INTERNATIONAL STANDARD

ISO 669

Third edition
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Resistance welding — Resistance welding equipment — Mechanical and electrical requirements

Soudage par résistance — Matériel de soudage par résistance — Exigences mécaniques et électriques

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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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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/TC 44, *Welding and allied processes*, Subcommittee SC 6, *Resistance welding and allied mechanical joining*.

This third edition cancels and replaces the second edition (ISO 669:2000), which has been technically revised.

Resistance welding — Resistance welding equipment — Mechanical and electrical requirements

1 Scope

This International Standard defines and specifies certain identified electrical and mechanical characteristics of equipment used for

- resistance spot welding,
- projection welding,
- resistance seam welding,
- upset welding[1)], and
- flash welding[2)].

This International Standard specifies the information to be given in equipment specifications and the test methods to be used for measuring those characteristics.

Not all requirements apply to all types of equipment.

The following types of power sources are included:

- single phase with alternating welding current;
- single phase with rectified welding current by rectification of the output of the welding transformer;
- single phase with inverter welding transformer;
- three phase with rectified welding current by rectification of the output of the welding transformer;
- three phase with a current rectification in the input of the welding transformer (sometimes called frequency convertor);
- three phase with inverter welding transformers.

This International Standard does not apply to welding transformers that are separate from the equipment.

NOTE Safety requirements for resistance welding equipment are covered by IEC 62135–1.

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 5826:2014, *Resistance welding equipment — Transformers — General specifications applicable to all transformers*

ISO 17657-2, *Resistance welding — Welding current measurement for resistance welding — Part 2: Welding current meter with current sensing coil*

1) Often referred to by the non-preferred term, butt welding.

2) Often referred to by the non-preferred term, flash butt welding.

ISO 17657-5, *Resistance welding — Welding current measurement for resistance welding — Part 5: Verification of welding current measuring system*

ISO 17677-1, *Resistance welding — Vocabulary — Part 1: Spot, projection and seam welding*

IEC 62135-1, *Resistance welding equipment — Part 1: Safety requirements for design, manufacture and installation*

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 Mechanical parts of spot, projection, and seam welding equipment

3.1.1
arm
device for transmitting the *electrode force* (3.1.16) which can also conduct the welding current or support a separate conductor

Note 1 to entry: See Figure 1 and Figure 3.

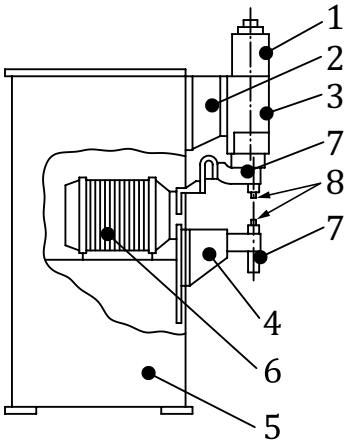
3.1.2
welding head
device comprising the force generation and guiding system carrying an *electrode holder* (3.1.3), *platen* (3.1.5), or *seam welding head* (3.1.6) mounted to the upper arm or directly to the machine body

Note 1 to entry: See Figure 1.

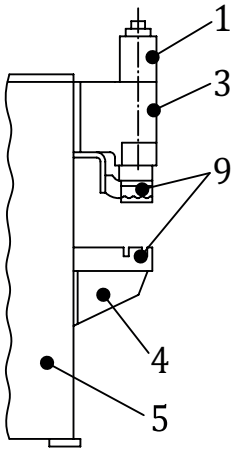
3.1.3
electrode holder
device holding a *spot welding electrode* (3.1.4) or an electrode adaptor

[SOURCE: ISO 8430-1, ISO 8430-2, and ISO 8430-3]

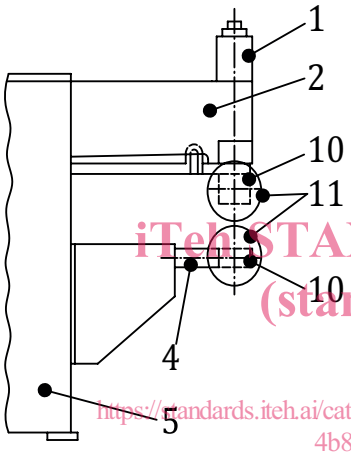
Note 1 to entry: See Figure 1.



