



SLOVENSKI STANDARD
oSIST prEN ISO 25239-2:2019

01-julij-2019

Varjenje z gnetenjem - Aluminij - 2. del: Zasnova zvarnih spojev (ISO/DIS 25239-2:2019)

Friction stir welding - Aluminium - Part 2: Design of weld joints (ISO/DIS 25239-2:2019)

Rührreibschweißen - Aluminium - Teil 2: Ausführung der Schweißverbindungen (ISO/DIS 25239-2:2019)

Soudage par friction-malaxage - Aluminium - Partie 2: Conception des assemblages soudés (ISO/DIS 25239-2:2019)

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Ta slovenski standard je istoveten z: prEN ISO 25239-2

ICS:

25.160.10	Varilni postopki in varjenje	Welding processes
77.120.10	Aluminij in aluminijeve zlitine	Aluminium and aluminium alloys

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DRAFT INTERNATIONAL STANDARD

ISO/DIS 25239-2

IIW

Secretariat: **ISO secretariat**Voting begins on:
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Friction stir welding — Aluminium —

Part 2: Design of weld joints

Soudage par friction-malaxage — Aluminium —

Partie 2: Conception des assemblages soudés

ICS: 25.160.40; 25.160.10

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Member bodies are requested to consult relevant national interests in ISO/TC 44/SC 10 before casting their ballot to the e-Balloting application.

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING

This draft International Standard is submitted to all ISO member bodies for voting, as a standard prepared by an international standardizing body in accordance with Council Resolution 42/1999. The proposer, the International Institute of Welding (IIW), has been recognized by the ISO Council as an international standardizing body for the purpose of Council Resolution 42/1999.

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ISO/DIS 25239-2:2019(E)

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 IIW, International Institute of Welding, Commission III, *Resistance Welding, Solid State Welding and Allied Joining Process*.

This second edition cancels and replaces the first edition (ISO 25239-2:2011), which has been technically revised.

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

- to be entered closer to publication.

A list of all parts in the ISO 25239- series can be found on the ISO website.

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.

Introduction

Welding processes are widely used in the fabrication of engineered structures. During the second half of the twentieth century, fusion welding processes, wherein fusion is obtained by the melting of parent material and usually a filler metal, dominated the welding of large structures. Then, in 1991, Wayne Thomas at TWI invented friction stir welding (FSW), which is carried out entirely in the solid phase (no melting).

The increasing use of FSW has created the need for this document in order to ensure that welding is carried out in the most effective way and that appropriate control is exercised over all aspects of the operation. This document focuses on the FSW of aluminium because, at the time of publication, the majority of commercial applications for FSW involved aluminium. Examples include railway carriages, consumer products, food processing equipment, aerospace structures, and marine vessels.

The parts of this document are:

- Part 1: Vocabulary, defines terms specific to FSW.
- Part 2: Design of weld joints, specifies design requirements for friction stir weld joints in aluminium.
- Part 3: Qualification of welding operators, specifies requirements for the qualification of a welding operator for the FSW of aluminium.
- Part 4: Specification and qualification of welding procedures, specifies requirements for the specification and qualification of welding procedures for the FSW of aluminium. A welding procedure specification (WPS) is needed to provide a basis for planning welding operations and for quality control during welding. Welding is considered a special process in the terminology of standards for quality systems. Standards for quality systems usually require that special processes be carried out in accordance with written procedure specifications. Metallurgical deviations constitute a special problem. Because non-destructive testing of the mechanical properties is impossible at the present level of technology, this has resulted in the establishment of a set of rules for qualification of the welding procedure prior to the release of the WPS to actual production. ISO 25239-4 defines these rules.
- Part 5: Quality and inspection requirements, specifies a method for determining the capability of a fabricator to use the FSW process for the production of aluminium products of the specified quality. It defines specific quality requirements but does not assign those requirements to any specific product group. To be effective, welded structures should be free from serious problems in production and in service. To achieve that goal, it is necessary to provide controls from the design phase through material selection, fabrication, and inspection. For example, poor design can create serious and costly difficulties in the workshop, on site, or in service. Incorrect material selection can result in welding problems, such as cracking. Welding procedures have to be correctly formulated and qualified to avoid imperfections. To ensure the fabrication of a quality product, management should understand the sources of potential trouble and introduce appropriate quality and inspection procedures. Supervision should be implemented to ensure that the specified quality is achieved.

