
**Resistance welding equipment —
Electrode taper fits for spot welding
equipment — Dimensions**

*Matériel de soudage par résistance — Emmanchements coniques
d'électrodes pour machines à souder par points — Dimensions*

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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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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For an explanation of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 6, *Resistance welding and allied mechanical joining*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 121, *Welding and allied processes*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 1089:1980), which has been technically revised.

The main changes are as follows:

- [Clauses 1, 4, 5](#) and [6](#) have been updated;
- [Clauses 2](#) and [3](#) have been added according to ISO drafting rules;
- former Figure 1 has been split into [Figures 1](#) and [2](#) and updated;
- [Figures 3](#) and [4](#) have been added;
- all tables have been rearranged and updated (see [Tables 1, 2](#) and [4](#));
- [Table 3](#) has been added;
- [Annex A](#) has been added for electrodes of RWMA type;
- a Bibliography has been added.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html. Official interpretations of ISO/TC 44 documents, where they exist, are available from this page: <https://committee.iso.org/sites/tc44/home/interpretation.html>.

Resistance welding equipment — Electrode taper fits for spot welding equipment — Dimensions

1 Scope

This document specifies the dimensions and tolerances of taper fits between the following:

- straight electrodes and electrode holders;
- electrode adapters connecting electrode caps and electrode holders;
- female electrode caps and electrode adapters;
- male electrode caps and electrode adapters.

NOTE Electrode holders and electrode caps utilizing locking tapers are addressed in ISO 20168.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17677-1 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Dimensions

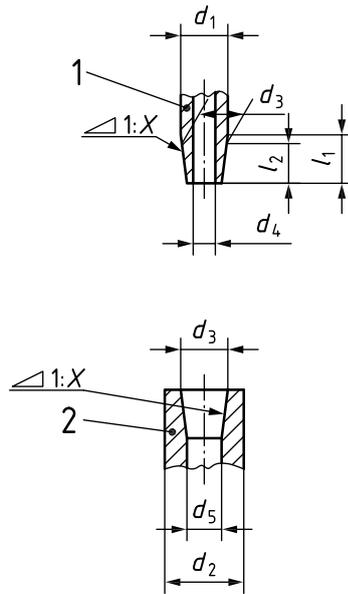
The dimensions shall be in accordance with figures and tables as follows:

- for taper types A and B, [Figure 1](#) and [Tables 1](#) and [2](#);
- for taper Type C, [Figure 2](#) and [Table 3](#), with [Figure 3](#) showing a detail view of l_2 , l_3 and l_4 ;
- for taper Type D, [Figure 4](#) and [Table 4](#).

Taper dimension tolerances are given in [Table 5](#).

Tapers can be checked using taper plug gauges and taper ring gauges in accordance with ISO 5822.

[Annex A](#) gives information on alternative types of electrode taper fits with 1:9.6 tapers.



Key

- | | | | |
|-------|--|-------|--|
| 1 | male component (straight electrode or electrode adaptor) | d_3 | gauge diameter at datum line of taper – male component or electrode holder |
| 2 | electrode holder | d_4 | cooling hole diameter – male component |
| 1:X | taper | d_5 | cooling hole diameter – electrode holder |
| d_1 | outside diameter – male component | l_1 | taper length – male component |
| d_2 | outside diameter – electrode holder | l_2 | effective taper length – male component |

Figure 1 — Taper-details — Male component (straight electrode or electrode adaptor, either for straight thrust or eccentric loading) and electrode holder — Taper types A and B

Table 1 — Male components (straight electrodes or electrode adaptors) and electrode holders — Dimensions for straight thrust — Taper type A

Dimensions in millimetres

Electrode taper fit	Taper 1:X	d_1	d_2	d_3	d_4	Straight thrust		Electrode force ^a F_{max} kN
						d_5	l_2	
A 10	1:10 (2°51'45")	10	16 20 25	9,8	5,5	8,5	13	2,5
A 13		13	20 25 31,5 40	12,7	7,5	11	16	4
A 16		16	25 31,5 40	15,5	8,5	13,5	20	6,3
A 20		20	31,5 40	19	10,5	16,5	25	10
A 25		25	40	24,5	13,5	21,5	31,5	16

^a For information only.

