INTERNATIONAL STANDARD

ISO 15981

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Open end blind rivets with break pull mandrel and protruding head — AIA/AIA

Rivets aveugles à rupture de tige à corps ouvert, à tête bombée — AIA/AIA

Reference number
ISO 15981:2002(E)

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Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 15981 was prepared by Technical Committee ISO/TC 2, *Fasteners*.

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Open end blind rivets with break pull mandrel and protruding head — AlA/AlA

1 Scope

This International Standard specifies dimensional and mechanical characteristics and application data for open end blind rivets with break pull mandrel and protruding head, with an aluminium alloy body (AlA) and an aluminium alloy mandrel (AlA) and with nominal diameters, d, from 2,4 mm up to and including 6,4 mm.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 3269:2000, *Fasteners — Acceptance inspection*

ISO 14588:2000, *Blind rivets — Terminology and definitions*

ISO 14589:2000, *Blind rivets — Mechanical testing*

3 Dimensions

3.1 General

Symbols and designations of dimensions are specified in ISO 14588.

3.2 Rivet dimensions

See Figure 1 and Table 1.

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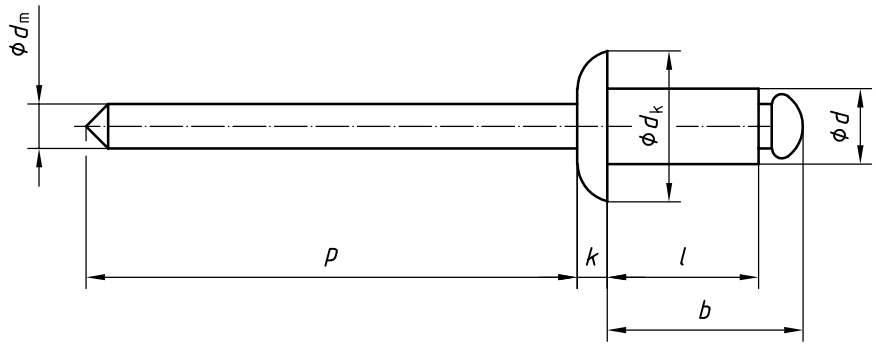

Figure 1 — Rivet dimensions

Table 1 — Rivet dimensions

Dimensions in millimetres

Rivet body	d	nom.	**2,4**	**3,2**	**4**	**4,8**	**6,4**
		max.	2,48	3,28	4,08	4,88	6,48
		min.	2,25	3,05	3,85	4,65	6,25
	d_k	max.	5,0	6,7	8,4	10,1	13,4
		min.	4,2	5,8	6,9	8,3	11,6
	k	max.	1	1,3	1,7	2	2,7
Mandrel	d_m	max.	1,6	2,1	2,55	3,05	4
	p	min.	25	25	25	27	27
Blind length	b	max.	l_{max} + 3	l_{max} + 3	l_{max} + 3,5	l_{max} + 4	l_{max} + 5,5

Rivet length l		**Recommended grip ranges**[a]				
nom. = min.	max.					
5	6	—	0,5 to 1,5	—	—	—
6	7	0,5 to 3,0	1,5 to 3,5	1 to 3	1,5 to 2,5	—
8	9	—	3,5 to 5,0	3 to 5	2,5 to 4,0	—
9	10	3 to 6	—	—	—	—
10	11	—	5 to 7	5,0 to 6,5	4 to 6	—
12	13	6 to 9	7 to 9	6,5 to 8,5	6 to 8	3 to 6
16	17	—	9 to 13	8,5 to 12,5	8 to 12	6 to 10
20	21	—	13 to 17	12,5 to 16,5	12 to 15	10 to 14
25	26	—	17 to 22	16,5 to 21,0	15 to 20	14 to 18
30	31	—	—	—	20 to 25	18 to 23

NOTE The rivet body dimensions are generated from the design formulae specified in annex A.

[a] The grip ranges of rivets with dimensions as given in Table 1, with the material combination as given in clause 4 are specified by the minimum and maximum grip lengths. The minimum grip lengths are given as a recommendation only. It may be possible to go into individual cases below the minimum values.

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3.3 Clearance hole diameters

The diameters of the clearance holes, d_{h1}, to accommodate the rivet in the components to be fastened are given in Table 2.

