INTERNATIONAL STANDARD

ISO 10656

Second edition
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Resistance welding equipment — Transformers — Integrated transformers for welding guns

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

Reference number
ISO 10656:2016(E)

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Foreword

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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 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.

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:2011, *Graphical symbols for use on equipment*

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).

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

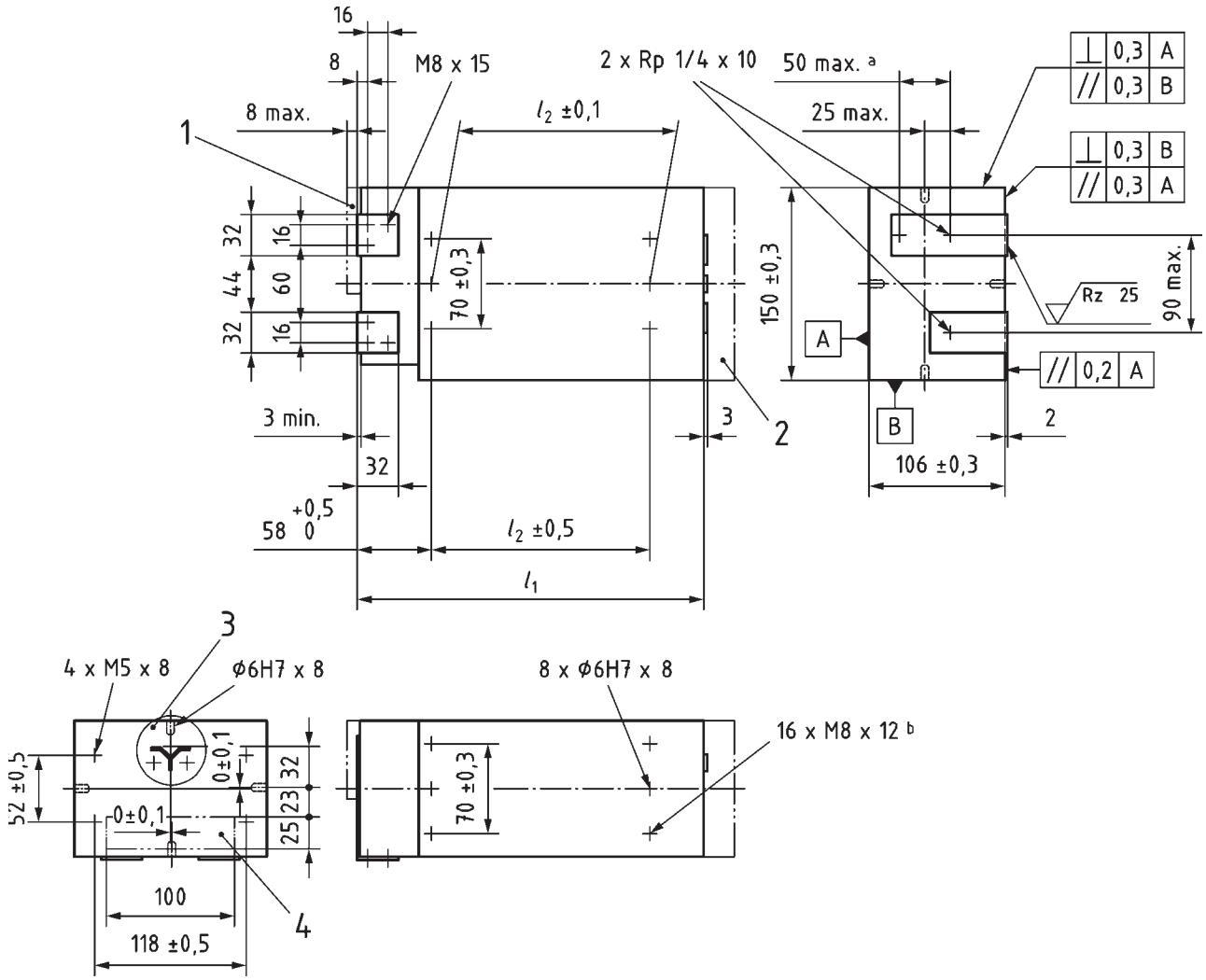
[a] See ISO 5826:2014, Annex D

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

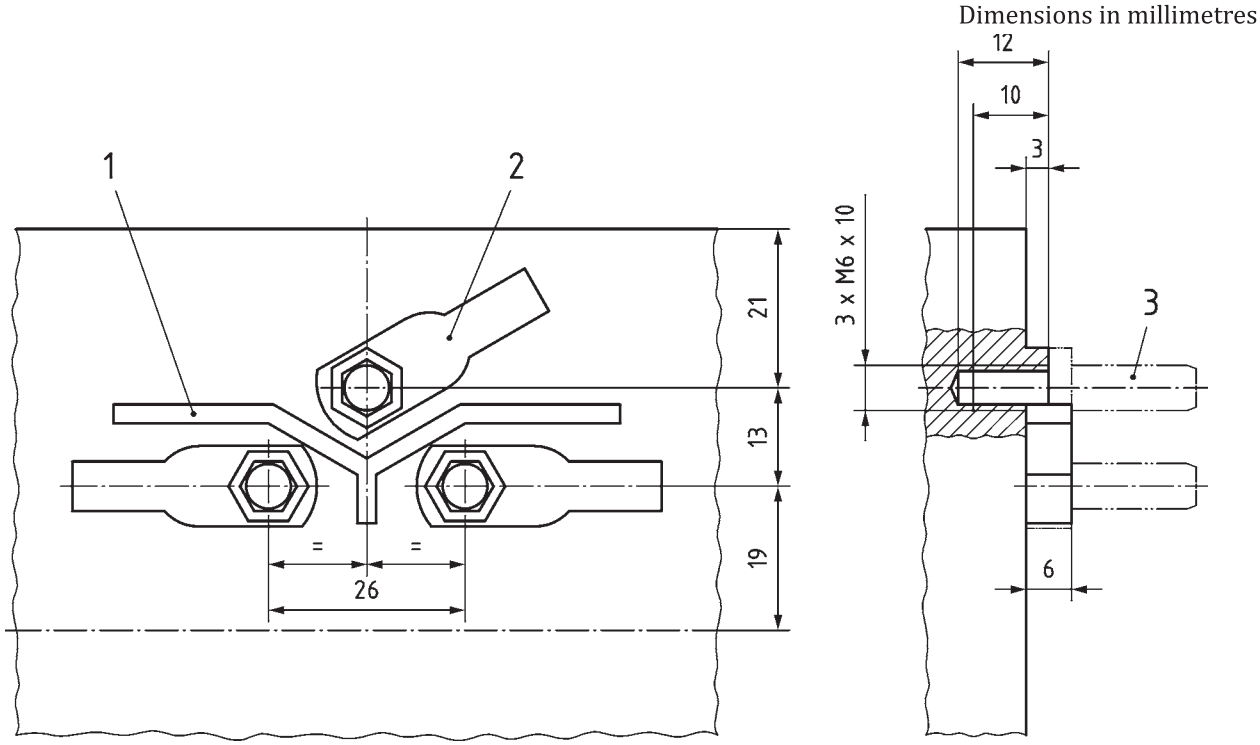
l_1, l_2 see Tables 1 and 2

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

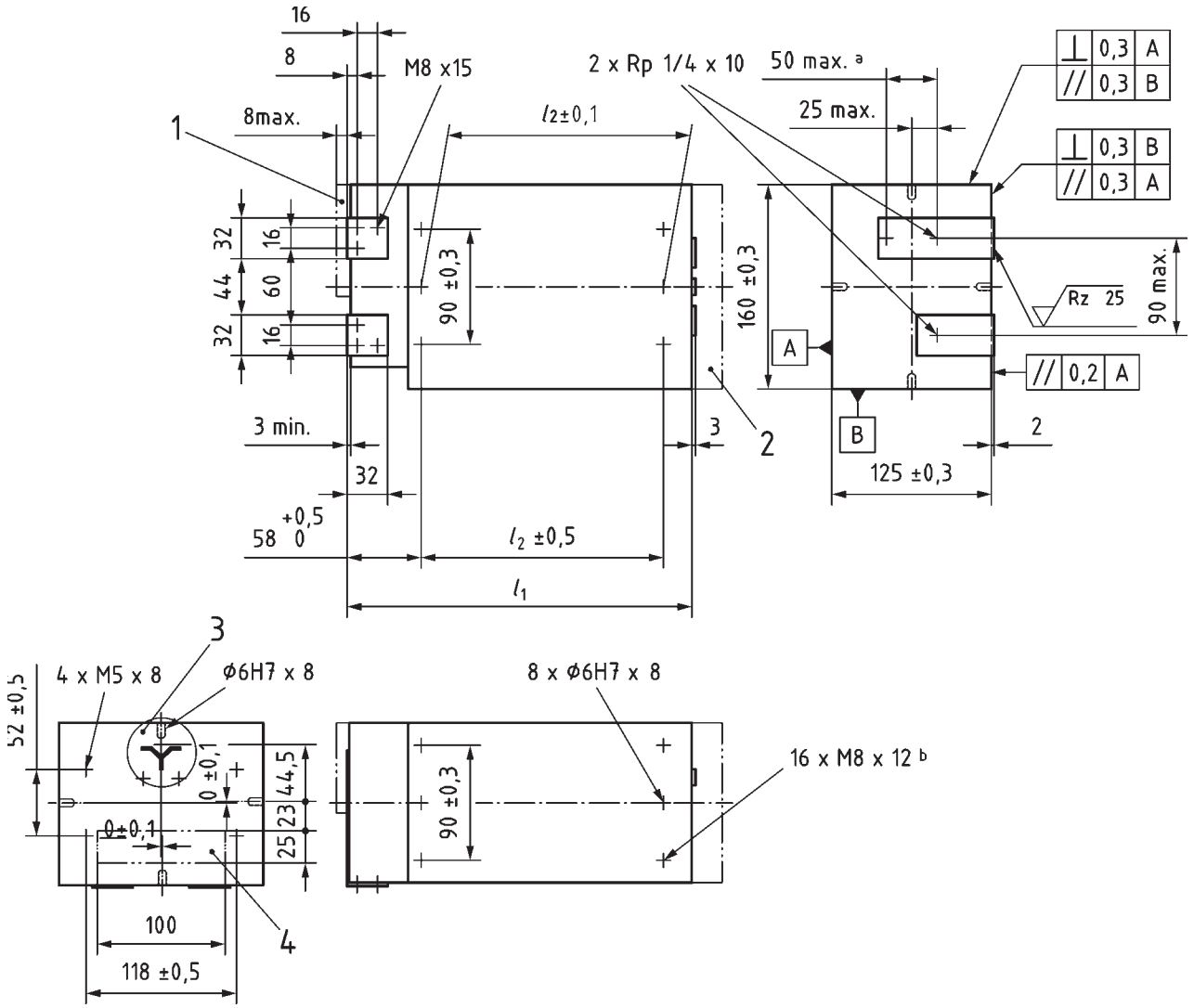
2 ø6 lug, 10 mm^2 cable

3 ø6 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

