# SLOVENSKI STANDARD
# oSIST prEN ISO 18496:2021

**01-junij-2021**

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**Trdo spajkanje - Talila za trdo spajkanje - Razvrstitev in tehnični dobavni pogoji (ISO 18496:2020)**

Brazing - Fluxes for brazing - Classification and technical delivery conditions (ISO 18496:2020)

Hartlöten - Flussmittel zum Hartlöten - Einteilung und technische Lieferbedingungen (ISO 18496:2020)



Brasage fort - Flux pour le brasage fort - Classification et conditions techniques de livraison (ISO 18496:2020)



**Ta slovenski standard je istoveten z: prEN ISO 18496**

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**ICS:**

25.160.50 Trdo in mehko lotanje Brazing and soldering

**oSIST prEN ISO 18496:2021 en,fr,de**

INTERNATIONAL STANDARD

# ISO 18496

First edition
2020-09

# Brazing — Fluxes for brazing — Classification and technical delivery conditions

*Brasage fort — Flux pour le brasage fort — Classification et conditions techniques de livraison*



Reference number
ISO 18496:2020(E)

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Published in Switzerland

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# Foreword

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This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 13, *Brazing materials and processes*.



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# Brazing — Fluxes for brazing — Classification and technical delivery conditions

## 1 Scope

This document specifies the classification of fluxes used for brazing metals and characterizes these fluxes on the basis of their properties and use, and gives technical delivery conditions and health and safety precautions.

This document covers two classes of flux, FH and FL. Class FH is used for the brazing of heavy metals (steels, stainless steels, copper and its alloys, nickel and its alloys, precious metals, molybdenum and tungsten). Class FL is used for the brazing of aluminium and its alloys.

## 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 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 Classification

### 4.1 General

The form of the fluxes shall be classified according to Table 1 A, B or C. The effective temperature range can be determined according to Annex A.

### 4.2 Fluxes for brazing heavy metals (Class FH)

#### 4.2.1 General

Class FH covers nine types of flux. The code for each type consists of the class letters FH followed by two digits.

#### 4.2.2 Type FH10

Fluxes with an effective temperature range from about 550 °C up to about 800 °C. They contain boron compounds, simple and complex fluorides and are used at brazing temperatures above 600 °C. These are general purpose fluxes. The residues are usually corrosive and have to be removed by washing or pickling.

#### 4.2.3 Type FH11

Fluxes with an effective temperature range from about 550 °C up to about 800 °C. They contain boron compounds, simple and complex fluorides and chlorides and are used at brazing temperatures above

 

600 °C. These fluxes are mainly used for brazing nonferrous metal with small amount of Al and Ti or refractory metal oxides, aluminium bronze and aluminium silicon type metals. The residues are usually corrosive and shall be removed by washing and pickling.

#### 4.2.4 Type FH12

Fluxes with an effective temperature range from about 550 °C up to about 850 °C. They contain boron compounds, elemental boron and simple and complex fluorides and are used at brazing temperatures above 600 °C. These fluxes are mainly used for brazing stainless and other alloy steels and hard metals. The residues are usually corrosive and shall be removed by washing and pickling.

#### 4.2.5 Type FH20

Fluxes with an effective temperature range from about 700 °C up to about 1 000 °C. They contain boron compounds and fluorides and are used at brazing temperatures above 750 °C. These are general purpose fluxes. The residues are usually corrosive and shall be removed by washing and pickling.

#### 4.2.6 Type FH21

Fluxes with an effective temperature range from about 750 °C up to about 1 100 °C. They contain boron compounds and are used at brazing temperatures above 800 °C. These are general purpose fluxes. The residues are usually non-corrosive but can be removed mechanically or by pickling.

#### 4.2.7 Type FH22



Fluxes with an effective temperature range from about 700 °C up to about 1 050 °C. They contain boron compounds, elemental boron as well as simple and complex fluorides and are used at brazing temperatures above 750 °C. These fluxes are mainly used for brazing stainless and other alloy steels and hard metals. The residues are usually corrosive and shall be removed by washing and pickling.

#### 4.2.8 Type FH23

Fluxes with an effective temperature range from about 700 °C up to about 1 200 °C. They contain borates and are general purpose fluxes. The residues are boron compounds.

