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Specimen dimensions and procedure for cross tension testing resistance spot and embossed projection welds

Dimensions des éprouvettes et mode opératoire pour l'essai de traction sur éprouvettes en croix des soudures par résistance par points et par bossages

Reference number
ISO 14272:2000(E)

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Foreword

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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 14272 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.

Specimen dimensions and procedure for cross tension testing resistance spot and embossed projection welds

1 Scope

This International Standard specifies specimen dimensions and a testing procedure for the cross tension testing of spot 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).

The object of cross tension testing is to determine the tensile 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 editions of the normative documents 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
cross tension force
maximum force obtained from the test

3.2
plug diameter
d_p
⟨plug failure⟩ mean diameter of the plug

See Figure 1 a).

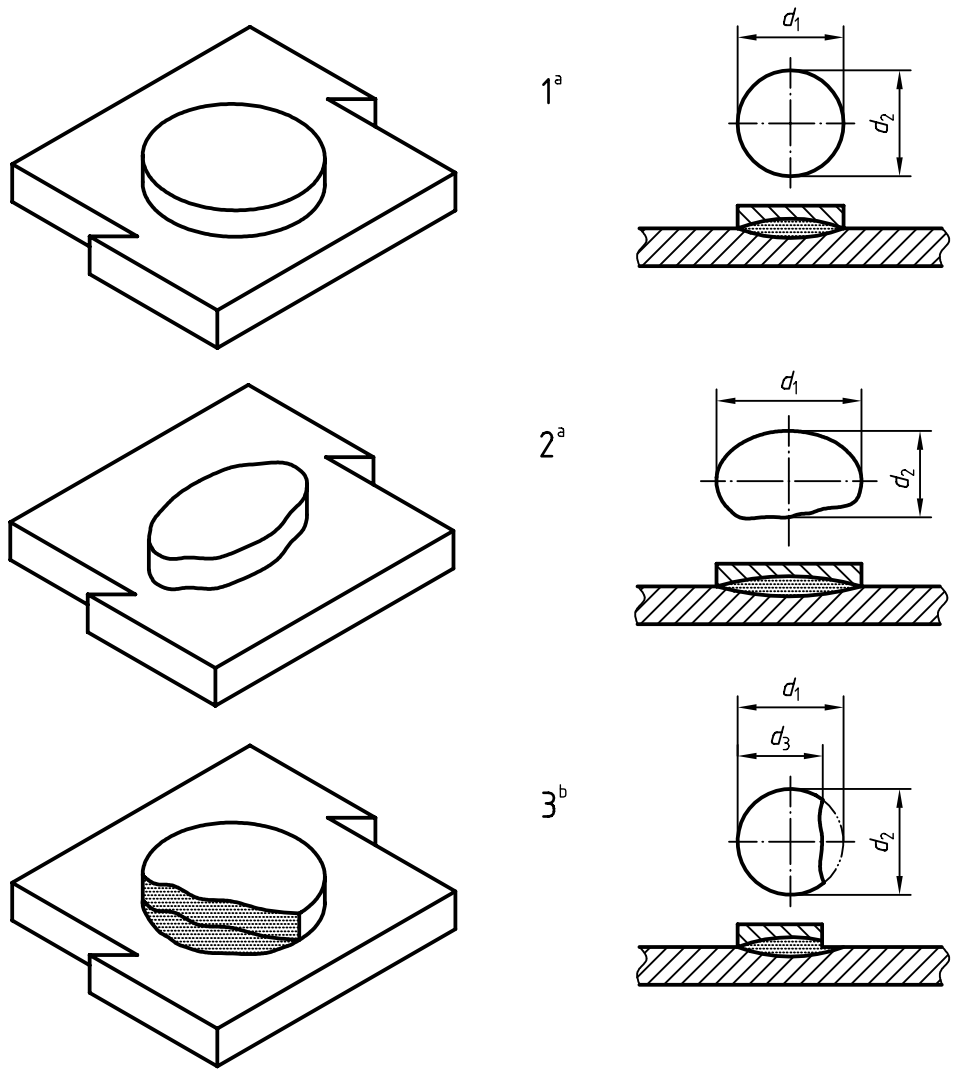
3.3
weld diameter
d
⟨partial plug failure⟩ mean diameter of the fused zone measured at the interface omitting the corona bond area and the maximum diameter of the plug component of the failure

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).

