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Resistance welding — Destructive testing of welds — Specimen dimensions and procedure for mechanized peel testing resistance spot, seam and embossed projection welds

Soudage par résistance — Essais destructifs des soudures — Dimensions des éprouvettes et mode opératoire pour l'essai de pelage mécanisé des soudures par résistance par points, à la molette et par bossages

Reference number
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Foreword

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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/IIW, *International Institute of Welding*, Commission III.

This second edition cancels and replaces the first edition (ISO 14270:2000), which has been technically revised.

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.

Introduction

This edition of ISO 14270 no longer includes figures showing failure types and modes for tensile shear and cross tension testing in accordance with ISO 14329.

ISO 14270 has been revised to align it with ISO 17677-1. This edition of ISO 14270 is now applicable to testing of welds made in high strength materials including ultra-high strength materials as well as ordinary strength materials. Some of the figures related to the failure types and modes have been revised in accordance with ISO 17677-1.

Resistance welding — Destructive testing of welds — Specimen dimensions and procedure for mechanized peel testing resistance spot, seam and embossed projection welds

1 Scope

This International Standard specifies specimen dimensions and a testing procedure for mechanized peel testing of single spot, seam and embossed projection welds, in overlapping sheets, in any metallic material of thickness 0,5 mm to 3 mm, where the welds have a maximum diameter of $7\sqrt{t}$ (where t is the sheet thickness in mm).

For welds of diameter between $5\sqrt{t}$ and $7\sqrt{t}$, the peel strength values obtained may be lower than expected when using the recommended test specimen dimensions because the test specimen width is designed for welds of diameter of $5\sqrt{t}$ or less.

The object of mechanized peel testing is to determine the peel strength that the test specimen can sustain.

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 7500-1, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Verification and calibration of the force-measuring system*

ISO 17677-1, *Resistance welding — Vocabulary — Part 1: Spot, projection and seam 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
mechanized peel strength
MPS
maximum peel force obtained from this test

3.2
peel force
force applied on test specimen during mechanized peel testing

3.3
minimum seam weld width
w_{min}
minimum width of the seam weld measured at the faying surface

Note 1 to entry: See Figure A.1.

Note 2 to entry: For interface failures, the seam weld width is measured in the plane of the interface in a transverse direction to the longitudinal axis of the linear seam weld.

4 Test pieces and specimens

Table 1 gives test specimen dimensions for mechanized peel tests. The positional accuracy of the weld on the test specimen shall be ±1 mm or less in every direction.

Table 1 — Test specimen dimensions and weld position

Thickness t mm	Flange length a mm	Specimen width b mm	Specimen length l_s mm	Free length between clamps l_f mm	Edge distance e mm
$0{,}5 < t \leq 3{,}0$	50	50	≥160	105	25
NOTE See Annex B for an explanation of the influence of weld position on mechanized peel test results of spot welds.					