Friction stir welding — Aluminium —

Part 2: Design of weld joints

1 Scope

This part of ISO 25239 specifies design requirements for friction stir weld joints. In this document, the term “aluminium” refers to aluminium and its alloys.

This document does not apply to friction stir spot welding which is covered by the ISO 18785- series.

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 2553, *Welding and allied processes — Symbolic representation on drawings — Welded joints*

ISO 25239-1, *Friction stir welding — Aluminium — Part 1: Vocabulary*

ISO 25239-3, *Friction stir welding — Aluminium — Part 3: Qualification of welding operators*

ISO 25239-4, *Friction stir welding — Aluminium — Part 4: Specification and qualification of welding procedures*

ISO 25239-5, *Friction stir welding — Aluminium — Part 5: Quality and inspection requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 25239-1 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 Design requirements

4.1 Documentation

The weldment shall be designed in accordance with defined requirements that support the end use of the product. Documentation shall define all requirements for the weld. Essential process controls shall be defined to substantiate that all design requirements can be met by the welds that were produced in accordance with the welding procedure specification (WPS) and inspection requirements.

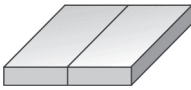
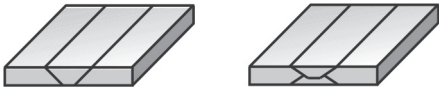
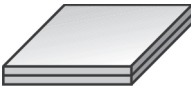
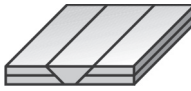
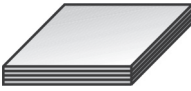
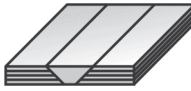
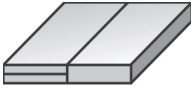
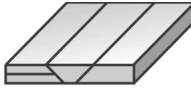
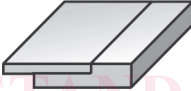
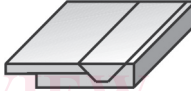
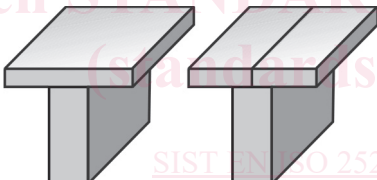
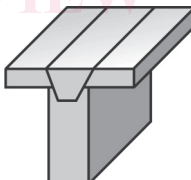
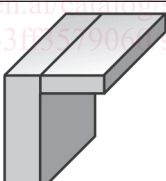
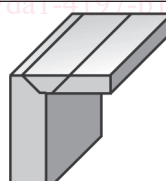
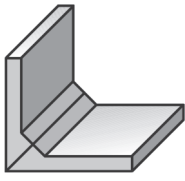
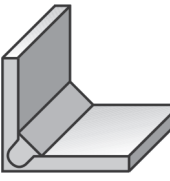
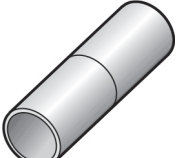
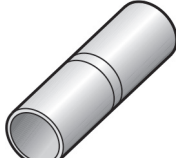
Weld symbols shall be in accordance with ISO 2553.

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4.2 Joint design

The weld joint design shall take into account the necessary material property data. Some examples of weld joints are shown in Table 1.

Table 1 — Various weld joints shown before and after friction stir welding

	Joint design	Before welding	After welding
1	Butt joint		
2	Lap joint		
3	Multi sheet lap joint		
4	Half overlap		
5	Combination of a lap joint and butt joint		
6	T-joint		
7	Corner joint		
8	Fillet joint		
9	Circumferential butt joint		

4.2.1 Butt joints

Essential variables shall be defined in the WPS as specified in ISO 25239, Part 4.

4.2.2 Lap joints

The distance from the centreline of the tool to the edge of each overlapping member shall be specified in the WPS. The depth of penetration of the probe into the lap joint shall be specified in the WPS.