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ISO 12090-2

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Rolling bearings — Profiled rail guides for linear motion rolling bearings —

Part 2: Boundary dimensions and tolerances for series 4 and 5

Roulements — Guidages sur rail profilé pour roulements pour mouvement linéaire —

Partie 2: Dimensions d'encombrement et tolérances pour les séries 4 et 5

Reference number
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Contents

Page

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.

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ISO 12090-2 was prepared by Technical Committee ISO/TC 4, *Rolling bearings*, Subcommittee SC 11, *Linear motion rolling bearings*.

ISO 12090 consists of the following parts, under the general title *Rolling bearings — Profiled rail guides for linear motion rolling bearings*:

— *Part 1: Boundary dimensions and tolerances for series 1, 2 and 3*

— *Part 2: Boundary dimensions and tolerances for series 4 and 5*

Rolling bearings — Profiled rail guides for linear motion rolling bearings —

Part 2:
Boundary dimensions and tolerances for series 4 and 5

1 Scope

This part of ISO 12090 establishes the boundary dimensions and tolerances for series 4 and 5 of linear motion rolling bearings, profiled rail guides.

These bearings consist of profiled rails with carriages, which can support forces from all perpendicular directions and moments around all axes and consist of recirculating rolling elements. The internal design of these profiled rail guides is at the discretion of the manufacturer.

An assembly, as specified by the manufacturer, can comprise one or more carriages on a linear profiled rail. Therefore, the interchange or combination of these elements can only be carried out within the limits permitted by the manufacturer.

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 5593, *Rolling bearings — Vocabulary*

ISO 15241, *Rolling bearings — Symbols for quantities*

ISO 24393, *Rolling bearings — Linear motion rolling bearings — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1132-1, ISO 5593, ISO 24393 and the following apply.

3.1
linear rail guide
profiled rail guide
⟨monorail guidance system⟩ linear motion rolling bearing unit consisting of a profiled rail or profiled guideway and one or more ball carriages or roller carriages

NOTE Adapted from ISO 24393:2008, definition 02.02.01.

3.2
ball carriage profiled rail guide
linear rail guide consisting of one or more ball carriages and a profiled rail or profiled guideway

[ISO 24393:2008, definition 02.02.03]

NOTE The amount of linear movement (stroke length) is unlimited as the ball carriage has a ball recirculating feature.

3.3
roller carriage profiled rail guide
linear rail guide consisting of one or more roller carriages and a profiled rail or profiled guideway

[ISO 24393:2008, definition 02.02.04]

NOTE The amount of linear movement (stroke length) is unlimited as the roller carriage has a roller recirculating feature.

3.4
ball carriage
linear bearing subassembly consisting of a ball carriage body and a number of closed loops of recirculating balls, which is designed to achieve unlimited motion along a profiled rail or profiled guideway

[ISO 24393:2008, definition 03.01.02]

3.5
roller carriage
linear bearing subassembly consisting of a roller carriage body and a number of closed loops of recirculating rollers, which is designed to achieve unlimited motion along a profiled rail or profiled guideway

[ISO 24393:2008, definition 03.01.03]

3.6
profiled rail
profiled guideway
rail or guideway having a profiled cross-section incorporating a number of raceways along which a ball carriage or a roller carriage traverses

NOTE Adapted from ISO 24393:2008, definition 04.01.15.

3.7
nominal carriage width
A
distance between the two faces of a carriage

3.8
reference face of a carriage
face of a carriage designated as the reference face by the manufacturer of the guide and which can be the datum for measurements

3.9
reference face of a profiled rail
face of a profiled rail designated as the reference face by the manufacturer of the guide and which can be the datum for measurements

3.10
nominal distance between the reference face of carriage and the reference face of the rail
A_1
distance between the two reference faces of the carriage and profiled rail (of profiled rail guide)

3.11
deviation of the distance between the reference faces of several carriages on one rail and profiled rail
ΔA_1
dimensional difference between the reference faces of several carriages on one rail, measured at the same point on the rail and at the centre point of the faces of several carriages

