

Friction stir welding - Aluminium - Part 2: Design of weld joints (ISO 25239-2:2011)

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

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English Version

**Friction stir welding - Aluminium - Part 2: Design of weld joints
(ISO 25239-2:2011)**

Soudage par friction-malaxage - Aluminium - Partie 2:
Conception des assemblages soudés (ISO 25239-2:2011)

Rührreibschweißen - Aluminium - Teil 2: Ausführung der
Schweißverbindungen (ISO 25239-2:2011)

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Foreword

This document (EN ISO 25239-2:2011) has been prepared by the International Institute of Welding in collaboration with Technical Committee CEN/TC 121 "Welding" 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of an identical text or by endorsement, at the latest by June 2012, and conflicting national standards shall be withdrawn at the latest by June 2012.

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

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Endorsement notice

The text of ISO 25239-2:2011 has been approved by CEN as a EN ISO 25239-2:2011 without any modification.

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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 International Standard 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 International Standard 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 International Standard are listed in the foreword.

Part 1 defines terms specific to FSW.

Part 2 specifies design requirements for FSW joints in aluminium.

Part 3 specifies requirements for the qualification of an operator for the FSW of aluminium.

Part 4 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 specifies a method for determining the capability of a manufacturer 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 may 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 part of ISO 25239, the term “aluminium” refers to aluminium and its alloys.

This part of ISO 25239 does not apply to friction stir spot welding.

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 2553, *Welded, brazed and soldered joints — Symbolic representation on drawings*

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.

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 clearly define the essential information of the weld and any special requirements, e.g. fracture critical, durability critical, mission critical, or safety critical, that are imposed over and above the general requirements. 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 those shown in ISO 2553.