INTERNATIONAL STANDARD

ISO 10447

Second edition
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Resistance welding — Peel and chisel testing of resistance spot and projection welds

Soudage par résistance — Essais de pelage et de déboutonnage au burin appliqués aux soudures par résistance par points et par bossages

Reference number
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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 10447 was prepared by Technical Committee ISO/TC IIW, *International Institute of Welding*, recognized as an international standardizing body in the field of welding in accordance with Council Resolution 42/1999.

This second edition cancels and replaces the first edition (ISO 10447:1991), 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.

Resistance welding — Peel and chisel testing of resistance spot and projection welds

1 Scope

This International Standard specifies the procedure and recommended tooling to be used for testing resistance spot and projection welds by means of peel and chisel tests. It applies to welds made in two or more sheets in the thickness range of 0,5 mm to 3,0 mm.

The aim of these tests is to determine:

— weld size and failure type when the tests are used as destructive tests, and

— verification of welds when the tests are used as non-destructive tests.

NOTE In the previous edition of this International Standard, seam welds were included. The preferred method of peel testing seam welds (mechanized peel testing) is now covered in ISO 14270.

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 14270, *Specimen dimensions and procedure for mechanized peel testing resistance spot, seam and embossed projection welds*

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

3 Terms and definitions

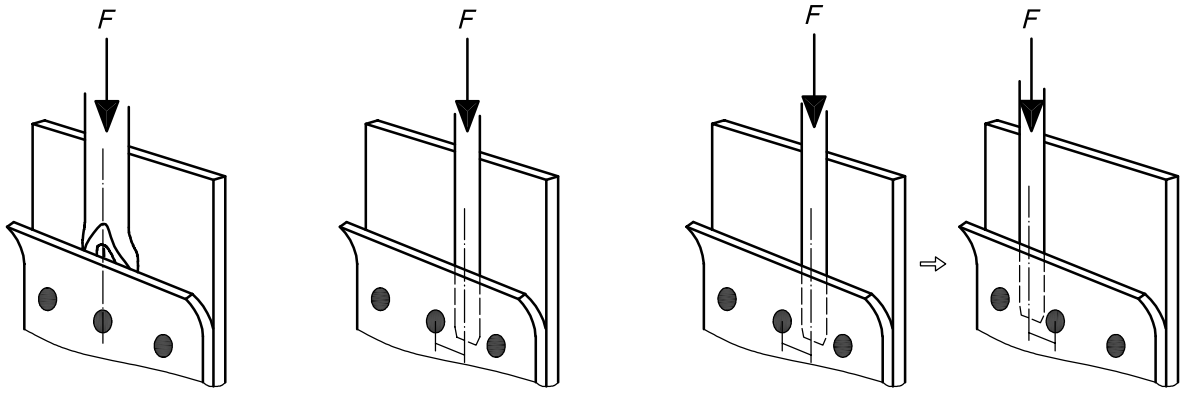
For the purposes of this document, the terms and definitions given in ISO 14329 and the following apply.

3.1
chisel test
destructive or non-destructive test in which welds are tested by applying a predominantly tensile force that results in stresses primarily normal to the surface of the joint interface

NOTE The force is applied using a chisel (see Figure 1).

3.2
peel test
destructive test in which welds are tested by applying a peel force that results in stresses primarily normal to the surface of the joint interface

NOTE The test can be accomplished either manually [see Figure 2 a)], or it can be mechanized using a tensile testing machine or other suitable mechanized equipment [see Figure 2 b)].

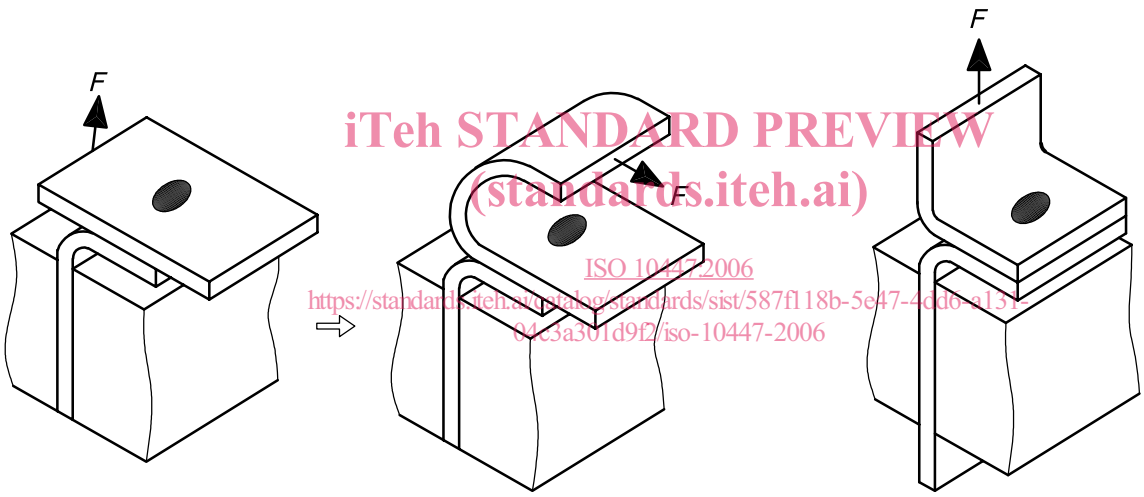


a) Type 1 (Recessed chisel)

b) Type 2 (One side testing)

c) Type 3 (Both side testing)

