SLOVENSKI STANDARD
oSIST prEN ISO 8167:2020

01-junij-2020

Uporovno varjenje - Bradavično uporovno varjenje - Bradavice za uporovno varjenje (ISO/DIS 8167:2020)

Resistance welding - Embossed projection welding - Projections for resistance welding (ISO/DIS 8167:2020)

Widerstandsschweißen - Buckelschweißungen mit geprägten Buckeln - Buckel zum Widerstandsschweißen (ISO/DIS 8167:2020)

Bossages pour le soudage par résistance (ISO/DIS 8167:2020)

Ta slovenski standard je istoveten z: **prEN ISO 8167**

ICS:

25.160.20 Potrošni material pri varjenju Welding consumables

oSIST prEN ISO 8167:2020 **en,fr,de**

DRAFT INTERNATIONAL STANDARD

ISO/DIS 8167

ISO/TC **44**/SC **6**

Secretariat: **DIN**

Voting begins on:
2020-04-10

Voting terminates on:
2020-07-03

Resistance welding — Embossed projection welding — Projections for resistance welding

ICS: 25.160.30

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING

Reference number
ISO/DIS 8167:2020(E)

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Published in Switzerland

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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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For an explanation on the voluntary nature of standards, 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.

This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 6, *Resistance welding and allied mechanical joining*.

This second edition cancels and replaces the first edition (ISO 8167:1989), which has been technically revised.

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

— updating of chapter 3 “terms and definitions”;

— Revision of Annex B and Annex C;

— technically revised to the state of the art.

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.

Resistance welding — Embossed projection welding — Projections for resistance welding

1 Scope

This International Standard specifies the geometries and dimensions of projections for embossed projection welding. Tools to make the projections are also included as an informative Annex (see Annex B).

The projections are used on hot-rolled, cold-rolled, uncoated and coated steels, stainless steels and nickel alloys for conventional welding quality up to 3 mm thickness, as single projections, in multiples or as a group of multiples.

NOTE Any solid projections are not included in this standard.

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 286-1, *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes — Part 1: Basis of tolerances, deviations and fits*

ISO 17677-1, *Resistance welding — Vocabulary — Part 1: Spot, projection and seam welding*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17677-1 and the following apply.

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

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
embossed projection
projection made by stamping or pressing processes for a sheet with punch and die

Note 1 to entry: Usually, open bottom types are used as the die. Closed bottom types also proposed!

3.2
solid projection
projection manufactured to achieve a special projection geometry

Note 1 to entry: A contour of the components is often used as the projection.

3.3
spherical projection (Type code: SP)
projection with circular protrusion (see Figure 1)

3.3
elongated projection (Type code: EP)
projection with oval protrusion (see Figure 2)

3.4
ring-shaped projection (Type code: RP)
annular projection
projection with ring-shaped protrusion (see Figure 3)

Note 1 to entry: In the United State, a kind of solid projection is called as “annular projection”.

3.5
Projection diameter
d_1
outer diameter of the projection in the embossed side surface of the sheet for spherical and ring-shaped projections (see Figure 1 and Figure 2)

3.6
Projection height
a
maximum height of the projection (see Figure 1 to Figure 3)

3.7
Projection width
b_1
maximum width of the elongated projection in the embossed side surface of the sheet (see Figure 3)

3.8
Projection length
l_1
bottom length of the elongated projection in the embossed side surface of the sheet (see Figure 3)

4 Types of projections

The projection shape shall be selected from three types of projections shown in Figure 1 to Figure 3 based on the design requirements of the welds or welding procedure specification (WPS) for the projection welding. Spherical projections are recommended for sheets thicknesses of 1 mm or greater. Ring-shaped projections and multiple spherical projections (e.g. a set of three projections) are usually used for sheets thinner than 1 mm. Elongated projections can be used to replace a set of two ring-shaped or spherical projections.

