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**Soft soldering fluxes — Test  
methods —**

**Part 1:  
Determination of non-volatile matter,  
gravimetric method**

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*Flux de brasage tendre — Méthodes d'essai —*

*Partie 1: Dosage des matières non volatiles par gravimétrie*

ISO 9455-1:2022

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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 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)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 materials*, 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 9455-1:1990), of which it constitutes a minor revision. The changes are as follows:

- [Clause 2](#) has been updated;
- new [Clause 3](#), Terms and definitions, has been inserted;
- [Clause 6](#), notes 1 and 2 changed to body text;
- the coding of the fluxes has been updated in accordance with ISO 9454-1;
- minor editorial changes.

A list of all parts in the ISO 9455 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). Official interpretations of ISO/TC 44 documents, where they exist, are available from this page: <https://committee.iso.org/sites/tc44/home/interpretation.html>.

# Soft soldering fluxes — Test methods —

## Part 1:

# Determination of non-volatile matter, gravimetric method

## 1 Scope

This document specifies a gravimetric method for the determination of the content of non-volatile matter in soft soldering fluxes. It is applicable to liquid and paste fluxes of type 1, as defined in ISO 9454-1.

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

No terms and definitions are listed in this document.

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/>

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## 4 Principle

A prepared, weighed sample of the flux is heated in a boiling water bath and then in an oven to drive off volatile matter. The cooled sample is re-weighed and the percentage of non-volatile matter is calculated.

## 5 Apparatus

Ordinary laboratory apparatus and, in particular, the following shall be used:

**5.1 Petri dish**, thin section glass nominally 100 mm diameter.

**5.2 Weighing pipette**, 20 ml to 25 ml capacity, for sampling liquid fluxes.

**5.3 Boiling water bath.**

**5.4 Drying oven**, maintained at a temperature of  $(110 \pm 2)$  °C.

**5.5 Desiccator**, containing silica gel as the desiccant.

## 6 Procedure

Carry out the following procedure in triplicate on the flux sample.

Dry the glass Petri dish (5.1) in the oven (5.4). Cool the dish in the desiccator to room temperature and weigh to the nearest 0,001 g. Transfer to the dish sufficient sample, weighed to the nearest 0,001 g, to yield between 0,5 g and 1,0 g of non-volatile matter, taking steps to prevent loss of volatile matter during the weighing. For liquid samples, the use of the weighing pipette (5.2) is recommended.

Heat the dish and contents on a boiling water bath (5.3) to evaporate the bulk of the volatile matter.

For samples already of a low volatile content, this preliminary drying may be omitted.

Remove the Petri dish (5.1) from the boiling water bath (5.3) and wipe the outside of the dish to remove condensed water.

Place the dish and contents in the oven and dry for 3 h at  $(110 \pm 2)$  °C. Cool in the desiccator to room temperature and weigh the dish and residue to the nearest 0,001 g.

The drying temperature used in the procedure, 110 °C, is applicable to fluxes containing propan-2-ol or other solvents of a similar boiling point. For fluxes with solvents of a higher boiling point, an alternative temperature may be agreed upon between the supplier and the purchaser. Fluxes of classes 113 and 123 (see ISO 9454-1), if activated with organic acids, and of classes 112 and 122 if they contain mixed organic and halide activators (see ISO 9454-1), can lose a proportion of the activator content during the procedure described in Clause 6.

## 7 Expression of results

The non-volatile matter in the flux sample, expressed as a percentage by mass, is given by Formula (1):

$$\frac{m_2}{m_1} \times 100 \% \quad (1)$$

where

$m_2$  is the mass, in g, of the residue after drying;

$m_1$  is the mass, in g, of the sample taken.

## 8 Precision

This method was subjected to a limited interlaboratory test programme, involving five laboratories.

Repeatability and reproducibility were calculated in accordance with ISO 5725-1; the results are given in Table 1.

**Table 1 — Precision data**

Parameter	Non-volatile matter content of test flux		
	5 % (mass fraction)	15 % (mass fraction)	25 % (mass fraction)
Intralaboratory:			
— standard deviation, $s_W$	0,06	0,09	0,12
— repeatability, $r$	0,19	0,25	0,35
Interlaboratory:			
— standard deviation, $s_L$	0,08	0,20	0,47
— reproducibility, $R$	0,25	0,55	1,30

## 9 Test report

The test report shall include the following information:

- a) the identification of the test sample;
- b) a reference to this document, (i.e. ISO 9455-1:2022);
- c) details of any variation of the drying temperature or drying time used (see [Clause 6](#));
- d) the results obtained;
- e) any unusual features noted during the determination;
- f) details of any operation not included in this document or regarded as optional;
- g) the date of the test.

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## Bibliography

- [1] ISO 5725-1, *Accuracy (trueness and precision) of measurement methods and results — Part 1: General principles and definitions*
- [2] ISO 9454-1, *Soft soldering fluxes — Classification and requirements — Part 1: Classification, labelling and packaging*

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