3.12
variation of the distance between the reference faces of several carriages on several rails and profiled rail
V_{A1}
dimensional variation between the reference faces of several carriages on several rails, measured at any point on the rails and at the centre point of the reference faces of several carriages

NOTE The variation of the distance between the reference faces of carriage on several rails is calculated using Equation (1):

$$V_{A1} = A_{1,\max} - A_{1,\min} \quad (1)$$

where

$A_{1,\max}$ is the maximum distance between the reference faces of the carriages and profiled rails;

$A_{1,\min}$ is the minimum distance between the reference faces of the carriages and profiled rails.

3.13
nominal carriage length
B
distance between the two end faces of the carriage designated to bound its length

3.14
nominal height of profiled rail guide
H
distance between the bottom face of the profiled rail and the top face of the carriage

3.15
deviation of the height of several carriages on one rail
ΔH
height difference between the top faces of several carriages on one rail, measured at the same point on the rail and at the centre point of the top faces of several carriages

3.16
variation of the height of several carriages on several rails
V_H
height variation between the top faces of several carriages on several rails, measured at any point on the rails and at the centre point of the top faces of several carriages

NOTE The variation of the height of several carriages on several rails is calculated using Equation (2):

$$V_H = H_{\max} - H_{\min} \quad (2)$$

where

$H_{\max}$ is the maximum height of profiled rail guide;

$H_{\min}$ is the minimum height of profiled rail guide.

3.17
nominal height between the bottom faces of profiled rail guide
H_1
distance between the bottom face of the profiled rail and that of the carriage designated to bound the clearance between the bottom of the carriage and the bottom of the profiled rail

3.18
nominal profiled rail width
W
distance between the two faces of the profiled rail

3.19
vertical running parallelism
P_V
running parallelism of the carriage measured at the centre point of the top face of the carriage and bottom face of the rail along the length of the rail

3.20
horizontal running parallelism
P_H
running parallelism of the carriage measured at the centre point of the reference face of the carriage and reference face of the rail along the length of the rail

4 Symbols

For the purposes of this document, the symbols given in ISO 15241 and the following apply.

The symbols (except those for tolerances) shown in Figures 1 to 3 and the values given in Tables 1 to 5 denote nominal dimensions unless specified otherwise.

A nominal carriage width

A_1 nominal distance between the reference face of the carriage and the reference face of the rail

B nominal carriage length

G designation of internal screw thread of carriage

H nominal height of profiled rail guide

H_1 nominal height between the bottom faces of carriage and profiled rail

H_2 height of reference face of carriage

h depth of bolt hole counterbore of profiled rail

J centre distance between bolt holes of carriage (width)

J_1 centre distance between bolt holes of carriage (length)

J_2 centre distance between bolt holes of profiled rail (length)

J_3 distance from the end face to the first bolt hole of profiled rail (length)

J_4 centre distance between bolt holes of profiled rail (width)

l_G length of internal screw thread of carriage

N_1 diameter of bolt hole of profiled rail

N_2 diameter of bolt hole counterbore of profiled rail

P_H horizontal running parallelism

P_V vertical running parallelism

V_{A1} variation of the distance between the reference faces of carriage on several rails

V_H variation of the height of several carriages on several rails

W nominal profiled rail width

ΔA_1 deviation of the distance between the reference faces of carriages on one rail

ΔH deviation of the height of several carriages on one rail

5 Design types

The design types of profiled rail guides are given in Table 1.

