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2016-08-15

**Resistance welding equipment —
Transformers — Integrated
transformers for welding guns**

*Matériel de soudage par résistance — Transformateurs —
Transformateurs incorporés pour pinces à souder*

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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.

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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 World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 44, *Welding and allied processes*, Subcommittee SC 6, *Resistance Welding and allied mechanical joining*.

This second edition cancels and replaces the first edition (ISO 10656:1996), which has been technically revised. It also incorporates the Technical Corrigendum ISO 10656:1996/Cor. 1:2000.

This corrected version of ISO 10656:2016 incorporates the following corrections:

- the example of a designation in [Clause 6](#) has been dated with the year of publication;
- a key has been added to [Figure A.1](#).

Requests for official interpretations of any aspect of this International Standard should be directed to the Secretariat of ISO/TC 44/SC 6 via your national standards body. A complete listing of these bodies can be found at www.iso.org.

Resistance welding equipment — Transformers — Integrated transformers for welding guns

1 Scope

This International Standard specifies additional requirements to those given in ISO 5826 for single-phase transformers used in AC welding. It is intended to be used in conjunction with ISO 5826, whose requirements it amends.

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*

IEC 60417-DB, *Graphical symbols for use on equipment*¹⁾

3 Dimensions and characteristics of transformers

The dimensions and characteristics of transformers shall be in accordance with

- [Table 1](#) for 50 Hz transformers,
- [Table 2](#) for 60 Hz transformers,
- [Figures 1](#) and [2](#) for type H transformers, and
- [Figures 3](#) and [4](#) for type J transformers.

The cooling water flow rate, Q , shall be 4 l/min.

The transformers are suitable for duty cycles up to 20 % (see [Annex A](#)).

1) See the ISO Online browsing platform: available at <http://www.iso.org/obp>

Table 1 — 50 Hz transformer types, lengths and electrical characteristics

Type ^a	AC no-load voltage U_{20} V	Overall length l_{1max} mm	Mounting hole spacing l_2 mm	Minimum permanent output current I_{2p} kA	Mass (approximate) m kg
H	4,5	245	170	4	18
H	5,6	270	170	4	23
J	6,3	275	190	5,4	26
J	7,1	295	190	5,4	29
J	8	310	230	5,4	32
J	10	370	260	5,4	39
J	13,5	460	350	5,4	52

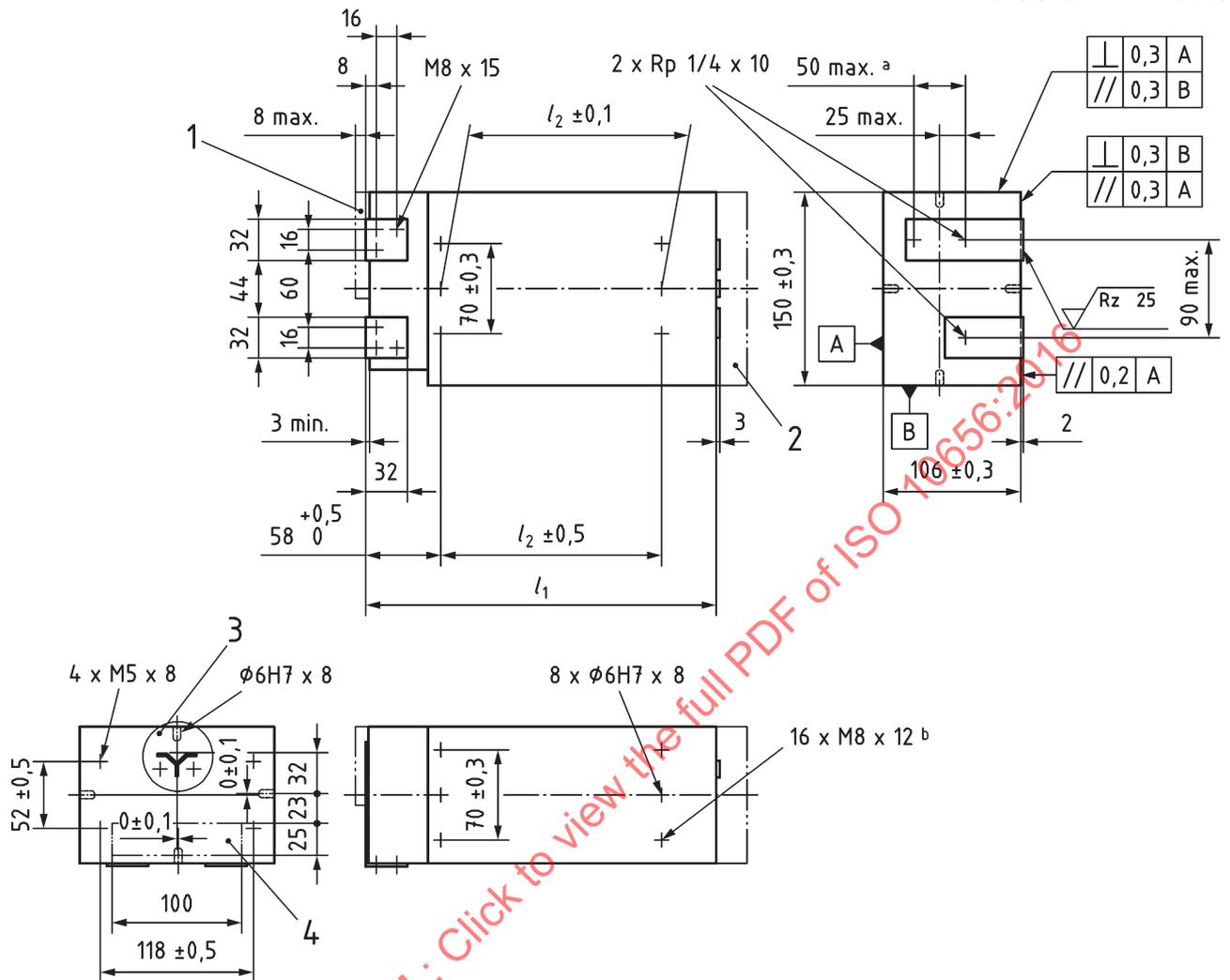
^a See ISO 5826:2014, Annex D.

