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**Destructive tests on welds in metallic  
materials — Torsion test of resistance spot  
welds**

*Essais destructifs des soudures sur matériaux métalliques — Essai de  
torsion de soudure par résistance par points*

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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 3.

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

ISO 17653 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 5, *Testing and inspection of welds*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this document, read "...this European Standard..." to mean "...this International Standard...".

Annex A of this International Standard is for information only.

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## Foreword

This document (EN ISO 17653:2003) has been prepared by Technical Committee CEN/TC 121, "Welding", the secretariat of which is held by DS, in collaboration with ISO/TC 44 "Welding and allied processes".

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2003, and conflicting national standards shall be withdrawn at the latest by September 2003.

In this European Standard annex A is informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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## 1 Scope

This European Standard is applicable to spot welded test specimens with single sheet thicknesses ranging from 0,5 mm to 3,0 mm in steels. It may be used for non-ferrous materials in certain circumstances, see annex A.

The aim of this test is to determine the influence of different steel types, welding parameters and other factors on the deformation characteristics of a spot weld. Using this test, it is possible to determine the weld diameter and the fracture type from fractured specimens. Additionally, the maximum torsion moment (torque) and the corresponding torsion angle can be determined.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

prEN ISO 14329:1999, *Welding — Destructive testing of welds — Failure types and geometric measurements for resistance spot, seam, and projection welds (ISO/DIS 14329:1999)*.

## 3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in prEN ISO 14329:1999 apply.

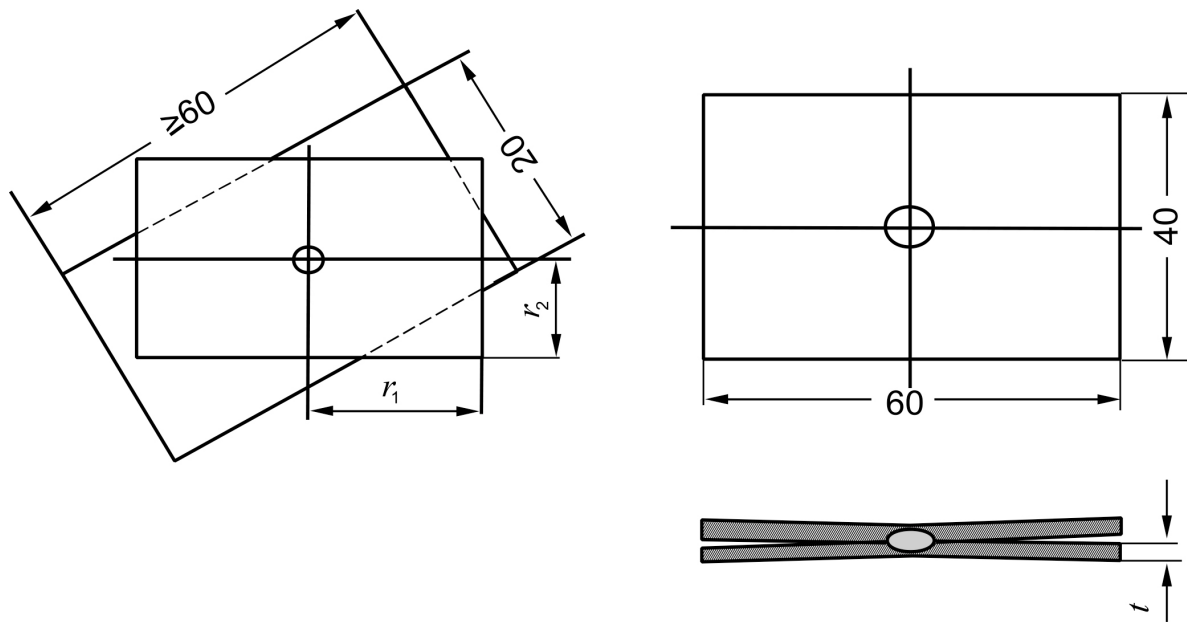
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## 4 Specimens

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Specimens for torsion testing are welded individually. In the case of the non-instrumented torsion test, the minimum distance of the spot weld from the edge shall be greater than 10 mm. When using an instrumented torsion device, the minimum distance shall be 20 mm. The specimen dimensions shall be adjusted to the test equipment but shall be adequate to ensure test specimen rigidity (see Figure 1). The spot weld shall be located in the centre of the test specimen (see 5.2.2).



