
**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*



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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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.

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

A₁

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

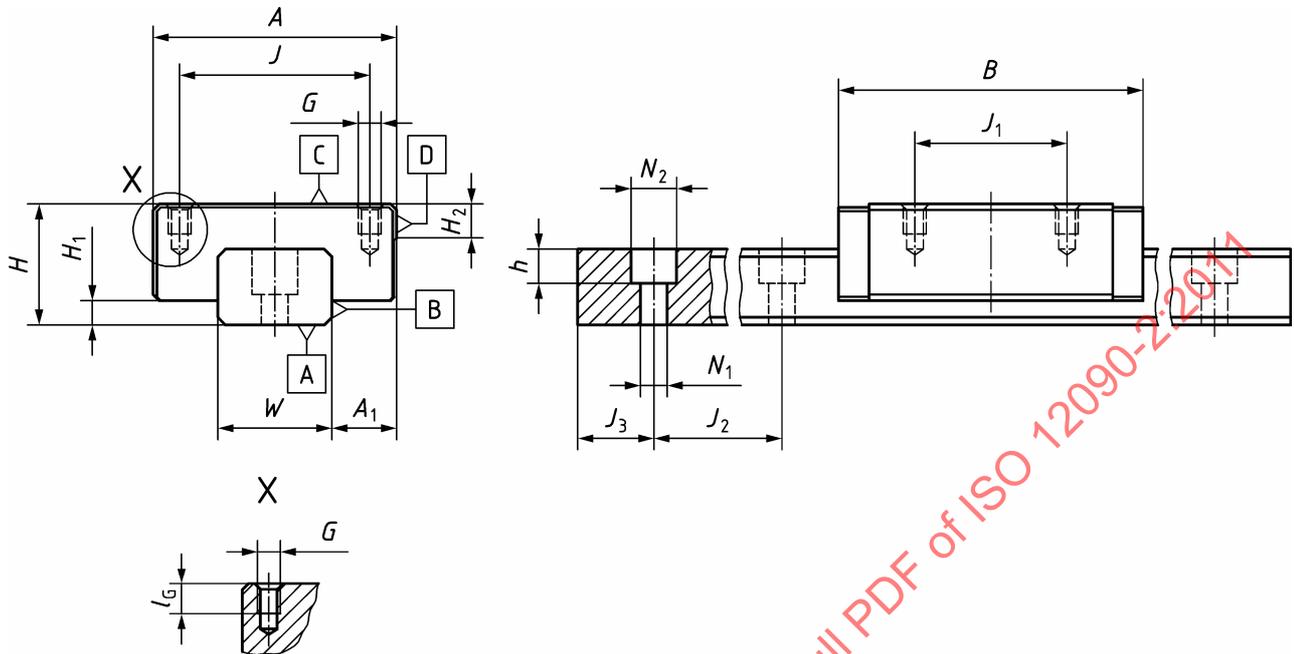
6.1 Profiled rail guides

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

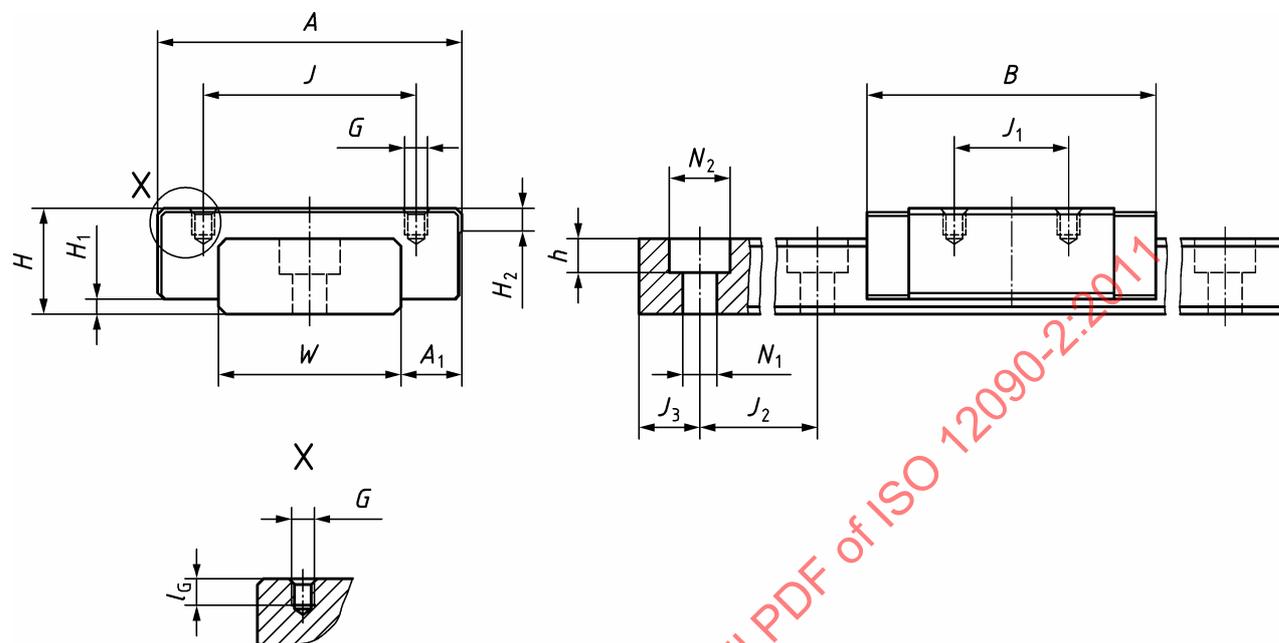
Table 2 — Dimensions of series 4

Dimensions in millimetres

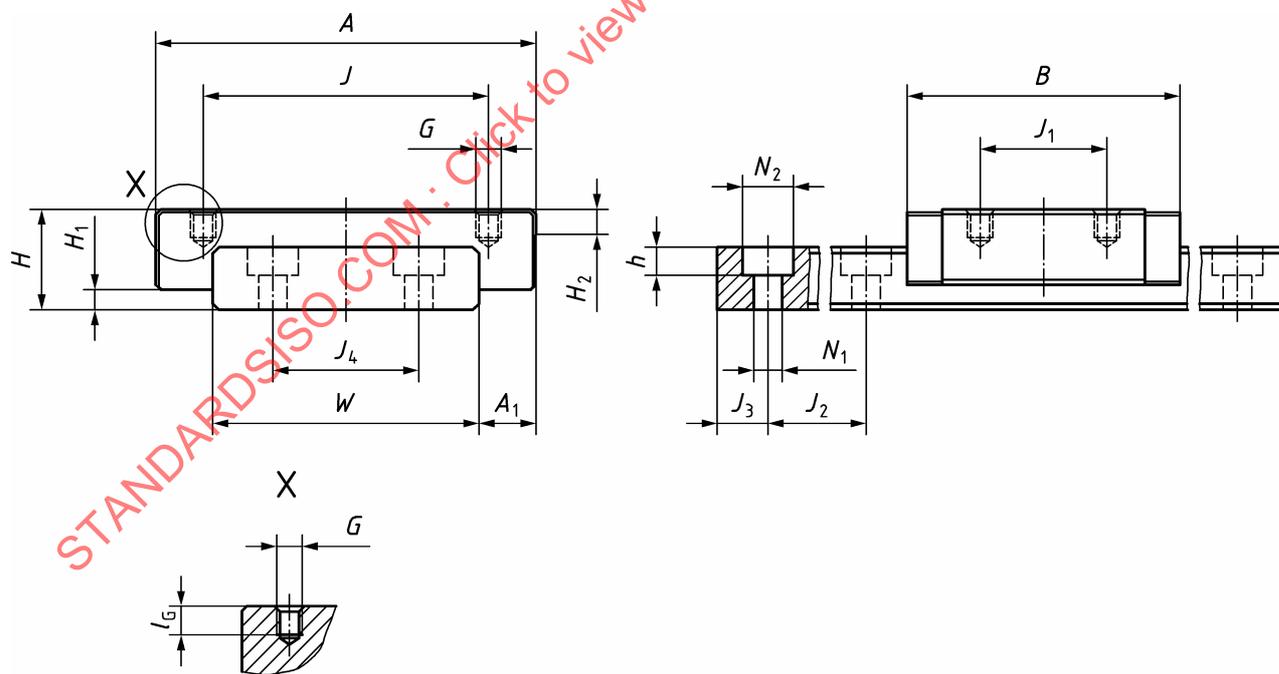
Size	W	H	A	A ₁	H ₁ min.	H ₂ min.	B max.	J	J ₁	G	J ₂	J ₃ min.	N ₁ min.	N ₂ min.	h min.	l _G min.