Table 2 — 60 Hz transformer types, lengths and electrical characteristics

Type ^a	AC no-load voltage U_{20} V	Overall length l_{1max} mm	Mounting hole spacing l_2 mm	Minimum permanent output current I_{2p} kA	Mass (approximate) m kg
H	5,4	245	170	4	18
H	6,7	270	170	4	23
J	7,6	275	190	5,4	26
J	8,5	295	190	5,4	29
J	9,6	310	230	5,4	32
J	12	370	260	5,4	39
J	16,2	460	350	5,4	52

^a See ISO 5826:2014, Annex D.

Dimensions in millimetres



Key

- 1 maximum permissible protuberance for measuring coil
- 2 connection box
- 3 for detailed view, see [Figure 2](#)
- 4 output area for M and T

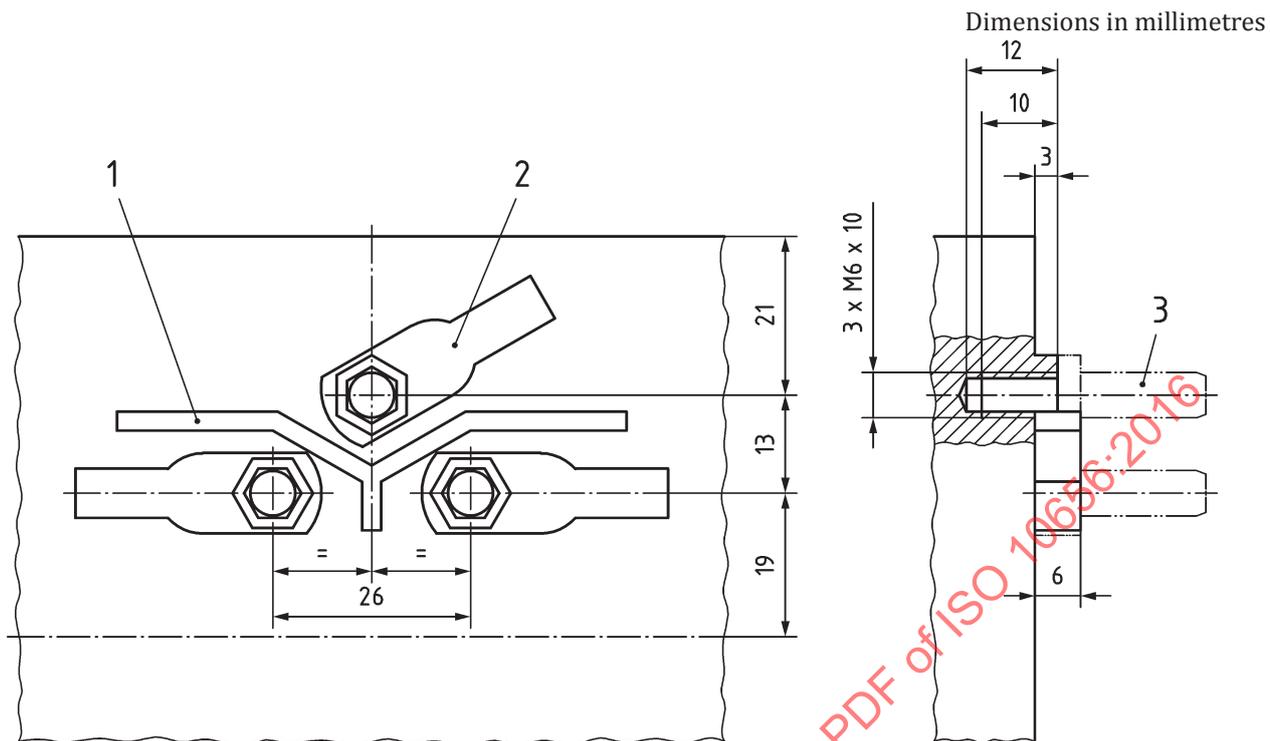
l_1, l_2 see [Tables 1](#) and [2](#)