#### 4.2.9 Type FH30

Fluxes with an effective temperature from about 1 000 °C upwards. They generally contain boron compounds, phosphates and silicates and are intended mainly for use with copper and nickel brazing filler metals. The residues are usually non-corrosive but can be removed mechanically or by pickling.

#### 4.2.10 Type FH40

Fluxes with an effective temperature range from about 600 °C up to about 1 000 °C. They generally contain chlorides and fluorides but are boron-free and are intended for applications where the presence of boron is not permitted. The residues are usually corrosive and shall be removed by washing or pickling.

### 4.3 Fluxes for brazing light metals (Class FL)

#### 4.3.1 General

Class FL covers three types of flux. The code for each type consists of the class letters FL followed by two digits. These fluxes have effective temperatures from about 550 °C upwards.

 

#### 4.3.2 Type FL10

These fluxes contain hygroscopic chlorides and fluorides, primarily lithium compounds. The residues are corrosive and shall be removed by washing or pickling.

#### 4.3.3 Type FL20

These fluxes contain non-hygroscopic fluorides. The residues are generally non-corrosive and can be left on the workpiece.

#### 4.3.4 Type FL30

These fluxes contain non-hygroscopic fluorides and caesium fluoroaluminates. The residues are generally non-corrosive and can be left on the workpiece. They can be used for aluminium alloys with up to 0,5 weight-% Mg.

An overview of all fluxes is given in Table 1.



 

**Table 1 — Overview of fluxes**

| Flux type | Flux basis | Effective temperature range[a,b] °C | Filler metal type[d] | Parent materials | Reaction and removal of flux residues | Form |
|---|---|---|---|---|---|---|
| FH10 | Boron compounds, simple and complex fluorides | 550 to 800 | Ag, CuP | Steel, copper, copper alloys, nickel and nickel alloys | Corrosive; washing or pickling | **A** powder<br>**B** paste<br>**C** liquid |
| FH11 | Boron compounds, simple and complex fluorides and chlorides | 550 to 800 | Ag, CuP | Copper alloys and other base materials containing up to 6 % aluminium and maximum 1 % Ti | Corrosive; washing or pickling | |
| FH12 | Boron compounds, elemental boron, simple and complex fluorides | 550 to 850 | Ag | Stainless steels, alloyed steels and cemented carbides. | Corrosive; washing or pickling | |
| FH20 | Boron compounds and complex fluorides | 700 to 1 000 | Ag, Cu, Ni | Steel, copper, copper alloys, nickel and nickel alloys | Corrosive; washing or pickling | |
| FH21 | Boron compounds and boric acid | 750 to 1 100 | Ag, Cu, Ni | Steel, copper, copper alloys, nickel and nickel alloys | Non-corrosive, mechanically or pickling | |
| FH22 | Boron compounds, elemental boron, simple and complex fluorides | 700 to 1 050 | Ag, Cu, Ni | Stainless steels, alloyed steels and cemented carbides. | Corrosive; washing or pickling | |
| FH23 | Boron compounds, borates | 700 to 1 200 | Ag, Cu, CuP | Steel, copper, copper alloys, nickel and nickel alloys | Non-corrosive; washing or pickling | |
| FH30 | Boron compounds, phosphates, silicates | Above 1 000 | Cu, Pd, Au | Steel, nickel and nickel alloys, refractory metals | Non-corrosive, mechanically or pickling | |
| FH40 | Chlorides and fluorides | 600 to 1 000 | Ag, Cu, CuP | Steel, stainless steel, copper, copper alloys, nickel and nickel alloys | Corrosive; washing or pickling | |
| FL10 | Hygroscopic chlorides and fluorides | 500 to 630 | Al | Aluminium and its brazeable alloys. | Corrosive; washing or pickling | |
| FL20 | Non-hygroscopic fluorides | 570 to 660 | Al | Aluminium and its brazeable alloys. | Non-corrosive, mechanically or pickling | |
| FL30 | Non-hygroscopic fluorides<br>Caesium fluoroaluminates | 450 to 600 | Al, Zn | Aluminium alloys containing up to 0,5 % magnesium. | Non-corrosive, mechanically or pickling | |

[a] The determination of the effective temperature range is mandatory. The test method can be defined by the manufacturer. For an example, see Annex A.

[b] Flux shall be active in the temperature range. The effective range shall be determined for each product by the manufacturer.

[d] See ISO 17672.