Spot welded test specimens can be produced by

— welding each one separately in accordance with Figure 1 a), or

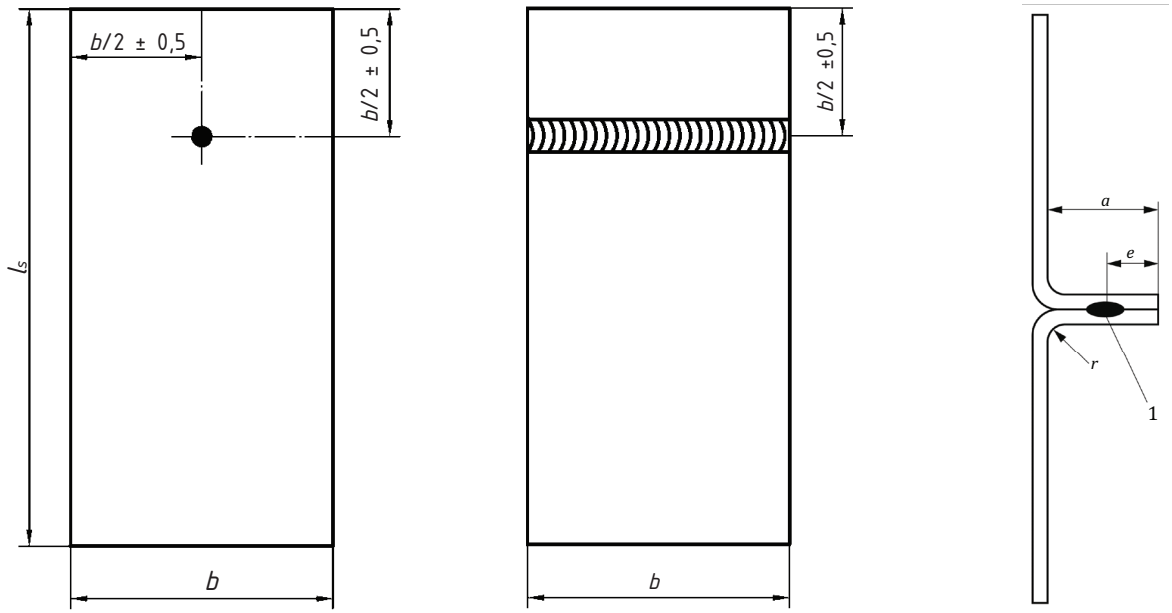
— making a number of individual welds joining two test plates as a multiple weld test piece, and then cutting them in accordance with Figure 2.

Embossed projection weld test specimens shall only be produced by welding a single weld specimen as shown in Figure 1 a).

In order to obtain statistically significant average results, it is recommended that several specimens are tested.

In the case of unequal sheet thicknesses, the test specimen dimensions shall be based on those of the thinner sheet. Mechanized peel test specimens in accordance with Figure 1 c) shall be produced in accordance with Clause 5 or Clause 6.

Dimensions in millimetres



a) Test specimen for single spot or embossed projection weld

b) Test specimen for seam weld

c) Mechanized peel test specimen

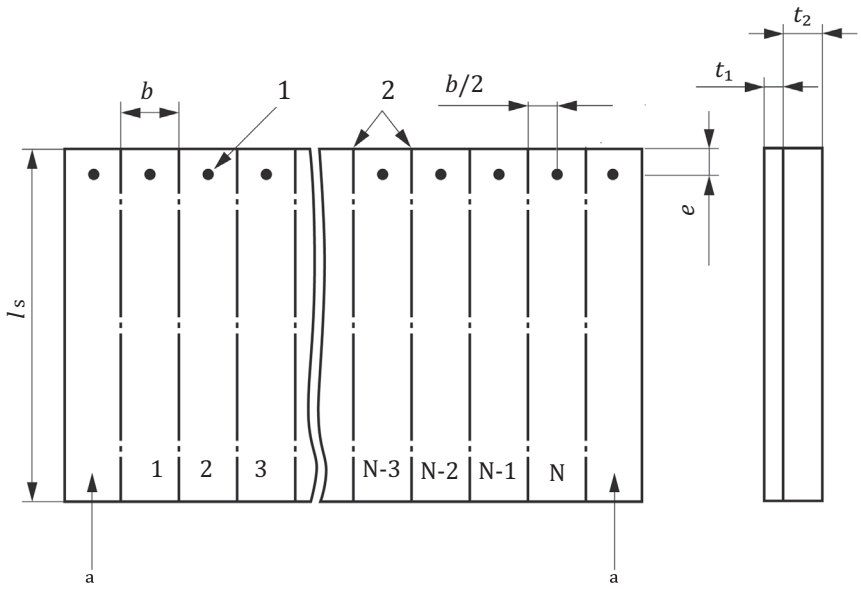
Key

1 weld

Figure 1 — Form of test specimen with weld position for single weld

When using multi-spot welding equipment, each electrode shall weld an individual test specimen as shown in Figure 1 a).

For multiple weld test pieces in large sheets, welding starts from an end location to the other end as shown in Figure 2. Since shunting occurs during welding of multiple weld test pieces, the welding current used shall be higher than that for welding for a single weld test specimen. For multiple weld pieces, the first and last welds shall be discarded as shown in Figure 2.