^a Water holes can be positioned anywhere along this dimension.

^b Fitted with steel inserts — wire type inserts are not acceptable.

NOTE For marking, see [Clause 5](#).

Figure 1 — Dimensions of type H transformers



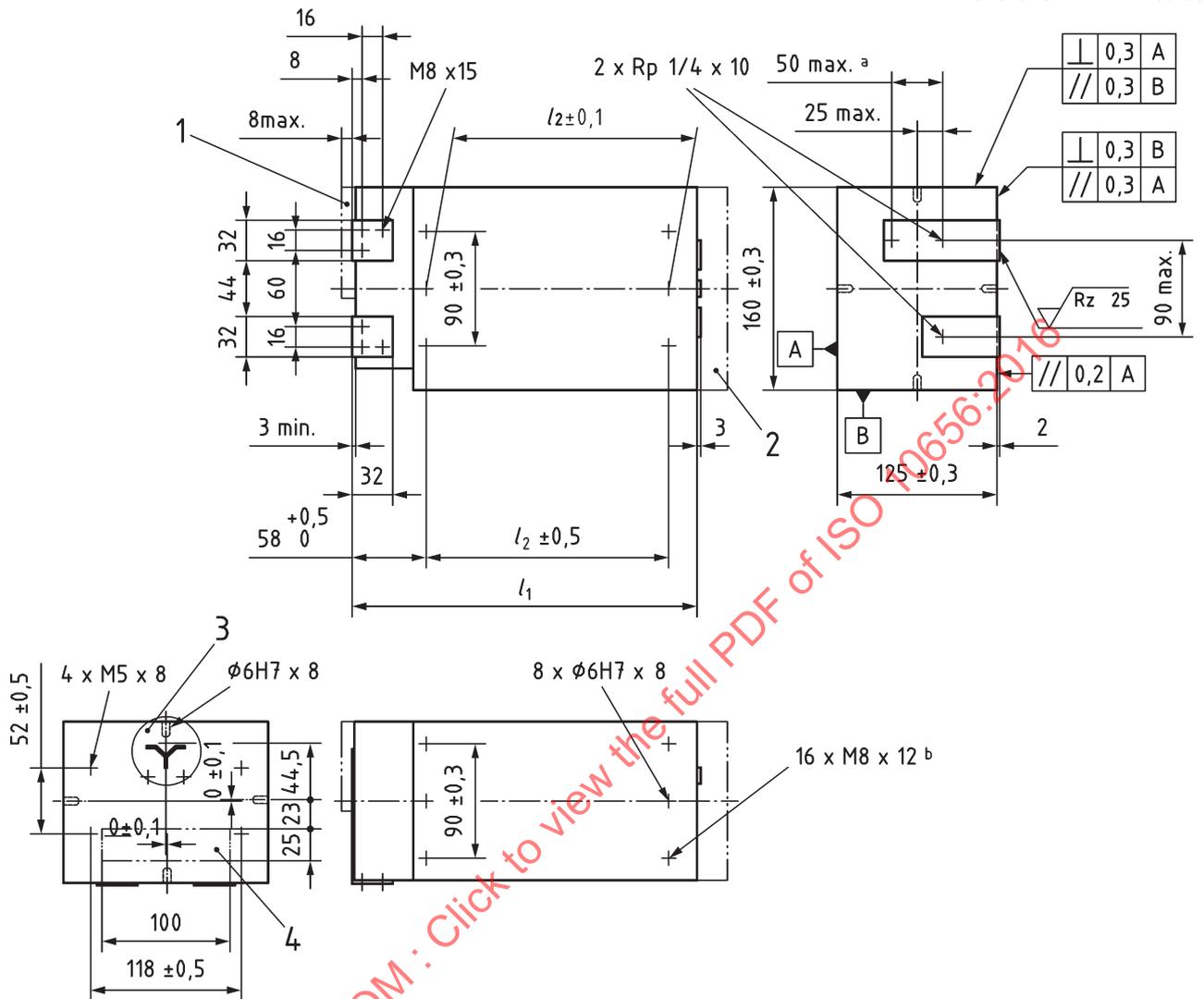
Key

- 1 insulating barrier
- 2 $\varnothing 6$ lug, 10 mm² cable
- 3 $\varnothing 6$ contact pin

NOTE This is a detailed view of [Figure 1](#).

