

Resistance welding - Spot welding of aluminium and aluminium alloys - Weldability, welding and testing (ISO 18595:2021)

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Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 10.02.2021.	Date of Availability of the European standard is 10.02.2021.
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EUROPEAN STANDARD

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English Version

Resistance welding - Spot welding of aluminium and
aluminium alloys - Weldability, welding and testing (ISO
18595:2021)

Soudage par résistance - Soudage par points de
l'aluminium et des alliages d'aluminium - Soudabilité,
soudage et essais (ISO 18595:2021)

Widerstandsschweißen - Punktschweißen von
Aluminium und Aluminiumlegierungen -
Schweißseignung, Schweißen und Prüfungen (ISO
18595:2021)

This European Standard was approved by CEN on 30 January 2021.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

This document (EN ISO 18595:2021) has been prepared by Technical Committee ISO/TC 44 "Welding and allied processes" in collaboration with Technical Committee CEN/TC 121 "Welding and allied processes" the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2021, and conflicting national standards shall be withdrawn at the latest by August 2021.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 18595:2007.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 18595:2021 has been approved by CEN as EN ISO 18595:2021 without any modification.

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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 of 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 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*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 121, *Welding and allied processes*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 18595:2007), which has been technically revised.

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

- new [Clause 3](#) Terms and definitions has been added;
- the whole document has been technically revised to the state of the art;
- [Annex C](#) has been revised.

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.

Official interpretations of ISO/TC 44 documents, where they exist, are available from this page: <https://committee.iso.org/sites/tc44/home/interpretation.html>.

Resistance welding — Spot welding of aluminium and aluminium alloys — Weldability, welding and testing

1 Scope

This document specifies requirements for resistance spot welding in the fabrication of assemblies of aluminium sheet, extrusions (both work- and age-hardening alloys) and/or cast material comprising two or three thicknesses of metal, where the maximum single (sheet) thickness of components to be welded is within the range 0,6 mm to 6 mm.

This document is applicable to the welding of sheets or plates of dissimilar thickness where the thickness ratio is less than or equal to 3:1. It applies to the welding of three thicknesses where the total thickness is less than or equal to 9 mm.

Welding with the following types of machines is within the scope of this document:

- pedestal welding machines;
- gun welders;
- automatic welding equipment where the components are fed by robots or automatic feeding equipment;
- multi-welders;
- robotic welders.

Information on appropriate welding equipment is given in [Annex A](#) and on spot welding conditions in [Annex B](#). The latter are for guidance only and can require modification depending on service conditions of the fabrication, type of welding equipment, characteristics of the secondary circuit, electrode material and geometry.

The welding of coated material, e.g. zinc-coated or anodized material, is outside the scope of this document.

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 209, *Aluminium and aluminium alloys — Chemical composition*

ISO 669, *Resistance welding — Resistance welding equipment — Mechanical and electrical requirements*

ISO 3522, *Aluminium and aluminium alloys — Castings — Chemical composition and mechanical properties*

ISO 5182, *Resistance welding — Materials for electrodes and ancillary equipment*

ISO 5184, *Straight resistance spot welding electrodes*

ISO 5821, *Resistance welding — Spot welding electrode caps*

ISO 5830, *Resistance spot welding — Male electrode caps*

ISO 10447, *Resistance welding — Testing of welds — Peel and chisel testing of resistance spot and projection welds*

ISO 14273, *Resistance welding — Destructive testing of welds — Specimen dimensions and procedure for tensile shear testing resistance spot and embossed projection welds*

ISO 15614-12, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 12: Spot, seam and projection welding*

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

ISO 18278-2, *Resistance welding — Weldability — Part 2: Evaluation procedures for weldability in spot welding*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 669 and ISO 17677-1 apply.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

4 Material

4.1 Form

The material shall be according to ISO 209 and ISO 3522.

4.2 Types of aluminium alloys

A partial list of aluminium alloys is given in [Annex C](#).

5 Surface conditions

Prior to welding, all surfaces shall be checked for their suitability for spot welding. The surfaces should preferably be free from oil, grease, lubricant, visible oxidation, paint, dirt or excessive scratches. If necessary, appropriate surface treatment, e.g. chemical etching, shall be carried out. Unless specifically developed for spot welding, mill-finish surfaces are generally not suitable for spot welding and can need pre-treatment. Die-cast material shall be free from excessive surface roughness and imperfections, e.g. as caused by washing out of the die material. Aluminium manufacturers and component suppliers can produce surface-treated material suitable for spot welding, e.g. with TiZr conversion coating. In addition, coated material can be supplied with chromate or phosphate passivation. Phosphated aluminium may be used in certain applications. Excessive quantities of dissolved gases in die-cast material shall be avoided. These materials can be spot welded, although adjustment of the welding parameters is generally necessary as outlined in [Annex B](#).

In all cases, the surface condition and any surface treatment shall be recorded in the testing documentation.

The stability of surface condition can be evaluated by measuring the transition resistance in accordance with ISO 18594.

6 Edge distance, edge conditions, form of component and weld spacing

The components to be welded shall be free from burrs or other defects, which can, in any way, interfere with interface contact or require excessive force to fit the parts together.