Table 1 — Profiled rail guides

Series	Design	Type
4	Miniature	4M
5	Miniature, wide	5W

6 Boundary dimensions

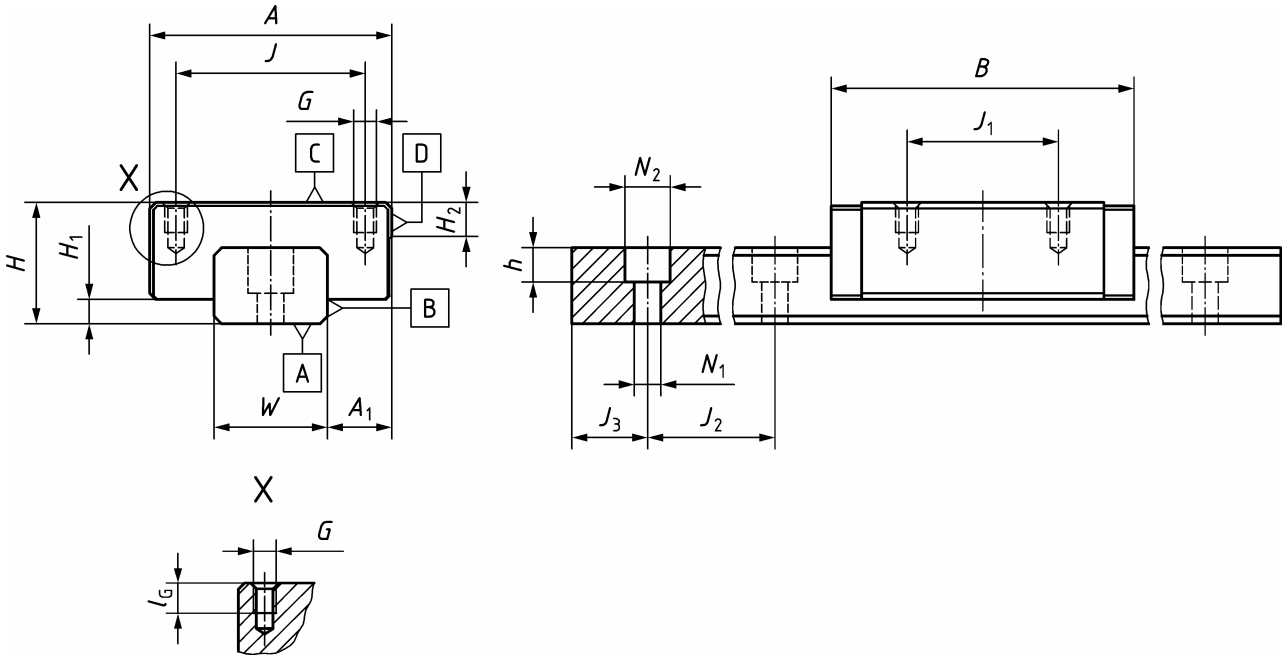
6.1 Profiled rail guides

6.1.1 General

The boundary dimensions for profiled rail guides of series 4 and 5 are given in Tables 2 and 3, respectively.

6.1.2 Series 4

The boundary dimensions for profiled rail guides of series 4 are given in Figure 1.



Key

A	Bottom face of rail
B	Reference face of rail
C	Top face of carriage
D	Reference face of carriage

NOTE Datum A till D applicable for Series 4 and 5.