Figure 2 — Size and location of the three M6 holes intended for supply connection of type H transformers

Dimensions in millimetres



Key

- 1 maximum permissible protuberance for measuring coil
- 2 connection box
- 3 for detailed view, see [Figure 4](#)
- 4 output area for M and T

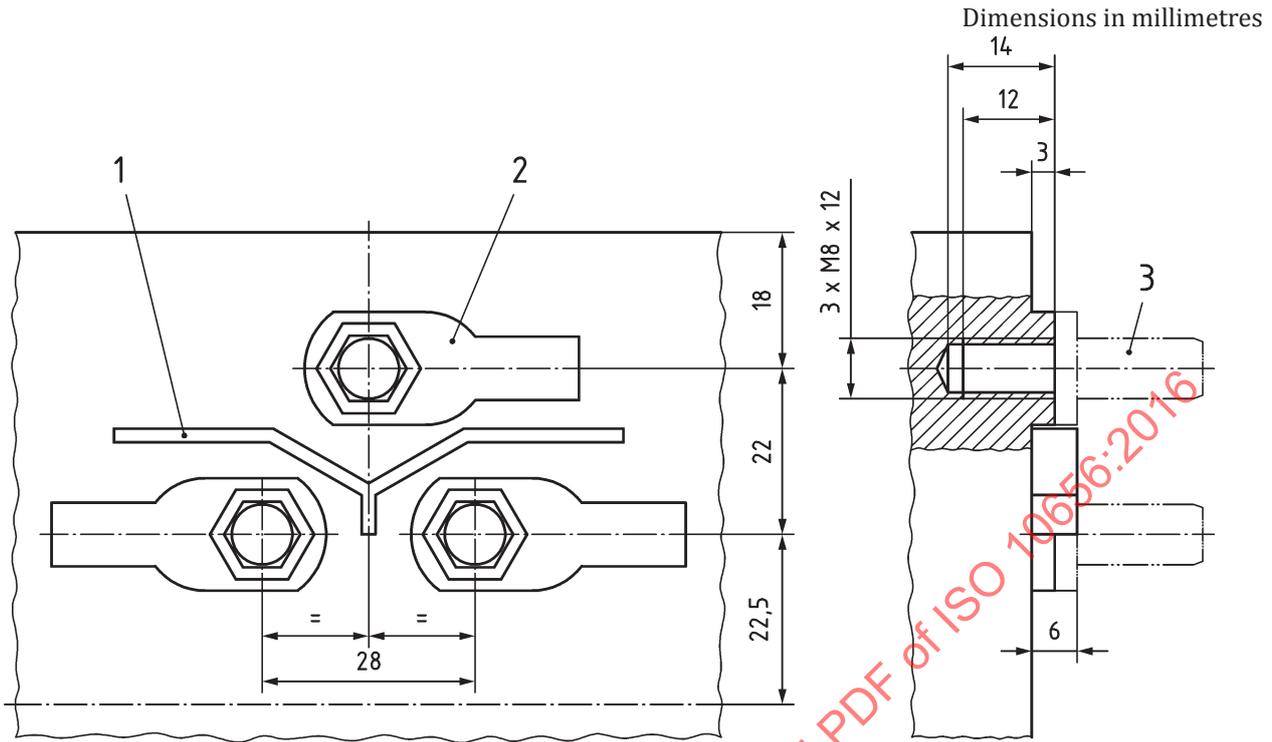
l_1, l_2 see [Tables 1](#) and [2](#)

