



**SLOVENSKI STANDARD**  
**oSIST prEN ISO 14555:2024**  
**01-september-2024**

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**Varjenje - Obločno varjenje čepov iz kovinskih materialov (ISO/DIS 14555:2024)**

Welding - Arc stud welding of metallic materials (ISO/DIS 14555:2024)

Schweißen - Lichtbogenbolzenschweißen von metallischen Werkstoffen (ISO/DIS 14555:2024)

Soudage - Soudage à l'arc des goujons sur les matériaux métalliques (ISO/DIS 14555:2024)

**Ta slovenski standard je istoveten z: prEN ISO 14555**

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25.160.10	Varilni postopki in varjenje	Welding processes

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# DRAFT International Standard

## ISO/DIS 14555

### Welding — Arc stud welding of metallic materials

*Soudage — Soudage à l'arc des goujons sur les matériaux  
métalliques*

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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 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](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*.

This fifth edition cancels and replaces the third edition (ISO 14555:2017), of which has been technical revised.

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

- the normative references and bibliography have been updated;
- terms and definitions revised and definition for *weld pool protection* added;
- subclauses under [9.10](#) (welding variables) deleted and content merged under [9.10](#);
- [Table 1](#) to Table 3 regarding examination and testing merged in one table;
- under [clause 11](#) (examination and testing) added that surface crack detection by magnetic test (MT) or penetration test (PT) is not suitable;
- torque test deleted;
- informative [Annex A](#) (processing of stud welding) deleted;
- informative [Annexes D](#) and [E](#) regarding *Welding Procedure Qualification Record (WPQR) form* merged in one single annex;
- informative Annexes F and G regarding *Production Test* merged in one single annex.

Requests for official interpretations of any aspect of this document should be directed to the Secretariat of ISO/TC 44/SC 10 via your national standards body. A complete listing of these bodies can be found at [www.iso.org](http://www.iso.org).

**ISO/DIS 14555:2024(en)****Introduction**

The purpose of arc stud welding is to weld predominantly pin-shaped metal parts to metal workpieces. In this document, it is referred to simply as stud welding. Among other things, stud welding is used in bridge building (especially in composite structures), steel structures, shipbuilding, facade-wall fabrication, vehicle manufacture, apparatus engineering, steam-boiler construction, and the manufacture of household appliances.

The quality of a stud weld depends not only on strict compliance with the welding procedure specification but also on the correct function of the actuating mechanism (e.g. welding guns), and on the condition of the components, of the accessories and of the power supply.

This document does not invalidate former specifications, providing the technical requirements are equivalent and satisfied.

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# Welding — Arc stud welding of metallic materials

## 1 Scope

This document covers arc stud welding of metallic materials subject to static and fatigue loading. It specifies requirements that are particular to stud welding, in relation to welding knowledge, quality requirements, welding procedure specification, welding procedure qualification, qualification testing of operators and testing of production welds.

This document is appropriate where it is necessary to demonstrate the capability of a manufacturer to produce welded construction of a specified quality.

NOTE General quality requirements for fusion welding of metallic materials are given in ISO 3834-1, ISO 3834-2, ISO 3834-3, ISO 3834-4 and ISO 3834-5.

This document has been prepared in a comprehensive manner, with a view to it being used as a reference in contracts. The requirements contained within it can be adopted in full, or partially, if certain requirements are not relevant to a particular construction (see [Annex A](#)). For the working range of stud welding, see [Annex B](#).

## 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 3834-1, *Quality requirements for fusion welding of metallic materials — Part 1: Criteria for the selection of the appropriate level of quality requirements*

ISO 3834-2, *Quality requirements for fusion welding of metallic materials — Part 2: Comprehensive quality requirements*

ISO 3834-3, *Quality requirements for fusion welding of metallic materials — Part 3: Standard quality requirements*

ISO 3834-4, *Quality requirements for fusion welding of metallic materials — Part 4: Elementary quality requirements*

ISO 4063, *Welding, brazing, soldering and cutting — Nomenclature of processes and reference numbers*

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

ISO 9606-1, *Qualification testing of welders — Fusion welding — Part 1: Steels*

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

ISO 13918, *Welding — Studs and ceramic ferrules for arc stud welding*

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

ISO 14731, *Welding coordination — Tasks and responsibilities*

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*

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

ISO 15611, *Specification and qualification of welding procedures for metallic materials — Qualification based on previous welding experience*