Figure 1 — Profiled rail guides — Series 4

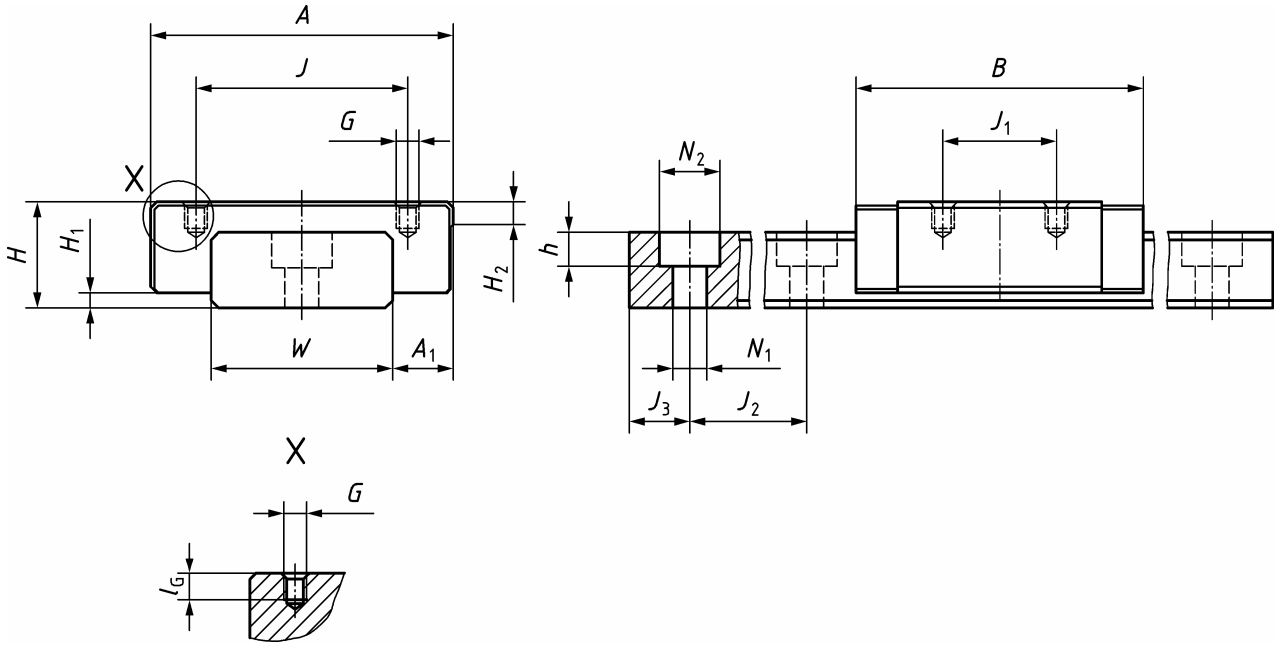
Table 2 — Dimensions of series 4

Dimensions in millimetres

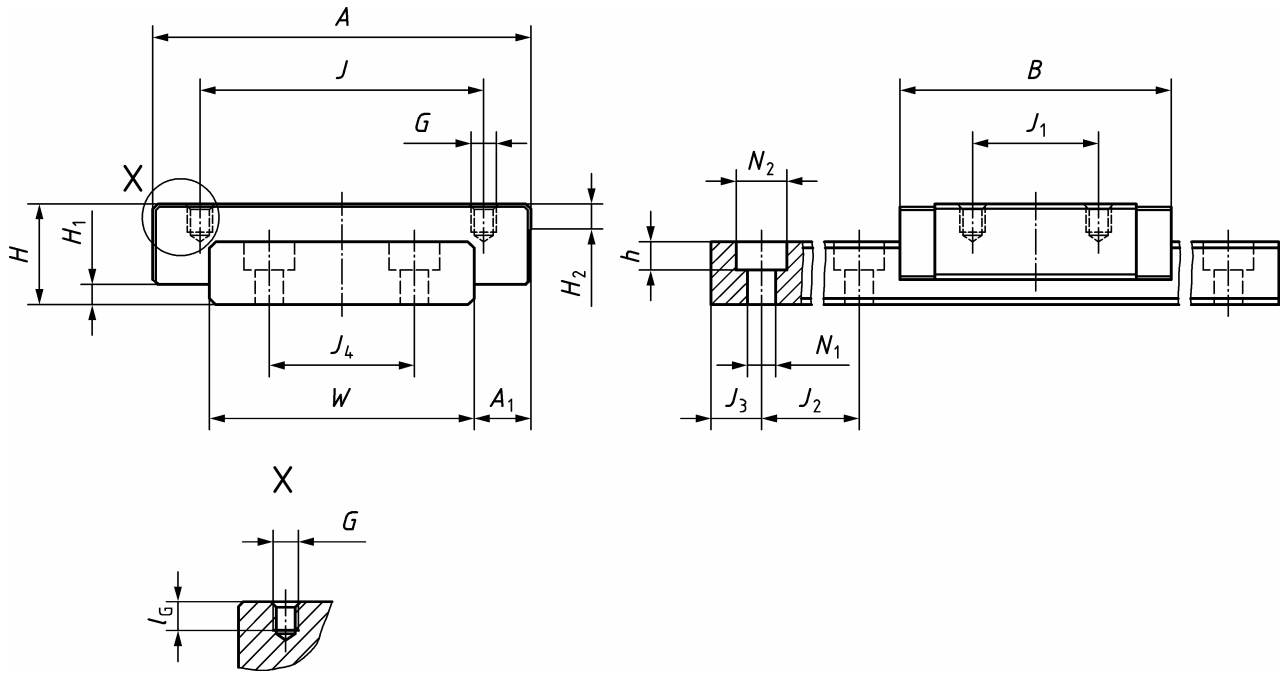
Size	W	H	A	A_1	H_1 min.	H_2 min.	B max.	J	J_1	G	J_2	J_3 min.	N_1 min.	N_2 min.	h min.	l_G min.
5	5	6	12	3,5	1	2	20	8	—	M2	15	5	2,4	3,5	0,8	1,5
7	7	8	17	5	1,1	1,8	25	12	8	M2	15	5	2,4	4,2	2,3	2,4
9	9	10	20	5,5	1,7	2,5	32	15	10	M3	20	6	3,5	6	3,1	3
12	12	13	27	7,5	2,6	3	36	20	15	M3	25	6	3,5	6	4,5	3,5
15	15	16	32	8,5	3,2	4	44	25	20	M3	40	6	3,5	6	4,5	4
20	20	25	46	13	5	5,5	70	38	38	M4	60	6,5	6	9,5	8	6