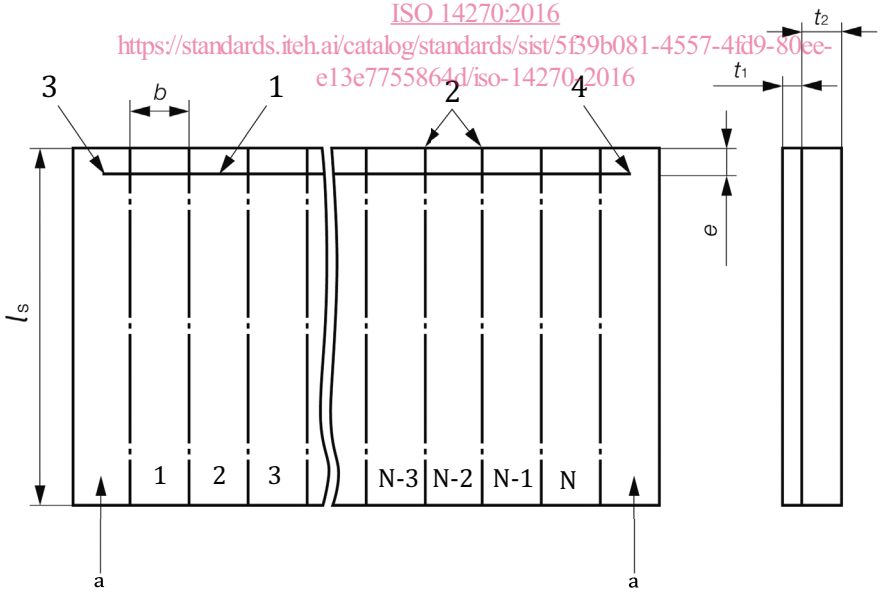


Key

1	spot or embossed projection welds	N	number of test specimens
2	cuts	a	Discarded.

NOTE For other symbols, see Table 1.

Figure 2 — Example for preparation of multiple weld test pieces



Key

1	seam weld	4	stop position of welding
2	cuts	N	number of test specimens
3	start of welding	a	Discarded.

Figure 3 — Example for preparation of seam welded test pieces

For seam welds, a continuous weld is made as shown in Figure 3. Test specimens shall be made as shown in Figure 1 b). Both end parts of the seam weld shall be discarded.

The properties of the welded joints in the test pieces shown in Figure 2 or Figure 3 shall not be affected by the cutting process used to separate individual test specimens.

5 Preparation of mechanized peel test specimens

5.1 General

Mechanized peel test specimens can be made by the following two sequences, for peel testing using a tensile test machine.

a) bending-after-welding process:

   Welding → Bending → Mechanized peel testing

b) welding-after-bending process:

   Bending → Welding → Mechanized peel testing

The bending-after-welding process is only recommended for thin sheet materials and/or soft materials. The bending-after-welding process can be applicable to multiple weld specimens.

For high strength and/or thick materials, the welding-after-bending process is recommended using single weld test pieces.

For high strength steel test specimens and/or for mild steel test specimens in sheet thicknesses greater than 1,5 mm, the welding-after-bending process is strongly recommended.

5.2 Bending procedure of weld test specimens after welding

Single weld specimens as shown in Figure 1 a) or Figure 1 b) shall be bent by the method illustrated in Figure 4 to make the shape shown in Figure 1 c). When using multiple weld test pieces as shown in Figure 2 or 3, single weld specimens shall be bent after cutting them from the multiple weld test piece. The properties of the joint shall not be influenced by the bending process.

An example of the welding-after-bending process is shown in C.1.

5.3 Bending procedure of test specimens before welding — Alternative procedure

Alternatively, for single weld mechanized peel test specimens, the test specimens can be bent before welding as shown in Figure 5 a). The test specimens are then welded as shown in Figure 5 b). Recommended jig set-up conditions for bending with a press brake are given in C.2.

NOTE When setting the value $l_b = a$, as shown in Figure 5, the maximum error of flange length is less than ±0,5 mm if $r = 2t$ and $t \leq 3$ mm, see detail in Annex D.