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

*Dimensions des éprouvettes et mode opératoire pour l'essai par
déboutonnage mécanisé des soudures par résistance par points, à la
molette et par bossages*



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 14270 was prepared in collaboration with the International Institute of Welding, which has been approved by the ISO Council as an international standardizing body in the field of welding.

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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 mechanised peel testing of single spot, seam and 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). With welds of diameter $> 5\sqrt{t}$ and $\leq 7\sqrt{t}$, it is possible to underestimate the value of peel force when using the recommended test specimen dimensions.

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

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

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.*

3 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.

3.1

peel force

the maximum force obtained from the test.

3.2

plug diameter

d_p

⟨plug failure⟩ mean diameter of the plug

See Figure 1 a).

3.3

weld diameter

d

⟨partial plug failure⟩ mean diameter of the fused zone measured at the interface omitting the corona bond area and the maximum diameter of the plug component of the failure

See Figure 1 a).

NOTE Measurement of the minimum diameter of the plug component should be quoted separately.

3.4

weld diameter

d

⟨interface failure⟩ mean diameter of the fused zone measured at the interface, omitting the corona bond area

See Figure 1 b).

3.5

minimum width of a resistance seam weld

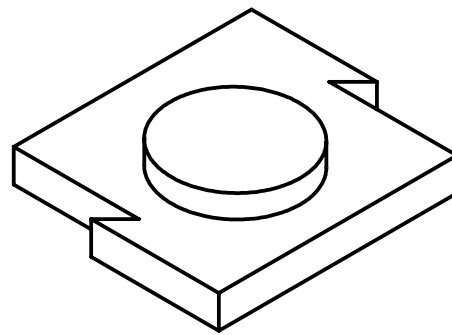
w

the width of the weld (plugs) measured at the base of the plug

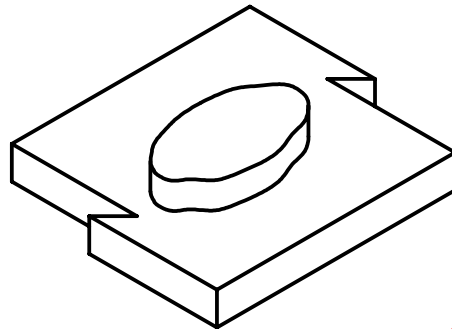
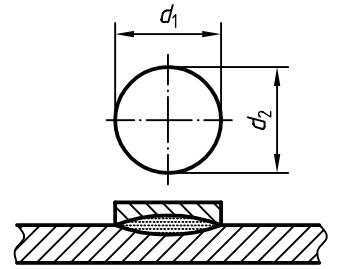
See Figure 1 c).

NOTE For interface failures, the width of the nugget is measured in the plane of the interface in a transverse direction to the longitudinal axis of the linear seam weld.

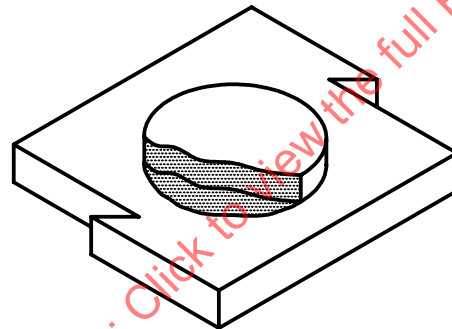
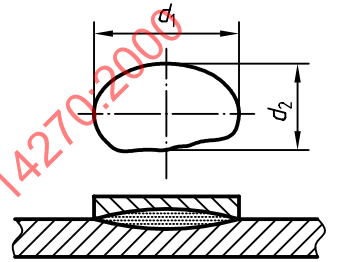
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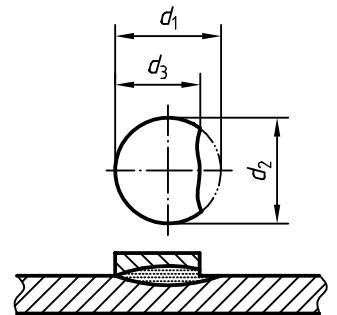
1^a



