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**Popis in kvalifikacija varilnih postopkov za kovinske materiale - Preskus varilnega postopka - 2. del: Obločno varjenje aluminija in njegovih zlitin (ISO/DIS 15614-2:2022)**

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 2: Arc welding of aluminium and its alloys (ISO/DIS 15614-2:2022)

Anforderung und Qualifizierung von Schweißverfahren für metallische Werkstoffe - Schweißverfahrensprüfung - Teil 2: Lichtbogenschweißen von Aluminium und seinen Legierungen (ISO/DIS 15614-2:2022)

Descriptif et qualification d'un mode opératoire de soudage pour les matériaux métalliques - Épreuve de qualification d'un mode opératoire de soudage - Partie 2: Soudage à l'arc de l'aluminium et de ses alliages (ISO/DIS 15614-2:2022)

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77.120.10	Aluminij in aluminijeve zlitine	Aluminium and aluminium alloys

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## Specification and qualification of welding procedures for metallic materials — Welding procedure test —

### Part 2: Arc welding of aluminium and its alloys

*Descriptif et qualification d'un mode opératoire de soudage pour les matériaux métalliques — Épreuve de qualification d'un mode opératoire de soudage —*

*Partie 2: Soudage à l'arc de l'aluminium et de ses alliages*

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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](http://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](http://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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 10, *Quality management in the field of welding*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 121, *Welding*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the second edition (ISO 15614-2:2005, Cor1:2005 and Cor2:2009), which has been technically revised. The main changes compared to the previous edition are as follows:

— xxx xxxxxxxx xxx xxxxx

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](http://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>.

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### Introduction

The primary purpose of welding procedure qualification is to demonstrate that the joining process proposed for construction is capable of producing joints having the required mechanical properties for the intended application.

All new welding procedure tests are to be carried out in accordance with this document from the date of this issue.

However, this document does not invalidate previous welding procedure tests made to former standards or specifications or previous issues of this document.

Where additional tests have to be carried out to make the qualification technically equivalent, it is only necessary to do the additional tests on a test piece which should be made in accordance with this document.

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# Specification and qualification of welding procedures for metallic materials — Welding procedure test —

## Part 2: Arc welding of aluminium and its alloys

### 1 Scope

This document specifies how a preliminary welding procedure specification is qualified by welding procedure tests.

This document applies to production welding, repair welding and build-up welding.

This document defines the conditions for the execution of welding procedure tests and the range of qualification for welding procedures for all practical welding operations within the qualification of this document.

This document applies to the arc welding of wrought and cast aluminium and its alloys. In this document the term aluminium stands for aluminium and for aluminium alloys.

This document does not apply to finishing welding of aluminium castings which is dealt by ISO 15614-4.

Arc welding of aluminium is covered by the following welding processes in accordance with ISO 4063:

131 — MIG welding with solid wire electrode;

141 — TIG welding with solid filler material (wire/rod);

142 — Autogenous TIG welding;

15 — plasma arc welding.

NOTE Specific service, material or manufacturing conditions may require more comprehensive testing than is specified by this document (see 7.1).

The principles of this document may be applied to other fusion welding processes.

### 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 2107, *Aluminium and aluminium alloys — Wrought products — Temper designations*

ISO 3452-1, *Non-destructive testing — Penetrant testing — Part 1: General principles*

ISO 4136, *Destructive tests on welds in metallic materials — Transverse tensile test*

ISO 5173, *Destructive tests on welds in metallic materials — Bend tests*

ISO 6947, *Welding and allied processes — Welding positions*

ISO 9017, *Destructive tests on welds in metallic materials — Fracture test*

ISO 9606-2, *Qualification test of welders — Fusion welding — Part 2: Aluminium and aluminium alloys*

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ISO 10042:2018, *Welding — Arc-welded joints in aluminium and its alloys — Quality levels for imperfections*

ISO 14175, *Welding consumables — Gases and gas mixtures for fusion welding and allied processes*

ISO 14732, *Welding personnel — Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials*

ISO 15607, *Specification and qualification of welding procedures for metallic materials — General rules*

ISO/TR 15608, *Welding — Guidelines for a metallic materials grouping system*

ISO 15609-1, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 1: Arc welding*

ISO 15613, *Specification and qualification of welding procedures for metallic materials — Qualification based on pre-production welding test*

ISO 17636, *Non-destructive testing of welds — Radiographic testing of fusion-welded joints*

ISO 17637, *Non-destructive testing of welds — Visual testing of fusion-welded joints*

ISO 17639, *Destructive tests on welds in metallic materials — Macroscopic and microscopic examination of welds*

ISO 17640, *Non-destructive testing of welds — Ultrasonic testing — Techniques, testing levels, and assessment*

ISO/TR 17671-1, *Welding — Recommendations for welding of metallic materials — Part 1: General guidance for arc welding*

ISO/TR 17671-4, *Welding — Recommendations for welding of metallic materials — Part 4: Arc welding of aluminium and aluminium alloys*

### **3 Terms and definitions**

For the purposes of this document, the terms and definitions given in ISO 15607 and the following 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 <https://www.electropedia.org/>

#### **3.1 finishing welding**

welding carried out during production in order to remove casting defects and core openings to ensure the agreed quality of castings

#### **3.2 examiner**

person who has been appointed to verify compliance with the applicable standard

Note 1 to entry: In certain cases, an external independent examiner may be required.