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

ISO 17636 (all parts), *Non-destructive testing of welds — Radiographic testing*

ISO/TR 25901-3, *Welding and allied processes — Vocabulary — Part 3: Welding processes*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 3834-1, ISO 4063, ISO 14731, ISO 14732, ISO 15607 and ISO/TR 25901-3 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

##### **stud**

fastener to be attached by stud welding

#### 3.2

##### **auxiliaries**

ceramic ferrules and shielding gases

#### 3.3

##### **stud-welding operator**

operating personnel for stud-welding equipment

Note 1 to entry: In special cases (e.g. mass production at the manufacturer's factory), the welding can be carried out by suitable auxiliary personnel, appropriately trained and supervised.

#### 3.4

##### **stud diameter**

$d$

stud (3.1) nominal diameter

Note 1 to entry: See ISO 13918.

Note 2 to entry: For non-round studs, the cross-section can be converted to an equivalent diameter.

#### 3.5

##### **welding diameter**

$d_w$

diameter of the stud at the base before welding

Note 1 to entry: For non-round studs, the cross-section can be converted to an equivalent diameter.

#### 3.6

##### **weld zone**

joining zone in the area of the nominal stud cross-section

#### 3.7

##### **current intensity**

root-mean-square (RMS) value of the welding current in the steady state during the burning time of the arc

Note 1 to entry: Current intensity is not applicable to capacitor discharge.

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**3.8****welding time**

time difference between the ignition and the final extinction of the main arc

**3.9****lift**

*L*

distance between the stud tip and the work piece surface with the stud-lifting mechanism in position and activated

Note 1 to entry: For tip ignition, this definition applies to the ignition gap.

**3.10****plunge**

axial movement of the *stud* (3.1) towards the surface of the work piece

**3.11****protrusion**

*P*

<unregulated lifting mechanism> distance between the tip of the *stud* (3.1) and the face of the support device in their initial positions, where the support device faces the work piece

Note 1 to entry: A spring-loaded lifting mechanism is an unregulated lifting mechanism.

**3.12****arc blow**

magnetic deflection of the arc from the axial direction of the *stud* (3.1)

**3.13****flux**

aluminium additive on the weld end of the *stud* (3.1), which improves the ignition and de-oxidizes the weld pool

**3.14****dual-material stud**

two-material *stud* (3.1) composed of a material at the weld tip, similar to that of the parent material, and a dissimilar material outside the weld tip, which are joined by a friction weld, thus avoiding a mixed structure in the *weld zone* (3.6) when stud welding

**3.15****structure subjected to fatigue loading**

structure subject to a set of typical load events described by the positions or movements of loads, their variation in intensity and their frequency and sequence of occurrence

**3.16****through-deck stud-welding**

application where shear connectors are welded to a steel structure through thin steel sheet with a thickness of less than 3 mm

**3.17****weld pool protection**

Use of either ceramic ferrules or shielding gas to protect the weld pool from the atmosphere

**3.18****wetted welding**

used of wetting agents to improve the visual appearance of the weld

**3.19****magnetic influence**

using an external magnetic field to influence the motion of the arc

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### 4 Symbols and abbreviated terms

#### 4.1 Symbols

For the purposes of this document, the following symbols apply.

$C$	capacitance (expressed in mF)
$d$	stud diameter (expressed in mm)
$d_w$	welding diameter (expressed in mm)
$h$	length of the threaded part of the nut
$I$	current intensity (expressed in A)
$L$	lift
$P$	protrusion
$t$	thickness of plate
$t_w$	welding time (expressed in ms or s)
$T$	torque (expressed in Nm)
$U$	charging voltage (expressed in V)
$E$	charging energy (expressed in Ws)
$\alpha$	bending angle (expressed in °)

#### 4.2 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply.

CF	ceramic ferrule
HAZ	heat-affected zone
NP	no protection
PA	flat welding position
PC	horizontal welding position
PE	overhead welding position
pWPS	preliminary welding procedure specification
SG	shielding gas
WPS	welding procedure specification
WPQR	welding procedure qualification record