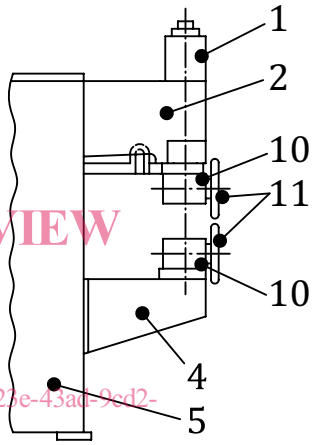
a) Spot welding equipment



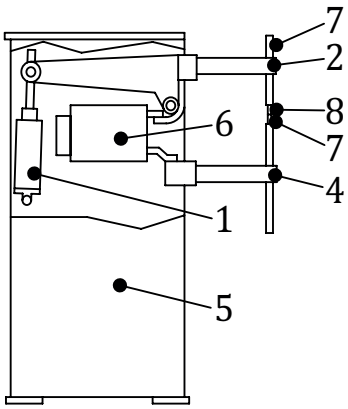
b) Projection welding equipment



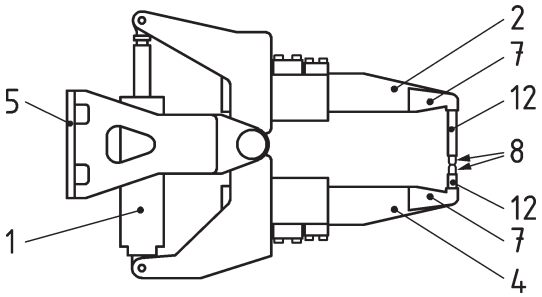
c) Longitudinal seam welding equipment



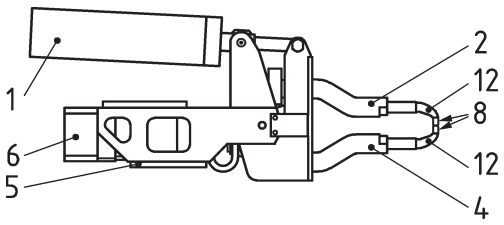
d) Transverse seam welding equipment



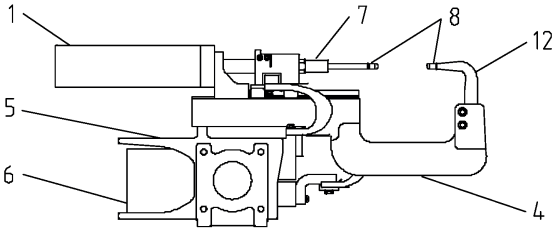
e) Rocker arm welding equipment



f) Welding gun without transformer



g) Manual gun with integrated transformer

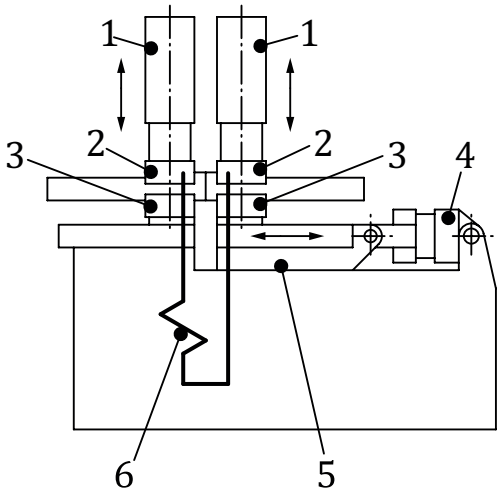


h) Robot mount C-gun

Key

1	force generation system	5	frame	9	platen
2	moveable arm	6	transformer	10	seam welding head
3	welding head	7	electrode holder	11	electrode wheel
4	stationary arm	8	spot welding electrode	12	electrode adapter

Figure 1 — Elements of spot, projection, and seam welding equipment



Key

1 clamping device
2 clamping die
3 current-carrying clamping die

4 slide drive
5 slide
6 welding transformer

Figure 2 — Elements of upset welding equipment

a) Arm length fixed **b) Arm length adjustable**

Figure 3 — Arms (lower arms)

3.1.4
spot welding electrode
electrode designed for spot welding

[SOURCE: ISO 5184 and ISO 5821]

Note 1 to entry: See Figure 1.

3.1.5
platen
device normally having tee slots and carrying projection welding electrodes or welding tools

[SOURCE: ISO 865]

Note 1 to entry: See Figure 1.

