
Soft soldering fluxes — Classification and requirements —

Part 2:
Performance requirements

*Flux de brasage tendre — Classification et caractéristiques —
Partie 2: Prescriptions de performance*



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Foreword

ISO (the International Standards Organization) is a worldwide federation of national standards bodies (ISO members). 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.

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.

International Standard ISO 9454-2 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, subcommittee SC12, *Soldering and brazing materials*

ISO 9454 consists of the following parts, under the general title *Soft soldering fluxes — Classification and requirements*:

- *Part 1: Classification, labelling and packaging*
- *Part 2: Performance requirements*

Annex A of this part of ISO 9454 is for information only.

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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.

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Soft soldering fluxes — Classification and requirements —

Part 2: Performance requirements

1 Scope

This part of ISO 9454 specifies the performance requirements for fluxes in solid, liquid and paste forms intended for use with soft solders.

NOTES

- 1 ISO 9454-1 specifies the requirements for labelling and packaging as well as the coding system for the classification of the fluxes.
- 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 should be agreed between the purchaser and the supplier.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 9454-1:1990, *Soft soldering fluxes — Classification and requirements — Part 1: Classification, labelling and packaging.*

ISO 9455-1:1990, *Soft soldering fluxes — Test methods — Part 1: Determination of non-volatile matter, gravimetric method.*

ISO 9455-2:1993, *Soft soldering fluxes — Test methods — Part 2: Determination of non-volatile matter, ebulliometric method.*

ISO 9455-3:1992, *Soft soldering fluxes — Test methods — Part 3: Determination of acid value, potentiometric and visual titration methods.*

ISO 9455-5:1992, *Soft soldering fluxes — Test methods — Part 5: Copper mirror test.*

ISO 9455-6:1995, *Soft soldering fluxes — Test methods — Part 6: Determination and detection of halide (excluding fluoride) content.*

ISO 9455-8:1991, *Soft soldering fluxes — Test methods — Part 8: Determination of zinc content.*

ISO 9455-9:1993, *Soft soldering fluxes — Test methods — Part 9: Determination of ammonia content.*

ISO 9455-10:1998, *Soft soldering fluxes — Test methods — Part 10: Flux efficacy tests, solder spread method.*

ISO 9455-11:1991, *Soft soldering fluxes — Test methods — Part 11: Solubility of flux residues.*

ISO 9455-12:1992, *Soft soldering fluxes — Test methods — Part 12: Steel tube corrosion test.*

ISO 9455-13:1996, *Soft soldering fluxes — Test methods — Part 13: Determination of flux spattering.*

ISO 9455-14:1991, *Soft soldering fluxes — Test methods — Part 14: Assessment of tackiness of flux residues.*

ISO 9455-15:1996, *Soft soldering fluxes — Test methods — Part 15: Copper corrosion test.*

ISO 9455-16:—¹⁾, *Soft soldering fluxes — Test methods — Part 16: Flux efficacy tests, wetting balance method.*

ISO 9455-17:—¹⁾, *Soft soldering fluxes — Test methods — Part 17: Surface insulation resistance, comb test and electrochemical migration test of flux residues.*

3 Definitions

For the purposes of this part of ISO 9454, the following definitions apply.

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 — Flux may 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 — 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.

1) To be published.

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 ISO 9455, 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 9455-3:1992, the value for *S* in 3.5 of the method is to be taken as 100.

NOTE — It should be noted 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.

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Table 1 — Performance requirements for type 1 fluxes

