INTERNATIONAL STANDARD

ISO 9454-1

Second edition
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Soft soldering fluxes — Classification and requirements —

Part 1: Classification, labelling and packaging

Flux de brasage tendre — Classification et exigences —

Partie 1: Classification, marquage et emballage

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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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information.

The committee responsible for this document is ISO/TC 44, *Welding and allied processes*, Subcommittee SC 12, *Soldering materials*.

This second edition cancels and replaces the first edition (ISO 9454-1:1990), which has been technically revised.

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*

Introduction

Fluxes assist molten solder to wet metal surfaces to be joined by removing oxides and related contaminations from the solder and surfaces of the parts during soldering. Fluxes also protect surfaces from oxidation an assist wetting of the basis 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.

Soft soldering fluxes — Classification and requirements —

Part 1:
Classification, labelling and packaging

WARNING — This part of ISO 9454-1 deals with products which might be hazardous to health, or which might cause other hazards such as corrosion, fire, etc., if adequate precautions are not taken. It refers only to the technical suitability of substances and in no way absolves the testing laboratory, the supplier, or the user from legal obligations relating to health and safety at any stage of flux manufacture or use.

1 Scope

This part of ISO 9454-1 specifies a coding system for the classification of fluxes intended for use with soft solders, according to their active fluxing ingredients, together with requirements for labelling and packaging.

2 Classification of fluxes

Fluxes specified in this part ISO 9454-1 have been classified in terms of their main ingredients and shall be encoded in accordance with Table 1.

For example, a phosphoric acid activated inorganic, flux with a halide content <0,01 % by mass, shall be encoded 3311, a non-halide activated rosin flux shall be encoded 1131.

3 Labelling and packaging

Fluxes supplied according to this part of ISO 9454-1 shall be packed in suitable containers, resistant to the flux they contain, and shall carry a label bearing the following information:

a) supplier's name and address;

b) name of the product;

c) reference to this part of ISO 9454, i.e. ISO 9454-1, and the flux classification code according to Table 1;

d) batch number;

e) date of manufacture;

f) details of any legal requirements concerning aspects of safety.

Labels shall be made of material resistant to the flux in the container.

Additional labelling requirements may be agreed upon between the supplier and the purchaser in accordance with the rules and regulations of the country or countries in question.

Table 1 — Classification of soft soldering fluxes according to their main ingredients

Flux type	Flux basis	Flux activation	Halide content % (by mass)
1 resin	1 rosin (non-modified colophony) 2 resin (modified colophony or synthetic)	1 no activator added 2 halide activated 3 non-halide activated	1 <0,01 2 <0,15 3 0,15 to 2,0 4 >2,0
2 organic (low or non-resin flux)	1 water-soluble 2 non-water-soluble		
3 inorganic	1 salts in aqueous solution 2 salts in organic formulation	1 with ammonium chloride 2 without ammonium chloride	
	3 acids	1 with phosphoric acid 2 without phosphoric acid	
	4 alkalis	1 amines and/or ammonium carbonates	

Annex A
(informative)

Grades of fluxes

Table A.1 indicates, for guidance, the various grades of fluxes and only refers to halide content. Flux selection can also be done from different points of view.

Table A.1 — Guidance for the uses of the various grades of fluxes

ISO-Code	Type description	Halides in % (by mass)	Guidance for use
1111	on basis of rosin (colophony) without additives	<0,01	electronics electrotechnology
1122	on basis of rosin (colophony) with additives of organic activators containing halides (e.g. glutamic acid hydrochloride)	<0,15	electronics electrotechnology electronic device construction metal goods
1123	on basis of rosin (colophony) with additives of organic activators containing halides (e.g. glutamic acid hydrochloride)	0,15 to 2,0	electronics electrotechnology electronic device construction metal goods
1124	on basis of rosin (colophony) with additives of organic activators containing halides (e.g. glutamic acid hydrochloride)	>2,0	electronics electrotechnology electronic device construction metal goods
1131	on basis of rosin (colophony) with additives of organic activators containing no halides (e.g. adipic, stearic, salicylic acid)	<0,01	electronics electrotechnology precision soldering metal goods
1211	on basis of modified resin without additives	<0,01	electronics electrotechnology
1222	on basis of modified resin with additives of organic activators containing halides (e.g. glutamic acid hydrochloride)	<0,15	electronics electrotechnology electronic device construction metal goods

Table A.1 *(continued)*

ISO-Code	Type description	Halides in % (by mass)	Guidance for use
1223	on basis of modified resin with additives of organic activators containing halides (e.g. glutamic acid hydrochloride)	0,15 to 2,0	electronics electrotechnology electronic device construction metal goods
1224	on basis of modified resin with additives of organic activators containing halides (e.g. glutamic acid hydrochloride)	>2,0	electronics electrotechnology electronic device construction metal goods
1231	on basis of modified resin with additives of organic activators containing no halides (e.g. adipic, stearic, salicylic acid)	<0,01	electronics electrotechnology precision soldering metal goods
2111	on basis of amines, diamines and /or carbamide	<0,01	electrotechnology precision soldering
2123	on basis of organic halide activators (e.g. glutamic acid hydrochloride)	0,15 to 2,0	electrotechnology electronics metal goods
2124	on basis of organic halide activators (e.g. glutamic acid hydrochloride)	>2,0	electrotechnology electronics metal goods
2131	on basis of amines, diamines or carbamide with organic activators containing no halides	<0,01	metal goods precision soldering electrotechnology
2131	on basis of organic activators (e.g. amines and /or diamines)	<0,01	soldering of aluminium
2211	on basis of organic activators with amines, diamines and /or carbamide containing no halide activators	<0,01	metal goods precision soldering electrotechnology
2223	on basis of organic halide activators	0,15 to 2,0	metal goods precision soldering electrotechnology
2224	on basis of organic halide activators	>2,0	metal goods precision soldering electrotechnology
2231	on basis of organic acids containing no halides with natural and /or modified resin (colophony)	<0,01	electronics electrotechnology metal goods