Table 1 (continued)

Electrode taper fit	Taper 1:X	d_1	d_2	d_3	d_4	Straight thrust		Electrode force ^a F_{\max} kN
						d_5	l_2	
A 32	1:5 (5°42'30")	32	50	31	14	23	40	25
A 40		40	63	39	16	29	50	40

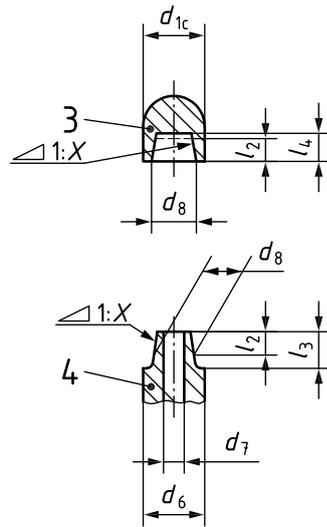
^a For information only.

Table 2 — Male components (offset electrodes or offset electrode adaptors) and electrode holders — Dimensions for eccentric loading — Taper type B

Dimensions in millimetres

Electrode taper fit	Taper 1:X	d_1	d_2	d_3	d_4	Eccentric loading		Electrode force ^a F_{\max} kN
						d_5	l_2	
B 10	1:10 (2°51'45")	10	16	9,8	5,5	8	20	2,5
			20					
		25						
B 13		13	25	12,7	7,5	10	25	4
			31,5					
		40						
B 16	16	25	15,5	8,5	12,5	31,5	6,3	
		31,5						
	40							
B 20	20	31,5	19	10,5	15	40	10	
		40						
B 25	25	40	24,5	13,5	19,5	50	16	
		40						
B 32	1:5 (5°42'30")	32	50	31	14	–	–	25
B 40		40	63	39	16	–	–	40

^a For information only.



Key

- | | | | |
|----------|--------------------------------------|-------|---|
| 3 | female electrode cap | d_7 | cooling hole diameter – electrode adaptor |
| 4 | electrode adaptor | d_8 | gauge diameter at datum line of taper – female electrode cap or electrode adaptor |
| 1:X | taper | l_2 | effective taper length or depth – electrode adaptor or female electrode cap |
| d_{1c} | outside diameter – electrode cap | l_3 | length of reduced diameter – electrode adaptor |
| d_6 | outside diameter – electrode adaptor | l_4 | total hole depth – female electrode cap |

NOTE A round head type F female electrode cap is shown as an example.

Figure 2 — Taper details — Female electrode cap and male electrode adaptor — Taper type C

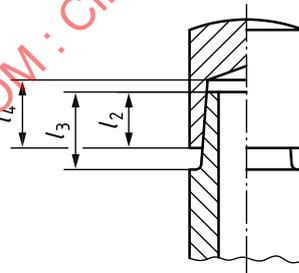


Figure 3 — Detail view of l_2 , l_3 and l_4 — Example of female electrode cap and male electrode adaptor — Taper type C

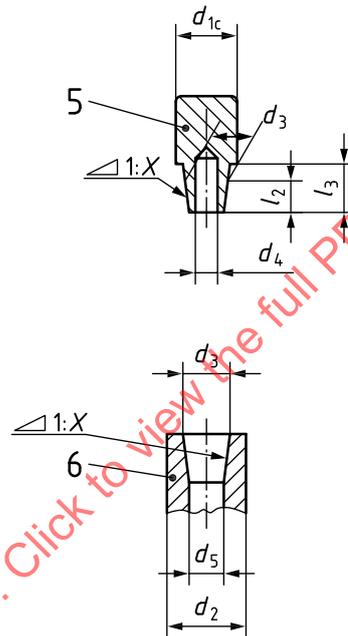
Table 3 — Female electrode caps and male adaptors — Dimensions — Taper type C

Dimensions in millimetres

Electrode taper fit 1:10 (2°51'45")	d_{1c}^a	d_6	d_7	d_8	l_2	l_3	l_4	Electrode force ^b F_{max} kN
C 13	13	13	6,5	10	6,5	10	8	2,5
C 16	16	16	8	12	8	13	9,5	4
C 20	20	20	10,5	15	10	15	11,5	6,3

^a Typical diameter. Other diameters can be used as well.