Flux classification (in accordance with ISO 9454-1)			Flux code ¹⁾	Performance requirements using test method ISO 9455: Part No. ²⁾									
Flux type	Flux basis	Flux activation		1 and 2	3	5	6 A	6 D					
				Tolerance based on nominal value for non-volatile content	Tolerance as % agreed nominal acid value in mg KOH/g non-volatile content	Copper mirror test	Halide (chloride bromide or iodide) expressed as % (m/m) chloride in ³⁾ the non-volatile content	Chromate silver paper test					
1 Resin	1 Colophony (rosin)	1 No activator added	1.1.1	± 0,5	± 10 %	Pass	0,01 max.	Pass					
			1.2.1										
	2 Non-colophony (resin)	2 Halide activated	1.1.2	W	± 0,5	± 10 %	Pass	0,05 max.	Pass				
				X	± 0,5	± 10 %	—	0,15 max.	—				
			1.2.2	Y	± 0,5	± 10 %	—	1,0 max.	—				
				Z	± 0,5	± 10 %	—	> 1,0	—				
Non-halide activated	3	1.1.3	W	± 0,5	± 10 %	Pass	0,01 max.	Pass					
		1.2.3	X	± 0,5	± 10 %	—	0,01 max.	Pass					
Flux classification (in accordance with ISO 9454-1)			Flux code	Performance requirements using test method ISO 9455: Part No.									
Flux type	Flux basis	Flux activation		10 A		10 B		11	12	13	14	15	
				Min. area of spread (mm ²)	Min. ratio of spread (%)	Min. area of spread (mm ²)	Min. ratio of spread (%)						Solder spread test
1 Resin	1 Colophony (rosin)	1 No activator added	1.1.1	80	70	40	50	Pass	Pass	Pass	Pass	Pass	
			1.2.1										
	2 Non-colophony (resin)	2 Halide activated	1.1.2	W	130	80	130	80	Pass	Pass	Pass	Pass	Pass
				X	130	80	130	80	Pass	—	Pass	Pass	Pass
			1.2.2	Y	130	80	130	80	Pass	—	Pass	Pass	Pass
				Z	130	80	130	80	Pass	—	Pass	Pass	—
Non-halide activated	3	1.1.3	W	100	75	100	75	Pass	Pass	Pass	Pass	Pass	
		1.2.3	X	100	75	100	75	Pass	—	Pass	Pass	—	
NOTES													
1 The values for the test in Part 3 of ISO 9455 apply only to fluxes with acid values greater than 50 mg KOH/g.													
2 The test in Part 10 of ISO 9455 is only applicable to fluxes with non-volatile content equal to or greater than 10 %.													
3 The values given for the test in Part 10 of ISO 9455 apply to flux samples tested on brass test plates for 10 a) and on oxidized copper plates for 10 b).													
1) The activated resin fluxes (types 1.1.2 and 1.1.3, 1.2.2 and 1.2.3) 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.													
2) 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.													
3) This method is only suitable for determining halide, not halogen contents.													
4) This test is not applicable to fluxes which give residues that are intended to be left on work pieces.													
5) For this test, "pass" means "no spattering of the flux".													

Table 2 — Performance requirements for type 2 fluxes

Flux classification (in accordance with ISO 9454-1)			Flux code ¹⁾	Performance requirements using test method ISO 9455: Part No. ²⁾											
Flux type	Flux basis	Flux activation		1 and 2	3	5	6A	6D	10 A		10 B		12	13	15
				Tolerance based on nominal value for non- volatile content	Tolerance as % agreed nominal acid value mg KOH/g non-volatile content	Copper mirror test	Halide (chloride bromide or iodide) expressed as % (<i>m/m</i>) chloride in ³⁾ the non-volatile content	Silver chromate paper test	Solder spread test		Solder spread test		Steel tube corrosion test	Spattering test ⁴⁾	Copper corrosion test
									Min. area of spread (mm ²)	Min. ratio of spread (%)	Min. area of spread (mm ²)	Min. ratio of spread (%)			
2	1 Water- soluble	1 No activator added	2.1.2	+ 5 %	± 10 %	—	> 0,01	—	200	85	200	85	—	Pass	—
	2 Non-water soluble	2 Halide activated	2.1.3	+ 5 %	± 10 %	Pass	0,01 max.	Pass	130	80	130	80	Pass	Pass	Pass
		3 Non- halide activated	2.2.2	+ 5 %	± 10 %	—	> 0,01	—	200	85	200	85	—	Pass	—
			2.2.3 E ⁵⁾	+ 5 %	± 10 %	Pass	0,01 max.	Pass	100	75	100	75	Pass	Pass	Pass
			2.2.3 O ⁵⁾	+ 5 %	± 10 %	—	0,01 max.	—	100	75	100	75	—	—	—

NOTES

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

2 The values given for the test in Part 10 of ISO 9455 apply to flux samples tested on brass test plates 10 a) and on oxidized copper plates for 10 b).

1) Fluxes of types 2.1.1 and 2.2.1 do not exist.

2) A dash (—) in any column signifies that no requirements are specified in this part of ISO 9454 for that particular flux type. For some special applications a requirement for this property may be specified by the purchaser, provided the details are given in the enquiry and order, and agreed to by the supplier.

3) For certain applications this test may not be applicable.

4) For this test "Pass" means no spattering of the flux.

5) E = electronic application; O = other application.