^a Water holes can be positioned anywhere along this dimension.

^b 16 x M10 x 15 for $U_2 = 13,5$ V only: fitted with steel inserts — wire type inserts are not acceptable.

NOTE For marking, see [Clause 5](#).

Figure 3 — Dimensions of type J transformers



Key

- 1 insulating barrier
- 2 $\varnothing 8$ lug, 16 mm² cable
- 3 $\varnothing 8$ contact pin

NOTE This is a detailed view of [Figure 3](#).

Figure 4 — Size and location of the three M8 holes intended for supply connection of type J transformers

4 Additional equipment

4.1 Grounding provision

The centre point of the secondary coil shall be connected to the transformer case by a removable link.

4.2 Thermal protection

Primary and secondary windings of the transformer shall be equipped with thermostiches. The position of the wiring shall be in accordance with [Figure 1](#) and [Figure 3](#).

The wiring colour shall be as follows:

- light blue for thermostich on primary winding;
- black for thermostich on secondary winding.

Additional requirements are given in ISO 5826.

4.3 Output current sensing coil

Transformers shall include an output current sensing coil and conform to ISO 5826.

5 Marking

5.1 General

Identification of the voltage and earth connections shall be clearly marked: U, V and the symbol IEC 60417-5019 .

The polarity of the output terminals should be indicated on the transformer and in the technical documentation.

5.2 Rating plate

The rating plate shall be in conformance with ISO 5826 except that box 4 shall reference this International Standard and its year of publication, i.e. ISO 10656:2016.

5.3 Colour of exterior finish

The transformer exterior finish colour shall be in accordance with [Table 3](#) for 50 Hz transformers and [Table 4](#) for 60 Hz transformers.

Table 3 — 50 Hz transformer exterior colour

AC no-load voltage U_{20} V	Colour
4,5	orange
5,6	lilac
6,3	blue
7,1	green
8	grey
10	yellow
13,5	brown

Table 4 — 60 Hz transformer exterior colour

AC no-load voltage U_{20} V	Colour
5,4	orange
6,7	lilac
7,6	blue
8,5	green
9,6	grey
12	yellow
16,2	brown

6 Designation

The designation shall comprise the following information in the order given:

- a) reference to this International Standard;
- b) type of transformer (e.g. "J");
- c) AC no load voltage U_{20} , minimum permanent output current I_{2p} , rated supply voltage U_{1N} ;
- d) T, indicating the presence of thermostats;
- e) M, indicating the presence of an output current sensing coil.

EXAMPLE ISO 10656:2016 - J - 7,1 - 5,4 - 400 - TM

7 Test conditions

Testing shall be carried out in accordance with ISO 5826 and the following additional tests.

7.1 Type tests

7.1.1 Mechanical strength

The transformer shall be solidly secured on two plates through the four M8 or M10 mounting holes on two opposite sides. A tensile load of 10 kN shall be progressively applied on both sides, such that the maximum loading is reached after 1 min and maintained for an additional 1 min. The test shall be repeated on the other two sides.

After testing, the transformer shall exhibit no permanent deformation or visible damage.

7.1.2 Dynamic behaviour of the output terminals

The transformer-rectifier shall withstand the dynamic loads produced by a repetitive flow of welding or test current, which shall be as high as possible, but not more than 5 times the secondary permanent output current, I_{2p} , in the test configuration shown in [Figure 5](#).

The duty cycle shall be 1 % and the weld time shall be 160 ms.

The number of cycles shall be 2 500.

The dimension, a , shall be measured before and after the test has been performed. The deformation of the output terminals shall not cause the dimension, a , to change by more than 10 mm.