
Mehke spajke - Kemijska sestava in oblike (ISO/DIS 9453:2019)

Soft solder alloys - Chemical compositions and forms (ISO/DIS 9453:2019)

Weichlote - Chemische Zusammensetzung und Lieferformen (ISO/DIS 9453:2019)

Alliages de brasage tendre - Compositions chimiques et formes (ISO/DIS 9453:2019)

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Soft solder alloys — Chemical compositions and forms

Alliages de brasage tendre — Compositions chimiques et formes

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

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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 9453 was prepared by Technical Committee ISO/TC 44, *Welding*, Subcommittee SC 12, *Soldering materials*.

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Introduction

The International Organization for Standardization (ISO) draws attention to the fact that it is claimed that conformance to this document may involve the use of a patent concerning soft solder alloy compositions given in [Table 3](#).

ISO takes no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured the ISO that he/she is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world.

Attention is drawn to the possibility that some of the elements (in particular the alloy compositions) of this document may be the subject of patent rights other than those identified above. ISO shall not be held responsible for identifying any or all such patent rights.

Patent rights vary between country of manufacture, sale, use and final destination; suppliers or users remain responsible for establishing the exact legal position relevant to their own situation.

Request for an official interpretation of technical aspects of this International Standard should be directed to the relevant secretariat of ISO/TC 44/SC 12 "Soldering materials" via the user's national standardization body; a listing of these bodies can be found at www.iso.org.

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Soft solder alloys — Chemical compositions and forms

1 Scope

This International Standard specifies the requirements for chemical composition for soft solder alloys containing two or more of:

— tin, lead, antimony, copper, silver, bismuth, zinc, indium and/or cadmium.

An indication of the forms generally available is also included.

2 Normative references

The following referenced documents are indispensable for the application 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 3677, *Filler metal for soldering and brazing — Designation*

3 Terms and definitions

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

3.1

soft solder

metallic filler material which is used to join metallic parts and which has a melting temperature (liquidus) lower than that of the parts to be joined and, usually, lower than 450 °C and which wets the parent metals

3.2

batch

collection of one or more units of product, made in a single production operation

4 Chemical composition

The chemical composition of the soft solder, sampled and analysed in accordance with [Clause 6](#), shall be as given for the appropriate material in [Table 1](#) or [Table 2](#).

5 Forms of delivery

5.1 General

Soft solders conforming to this International Standard shall be supplied in one of the following forms: ingot, slab, stick, bar, rod, wire, pellets, preforms, spheres, ribbons, powder or pastes and creams containing powder. Solder shall be uniform in quality and free from detrimental conditions such as contamination or surface oxide that prevent melting and flow in a manner suitable for the intended application.

NOTE 1 Solders supplied in the form of rod, wire, or preforms may be supplied with or without an integral flux, subject to agreement between the supplier and the purchaser.

NOTE 2 Not all the solder compositions given in the tables are necessarily available in all the product forms listed.

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5.2 Unit of product

The unit of product used for defining the requirements for the marking of soft solders varies with the form of the solder,

NOTE See [Table 1](#).

Table 1 — Variations of unit of product with form of solder

Form of solder	Unit of product
Ingot, bar, slab, stick or rod	A single ingot, bar, slab, stick or rod
Wire or ribbon	A single coil or reel
Preforms and rings, spheres, pellets or powder	The individual packaged quantity
Powder in solder pastes	The individual packaged quantity

6 Sampling and analysis

Pending the publication of International Standards for sampling and for methods of analysis for soft solder alloys, the methods used shall, in cases of dispute, be agreed between the supplier and the purchaser.

NOTE Preferred analysis methods are Spark-OES and AAS.

7 Marking, labelling and packaging

Each batch of solder supplied in accordance with this International Standard shall be marked with the information indicated by a cross in [Table 4](#).

