



**SLOVENSKI STANDARD**  
**oSIST prEN ISO 12224-1:2023**

**01-oktober-2023**

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**Mehke spajke v obliki žice, palice in strženske žice - Specifikacije in preskusne metode - 1. del: Razvrstitev in zahteve (ISO/DIS 12224-1:2023)**

Solder wire, solid and flux cored - Specification and test methods - Part 1: Classification and performance requirements (ISO/DIS 12224-1:2023)

Massive Lotdrähte und flussmittelgefüllte Röhrenlote - Festlegungen und Prüfverfahren - Teil 1: Einteilung und Anforderungen (ISO/DIS 12224-1:2023)

Fils d'apport de brasage, pleins et à flux incorporé - Spécifications et méthodes d'essai - Partie 1: Classification et exigences de performance (ISO/DIS 12224-1:2023)

**Ta slovenski standard je istoveten z: prEN ISO 12224-1**

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**ICS:**

25.160.50 Trdo in mehko lotanje Brazing and soldering

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**en,fr,de**



# DRAFT INTERNATIONAL STANDARD

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## Solder wire, solid and flux cored — Specification and test methods —

### Part 1: Classification and performance requirements

*Fils d'apport de brasage, pleins et à flux incorporé — Spécifications et méthodes d'essai —  
Partie 1: Classification et exigences de performance*

ICS: 25.160.50

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## ISO/DIS 12224-1:2023(E)

### 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](http://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](http://www.iso.org/patents)).

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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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 12, *Soldering and brazing materials*.

This second edition cancels and replaces the first edition (ISO 12224-1:1997), which has been technically revised.

The main changes compared to the previous edition are as follows:

- in [Table 1](#) greater nominal contents were added;
- [5.5](#) and Table 3 were deleted because the spread test is not commonly used;
- 5.6.1 was deleted because the test method was withdrawn;
- in [6.1](#) the reference to ISO 10564, which was withdrawn, was replaced by a recommended method;
- the designations were aligned with ISO 9454-1:2016;

A list of all parts in the ISO 12224 series can be found on the ISO website.

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](http://www.iso.org/members.html).

# Solder wire, solid and flux cored — Specification and test methods —

## Part 1: Classification and performance requirements

### 1 Scope

This part of ISO 12224 specifies a coding system for the classification and designation of solid and flux cored solder wire, and the performance requirements to be met by flux cored wire and its constituents. Requirements for sampling, labelling and packaging are also specified.

[Annex A](#) specifies a method for the solvent extraction of flux incorporated in flux cored solder wire. The solution so obtained may be used for testing purposes.

[Annex B](#) specifies the method for measuring the mean diameter of flux cored solder wire.

[Annex C](#) gives guidance on the test methods appropriate for the flux types incorporated in flux cored solder wire.

### 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 9453, *Soft solder alloys — Chemical compositions and forms*

ISO 9454-1:2016, *Soft soldering fluxes — Classification and requirements — Part 1: Classification, labelling and packaging*

ISO 9455-10, *Soft soldering fluxes — Test methods — Part 10: Flux efficacy test, solder spread method*

ISO 9455-15, *Soft soldering fluxes — Test methods — Part 15: Copper corrosion test*

ISO 9455-17, *Soft soldering fluxes — Test methods — Part 17: Surface insulation resistance comb test and electrochemical migration test of flux residues*

ISO 12224-2, *Solder wire, solid and flux cored — Specification and test methods — Part 2: Determination of flux content*

### 3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological 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/>

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### 4 Classification and designation

#### 4.1 Solder alloy designation

The solder alloy used for solid wire, and for the solder component of flux cored solder wire, shall be designated in accordance with the solder alloy designations given in ISO 9453.

#### 4.2 Flux classification

The flux component of flux cored solder wire shall be classified in accordance with the system, based on the main fluxing ingredients, given in ISO 9454-1.

#### 4.3 Designation of flux cored solder wire

The designations for solid and flux cored solder wire shall consist of the following parts:

- a) reference to this part of ISO 12224 (i.e. ISO 12224-1);
- b) the appropriate soft solder alloy designation in accordance with ISO 9453;
- c) in the case of flux cored solder wire, the appropriate flux classification in accordance with ISO 9454-1.

The three parts of the designation shall be separated by an oblique stroke (/).

EXAMPLE 1 A solid solder wire, which corresponds to ISO 12224-1, made of 99,3/0,7 tin-copper soft solder, is designated as follows:

ISO 12224-1/Sn99,3Cu0,7

EXAMPLE 2 A flux filled solder wire, which corresponds to ISO 12224-1, made of 99,3/0,7 tin-copper soft solder with a halogen-activated rosin filling, is designated as follows:

ISO 12224-1/Sn99,3Cu0,7/1 123

### 5 Requirements

#### 5.1 Solder alloy composition of solid and flux cored solder wire

Solid solder wire shall conform to the requirements for the appropriate alloy given in ISO 9453.

The solder component of flux cored solder wire shall conform to the requirements for the appropriate alloy given in ISO 9453.