Figure 1 — Chisel routine test on resistance spot and protection welded joints



a) Manual peel test

b) Mechanized peel test

Figure 2 — Peel routine test on resistance spot and protection welded joints

4 Test specimens

When used for quality control in production, tests shall be conducted on actual components or specimens taken from actual components.

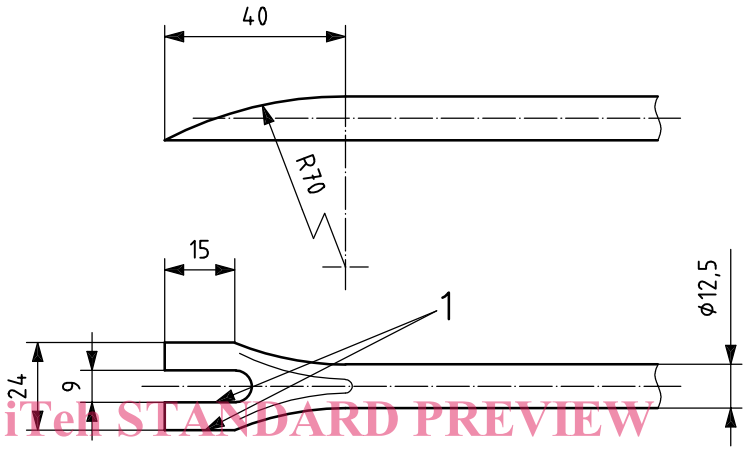
When used for setting welding parameters, where it is not practicable to use actual components, separate welded test pieces may be used. The test pieces shall be produced from the same material as used for the component, and welded under conditions adapted to simulate and produce the same weld quality as observed in the component. The effects of different shunt or impedance conditions should be taken into account when producing the test pieces, by inserting sufficient material in the throat of the machine to approximate the magnetic effect of the work piece under production conditions.

5 Test procedure

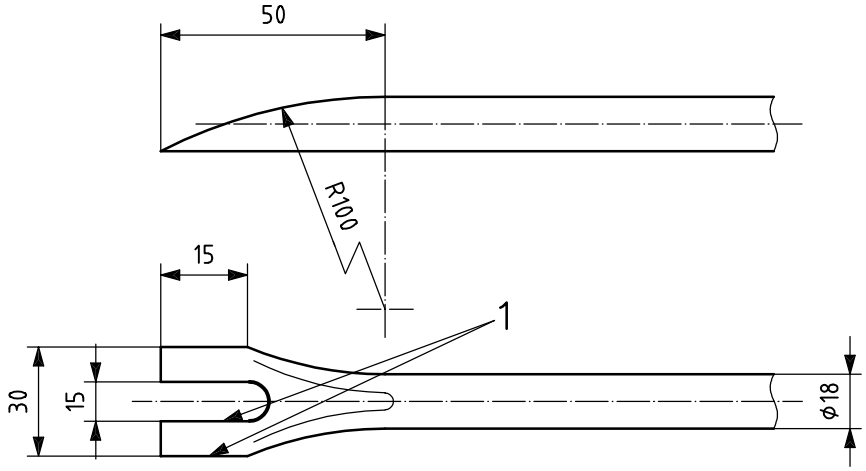
5.1 Chisel test

A chisel shall be used to separate the sheets adjacent to the weld under test. Typical chisel designs are shown in Figures 3 and 4. The chisel geometry should be chosen based on the work piece thickness and geometry, weld diameter, distance between welds, and whether the weld is to be destructively or non-destructively tested (see Table 1).