2^a



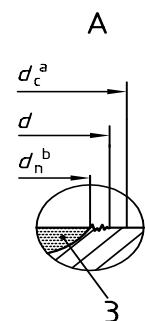
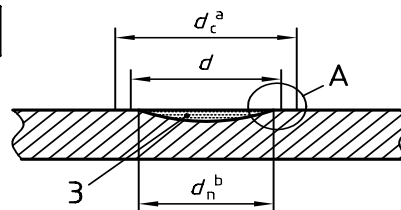
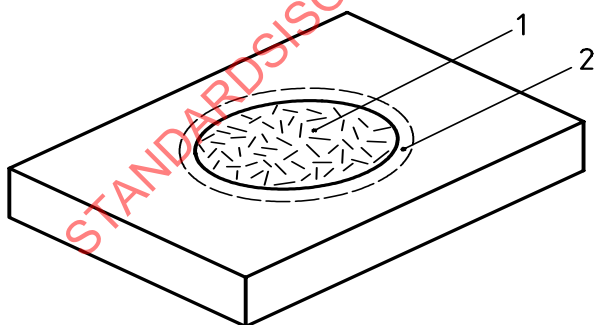
3^b



Key

- 1 Symmetrical
- 2 Asymmetrical
- 3 Partial
- ^a $d = d_p = (d_1 + d_2)/2$
- ^b $d = (d_1 + d_2)/2$ and $d_p = (d_2 + d_3)/2$

