



SLOVENSKI STANDARD
oSIST prEN ISO 18278-3:2016
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Uporovno varjenje - Varivost - 3. del: Postopki vrednotenja varivosti pri tehniki sočasnega točkovnega uporovnega varjenja in lepljenja (ISO/DIS 18278-3:2016)

Resistance welding - Weldability - Part 3: Evaluation procedures for weldability in spot weld bonding (ISO/DIS 18278-3:2016)

Widerstandsschweißen - Schweißeignung - Teil 3: Verfahren zum Bewerten der Eignung für das Widerstandspunktschweißkleben (ISO/DIS 18278-3:2016)

Soudage par résistance - Soudabilité - Partie 3: Méthodes d'évaluation de l'aptitude au soudocollage par points (ISO/DIS 18278-3:2016)

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Resistance welding — Weldability —

Part 3: Evaluation procedures for weldability in spot weld bonding

Soudage par résistance — Soudabilité —

Partie 3: Méthodes d'évaluation de l'aptitude au soudocollage par points

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ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five month enquiry.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.



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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 44/SC 6, *Resistance Welding and allied mechanical joining*.

ISO 18278 consists of the following parts, under the general title *Resistance Welding — Weldability*

- *Part 1: General requirements for the evaluation of weldability for resistance spot, seam and projection welding of metallic materials*
- *Part 2: Alternative procedures for the evaluation of spot weldability*
- *Part 3: Evaluation procedures for weldability in spot weld bonding*

Introduction

This document describes procedures for evaluating the weldability of weld bonding using the resistance spot welding process by determining the welding current range and electrode life.

These procedures can be used to evaluate the following:

- a) the effect of electrode material, shape, dimensions and electrode cooling;
- b) the effect of material types and thicknesses and coatings being welded;
- c) the effect of welding conditions;
- d) the effect of welding equipment;
- e) the effect of adhesive on welding.

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Resistance welding — Weldability —

Part 3:

Evaluation procedures for weldability in spot weld bonding

1 Scope

This document specifies procedures for the determination of the acceptable welding current range and the electrode life for spot weld bonding using resistance spot welding with adhesive bonding.

This document is applicable for the evaluation of the weldability of prepared assemblies of uncoated and coated metal sheets with individual thicknesses from 0,4 mm to 6,0 mm.

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

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

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

ISO 5183-1, *Resistance welding equipment — Electrode adaptors, male taper 1:10 — Part 1: Conical fixing, taper 1:10*

ISO 6520-2, *Welding and allied processes — Classification of geometric imperfections in metallic materials — Part 2: Welding with pressure*

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

ISO 14272, *Resistance welding — Destructive testing of welds — Specimen dimensions and procedure for cross tension testing of resistance spot and embossed 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 14327, *Resistance welding — Procedures for determining the weldability lobe for resistance spot, projection and seam welding*

ISO 14329, *Resistance welding — Destructive tests of welds — Failure types and geometric measurements for resistance spot, seam and projection welds*

ISO 14373, *Resistance welding — Procedure for spot welding of uncoated and coated low carbon steels*

ISO 15609-5, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 5: Resistance welding*

ISO 17657-1, *Resistance welding — Welding current measurement for resistance welding — Part 1: Guidelines for measurement*

ISO 17657-2, *Resistance welding — Welding current measurement for resistance welding — Part 2: Welding current meter with current sensing coil*

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ISO 17657-3, *Resistance welding — Welding current measurement for resistance welding — Part 3: Current sensing coil*

ISO 17657-4, *Resistance welding — Welding current measurement for resistance welding — Part 4: Calibration system*

ISO 17657-5, *Resistance welding — Welding current measurement for resistance welding — Part 5: Verification of welding current measuring system*

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

ISO 18278-1, *Resistance welding — Weldability — Part 1: General requirements for the evaluation of weldability for resistance spot, seam and projection welding of metallic materials*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in ISO 669, ISO 14373, ISO 17677-1 and ISO 18278-1 and the following apply.

3.1**spot weld bonding**

resistance spot welding through an adhesive or sealant

3.2**substrate**

material upon the surface of which an adhesive is spread for weld bonding

3.3**prepared assembly**

set of components (substrates and adhesives) positioned prior to welding

4 Weld bonding equipment**4.1 General**

Methods to characterize resistance welding equipment can be found in ISO 669.

The mass and friction of the movable electrode assembly can be determined in accordance with ISO 18278-1.

4.2 Adhesive dispensing equipment

The adhesive dispensing equipment shall be defined by agreement between the contracting parties.

4.3 Storage chamber

The storage chamber shall have a temperature regulation system that is sufficient to maintain the properties of the adhesive or sealant, as required by the manufacturer of the adhesive or sealant. .

4.4 Electrodes

The electrodes shall be of type A 2/2 material as defined in ISO 5182. Their geometry shall be defined according ISO 5821.

4.5 Welding current

The type of welding current used (AC or DC) shall be specified before testing, and recorded. Constant current control settings shall be used.

When using AC resistance welding equipment, it shall be set so that welding current is not less than 30 % of R.M.S. value at full conduction angle.

4.6 Mechanical settings

The mechanical settings shall be chosen to limit the impact of the electrode meeting the sheet.

NOTE To limit the impact of the electrode an electrode approach speed of 0,15 m/s is recommended and/or the peak force should be less than 150 % of the nominal electrode force.

The machine squeeze time should be of sufficient duration to overcome electrode bounce effects and machine inertia so as to allow the electrode force to build up to the required value before the welding current is initiated.

4.7 Measurement of parameters

4.7.1 Temperature

The ambient temperature shall be measured.

4.7.2 Amount of adhesive applied

Measurement of the amount of adhesive applied shall be carried out as defined by the contracting parties.

EXAMPLE Methods of measurements are e.g. by a calliper gauge, by a scale magnifier, by relative weighing.

4.7.3 Welding current and electrode force

Measurement of welding current and electrode force requirements shall be in accordance with ISO 18278-1.

4.7.4 Electrode cooling water flow rate

Since water cooling significantly influences electrode life, the inlet water temperature should be maintained at 20 °C and shall not exceed 30 °C. A separate water supply should be used for each electrode, and the water flow rate for each electrode shall be a minimum of 4 l/min. The water cooling tube should be arranged to ensure that the water directly cools the electrode.

Dimensions of the water cooling holes and pipes shall comply with the relevant requirements of the appropriate ISO Standard for various electrode types. The distance between the back and working face of the electrode should not exceed the values given in ISO 5821 which specifies electrode dimensions.

Any deviations shall be recorded.

All machine and water cooling details shall be recorded in the format presented in [Clause 8](#).

4.8 Measurement of results

4.8.1 Weld diameter

After the destructive testing, the weld diameter shall be measured, see ISO 17677-1.

4.8.2 Detection of expulsion

Occurrence of expulsion shall be determined by

— the electrode displacement curve,