Dimensions in millimetres



a) Chisels for weld diameter < 8 mm



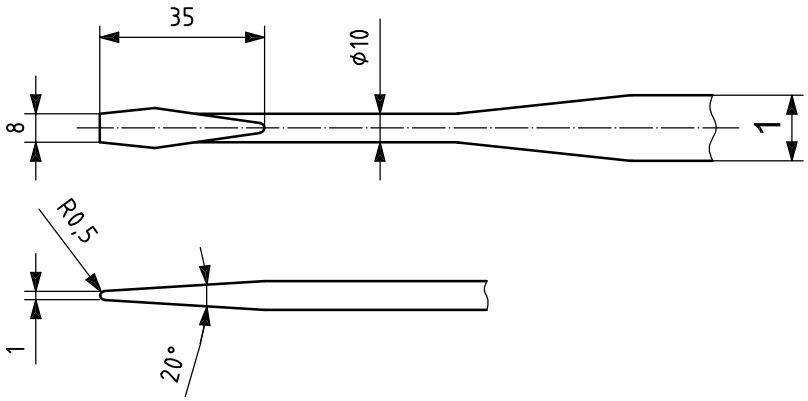
b) Chisels for weld diameter < 13 mm

Key

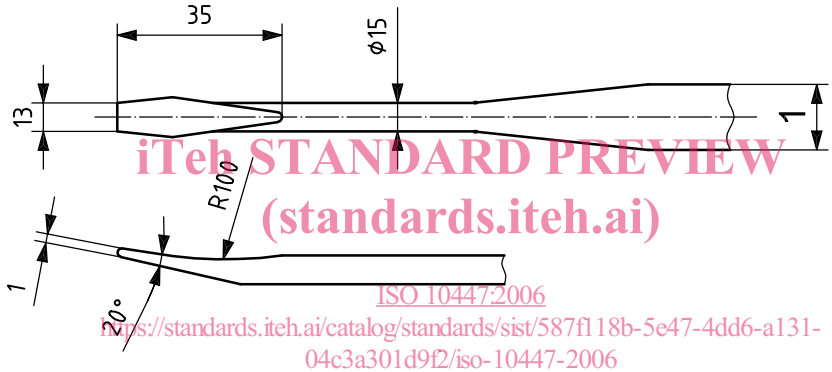
1 Burr to be removed from all corners

Figure 3 — Typical dimensions of chisels

Dimensions in millimetres



a) Chisel of type 2-1 (for thickness ⩽ 2 mm)



b) Chisel of type 2-2 (for thickness > 2 mm)

Key

1 arbitrary value

Figure 4 — Examples of dimensions of chisels for non-destructive test

Table 1 — Selection of recommended chisels for chisel testing

Chisel design	Test types (Destructive or non-destructive)	For testing	
		Weld diameter D mm	Plate thickness t mm
Figure 3 a)	Both	$D < 8$	—
Figure 3 b)	Both	$D < 13$	—
Figure 4 a)	Non destructive	—	$t \leqslant 2{,}0$
Figure 4 b)	Non destructive	—	$t > 2{,}0$

The slot in the chisels shown in Figure 3 is only necessary if the axis of the chisel is placed at the centre of the weld.

Normally, the chisel is driven between the sheets manually by a hammer or a pneumatic tool.

NOTE In chisel testing, the results can be influenced by the following factors:

a) chisel shape – dimensions and condition,

b) hammer type – mass and type of blow,

c) test specimen – sheet thickness,

d) position of the weld in relation to the sheet and its edge,

e) position of the chisel relative to the weld, and

f) insertion depth of chisel.

Before a chisel test is implemented in production for non-destructive testing, the effectiveness of this test shall be verified with destructive tests. The chisel test for non-destructive testing should be used with considerable caution, especially when used with high strength steels. Joint design and material thickness may also influence the results.

For the destructive test, a chisel shall be driven between the sheets and adjacent to the weld until fracture occurs in or adjacent to the weld, or until severe deformation occurs. The aim of this test is to separate the sheets so that a weld plug or interfacial fracture occurs to allow weld size to be determined. In the case of a weld between three or more sheets, the test shall be made between each adjacent pair of sheets.

For the non-destructive test, a chisel shall be driven between the sheets and adjacent to the weld until the material yields or bends near the weld. The aim of this test is to obtain an indication that a weld has been made without causing fracture to occur in or adjacent to the weld. In the case of a weld between three or more sheets, the test shall be made between each adjacent pair of sheets. If fracture has not occurred after testing, the components shall be restored to their original shape.

5.2 Peel test

The peel test is a destructive test for determining weld size and fracture mode of a welded lap joint. The sheets near the weld shall be slowly peeled apart until all welds under test are completely fractured. A roller tool, pincers, pliers, vice, or mechanized equipment (see Figures 2 and 5) are typically used. If a roller tool is used, a diameter of 30 mm is recommended for sheet thicknesses up to 1 mm [see Figure 5 a)]. For testing using a vice and pliers, see Figure 5 b). For materials that are too thick or too strong to be tested manually, mechanized equipment is recommended (see ISO 14270). The applied force may be generated by means of a normal tensile testing machine or other suitable mechanized equipment.

NOTE Fracture mode and plug size can vary depending on the direction of the applied force.

Peel testing may be applied to test specimens cut from production components or welded test pieces.