#### **3.3 examining body**

organization appointed to verify compliance with the applicable standard

Note 1 to entry: In certain cases, an external independent examining body can be required.

## 4 Preliminary welding procedure specification (pWPS)

The preliminary welding procedure specification shall be prepared in accordance with ISO 15609-1. It shall specify the tolerance for all the relevant parameters.

Guidance on welding of aluminium is given in ISO/TR 17671-1 and ISO/TR 17671-4.

## 5 Welding procedure test

The welding and testing of test pieces shall be in accordance with [Clauses 6](#) and [7](#).

The welder or welding operator who undertakes the welding procedure test satisfactorily in accordance with this document is qualified for the appropriate range of qualification in accordance with ISO 9606-2 or ISO 14732, providing that the relevant testing requirements are met.

## 6 Test piece

### 6.1 General

The welded joint to which the welding procedure will relate in production shall be represented by making a standardized test piece or pieces, as specified in [6.2](#). Where the production/joint geometry requirements do not represent the standardized test pieces as shown in this document, ISO 15613 shall be used.

### 6.2 Shape and dimensions of test pieces

#### 6.2.1 General

The length or number of test pieces shall be sufficient to allow all required tests to be carried out.

Additional test pieces, or longer test pieces than the minimum size, may be prepared in order to allow for extra and or for re-testing specimens (see [7.6](#)).

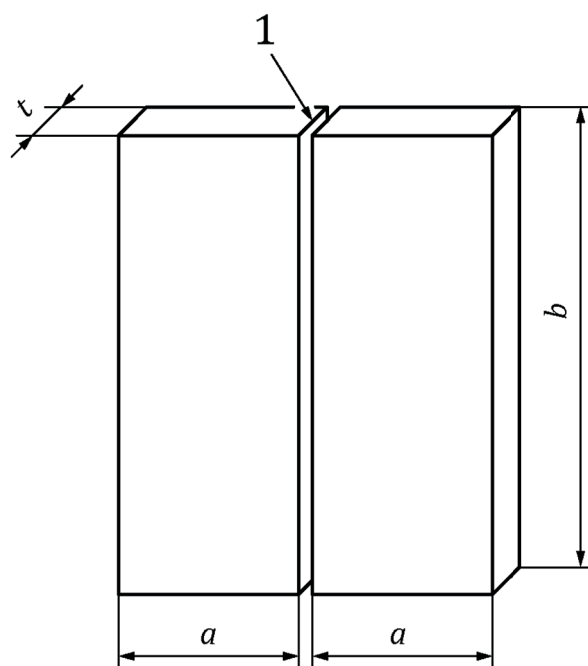
For all test pieces except branch connections (see [Figure 4](#)) and T-joints (and T-joints (T-butt weld or fillet weld; see [Figure 3](#)), the material thickness,  $t$ , and the diameter,  $D$ , shall be the same for both plates and pipes on the required length of the test piece to be welded. If required by the application standard, the direction of working, e.g. for extrusion, shall be marked on the test piece.

The material thickness and/or pipe outside diameter of the test pieces shall be selected in accordance with [8.3.2.1](#) to [8.3.2.4](#).

The shape and minimum dimensions of the test piece shall be as follows:

#### 6.2.2 Butt joint in plate with full penetration

The test piece shall be prepared in accordance with [Figure 1](#).

**Key**

- 1 joint preparation and fit-up as detailed in the preliminary Welding Procedure Specification (pWPS)  
 $a$  minimum value 150 mm  
 $b$  minimum value 300 mm (transverse bend test specimens may require a larger  $a$ , see 7.4)  
 $t$  material thickness

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**Figure 1 — Test piece for a butt joint in plate with full penetration**

**6.2.3 Butt joint in pipe with full penetration**

The test piece shall be prepared in accordance with [Figure 2](#).

NOTE The word "pipe" alone or in combination is used to mean "pipe", "tube" or "hollow section".

**6.2.4 T-joint**

The test piece shall be prepared in accordance with [Figure 3](#).

This may be used for fully penetrated butt welds or fillet welds.