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Soft soldering fluxes — Classification and requirements —

Part 2: Performance requirements

Flux de brasage tendre — Classification et exigences —

Partie 2: Exigences de performance

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Foreword

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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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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*, 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 9454-2:1998), 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 9454 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.

Official interpretations of ISO/TC 44 documents, where they exist, are available from this page: https://committee.iso.org/sites/tc44/home/interpretation.html.

Introduction

Fluxes assist molten solder to wet metals surfaces to be joined by removing oxides and related contaminants from the solder and surfaces of the parts during soldering. Fluxes also protect surfaces from oxidization and assist wetting of the base metals by molten solder.

Care is necessary when selecting a flux for a particular application, in order to ensure an adequate service life of the assembly. Factors such as the ease of residue removal, corrosiveness, possible health and safety hazards and the efficacy of the flux, should all be considered when making the choice.

Soft soldering fluxes — Classification and requirements —

Part 2: Performance requirements

1 Scope

This document specifies the performance requirements for fluxes in solid, liquid and paste forms intended for use with soft solders.

NOTE 1 ISO 9454-1 specifies the requirements for labelling and packaging as well as the coding system for the classification of the fluxes.

NOTE 2 Some of the fluxes intended for inert gas and vapour phase soldering may not pass some of the criteria in Tables 1 and 2.

Requirements for these fluxes are agreed between the purchaser and the supplier.

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 9455-3:2019, *Soft soldering fluxes — Test methods — Part 3: Determination of acid value, potentiometric and visual titration methods*

3 Terms and definitions

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

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/

3.1
flux
chemical substance in a form which assists molten solder to wet metal surfaces to be joined, by removing oxides and related contaminants from the solder and from the surfaces of the parts during soldering

Note 1 to entry: Flux can be in solid, liquid or paste form.

3.2
liquid flux
solution of a flux in a suitable liquid solvent

3.3
paste flux
solution or uniform dispersion of flux in a suitable viscous medium

3.4
colophony
rosin
hard, natural resin, extracted from the oleoresin of pine trees and refined, consisting of abietic and pimaric acids and their isomers, some organic fatty acids and terpene hydrocarbons

Note 1 to entry: These natural rosins, or modified rosins, should give a positive reaction to the Liebermann and Storch test [1] and shall have an acid value greater than 155 mg KOH/g.

3.5
resin
general, non-specific, widely accepted term for natural and synthetic resinous products

3.6
activator
substance which increases the chemical reactivity of a flux

3.7
organic type flux
flux which is based on non-rosin organic substances

3.8
inorganic type flux
flux containing inorganic acids or alkalis, or their salts

4 Flux condition

Solid fluxes shall be of uniform composition and be free from foreign matter or impurities deleterious to the fluxing action.

Liquid fluxes shall be homogeneous and free from sediment.

Paste fluxes shall be of a uniform viscous form and of a consistency suitable for application to the surface to be soldered.

5 Performance requirements for fluxes

When tested in accordance with the appropriate test methods given in the various parts of the ISO 9455 series, fluxes shall comply with the requirements given in Tables 1 to 3.

When determining the acid value for type 2 fluxes in accordance with ISO 9455-3:2019, the value for *S* in ISO 9455-3:2019, 4.5 of the method is to be taken as 100.

NOTE It is worth noting that, because of the difference between the chemicals in flux types 1 and 2, the values for acid value (see ISO 9455-3), and for halide content (see ISO 9455-6), are expressed on different bases and are not, therefore, comparable.

Table 1 — Performance requirements for type 1 fluxes

Flux classification (in accordance with ISO 9454-1)	**Flux type**			1 Resin						
	Flux basis			1 Rosin (non-modified colophony)	2 Resin (modified colophony or synthetic)					
	Flux activation			1 No activator added 2 Halide activated 3 Non-halide activated						
Flux code[a]				111, 121	112		122		113, 123	
					W	X	Y	Z	W	X
Performance requirements using test method[b]	**ISO 9455-1 and ISO 9455-2**	Tolerance based on nominal value for non-volatile content		±0,5	±0,5	±0,5	±0,5	±0,5	±0,5	±0,5
	ISO 9455-3	Tolerance as % agreed nominal acid value in mg KOH/g non-volatile content		±10 %	±10 %	±10 %	±10 %	±10 %	±10 %	±10 %
	ISO 9455-5	Copper mirror test		Pass	Pass	—	—	—	Pass	—
	ISO 9455-6:1995, Clause 3 (Method A)	Halide (chloride bromide or iodide) expressed as % (m/m) chloride in[c] the non-volatile content		0,01 max.	0,05 max.	0,15 max.	1,0 max.	>1,0	0,01 max.	0,01 max.
	ISO 9455-6:1995, Clause 3 (Method D)	Chromate silver paper test		Pass	Pass	—	—	—	Pass	Pass
	ISO 9455-10 A (see NOTE 3)	Solder spread test	Min. area of spread (mm^2)	80	130	130	130	130	100	100
			Min. ratio of spread (%)	70	80	80	80	80	75	75
	ISO 9455-10 B (see NOTE 3)	Solder spread test	Min. area of spread (mm^2)	40	130	130	130	130	100	100
			Min. ratio of spread (%)	50	80	80	80	80	75	75
	ISO 9455-11	Solubility of flux residues[d]		Pass	Pass	Pass	Pass	Pass	Pass	Pass
	ISO 9455-13	Spattering test[e]		Pass	Pass	Pass	Pass	Pass	Pass	Pass
	ISO 9455-14	Tackiness test		Pass	Pass	Pass	Pass	Pass	Pass	Pass
	ISO 9455-15	Copper corrosion test		Pass	Pass	Pass	Pass	—	Pass	—

NOTE 1 The values for the test in ISO 9455-3 apply only to fluxes with acid values greater than 50 mg KOH/g.

NOTE 2 The test in ISO 9455-10 is only applicable to fluxes with non-volatile content equal to or greater than 10 %.

NOTE 3 The values given for the test in ISO 9455-10 apply to flux samples tested on brass test plates for 10 A and on oxidized copper plates for 10 B.

[a] The activated resin fluxes (types 112 and 113, 122 and 123) have each been sub-divided into 4 grades designated "W", "X", "Y" and "Z", to indicate low, mild, medium and high levels of initial flux activity respectively.

[b] A dash (—) in any column signifies that no requirements are specified in this standard for that property for that particular flux. For some special applications a requirement of this property may be specified by the purchaser, provided the details are given in the enquiry and order, and agreed by the supplier.

[c] This method is only suitable for determining halide, not halogen contents.

[d] This test is not applicable to fluxes which give residues that are intended to be left on work pieces.

[e] For this test, "pass" means "no spattering of the flux".