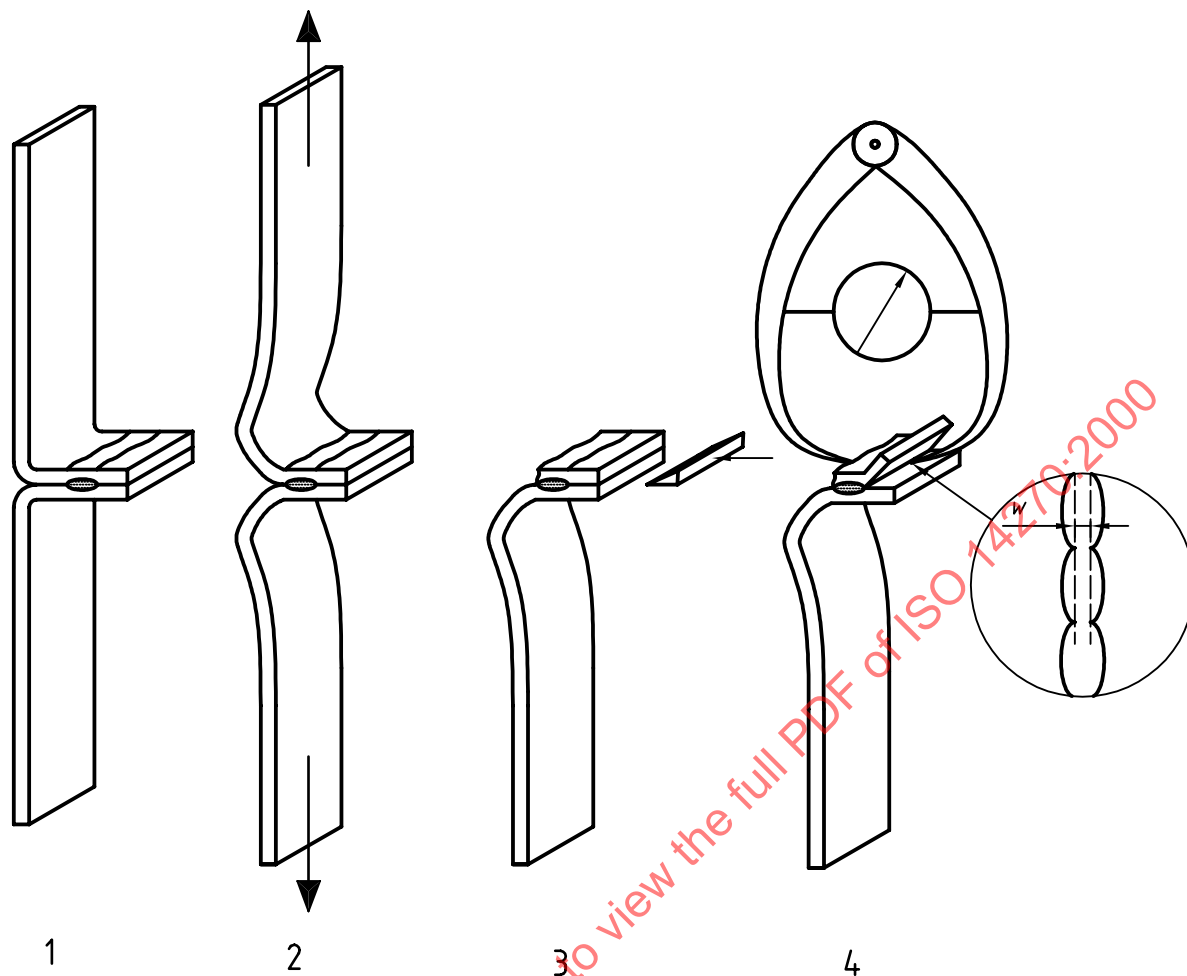
a) Weld with plug (slug) failure



Key

- 1 Sheared nugget
- 2 Corona bond zone
- 3 Nugget
- ^a diameter of the corona
- ^b diameter of the nugget

b) Weld with interface failure, $d < d_c$

**Key**

- 1 Before loading
- 2 Under load
- 3 Opening using a chisel or wedge
- 4 Measuring using a gauge

c) Measuring minimum seam width, w , of seam weld**Figure 1 — Measurement of weld size****4 Test pieces and specimens**

Table 1 gives test specimen dimensions. The test specimen can be produced, either by welding each one separately as shown in Figure 2 or by making a certain number of individual spot welds joining two test plates and then cutting them as in Figure 3. In the case of different sheet thicknesses the dimensions shall be based on the thinner sheet. In the case of multispot welding equipment each electrode shall weld its own individual test specimen as in Figure 2 b) or one multispot test piece as in Figure 3. Because shunting occurs during welding of a multispot test piece in order to obtain the same weld size the welding current used shall be higher than that for welding the single spot test specimen.

When projection welding, all welds shall be tested but for multi-spot welding the first and last welds on the test piece as shown in Figure 3 shall be discarded.

With seam welds, a continuous seam shall be made as shown in Figure 2 a) and the first and last part of the seam shall be disregarded.

The properties of the welded joints in the test piece shown in Figure 3 shall not be affected by the process of cutting into individual test specimens. The single spot specimen shall be bent into its final shape, using the procedure as shown in Figure 4, particularly for sheet thicknesses larger than 1,5 mm. The properties of the joint shall not be influenced by the bending process. For spot and projection welding the minimum number of test specimens shall be eleven in one row.

Table 1 — Test specimen dimensions

Dimensions in millimetres

Thickness t	Overlap a	Specimen width b	Specimen length l_s	Free length between clamps l_f	Clamping length l_c
$0,5 \leq t \leq 1,5$	35	45	125	95	40
$1,5 < t \leq 3$	45	60	160	105	60