3.1.6
seam welding head
device comprising an *electrode wheel bearing* (3.1.7) and mounted on the upper and lower arm for longitudinal and/or transversal seam welding

Note 1 to entry: See Figure 1.

3.1.7
electrode wheel bearing
device guiding the *electrode wheel* (3.1.8) for force transfer and mostly for current transfer

3.1.8
electrode wheel
electrode as a rotating disc

Note 1 to entry: See Figure 1.

Note 2 to entry: This device can be driven by a motor or moved by the workpiece (idler wheels). The driver can be direct to the electrode shaft or to its circumference (knurl drive) (see Figure 6).

3.1.9
electrode wheel profile
form of the *electrode wheel* (3.1.8) being single- or double-sided bevelled or radiused depending on the welding conditions and access

Note 1 to entry: See Figure 5.

3.1.10
electrode wheel speed
<direct drive seam welding> rotational speed, *n*, of the *electrode wheel* (3.1.8)

Note 1 to entry: See Figure 4.

3.1.11
electrode wheel speed
<knurl drive seam welding> linear tangential speed, *v*, of the *electrode wheel* (3.1.8) at the circumference

Note 1 to entry: See Figure 4.

3.1.12
throat gap
e
<spot and seam welding equipment> usable distance between the *arms* (3.1.1) or the outer current conducting parts of the welding circuit

Note 1 to entry: See Figure 6.

3.1.13
platen distance
e
<projection welding equipment> clamping distance between the *platens* (3.1.5)

Note 1 to entry: See Figure 6.

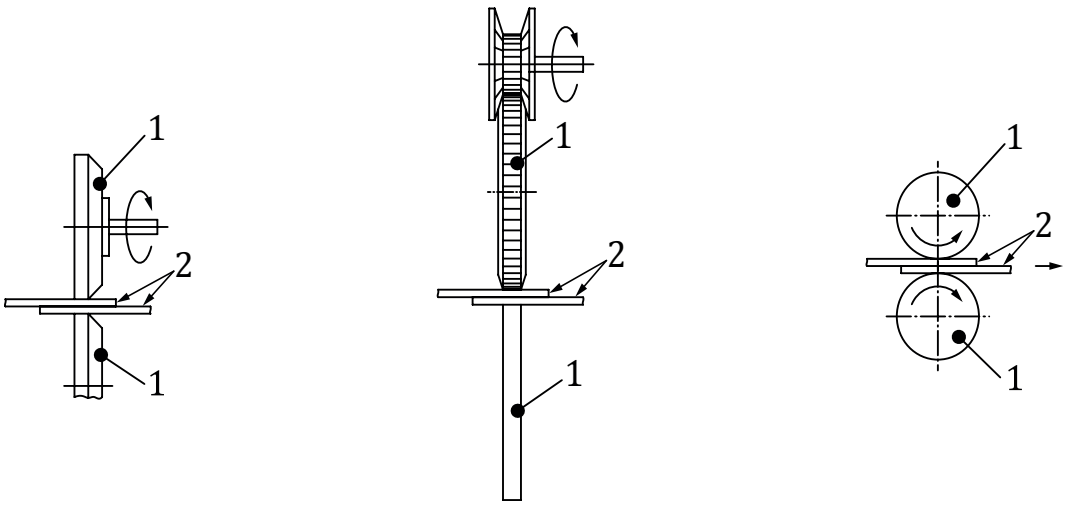
Note 2 to entry: See also *die distance* (3.2.11).

3.1.14
throat depth
l

usable distance from the centre of the *platens* (3.1.5) or the axes of the electrodes or, in the case of oblique electrodes, the point of intersection of the electrode axes in the working position or the contact line of *electrode wheels* (3.1.8) and that part of the equipment body located closest to it

Note 1 to entry: See Figure 6.

Note 2 to entry: This definition does not consider any offset of the electrode tips.



a) Direct drive **b) Knurl drive** **c) Idler wheels**

Key

1 electrode wheel

2 workpieces to be welded

Figure 4 — Drive types of electrode wheels

a) Bevelled **b) Radiused**

Figure 5 — Electrode wheel profiles

a) Spot welding equipment **b) Projection welding equipment**

c) Upset welding equipment (top view) **d) Seam welding equipment**

Key

e throat gap

l throat depth

Figure 6 — Main dimensions

3.1.15
electrode stroke
c
physical displacement of electrodes during process function

Note 1 to entry: When the electrode is attached to the force generation system, the stroke of both the electrode and the driving cylinder is equal.