#### 5.2 Flux composition of flux cored solder wire

After extraction from a sample of the flux cored solder wire, using the method given in [Annex A](#), the flux composition shall conform to the requirements for the appropriate flux type given in ISO 9454-1.

#### 5.3 Flux content

[Table 1](#) gives the recommended (or preferred) nominal flux contents which are generally available for flux cored solder wire.

When tested in accordance with the method given in ISO 12224-2, the flux content of the sample shall be within the permitted range for the appropriate nominal content given in [Table 1](#).



**Table 1 — Recommended (preferred) nominal flux contents**

Percentage mass flux contents

Recommended nominal content (see note)	Permitted range	
	min.	max.
NIL	—	—
0,3	0,15	0,45
0,5	0,35	0,65
1,0	0,85	1,15
1,5	1,2	1,8
2,0	1,7	2,3
2,5	2,2	2,8
3,0	2,7	3,3
3,5	3,2	3,8
4,0	3,7	4,3
4,5	4,2	4,8
5,0	4,7	5,3
5,5	5,2	5,8
6,0	5,7	6,3
6,5	6,2	6,8

NOTE Other nominal flux contents may be specified, subject to agreement between purchaser and supplier. In all cases, the permitted range shall be based on a tolerance of  $\pm 0,15$  % for nominal contents 1,0 % and less, and  $\pm 0,3$  % for nominal contents above 1,0 %.

The flux core(s) shall be continuous and uniform along the length of the flux cored solder wire.

#### 5.4 Dimensions and tolerances

[Table 2](#) gives the recommended (or preferred) nominal sizes of solid and flux cored solder wire, which are generally available and the associated tolerance values.

When tested in accordance with [Annex B](#), the mean diameter (i.e. the average of the maximum and minimum diameters at any one cross-section of the wire) at each location shall conform to the tolerances given for the appropriate nominal diameter in [Table 2](#).

**Table 2 — Recommended (preferred) nominal diameters and tolerances**

Dimensions in mm

Recommended nominal diameter (see note)	Tolerance on mean diameter
< 0,5	$\pm 0,03$
$\geq 0,5$ to 2,5	$\pm 0,05$
> 2,5	$\pm 0,1$

**5.5 Corrosion by residues** (applicable only to flux cored solder wires containing type 1 and type 22 fluxes)

##### 5.5.1 Copper corrosion test

When the flux cored solder wire is tested in accordance with ISO 9455-15, there shall be no evidence of corrosion:

- after 21 days, for wire having core of flux type 111 or 121;
- after 3 days, for wire having core of flux type 112, 113, 122, 123, 222 or 223.

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### 5.6 Influence of flux vapours on insulation resistance (applicable only to flux cored solder wires containing type 1 and type 22 fluxes)

When the flux cored solder wire is tested in accordance with ISO 9455-17, the insulation resistance of the comb pattern shall not decrease by more than one decade.

## 6 Sampling

### 6.1 Sampling for chemical analysis of the solder

The recommended method of analysis for soft solder alloys is induced coupled plasma (ICP). The methods used shall be agreed between the supplier and the purchaser.

NOTE Other acceptable analysis methods are Spark optical emission spectrometry (Spark-OES) and atomic absorption spectroscopy (AAS).

The minimum sample amount is 20 g of a flux cored solder wire. The solder and the flux are separated by melting the solder wire in a suitable crucible and then poured into a mold with a flat bottom, while pouring off as little flux as possible. After the solder has solidified, any flux residues shall be thoroughly removed with a suitable solvent.

### 6.2 Sampling for tests to determine the properties of the flux core (i.e. Tests as described in the various parts of ISO 9455)

Select a sample at random from each batch of flux cored solder wire to be tested. The sample size shall be as indicated in [Annex A](#).

Extract the flux from the sample, following the procedure given in [Annex A](#). Adjust the flux concentration of the resulting solution, by dilution or evaporation, to that required in the relevant part(s) of ISO 9455.

### 6.3 Sampling for tests to determine the flux content and the diameter of the flux cored solder wire

Select samples from the batch of flux cored solder wire, as follows:

- a) where the batch consists of up to 4 units of product (i.e. reel, coil or pack), select all units;
- b) where the batch consists of over 4, up to and including 44 units of product, select at random 4 units;
- c) where the batch consists of  $n$  units of product ( $n > 44$ ), select at random 0,1  $n$  units (to the nearest integer above 0,1  $n$ ).

From each selected unit, cut back approximately 2 m from the free end of the wire and then cut a test specimen, approximately 2 m in length, for the determination of flux content and wire diameter.

## 7 Marking, labelling and packaging

Flux cored solder wire shall be suitably packed to avoid damage or deterioration in handling and storage.

Each package (i.e. each reel, coil or other unit of product) of flux cored solder wire supplied in accordance with this part of ISO 12224 shall carry a label bearing the following information:

- a) the supplier's name, or identification;
- b) the designation of the flux cored solder wire, in accordance with the designation system described in [4.3](#);
- c) the flux content;