**Key**

- $r_1$  distance from the edge to the centre of the spot weld
- $r_2$  distance from the edge to the centre of the spot weld
- $t$  material thickness (0,5 mm to 3,0 mm)

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- a) specimens for non instrumental torsion test  
Non-instrumented
- b) recommended specimen dimensions  
for instrumented torsion test using a  
torsion device (manual or  
mechanized)

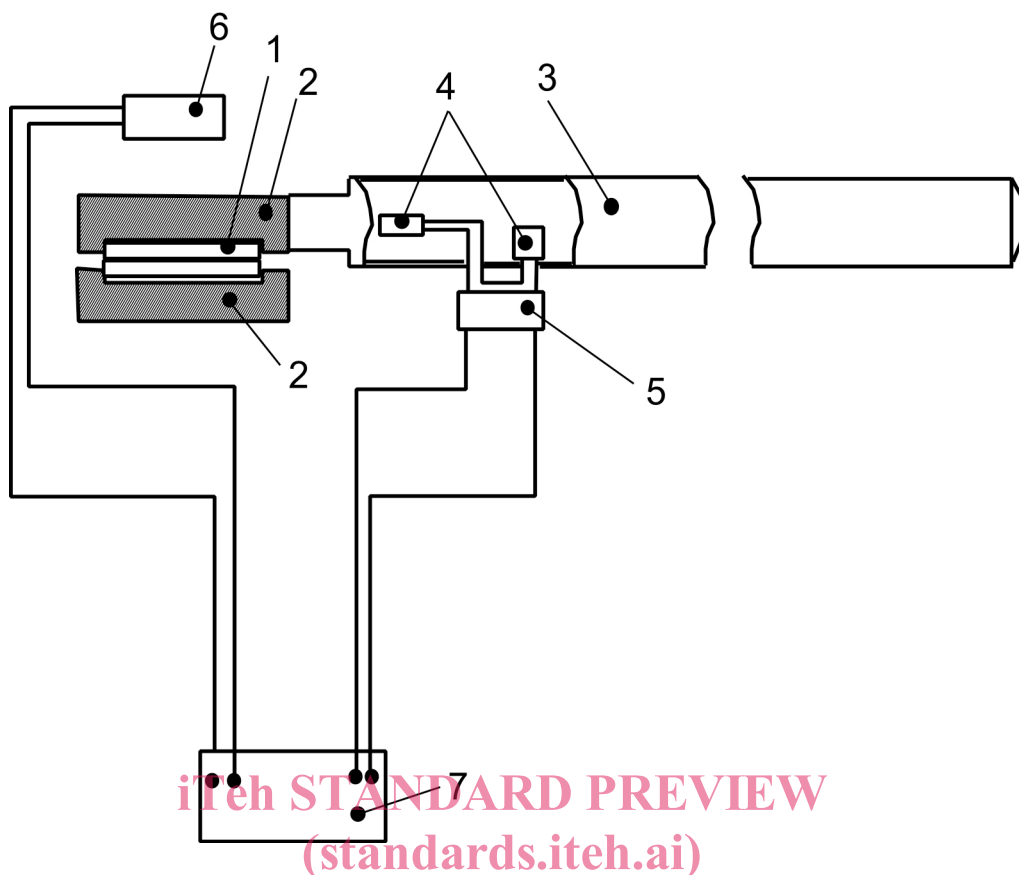
Figure 1 — Specimens

## 5 Testing equipment and testing procedure

### 5.1 Manual torsion test using a pair of tongs (workshop test)

For this test, the lower sheet of the specimen is gripped using a specimen gripper similar to that shown in Figure 2. This can be subsequently clamped in a vice. The upper sheet of the specimen is held in a pair of tongs and twisted continuously in one direction until rupture of the spot weld. Bending of the two sheets of the specimen shall be avoided during testing in order to maintain pure torsional loading at the spot weld. This is essential if the test results are to be comparable. This test method only allows weld diameter and fracture type to be determined.



**Key**

- 1 Specimen
- 2 Specimen gripper
- 3 Torque bar
- 4 Strain gauge
- 5 Strain gauge amplifier
- 6 Potentiometer for measuring the torsion angle
- 7 X-Y-recorder

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**Figure 2 – Measuring equipment****5.2 Instrumented torsion test****5.2.1 Manual twisting**

The device used for this variant of torsion test shall be constructed in such a way that the clearance between the edge of the specimen and the tooling shall not exceed 0,3 mm. Positioning of the specimen shall be arranged in such a way that the interface between the two sheets corresponds to the torsional plane of the device and shims, or an adjusting mechanism, may be used for this purpose. Twisting of the specimen shall be possible without tilting or interference between the specimen sheets or the parts of the tooling.

The torsion moment is imposed manually via a lever arm on the rotating part of the testing device (upper part). During testing, the lever arm shall be moved manually at a slow and steady rate of about 90° in 5 s.

Torsion moment and torsion angle are measured during testing using measuring equipment as shown in Figure 2 for example. Permanent records may be made using suitable instrumentation, for example an X-Y recorder.