The information in [Table 4](#) shall be applied to the product forms as follows:

- a) for ingots and slabs: by stamping, or inkjet marking on the surface of each unit of product;
- b) for sticks, bars, rods and wire in coil: either on a label securely attached to each unit of product, or on a label on the package in which the units of product are contained;
- c) for wire or ribbon on reels: on a label on each reel;
- d) for pellets, performs, spheres, powder, paste or cream: on a label on each individually packaged quantity;

All product forms shall also be labelled with any health and safety warnings required by the relevant rules and regulations of the country of manufacture, or as specified in the order.

Table 2 — Chemical compositions of lead containing solder alloys (tin-lead, lead-tin, tin-lead-antimony, tin-lead-bismuth, tin-lead-cadmium, tin-lead-copper, tin-lead-silver, and lead-silver)

Group	Alloy No. ^a	Alloy Designation according to ISO 3677 ^b	Melting or solidus/liquidus temperature °C ^c	Chemical composition, mass fraction in % ^{d,e}											Fe	Ni	Zn
				Sn	Pb	Sb	Bi	Cd	Cu	Au	In	Ag	Al	As			
Tin-lead binary alloys solidus temperature 183 °C	101	Sn63Pb37	183	62,5 to 63,5	Rem	0,20	0,10	0,002	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
	102	Sn63Pb37E	183	62,5 to 63,5	Rem	0,05	0,05	0,002	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
	103	Sn60Pb40	183/190	59,5 to 60,5	Rem	0,20	0,10	0,002	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
	104	Sn60Pb40E	183/190	59,5 to 60,5	Rem	0,05	0,05	0,002	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
Lead-tin binary alloys solidus temperature 183 °C	111	Pb50Sn50	183/215	49,5 to 50,5	Rem	0,20	0,10	0,002	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
	112	Pb50Sn50E	183/215	49,5 to 50,5	Rem	0,05	0,05	0,002	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
	113	Pb55Sn45	183/226	44,5 to 45,5	Rem	0,50	0,25	0,005	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
	114	Pb60Sn40	183/238	39,5 to 40,5	Rem	0,50	0,25	0,005	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
	115	Pb65Sn35	183/245	34,5 to 35,5	Rem	0,50	0,25	0,005	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
Lead-tin binary alloys solidus temperature > 183 °C	116	Pb70Sn30	183/255	29,5 to 30,5	Rem	0,50	0,25	0,005	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
	117	Pb80Sn20	183/280	19,5 to 20,5	Rem	0,50	0,25	0,005	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
	121	Pb85Sn15	226/290	14,5 to 15,5	Rem	0,50	0,25	0,005	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
	122	Pb90Sn10	268/302	9,5 to 10,5	Rem	0,50	0,25	0,005	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
	123	Pb95Sn5	300/314	4,5 to 5,5	Rem	0,50	0,10	0,005	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
Tin-lead-anti-mony	124	Pb98Sn2	320/325	1,8 to 2,2	Rem	0,12	0,10	0,002	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
	131	Sn63Pb37Sb	183	62,5 to 63,5	Rem	0,20 to 0,50	0,10	0,002	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
	132	Sn60Pb40Sb	183/190	59,5 to 60,5	Rem	0,20 to 0,50	0,10	0,002	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
	133	Pb50Sn50Sb	183/216	49,5 to 50,5	Rem	0,20 to 0,50	0,10	0,002	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
	134	Pb58Sn40Sb2	185/231	39,5 to 40,5	Rem	2,0 to 2,4	0,25	0,005	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
	135	Pb69Sn30Sb1	185/250	29,5 to 30,5	Rem	0,5 to 1,8	0,25	0,005	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
	136	Pb74Sn25Sb1	185/263	24,5 to 25,5	Rem	0,5 to 2,0	0,25	0,005	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001
	137	Pb78Sn20Sb2	185/270	19,5 to 20,5	Rem	0,5 to 3,0	0,25	0,005	0,08	0,05	0,10	0,10	0,001	0,03	0,02	0,01	0,001