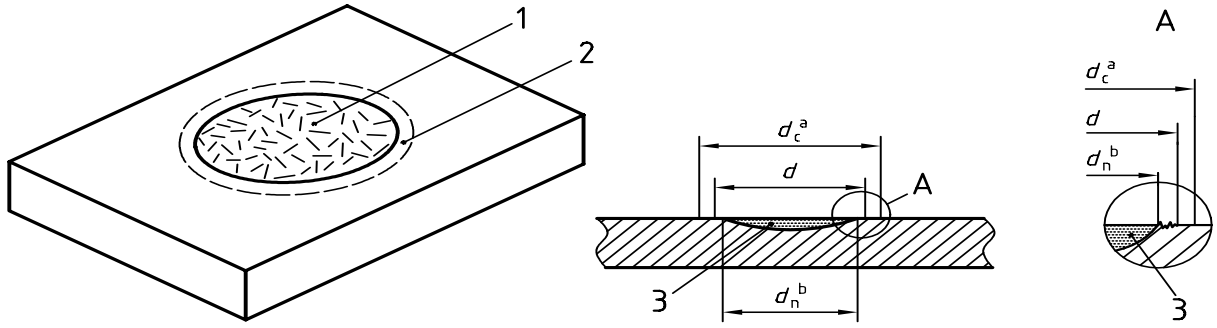


Key

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, $d < d_c$

Figure 1 — Measurement of weld size

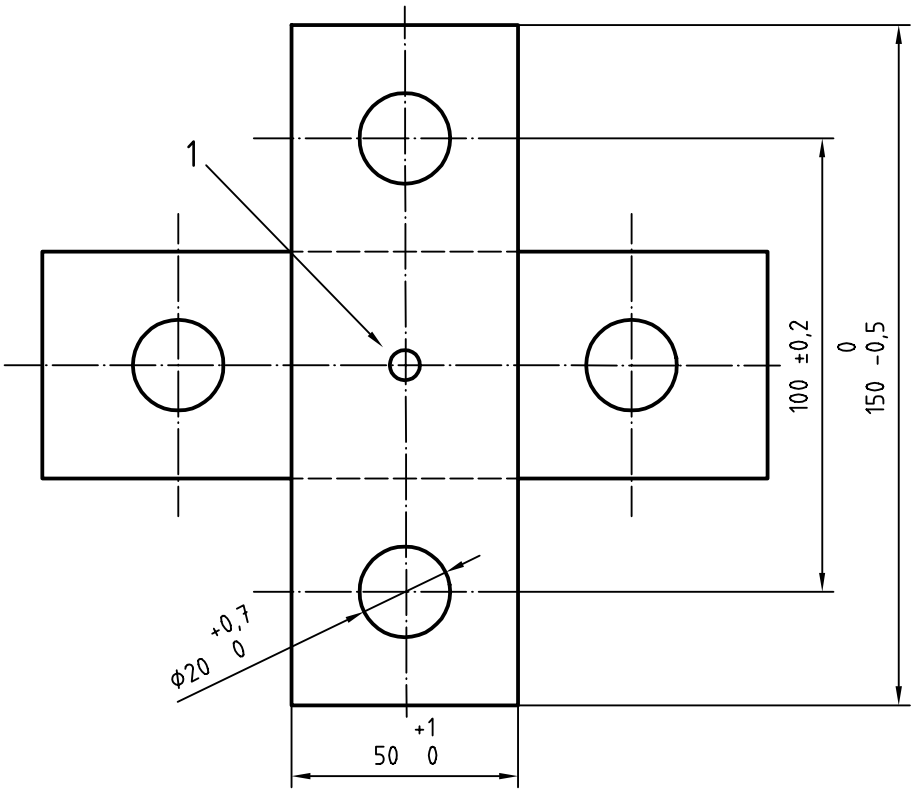
4 Test specimen

Test specimen configuration and dimensions are shown in Figure 2 a). Figure 2 b) illustrates an example of a jig which can be used for welding the two sheets. Two punched strips are placed at right angles to each other, held in the jig, and welded together. The minimum number of specimens tested shall be eleven.

5 Test equipment and testing procedure

The specimen is held in clamps as shown in Figure 3 and pulled apart in a tensile testing machine which satisfies the requirements of ISO 7500-1. The cross tension force shall be measured during testing and the weld diameter determined from the broken test specimen. All tests shall be carried out at room temperature.

