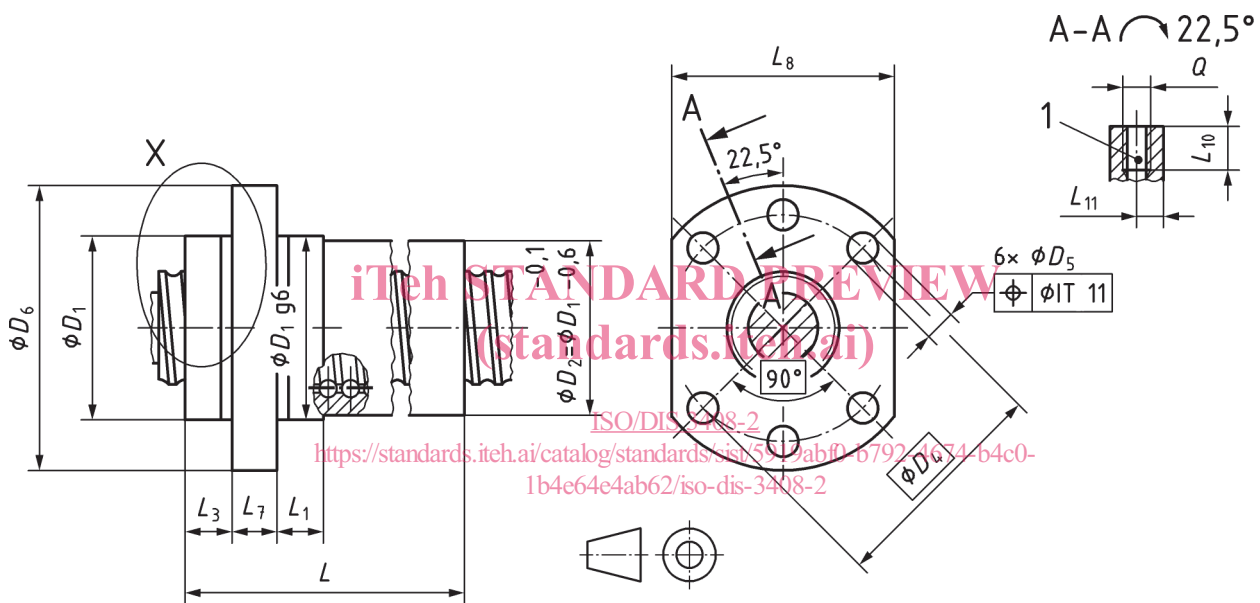
### 6 Mounting dimensions for ball screw nuts, type B6, B8 and B4, A6 and C6

There are three series of ball screw nut dimensions standardized. In Table 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).