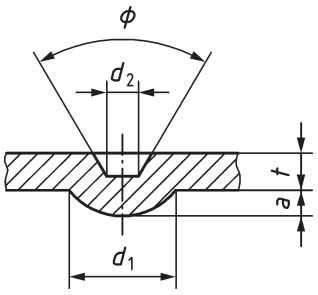

Figure 1 — Spherical projection

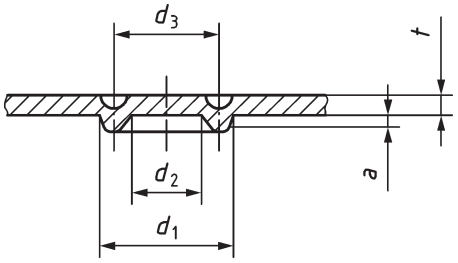

Figure 2 — Ring-shaped projection

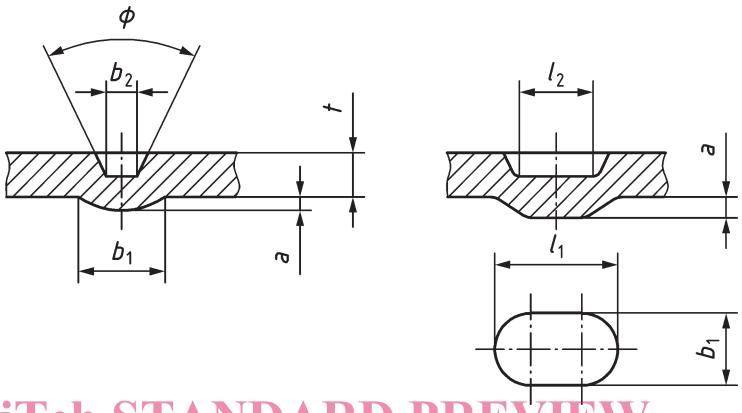

Figure 3 — Elongated projection

5 Dimensions of projections

The dimensions shall be as specified in Table 1 to Table 3 for spherical, elongated and ring-shaped projections, respectively. The tolerance on the projection diameter, d_1, projection width, b_1, and projection height, a, shall be equal or less than the values specified in Table 1 to Table 3.

In the case of multiple projection welding with spherical and ring-shaped projections in one operation, more severe tolerance control for the projection height is required. The height of the individual projections on any of the components comprising the assembly shall not vary by more than 5 % from one another.

Alternative projection dimensions can be found in Annex C.

NOTE 1 The height, a, is determined by the punch stroke when using open bottom die.

NOTE 2 The projection should be made in the thicker sheet with the dimensions determined according to the thinner sheet thickness

NOTE 3 Annex A indicates the relationship between sheet thickness t and projection diameter d_1 for spherical projections.

NOTE 4 When welding of dissimilar materials sheets, the projection should be made in the material with the lower heat conductivity and/or higher strength.

Table 1 — Dimensions for spherical projection

Dimensions in millimetres

Projection diameter		Projection height		Bottom diameter of the indentation part
Nominal diameter d_1[a]	Tolerance	Nominal height a	Tolerance[b]	d_2[c]
1,4	+0,1 −0,1	0,38	+0,05 −0,05	0,45
1,6		0,4		0,5
2,0		0,5		0,63
2,5		0,63		0,8
3,2		0,8		1,0
4,0	+0,15 −0,15	1,0	+0,05 −0,10	1,25
5,0		1,25		1,6
6,3		1,6		2,0
8,0		2,0		2,5

1 The indentation angle, ϕ and bottom diameter of the indentation part, d_2, vary depending to the forming tool geometry used to make the projection. The indentation angle between 45° and 90° can be selected in accordance with the design requirements or WPS.

[a] The rod diameter of the forming tool (e.g. punch) shall be greater than d_1; an example of the forming tool is given in Annex B.

[b] In the case of welding with single projection, ±10 % is acceptable as the tolerance of projection height.

[c] The diameter values indicated in this table are only informative. The values are effective only to prepare the forming tool with a truncated cone tip geometry in which the tool tip angle is 60°.

Table 2 — Dimensions for elongated projection

Dimensions in millimetres

Projection width		Projection height		Short side width of the indentation bottom	Projection length
Nominal width b_1	Tolerance	Nominal height a	Tolerance	b_2[a]	l_1
1,4	+0,1 −0,1	0,38	+0,05 −0,05	0,45	2,8 to 4,5
1,6		0,4		0,5	3,2 to 5,1
2,0		0,5		0,63	4,0 to 6,4
2,5		0,63		0,8	5,0 to 8,0
3,2		0,8		1,0	6,4 to 10,2
4,0	+0,15 −0,15	1,0	+0,05 −0,10	1,25	8,0 to 12,8
5,0		1,25		1,6	10,0 to 16,0
6,3		1,6		2,0	12,6 to 20,2
8,0		2,0		2,5	16,0 to 25,6

1 The indentation angle, ϕ, and the indentation geometry vary depending to the forming tool shape and geometry used to make the projection. The indentation angle between 45° and 90° can be selected in accordance with the design requirements or WPS.

[a] The short side width values indicated in this table are only informative. The values are effective only to prepare the forming tool with a truncated cone tip geometry in which the tool tip angle is 60°.