DRAFT INTERNATIONAL STANDARD

ISO/DIS 5182

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Resistance welding — Materials for electrodes and ancillary equipment

Soudage par résistance — Matériaux pour électrodes et équipements annexes

ICS: 25.160.20

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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

ISO 5182 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 6, *Resistance welding and allied mechanical joining*.

This fourth edition cancels and replaces the third edition (ISO 5182:2008), which has been technically revised.

Resistance welding — Materials for electrodes and ancillary equipment

1 Scope

This International Standard specifies the characteristics of materials for resistance welding electrodes and ancillary equipment which are used for carrying current and transmitting force to the work.

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 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method*

ASTM E1004, *Standard practice for determining electrical conductivity using the electromagnetic (eddy-current) method*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
softening temperature
maximum temperature that, if maintained for 2 h, will result in a reduction in ambient temperature hardness of a maximum of 15 % of the “as received” value

4 Classification

4.1 Group A — Copper and copper alloys

This group defines four types of material in accordance with Table 1.

Table 1 — Group A — Classification of copper and copper alloys

Type	Description
1	Non-heat-treatable alloys of high conductivity and medium hardness, the wrought forms of which are given their strengths by cold working during manufacture;
2	Alloys which are harder than type 1 and in which the mechanical properties have been developed by heat treatment during manufacture or by a combination of heat treatment and cold working;
3	Heat-treated alloys which have superior mechanical properties to type 2 but a lower electrical conductivity than either type 1 or type 2;
4	Alloys having certain specialised properties which may, in some cases, be obtained either by cold working or by heat treatment. Alloys of this type are not necessarily interchangeable with each other;

4.2 Group B — Sintered materials

This group comprises six types of material based upon the constituents used in accordance with Table 2.

Table 2 — Group B — Classification of sintered materials

Type	Description
10 and **11**	Sintered products of copper and tungsten.
12	Sintered product of copper and tungsten carbide.
13	Sintered and worked product of molybdenum.
14	Sintered and worked product of tungsten.
15	Sintered product of tungsten and silver.

4.3 Group C — Dispersion-strengthened copper (DSC) alloys

This group comprises two types of materials (see Table 3):

— C 20/1, C 20/2 and C 20/3, manufactured by internal oxidation;

— C 20/4, C 20/5 and C 20/6, manufactured by ball milling or mechanical alloying.

5 Specifications

5.1 Requirements

The materials shall comply with Table 3.

5.2 Chemical composition

The chemical compositions are given in Table 3.

5.3 Mechanical properties

The material hardness shall not be less than as given in Table 3.

NOTE When these materials are used for resistance welding equipment the required properties are different from those of materials used for general purposes.

5.4 Electrical properties

The electrical conductivity, given in mega-Siemens per metre (MS/m) or as a percentage of the conductivity of the International Annealed Copper Standard (IACS), of materials shall be not less than those given in Table 3.

6 Methods of test

6.1 Vickers hardness test

The Vickers hardness test shall be carried out with a 300 N load in accordance with ISO 6507-1.

6.2 Electrical properties

The electrical properties shall be measured in accordance with ASTM E1004. When it is not possible to use this method, the test shall be carried out as agreed between the suppliers, the purchaser, and a mutually acceptable arbitrator.

NOTE Electrical conductivity, when evaluated with eddy-current instruments, is usually expressed as a percentage of the conductivity of the International Annealed Copper Standard (IACS).

6.3 Softening temperature test

Hardness and conductivity tests normally guarantee the quality of the material and allow verification of the softening temperature. The softening temperature test is not normally carried out on each batch of material.

Pending the finalization of a standard method for carrying out the softening temperature test, the test can only be made as agreed between suppliers and purchaser.

7 Designation

Materials shall be designated by the group, type and number (see Table 3).

EXAMPLE 1 CuCr1 is designated:

ISO 5182:20XX – A 2/1

where

ISO 5182 is the number of this International Standard;

A is the material group (see Clause 4);

2 is the material type (see Clause 4);

1 is the CuCr1 material number (see Table 3).

EXAMPLE 2 W75Cu is designated:

ISO 5182:20XX – B 10

where

ISO 5182 is the number of this International Standard;

B is the material group (see Clause 4);

10 is the material type (see Clause 4);

8 Application

For typical applications, see Annex A.

WARNING — For alloys containing beryllium, precautions shall be taken in case of dry grinding, dry polishing or welding to avoid inhalation of dust or fumes over a certain period of time.

9 Hardness conversions

See Annex B.

Table 3 — Composition and properties of materials

Group	Type	Number	Designation	Nominal alloying elements %	Forms available mm	Hardness HV 30 min.	Electrical conductivity MS/m min.	 % IACS	Softening temperature °C min.
A	1	1	Cu-ETP	Cu (+Ag) min. 99,90	drawn ≥ 25	85	57	98	150
					drawn < 25	100	57	98	
					forged	45	57	98	
					cast	40	50	86	
		2	Cu-EPT1	Cu min 99,90 O max.0,04	wire d≤2,5/-0,04	–	57,5	99	150
		3	CuAg0,10P	Ag 0,08 to 0,12	drawn < 25	90	55	95	150
		4	Cu-PHC	P 0,001 to 0,006	drawn	85	57	98	150
	2	1	CuCr1	Cr 0,5 to 1,2	drawn ≥ 25	125	44	76	475
					drawn < 25	140	44	76	
					forged	100	44	76	
					cast	85	44	76	
		2	CuCr1Zr	Cr 0,5 to 1,4 Zr 0,03 to 0,3	drawn ≥ 25	135	43	74	500
					drawn < 25	140	43	74	
					forged	100	43	74	
		3	CuCrZr	Cr 0,4 to 1 Zr 0,02 to 0,15	hardened	150	43	74	500
					ground < 45	150	43	74	
		4	CuZr	Zr 0,1 to 0,2	drawn	140	47	81	500
					ground < 30	130	47	81	
	3	1	CuCo2Be	Co 2,0 to 2,8 Be 0,4 to 0,7	drawn ≥ 25	260	23	40	500
					drawn < 25	270	23	40	
					forged	260	23	40	
					cast	250	23	40	
		2	CuNi2Si	Ni 1,6 to 2,5 Si 0,4 to 0,8	drawn ≥ 25	180	17	29	450
					drawn < 25	190	18	31	
					forged	170	19	33	
					cast	160	17	29	
		3	CuNi2Be	Ni 1,4 to 2,4 Be 0,2 to 0,6	drawn < 40	240	24	42	450
		4	CuCo1Ni1Be	Co 0,8 to 1,3 Ni 0,8 to 1,3 Be 0,4 to 0,7	drawn < 40	250	23	40	475

[a] Rm=400 N/mm²