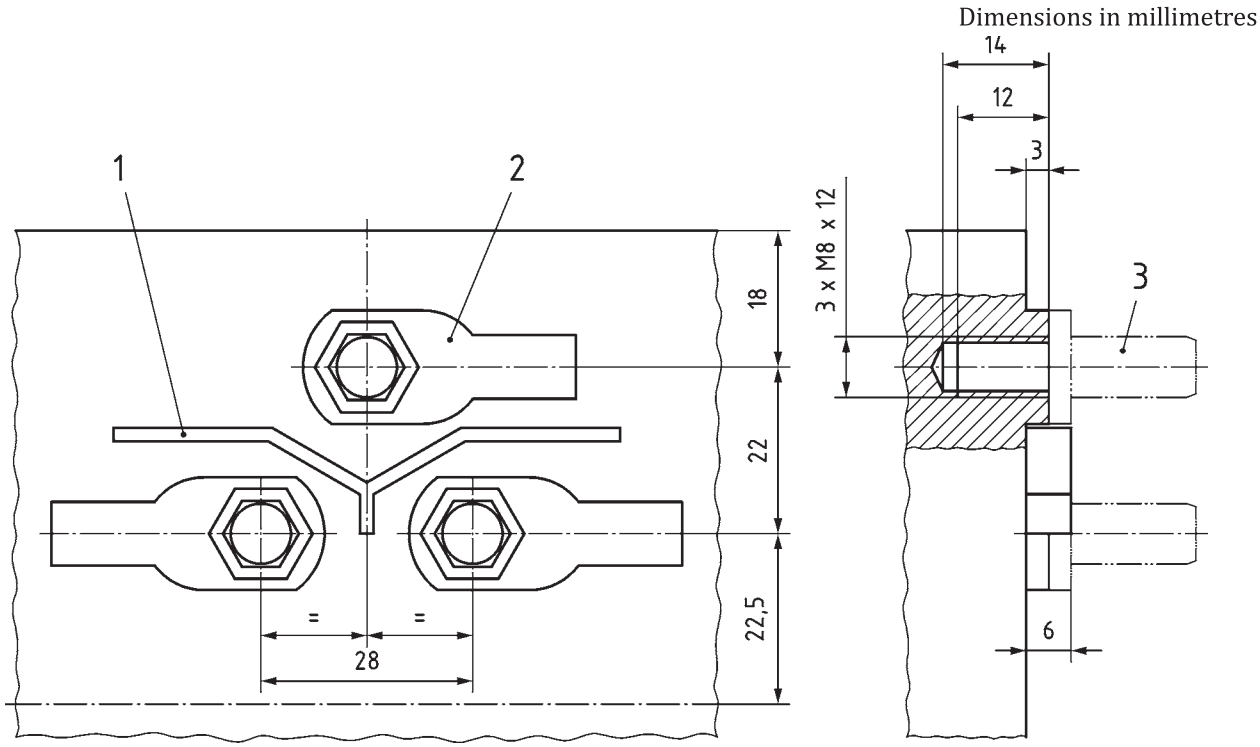
l_1, l_2 see Tables 1 and 2

a Water holes can be positioned anywhere along this dimension.

b 16 × M10 × 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 ø8 lug, 16 mm^2 cable

3 ø8 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 thermoswitches. 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 thermoswitch on primary winding;

— black for thermoswitch 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 ⏚ in accordance with IEC 60417-DB:2011.