6.1.3 Series 5

The boundary dimensions for profiled rail guides of series 5 are given in Figure 2.



a) Sizes 5W to 12W



b) Size 15W

Figure 2 — Profiled rail guides — Series 5

Table 3 — Dimensions of series 5

Dimensions in millimetres

Size	W	H	A	A_1	H_1 min.	H_2 min.	B max.	J	J_1	G	J_2	J_3 min.	J_4	N_1 min.	N_2 min.	h min.	l_G min.
5W	10	6,5	17	3,5	1,4	2	24,5	13	—	M2,5[a]	20	5	—	2,9	4,8	1,6	1,5[a]
								—	6,5	M3[a]							2,3[a]
7W	14	9	25	5,5	1,7	1,8	32	19	10	M3	30	6	—	3,5	6	3,1	2,8
9W	18	12	30	6	2	2,5	40	21	12	M3	30	6	—	3,5	6	4,5	3
12W	24	14	40	8	2	3	46	28	15	M3	40	8	—	4,5	8	4,5	3,5
15W	42	16	60	9	3,2	4	57	45	20	M4	40	8	23	4,5	8	4,5	4

[a] The design is at the discretion of the manufacturer(s). Therefore, two different sizes for G and l_G, respectively, are usual.

6.2 Multi-piece profiled rails

For profiled rail guides with a long stroke, it may be necessary for the profiled rail to be manufactured in two or more pieces, which are placed end-to-end during installation.

Marking of the individual components and the establishment of the corresponding installation procedures are at the discretion of the manufacturer.

7 Tolerances

The tolerances for profiled rail guides are given in Table 4 and Figure 3.