Table A.1 *(continued)*

ISO-Code	Type description	Halides in % (by mass)	Guidance for use
2231	on basis of organic activators with amines, diamines and /or carbamide containing no halide activators	<0,01	metal goods precision soldering electrotechnology
3114	on basis of zinc and /or metal chlorides and/or ammonium chloride, but without free acids	>2,0	heat exchanger metal goods metal handcraft
3114	on basis of zinc and/or tin chloride, if applicable by adding alkali chlorides or organic activators	>2,0	soldering of aluminium
3124	on basis of zinc and/or other metal chlorides, without free acids in aqueous solution	>2,0	heat exchanger metal goods metal handcraft
3214	on basis of zinc and/or other metal chlorides, and ammonium chloride in organic formulation (e.g. alcohol, greases or mineral products)	>2,0	metal goods metal handcraft fittings copper pipe installation
3224	on basis of zinc and/or other metal chlorides, and ammonium chloride in organic formulation (e.g. alcohol, greases or mineral products)	>2,0	metal goods metal handcraft fittings copper pipe installation
3314	on basis of phosphoric acid or derivates	>2,0	metal goods made from copper, copper activators

Annex B
(informative)

Testing of fluxes

Test methods for the determination of the properties and characteristics of soft soldering fluxes are given in ISO 9455. Table B.1 indicates, for guidance, those test methods which are relevant to various fluxes according to their classifications. The test methods to be carried out on a consignment of flux should be the subject of agreement between the supplier and the purchaser.

Table B.1 — Guidance for the use of test methods

Flux classification			Relevant test methods															
			Non-volatile matter[1]	Acid value[3]	Copper mirror[4]	Ionic residues	Halide content[5]				Zinc content[6]	Ammonia content[7]	Flux efficiency		Ease of residue removal [9]	Printed circuitry – Surface resistance	Flux spattering test[10]	Dryness test (tackiness) [11]
Flux type	**Flux basis**	**Flux activation**					Potentiometric method	Total halide of water-based flux	Halide of fluxes containing phosphate	Free halides — Silver chromate paper test			Solder spread method[8]	Wetting balance method [12]				
1 resin	1 rosin (non-modified colophony)	1 no activator added	*	*	*	*	*			*			*	*	*	*	*	*
	2 resin (modified colophony or synthetic)	2 halide activated	*	*	*	*	*			*			*	*	*	*	*	*
2 organic	1 water soluble	3 non-halide activated		*		*	*	*		*			*	*		*	*	
	2 non-water soluble			*		*	*			*			*	*		*	*	
NOTE The symbol * indicates that the test is relevant to the flux of that classification.																		

Table B.1 *(continued)*

Flux classification			Relevant test methods															
			Non-volatile matter[1]	Acid value[3]	Copper mirror[4]	Ionic residues	Halide content[5]				Zinc content[6]	Ammonia content[7]	Flux efficiency		Ease of residue removal [9]	Printed circuitry – Surface resistance	Flux spattering test[10]	Dryness test (tackiness) [11]
Flux type	**Flux basis**	**Flux activation**					Potentiometric method	Total halide of water-based flux	Halide of fluxes containing phosphate	Free halides — Silver chromate paper test			Solder spread method[8]	Wetting balance method [12]				
3 inorganic	1 salts in aqueous solution	1 with ammonium chloride		*		*	*	*		*	*	*	*	*			*	
	2 salts in organic formulation	2 without ammonium chloride																
	3 acids	1 with phosphoric acid 2 without phosphoric acid		*		*	*	*	*	*	*	*	*	*			*	
	4 alkalis	1 amines and/or ammonium carbonates				*	*	*				*	*	*			*	

NOTE The symbol * indicates that the test is relevant to the flux of that classification.

Bibliography

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

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

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

[4] ISO 9455-5, *Soft soldering fluxes — Test methods — Part 5: Copper mirror test*

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

[6] ISO 9455-8, *Soft soldering fluxes — Test methods — Part 8: Determination of zinc content*

[7] ISO 9455-9, *Soft soldering fluxes — Test methods — Part 9: Determination of ammonia content*

[8] ISO 9455-10, *Soft soldering fluxes — Test methods — Part 10: Flux efficacy tests — Solder spread method*

[9] ISO 9455-11, *Soft soldering fluxes — Test methods — Part 11: Solubility of flux residues*

[10] ISO 9455-13, *Soft soldering fluxes — Test methods — Part 13: Determination of flux spattering*

[11] ISO 9455-14, *Soft soldering fluxes — Test methods — Part 14: Assessment of tackiness of flux residues*

[12] ISO 9455-16, *Soft soldering fluxes — Test methods — Part 16: Flux efficacy tests — Wetting balance method*

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