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 thermoswitches;

e) M, indicating the presence of an output current sensing coil.

EXAMPLE **ISO 10656 — 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

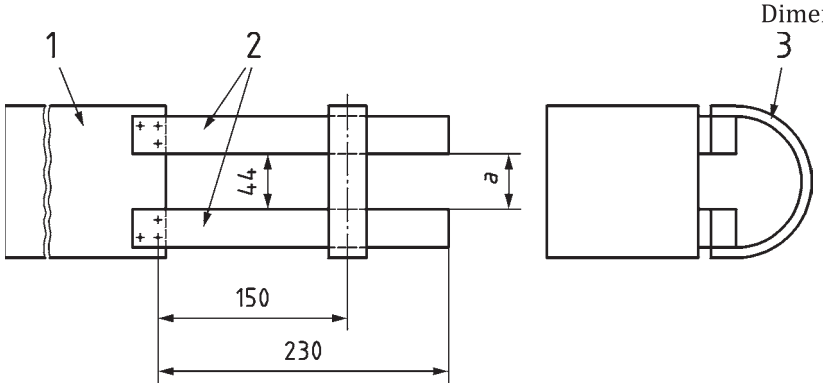
The transformer-rectifier shall withstand the dynamic loads produced by a repetitive flow of welding or test current, which shall be as high as possible, but not more than 5 times the secondary permanent output current, I_{2p}, in the test configuration shown in Figure 5.

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.

Dimensions in millimetres



Key

1 transformer
2 copper bars 30 × 30
3 flexible shunt
a See 7.1.2.

Figure 5 — Device for the dynamic type test

7.2 Thermal test (type test)

The heat rise and temperature limits shall conform to ISO 5826 up to a duty cycle of 20 %.

The test shall be done with nominal primary voltage at a load time of 240 ms and a duty cycle of 20 %.

Annex A
(informative)

Secondary current and duty cycle

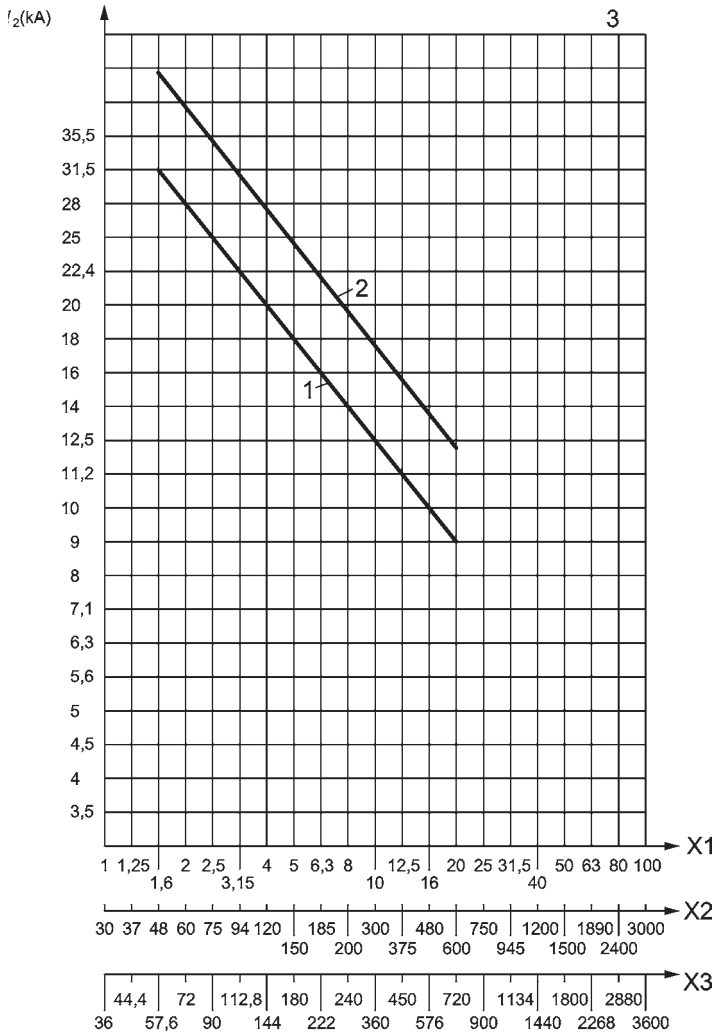


Figure A.1 — Relationship between secondary current I_2 and duty cycle

Bibliography

[1] ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

[2] ISO 1302, *Geometrical Product Specifications (GPS) — Indication of surface texture in technical product documentation*

ICS 25.160.30; 29.180

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