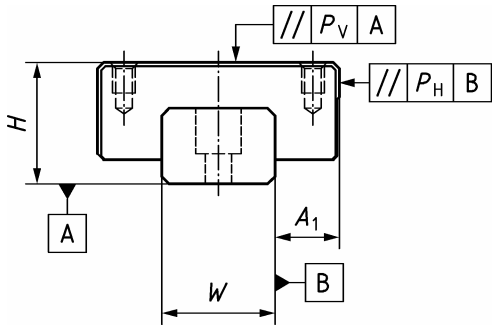


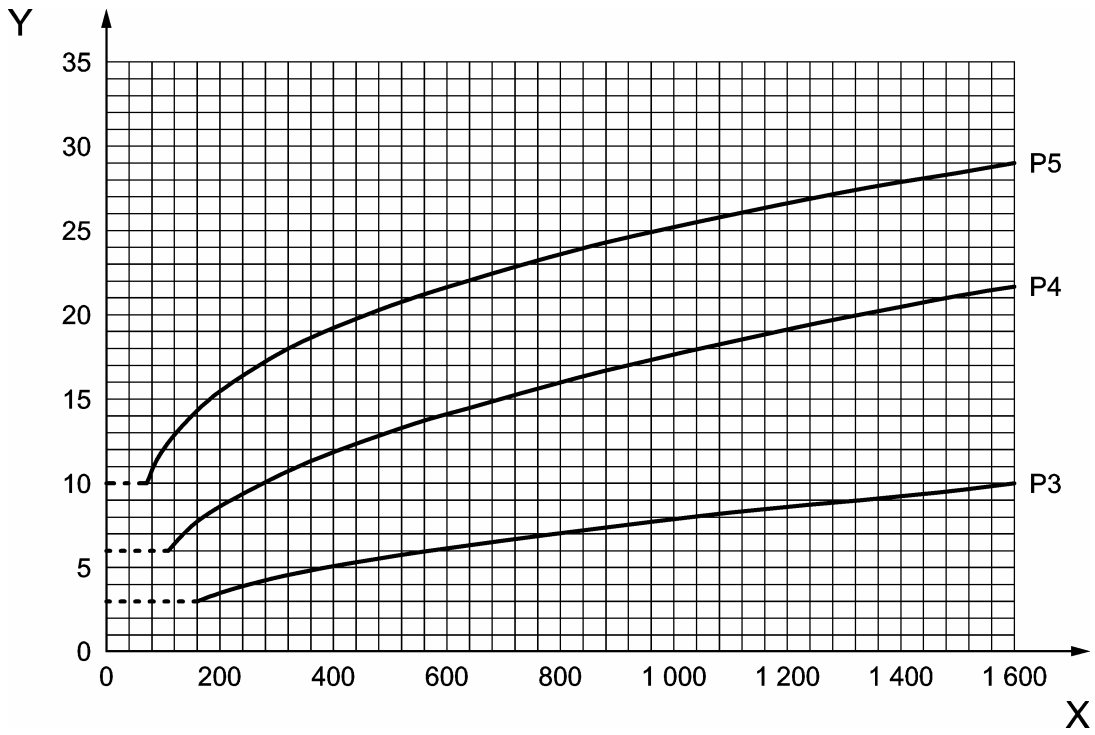
Figure 3 — Measurement guide for running parallelism

Table 4 — Tolerances for P_V and P_H over a single-piece profiled rail length

Dimensions and tolerance values in millimetres

Symbol	Dimension W	Tolerance class		
		P5	P4	P3
ΔH[a]	All sizes	±0,04	±0,02	±0,01
V_H	All sizes	0,03	0,015	0,007
ΔA_1[a]	All sizes	±0,04	±0,025	±0,015
V_{A1}	All sizes	0,03	0,02	0,01
P_V maximum		See Figures 3 and 4		
P_H maximum		See Figures 3 and 4		

[a] The deviation of the actual height, ΔH, and the deviation of the actual distance between the reference side faces, ΔA_1, are the dimensional differences between several carriages on one profiled rail, measured at the same point on the profiled rail and at the centre point of the top face or the reference side face of the carriages.



Key

X single-piece profiled rail length, in millimetres

Y P_V and P_H, in micrometres

Figure 4 — Tolerances for P_V and P_H

Annex A
(informative)

General length tolerances for profiled rails

Tolerances for the lengths of a profiled rail are given in Table A.1.

Table A.1 — General length tolerances for profiled rails

Dimensions and tolerance values in millimetres

Dimension		Tolerance class
>	≤	All classes
—	6	±0,1
6	30	±0,2
30	120	±0,3
120	400	±0,5
400	1 000	±0,8

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