



BSI Standards Publication

Soft soldering fluxes — Test methods

Part 16: Flux efficacy test, wetting balance method

National foreword

This British Standard is the UK implementation of EN ISO 9455-16:2019. It is identical to ISO 9455-16:2019. It supersedes BS EN ISO 9455-16:2013, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee NFE/27, Tin, tin alloys, Solders and soldering fluxes.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

Soft soldering fluxes - Test methods - Part 16: Flux efficacy
test, wetting balance method (ISO 9455-16:2019)

Flux de brasage tendre - Méthodes d'essai - Partie 16:
Essai d'efficacité du flux, méthode à la balance de
mouillage (ISO 9455-16:2019)

Flussmittel zum Weichlöten - Prüfverfahren - Teil 16:
Bestimmung der Wirksamkeit des Flussmittels,
Verfahren zur Messung der Benetzungskraft (ISO
9455-16:2019)

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN ISO 9455-16:2019) has been prepared by Technical Committee ISO/TC 44 "Welding and allied processes" in collaboration with Technical Committee CEN/TC 121 "Welding and allied processes" the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2020, and conflicting national standards shall be withdrawn at the latest by April 2020.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 9455-16:2013.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 9455-16:2019 has been approved by CEN as EN ISO 9455-16:2019 without any modification.

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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).

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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.

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

This third edition cancels and replaces the second edition (ISO 9455-16:2013), of which it constitutes a minor revision.

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

- Clause 2 has been updated;
- the coding of the fluxes has been updated in accordance with ISO 9454-1:2016;
- the format of this document has been updated.

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.

Soft soldering fluxes — Test methods —

Part 16:

Flux efficacy test, wetting balance method

1 Scope

This document specifies a method for the assessment of the efficacy of a soft soldering flux, known as the wetting balance method. It gives a qualitative assessment of the comparative efficacy of two fluxes (for example, a standard and a test flux), based on their capacity to promote wetting of a metal surface by liquid solder. The method is applicable to all flux types in liquid form classified in ISO 9454-1.

NOTE It is hoped that future developments using improved techniques for obtaining a reproducible range of test surfaces will enable this method for assessing flux efficacy to be quantitative. For this reason, several alternative procedures for preparing the surface of the test piece are included in the present method.

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

IEC 60068-2-20:2008, *Environmental testing — Part 2-20: Tests — Test T: Test methods for solderability and resistance to soldering heat of devices with leads*

IEC 60068-2-69, *Environmental testing — Part 2-69: Tests — Test Te/Tc: Solderability testing of electronic components and printed boards by the wetting balance (force measurement) method*

IEC 60068-2-78:2012, *Environmental testing — Part 2-78: Tests; Test Cab: Damp heat, steady state*

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 <http://www.electropedia.org/>

4 Symbols

- d depth of immersion, in millimetres, of the test piece below the undisturbed solder level
- A cross-sectional area, in square millimetres, of the test piece at the solder line
- ρ density, in grams per millilitre, of the solder under test at the test temperature
- F wetting force, in millinewtons

- t_0 time at which the test piece first makes contact with the surface of the liquid solder in the bath
- t_1 time at which the solder starts to wet the test piece (point A, see [Figure 1](#)), at which point the trace begins to fall
- t_2 time at which the recorded force is equal to the upward force due to buoyancy
- t_3 time at which the trace crosses the reference line

5 Principle

The efficacy of the liquid flux under test is compared with that of a standard liquid flux, using a wetting balance in conjunction with a specified test piece, appropriate to the class of flux under test.

The fluxes under test shall correspond to one of the classes defined in ISO 9454-1 and fulfil the requirements of ISO 9454-1.

6 Reagents

Use only reagents of recognized analytical quality and only distilled or deionized water.

6.1 Acid cleaning solution, prepared as follows:

Add cautiously, while stirring, 75 ml of sulfuric acid ($\rho = 1,84 \text{ g/ml}$) to 210 ml of water and mix. Cool the solution to room temperature. Add 15 ml of nitric acid ($\rho = 1,42 \text{ g/ml}$) and mix thoroughly.

6.2 Acetone.

6.3 Propan-2-ol, complying with the following requirements:

- propan-2-ol: 99,5 % (by mass) minimum;
- acid content: 0,002 % (by mass) maximum;
- non-volatile content: 0,2 % (by mass) maximum.

Isopropyl alcohol (also propan-2-ol, 2-propanol or the abbreviation IPA) is a common name for this chemical compound, which has the molecular formula $\text{C}_3\text{H}_8\text{O}$.

7 Apparatus

Usual laboratory apparatus and, in particular, the following.

7.1 Wetting balance and ancillary instrumentation, in accordance with IEC 60068-2-69.

Calibrate the apparatus in accordance with the manufacturer's instructions.

7.2 Solder bath.

As a minimum, the bath temperature shall be capable of being maintained at a temperature corresponding to the liquidus temperature of the alloy under test plus 35 °C. The test temperature shall be reported in the test report.

The dimensions of the solder bath shall be such that no portion of the test piece (see [Clause 8](#)) is less than 15 mm from the wall of the bath and the depth of the liquid solder in the bath shall be not less than 30 mm.