5	5	6	12	3,5	1	2	20	8	—	M2	15	5	2,4	3,5	0,8	1,5
7	7	8	17	5	1,1	1,8	25	12	8	M2	15	5	2,4	4,2	2,3	2,4
9	9	10	20	5,5	1,7	2,5	32	15	10	M3	20	6	3,5	6	3,1	3
12	12	13	27	7,5	2,6	3	36	20	15	M3	25	6	3,5	6	4,5	3,5
15	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	<i>W</i>	<i>H</i>	<i>A</i>	<i>A</i> ₁	<i>H</i> ₁ min.	<i>H</i> ₂ min.	<i>B</i> max.	<i>J</i>	<i>J</i> ₁	<i>G</i>	<i>J</i> ₂	<i>J</i> ₃ min.	<i>J</i> ₄	<i>N</i> ₁ min.	<i>N</i> ₂ min.	<i>h</i> min.	<i>l</i> _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.

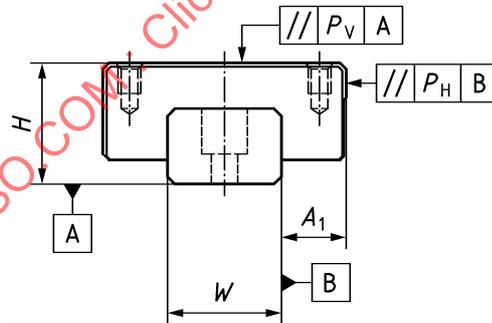


Figure 3 — Measurement guide for running parallelism