SLOVENSKI STANDARD
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Uporovno varjenje - Postopek točkovnega varjenja neprevlečenih in prevlečenih malooglјičnih jekel (ISO/DIS 14373:2023)

Resistance welding - Procedure for spot welding of uncoated and coated low carbon steels (ISO/DIS 14373:2023)

Widerstandsschweißen - Verfahren zum Punktschweißen von niedriglegierten Stählen mit oder ohne metallischem Überzug (ISO/DIS 14373:2023)

Soudage par résistance - Mode opératoire pour le soudage par points des aciers à bas carbone revêtus et non revêtus (ISO/DIS 14373:2023)

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Resistance welding — Procedure for spot welding of uncoated and coated low carbon steels

Soudage par résistance — Mode opératoire pour le soudage par points des aciers à bas carbone revêtus et non revêtus

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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).

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 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

ISO 14373 was prepared by ISO/TC 44/SC 6 *Resistance welding*. Requests for official interpretations of any aspect of this International Standard should be directed to the ISO Central Secretariat, who will forward them to the IIW Secretariat for an official response.

This third edition cancels and replaces the second edition (ISO 14373:2015), which has been technically revised to align it with ISO 17677-1.

Introduction

This International Standard no longer includes figures showing failure types and modes for tensile shear and cross tension testing in accordance with ISO 17677-1.

Resistance welding — Procedure for spot welding of uncoated and coated low carbon steels

1 Scope

This document specifies requirements for resistance spot welding in the fabrication of assemblies of uncoated, and metallic coated or weldable non-metallic coated low carbon steel, comprising two or three sheets of metal, where the maximum single sheet thickness of components to be welded is within the range 0,4 mm to 3 mm.

This document is applicable to welding of sheets of the same or unequal thickness, where the thickness ratio is less than or equal to 3:1. It applies to the welding of three sheets, where the total thickness is less than or equal to 9 mm.

Welding with the following types of equipment is within the scope of this document:

a) pedestal welding equipment;

b) portable welding guns;

c) automatic welding equipment where the components are fed by robots or automatic feeding equipment;

d) multi-spot welding machine;

e) robotic welding machine.

Information on appropriate welding equipment is given in Annex A, and information on spot welding conditions is given in Annex B. This information is provided for guidance only.

Depending on the service conditions of the fabrication, the type of welding equipment, the characteristics of the secondary circuit, electrode force actuation system,, the electrode material, and the shape, it is possible that certain modifications are necessary. In such cases, further information can be obtained from the relevant application standard, where one exists.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 3573, *Hot-rolled carbon steel sheet of commercial and drawing qualities*

ISO 3574, *Cold-reduced carbon steel sheet of commercial and drawing qualities*

ISO 3575, *Continuous hot-dip zinc-coated and zinc-iron alloy-coated carbon steel sheet of commercial and drawing qualities*

ISO 4950-1, *High yield strength flat steel products — Part 1: General requirements*

ISO 4950-2, *High yield strength flat steel products — Part 2: Products supplied in the normalized or controlled rolled condition*

ISO 4998, *Continuous hot-dip zinc-coated and zinc-iron alloy-coated carbon steel sheet of structural quality*

ISO 5000, *Steel sheet, aluminium-silicon alloy-coated by the continuous hot-dip process, of commercial and drawing qualities*

ISO 5002, *Hot-rolled and cold-reduced electrolytic zinc-coated carbon steel sheet of commercial and drawing qualities*

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

ISO 5184, *Straight resistance spot welding electrodes*

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

ISO 5830, *Resistance spot welding — Male electrode caps*

ISO 9364, *Steel sheet, 55 % aluminium-zinc alloy-coated by the continuous hot-dip process, of commercial, drawing and structural qualities*

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

ISO 14270, *Resistance welding — Destructive testing of welds — Specimen dimensions and procedure for mechanized peel testing resistance spot, seam and embossed 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 15609-5, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 5: Resistance welding*

ISO 15614-12, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 12: Spot, seam and projection welding*

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*

ISO 18272-2, *Resistance welding — Weldability — Part 2: Alternative procedures for the assessment of sheet steels for spot welding*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17677-1 and the following apply.

3.1
weld pitch
centre-to-centre distance between adjacent spot welds

3.2
edge distance
distance from the edge of the component to the centre of a weld

4 Symbols and abbreviated terms

See Table 1.

Table 1 — Symbols and definitions

Symbol	Term	Unit
d_w	weld diameter (see ISO 17677-1)	mm
d_e	electrode tip diameter	mm
t	sheet thickness	mm

5 Materials

5.1 Form

The steel shall be flat rolled, in coil or cut to length, and shall be free from harmful imperfections.

5.2 Coatings

A partial list of coatings to which this document is applicable is given in Annex C.

6 Surface conditions

Prior to welding, all surfaces of components to be welded shall be free from grease, scale, rust, paint, dirt, or excessive pitting. Standard oiling from rolling or stamping operations is not detrimental to welding.

When the steel sheet has been hot formed, it shall be sand-blasted (or processed by any equivalent cleaning process) prior to welding to remove the oxides formed during the hot forming operation. On the other hand, steel sheets coated with Aluminum-Silicon coatings can be welded directly after hot forming without sand blasting.

Uncoated hot rolled steel shall be in the pickled condition.

Coated steels can be supplied with a chromate or phosphate passivation treatment. Phosphated uncoated steel may also be used. These materials can be welded, although adjustment may be required to the welding parameters outlined in Annex B. Generally speaking, only thin phosphate pretreatment of steel is acceptable prior to spot welding.

NOTE Certain surface treatments, such as the application of paint primers weldable organic coatings, rust preventatives, and oils, can be applied before welding, provided that the coating is uniform in thickness and it has been shown that consistent welds conforming to this document can be obtained. Excessive use of surface pretreatment reduces the length of electrode life.

7 Edge conditions, form of component, and weld pitch

The components to be welded shall be free from any burrs or other defects which may interfere with interface contact in some way, or which may necessitate excessive force in fitting the parts together.

The shape of the component should be such that there is satisfactory interfacial contact in the area where the welds are to be made. The edge distance should not be less than 1,25 d_w (see Figure 1), where d_w is the weld diameter as defined in 10.1. The use of edge distances less than the recommended values influences weld quality adversely. In such cases, the nominal weld size specified may be less than that given in 10.1, and therefore due allowance is needed for a lower weld strength (see 10.4).

The weld pitch (see Figure 1) should be greater than 16 t and 3 d_w. Tolerances for the weld pitch should not exceed ±10 %, provided that it does not fall below the minimum value. If the weld pitch is too short, the shunting current through the previous weld will reduce the size of the following weld. Increase of the welding current may compensate the problem partially.