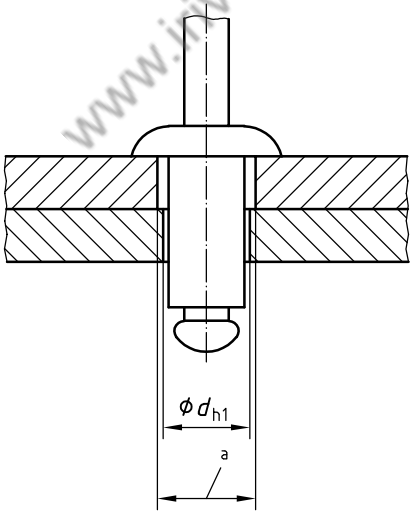
Table 2 — Clearance hole diameters

Dimensions in millimetres

d	d_{h1}	
nom.	min.	max.
2,4	2,5	2,6
3,2	3,3	3,4
4,0	4,1	4,2
4,8	4,9	5,0
6,4	6,5	6,6

Non-conformance to the values listed in Table 2 may result in assembly difficulties and/or reduction in the shear and tensile loads specified in Table 3.

When necessary, to facilitate alignment, only the component on the access side may have a clearance hole larger than specified in Table 2 (see Figure 2). This may also result in a reduction of the shear and tensile loads specified in Table 3.



a Enlarged clearance hole

Figure 2 — Enlarged clearance hole to facilitate alignment

4 Material and finish

Blind rivets in accordance with this International Standard shall have a rivet body made of aluminium alloy (AlA) and a mandrel made of aluminium alloy (AlA) and shall have mechanical properties as specified in clause 5.

Material specification is at the discretion of the manufacturer.

The surface of rivet body and mandrel shall be plain, i.e. in natural finish.

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5 Mechanical properties

The minimum shear load, minimum tensile load and maximum mandrel break load shall be as specified in Table 3 when tested in accordance with ISO 14589.

Table 3 — Mechanical properties

d nom. mm	**Shear load** min. N	**Tensile load** min. N	**Mandrel break load** max. N
2,4	250	350	1 100
3,2	500	670	1 800
4	850	1 020	2 700
4,8	1 160	1 420	3 700
6,4	2 050	2 490	6 300

6 Mandrel push-out resistance

The load to push out the mandrel shall exceed 10 N when tested in accordance with ISO 14589.

7 Mandrel head retention capability

The portion of the mandrel remaining in the set rivet shall not be ejected by the application of the head retention test load specified in Table 4 when tested in accordance with ISO 14589.

Table 4 — Mandrel head retention test loads

d nom. mm	**Head retention test load** N
2,4	10
3,2	15
4	20
4,8	25
6,4	50

8 Workmanship

Rivets shall be free from burrs and harmful defects and shall have well-formed heads and shanks.

After setting, rivets shall not show evidence of cracking when viewed at 5 × magnification.

9 Acceptance testing

If there is no other agreement, acceptance inspection in accordance with ISO 3269 applies.

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10 Designation

EXAMPLE A open end blind rivet, with break pull mandrel and protruding head, with nominal diameter $d = 4$ mm and nominal length $l = 12$ mm with an aluminium body (AlA) and an aluminium alloy mandrel (AlA) is designated as follows:

Blind rivet ISO 15981 - 4 × 12 - AlA/AlA

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Annex A
(informative)

Design formulae

A.1 General

Blind rivets in accordance with this International Standard comply with the following design formulae and tolerances.

A.2 Shank diameter

The maximum shank diameter complies with the formula:

$$d_{max} = d_{nom} + 0{,}08 \text{ mm}$$

The minimum shank diameter complies with the formula:

$$d_{min} = d_{nom} - 0{,}15 \text{ mm}$$

A.3 Head diameter

The maximum head diameter complies with the formula:

$$d_{k\,max} = 2{,}1\ d_{nom}$$

rounded to one decimal place.

A.4 Head diameter tolerance

The head diameter tolerance is h16 for $d_{nom} \leqslant 3{,}2$ mm and h17 for $d_{nom} > 3{,}2$ mm.

A.5 Head height

The maximum head height complies with the formula:

$$k_{max} = 0{,}415\ d_{nom}$$

rounded to one decimal place.

A.6 Clearance hole diameter

The clearance hole diameter for blind rivet application complies with the formulae:

$$d_{h1\,max} = d_{nom} + 0{,}2 \text{ mm}$$

$$d_{h1\,min} = d_{nom} + 0{,}1 \text{ mm}$$

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