^b For information only.



Key

- | | | | |
|-------|-------------------------------|----------|---|
| 5 | male electrode cap | d_{1c} | outside diameter – male electrode cap |
| 6 | electrode adaptor | d_2 | outside diameter – electrode adaptor |
| l_2 | effective taper length | d_3 | gauge diameter at datum line of taper – male electrode cap or electrode adaptor |
| l_3 | taper length – male electrode | d_4 | cooling hole diameter – male electrode cap |
| 1:X | taper | d_5 | cooling hole diameter – electrode adaptor |

Figure 4 — Taper details — Male electrode cap and female electrode adaptor — Taper type D

Table 4 — Male electrode cap and female electrode adaptor — Dimensions — Taper type D

Dimensions in millimetres

Electrode taper fit 1:10 (2°51'45")	d_{1c}^a	d_2	d_3	d_4	d_5	l_2	l_3	Electrode force ^b F_{max} kN
D 16	16	16	11,8	8	8	6	10	4
^a Typical diameter. Other diameters can be used as well. ^b For information only.								

Table 5 — Taper dimension tolerances

Taper angle tolerance d°m's"	d_3, d_8 mm	l_1 mm	l_3, l_4^a mm
0	0	+0,5	+0,5
-0°6'0"	-0,1	-0,5	0
^a Includes any unevenness of the electrode skirt length.			

5 Designation

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

- the number of this document (i.e. ISO 1089);
- electrode taper fit as mentioned in the first column of [Table 1](#), [Table 2](#), [Table 3](#) and [Table 4](#).

EXAMPLE Electrode taper fit of Type A and $d_1 = 16$ mm:

ISO 1089 — A16

6 Marking

Electrode holders with an electrode taper fit in accordance with this document shall be marked with the designation (without the number of this document), for example "A16".

Electrode adapters with an electrode taper fit for an electrode cap side in accordance with this document should be marked with the designation (without the number of this document), for example "C16".

Annex A (informative)

Alternative types and dimensions of female and male electrode taper fits

[Table A.1](#) and [Table A.2](#) show alternative types of electrode taper fits with 1:9.6 tapers. The symbols indicated in [Table A.1](#) and [Table A.2](#) refer to [Figure 2](#) and [Figure 4](#), respectively.

Table A.1 — Female electrode caps and adapters — Dimensions — Taper type F

Dimensions in millimetres

Electrode taper fit 1:9.6	d_{1c}	d_6	d_8	d_7	l_2^a	l_3	l_4
F12	12,70	12,24	10,01	6,35	—	8,13	8,13
F16	15,88	15,88	12,57	6,73	—	9,53	9,53
F19	19,05	19,05	15,88	8,71	—	11,94	11,94
F22	22,23	22,23	15,88	8,71	—	11,94	11,94
^a Not specified because this value varies during welding process.							

Table A.2 — Male electrode caps and adapters — Dimensions — Taper type G

Dimensions in millimetres

Electrode taper fit 1:9.6	d_{1c}	d_2	d_3	d_4	d_5	l_3	l_2^a
G12	12,24	12,24	9,53	7,14	7,14	9,53	—
G16	15,88	15,88	10,54	7,92	9,53	12,70	—
G19	19,05	19,05	12,73	9,35	11,11	15,88	—
G22	22,23	22,23	15,57	12,70	12,70	15,88	—
^a Not specified because this value varies during welding process.							