Dimensions in millimetres

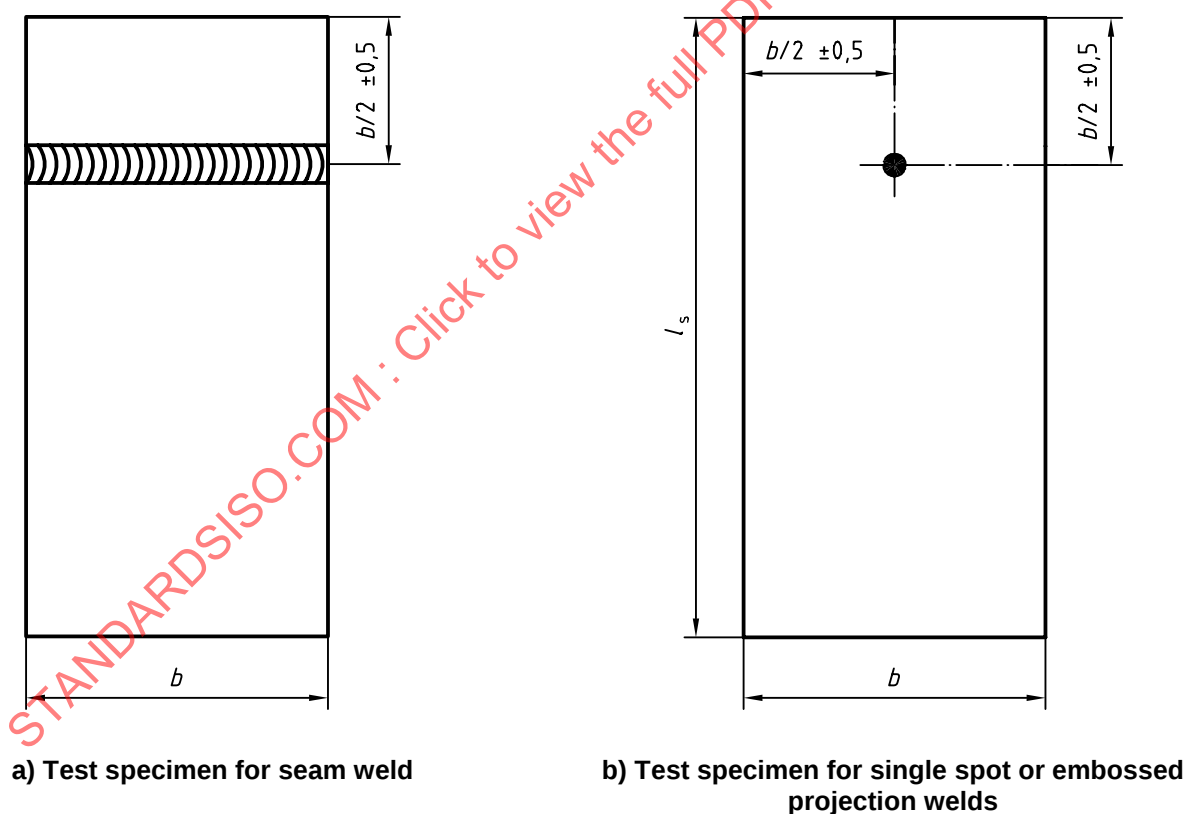


Figure 2 — Test specimen for simple welds

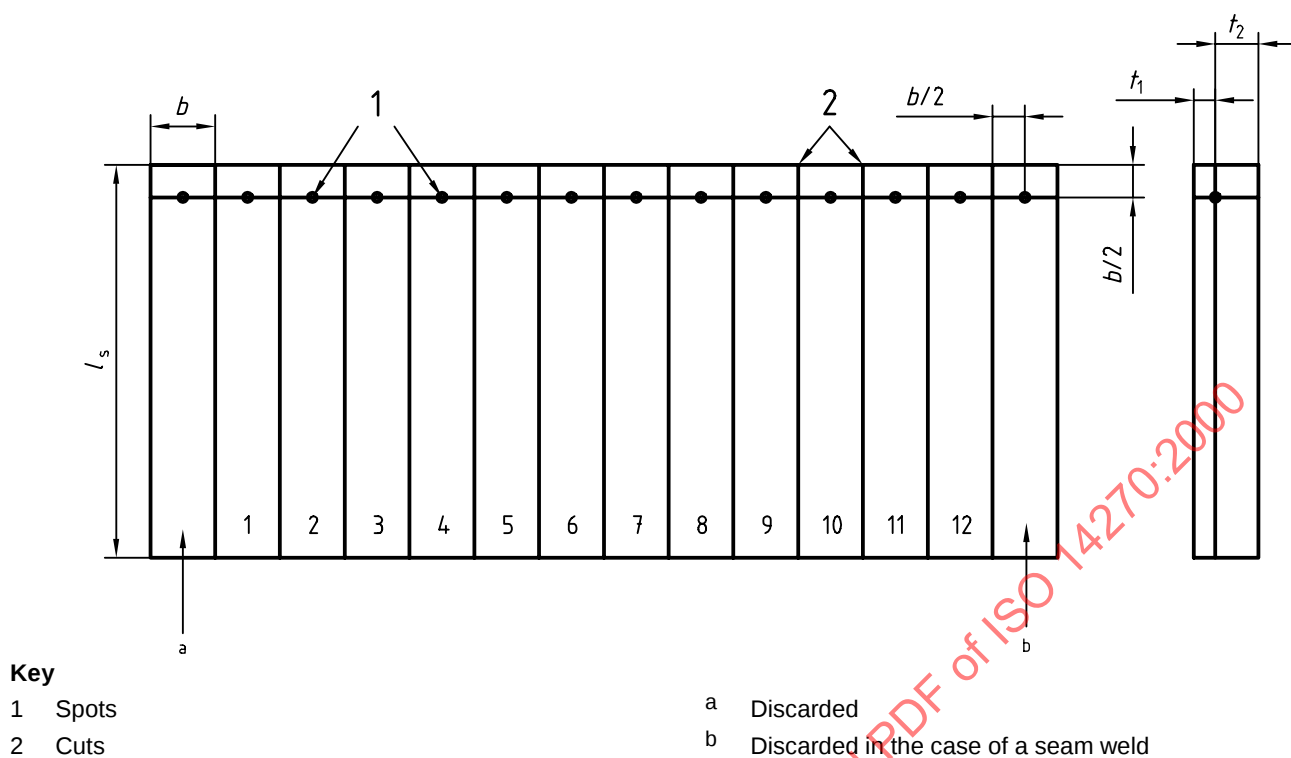


Figure 3 — Test specimen for preparing multi-spot test pieces

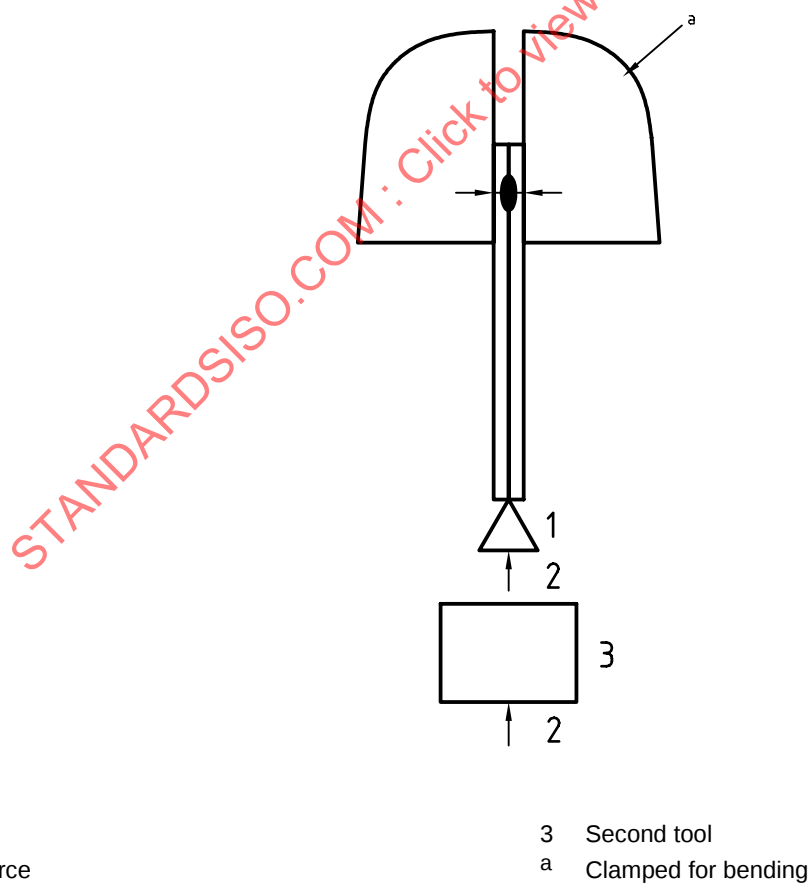
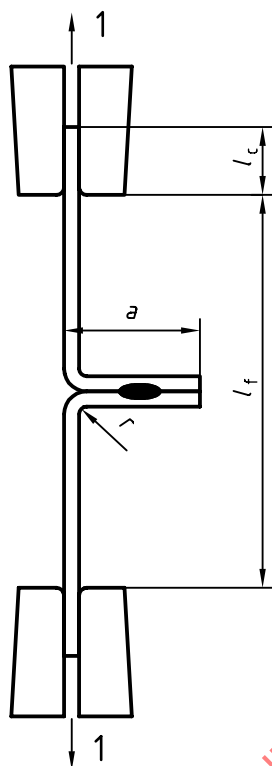


Figure 4 — Bending procedure for single spot welded specimens

**Key**

- 1 Applied force
 r Radius $\approx t$

Figure 5 — Clamping procedure for peel testing

5 Test equipment and testing procedure

The specimen is clamped in a tensile testing machine which shall satisfy the requirements of ISO 7500-1, in such a way that the clamps are at the required distance from one another as shown in Figure 5. Testing shall be carried out at room temperature.

6 Test report

The test report shall contain the following information:

- a) the welding process;
- b) the welding conditions and equipment;
- c) the material and its condition;
- d) the dimensions of the test piece and specimens;
- e) individual values, mean value and standard deviation of the peel force;
- f) the type of failure;
- g) individual values, mean value and standard deviation of the weld diameter;
- h) special remarks if any.