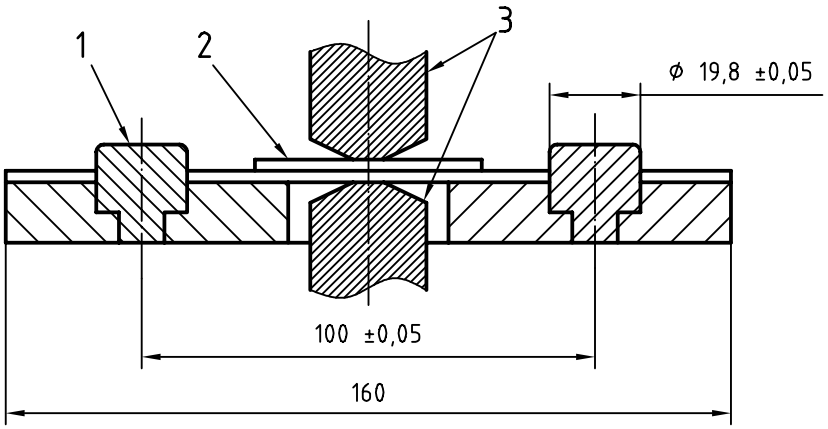
Dimensions in millimetres



Key

1 Weld

a) Cross tension specimen



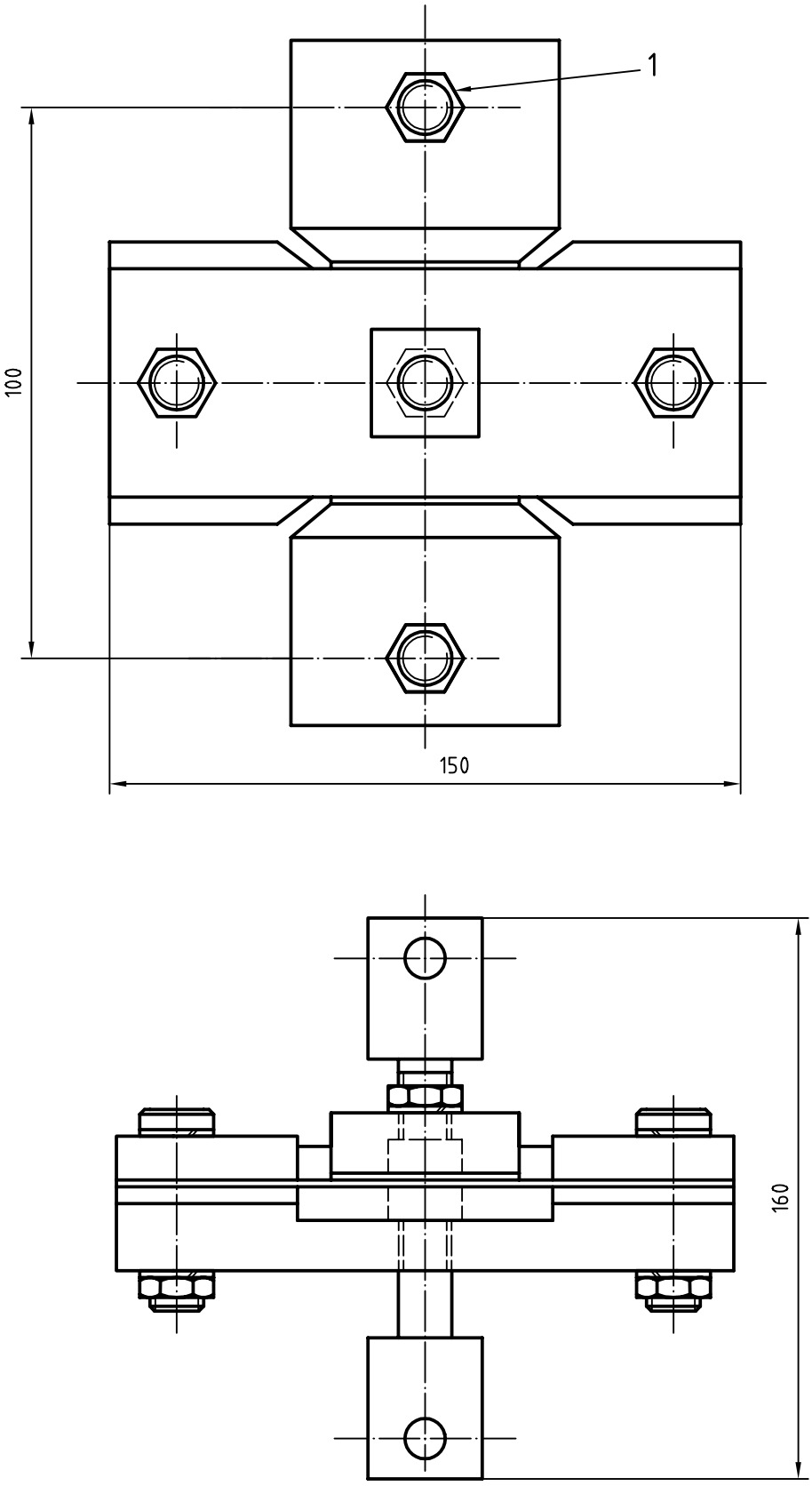
Key

1 Jig
2 Specimen
3 Welding electrode

b) Cross tension specimen in welding jig

Figure 2 — Cross tension test

Dimensions in millimetres



Key

1 Clamping screw M12 × 43LG

Figure 3 — Cross tension specimen in testing clamps

6 Test report

The test report shall contain the followiing information:

a) the welding process;

b) the welding conditions and equipment;

c) the material and its condition;

d) the dimensions of the test specimens;