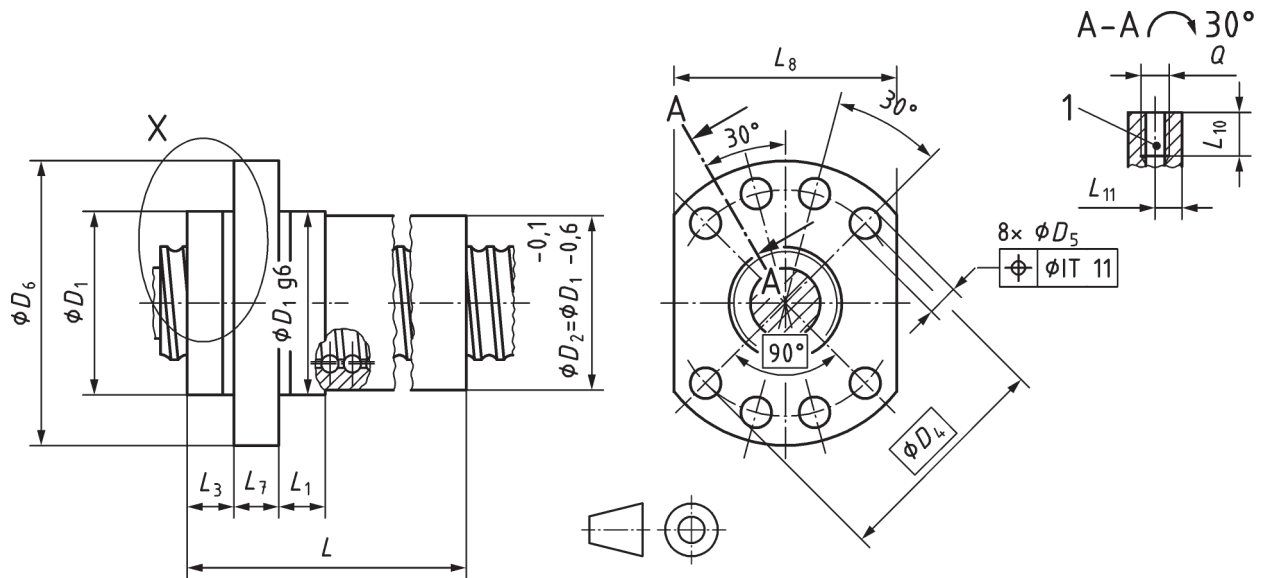


**Key**

- 1 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 The length of the ball screw nut is manufacturer specific.
- L<sub>11</sub> The position of the thread for the lubrication port of the ball screw nut is manufacturer specific.

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

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



**Key**

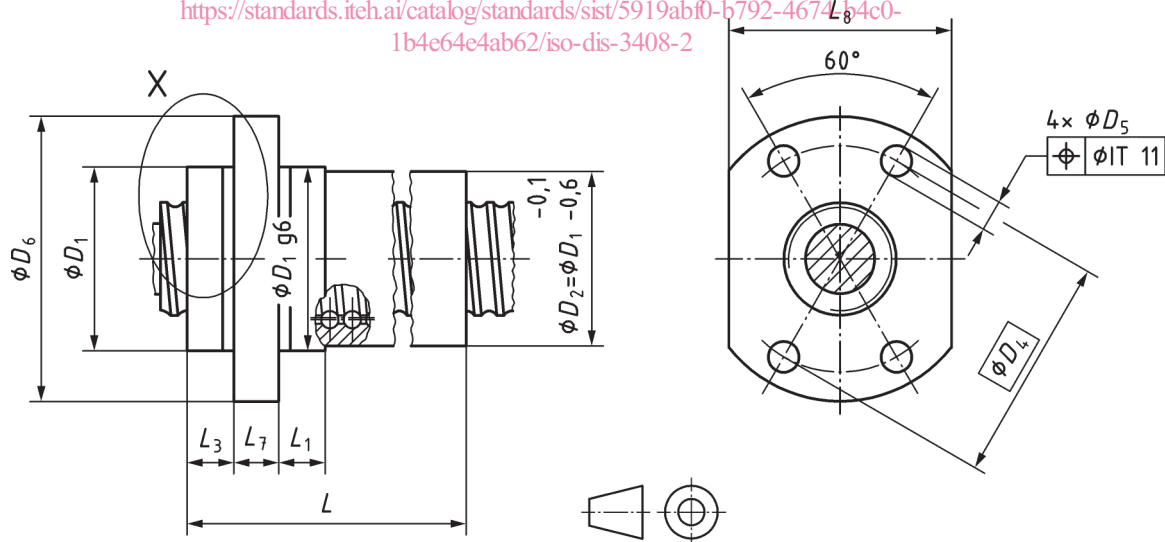
- 1 If the position of the lubrication port is not sufficient, it can be sealed and replaced by a new axial hole on either side of the flange. Details need to be defined separately.
- $L$  The length of the ball screw nut is manufacturer specific.
- $L_{11}$  The position of the thread for the lubrication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

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**

- $L$  The length of the ball screw nut is manufacturer specific.

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**