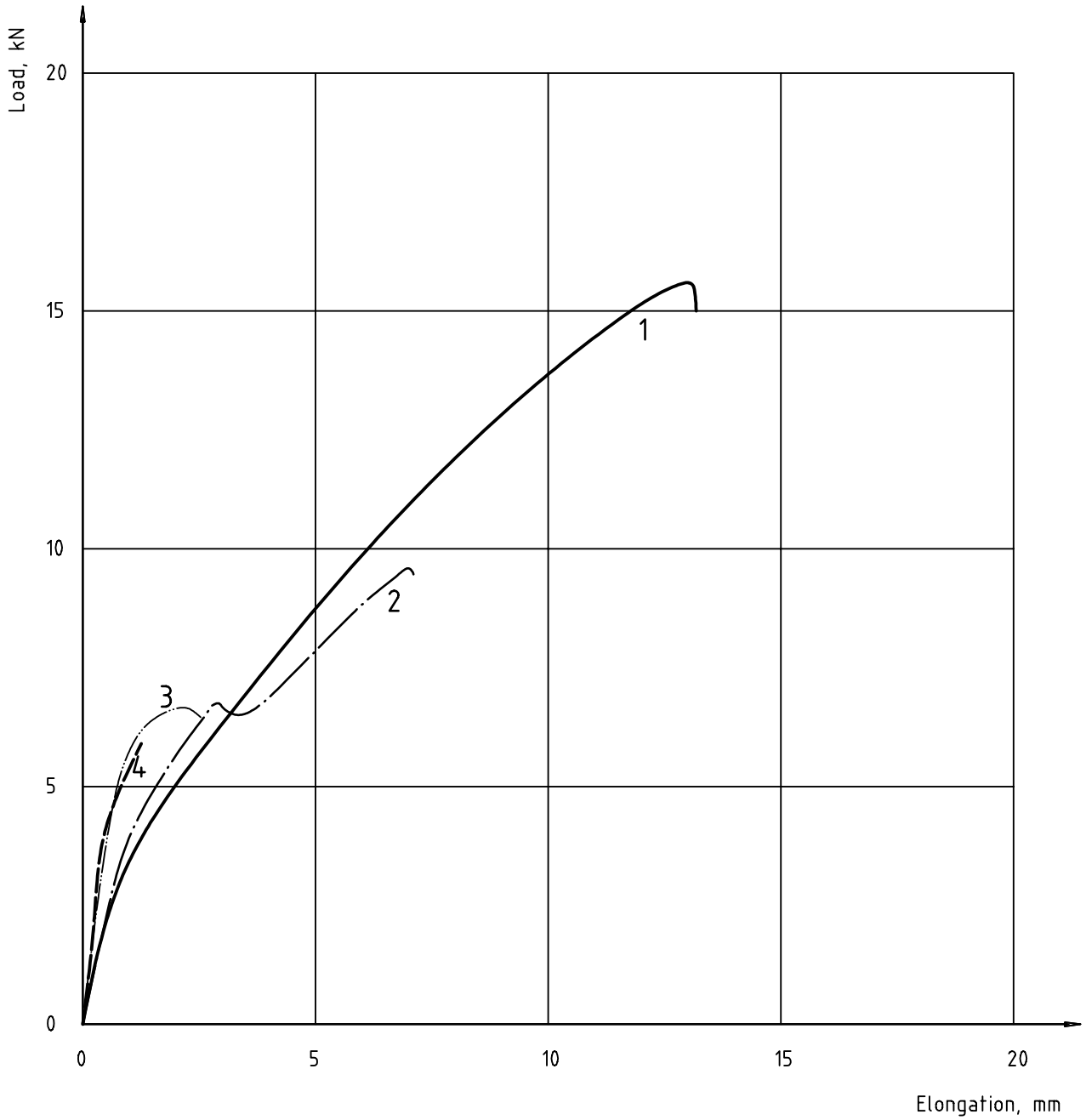
e) individual values, mean value and standard deviation of the cross tension force in kN;

f) the type of failure;

g) individual values, mean value and standard deviation of the weld diameter;

h) special remarks if any.

A load-elongation diagram shall be constructed in order to give information on the deformation of the test specimen. An example of such a diagram is shown in Figure 4.



	Type of fracture	d_n mm	Welding time cycles [a]
1	Plug failure in parent metal	8,1	18
2	Plug failure in HAZ (heat affected zone)	7,8	52
3	Interface failure	8,1	18
4	Interface failure	8,2	18
[a] 1 cycle = 0,02 s.			

Figure 4 — Typical load-elongation curves of spot welded joints made on 2 mm thick steel sheets

Bibliography

[1] ISO 14329[1)], *Welding — Destructive testing of welds — Failure types and geometric measurements for resistance spot, seam and projection welds*.

1) To be published.

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