
Trdo spajkanje – Dodajni materiali

Brazing - Filler metals

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English Version

Brazing - Filler metals

Brassage fort - Métaux d'apport

Hartlöten - Lötzusätze

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 121.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Foreword

This document (prEN 1044:2006) has been prepared by Technical Committee CEN/TC 121 "Welding", the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 1044:1999.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

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1 Scope

This European Standard specifies the compositions of a range of filler metals used for brazing. The filler metals have been divided into eight classes, related to their composition but not necessarily to the major element present, see annex A. In the case of composite products such as flux-coated rods, pastes or plastics tapes, the standard only covers the filler metal that forms part of such products. Although the melting range is given in the tables, it will necessarily vary within the compositional range of the filler metal and can only be regarded as approximate. Therefore it does not form part of the specification and is given only for information. Technical delivery conditions are given for brazing filler metals and products containing brazing filler metals with other constituents such as flux and/or binders.

NOTE For some applications, e.g. precious metal jewellery, aerospace and dental, filler metals other than those included in this standard will often be used and these are covered by other standards to which reference should be made.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN ISO 3677: 1995, *Filler metal for soft soldering, brazing and braze welding — Designation*

3 Composition

The filler metal shall have a composition in accordance with tables 2 to 8 for the particular type, except as modified for special vacuum requirements (see clause 4 and table 1).

For the purposes of determining compliance with composition limits, any value obtained from the analysis shall be rounded to the same number of decimal places as used in this standard in expressing the specified limit. The following rules shall be used for rounding:

- a) When the figure immediately after the last figure to be retained is less than five, then the last figure to be retained shall be kept unchanged.
- b) When the figure immediately after the last figure to be retained is either:
 - 1) greater than five; or
 - 2) equal to five and followed by at least one figure other than zero;

then the last figure to be retained shall be increased by one.

- c) When the figure immediately after the last figure to be retained is equal to five, and followed by zeros only, then the last figure to be retained shall be left unchanged if even, and increased by one if odd.

4 Special vacuum requirements

In a few instances, which are most likely to apply to AG 401, PD 101 to PD 106, PD 201, PD 203 and AU 101 to AU 106, lower impurity limits can be required for brazing in vacuum or service in vacuum and these limits shall be as given in table 1.

Filler metals complying with table 1 shall have the letter V added as a suffix to the codification plus the digit 1 or 2 to indicate the grade.

NOTE Grade 1 is intended for the most demanding duties, Grade 2 for less demanding.

Table 1: Impurity limits for special vacuum requirements

Impurity	Limit (% by mass, max.)	
	Grade 1	Grade 2
C ¹⁾	0,005	0,005
Cd	0,001	0,002
P	0,002	0,002 ²⁾
Pb	0,002	0,002
Zn	0,001	0,002
Mn ³⁾	0,001	0,002
In ³⁾	0,002	0,003
All other elements where vapour pressure at 500 °C is $>1,3 \times 10^{-10}$ bar ⁴⁾	0,001	0,002

1) For filler metal AG 401 (see table 3), lower levels may be available by agreement between purchaser and supplier.

2) For filler metal AG 401, 0,02 % maximum.

3) Except where otherwise specified in tables 2 to 8.

4) Examples of such elements are Ca, Cs, K, Li, Mg, Na, Rb, S, Sb, Se, Sr, Te, Tl. For such elements (including Cd, Pb and Zn), the total is limited to 0,010 %.

5 Chemical analysis

Chemical analyses shall be carried out by any suitable method, but it should be noted that in the case of many brazing alloys, the use of reference standards may be essential, as agreed between the purchaser and supplier. Analysis is only required to be carried out routinely for those elements for which specific limits are shown. If, however, the presence of other elements is suspected, or in the course of routine analysis is indicated, to be in excess of the limits laid down for unnamed elements or would bring the total of impurities above the specified limit, further analyses shall be carried out for such elements.

6 Designation

The filler metal shall be designated by the description "filler metal"; the number of this standard "EN 1044" and a code. Details of the three options for the code system used are given in annex A.

As an example, the designations of an aluminium filler metal containing 11% to 13 % Si, in accordance with this standard can be made in one of the following ways:

EXAMPLE 1

Filler metal EN 1044-AL 104

where "Filler metal" is the description;

"EN 1044" is the number of this standard;

"AL 104" is the code given in tables 2 to 8.

EXAMPLE 2

Filler metal EN 1044-B-AL88Si-575/585

where "Filler metal" is the description;

"EN 1044" is the number of this standard;

"B" denotes brazing;

"AL88Si-575/585" is the code in accordance with EN ISO 3677.

EXAMPLE 3

Filler metal EN 1044-AW4047A

where "Filler metal" is the description;

"EN 1044" is the number of this standard;

"AW4047A" is the European material designation.

7 Technical delivery conditions

7.1 Types of products

The form of the material shall be agreed between the purchaser and the manufacturer/supplier at the time of placing the order.

NOTE Brazing filler metals are available as rod, wire, foil (or preforms made from them) or powder, although not all filler metals are necessarily available in every type of product. They are also available as a constituent of brazing pastes or, particularly in the case of aluminium brazing filler metals, clad onto one or both sides of an alloy sheet. Rods may be completely or partially coated with flux.

7.2 Dimensions

7.2.1 General

As it is only possible to specify dimensions and tolerances for rod (see 7.2.2) and to a lesser extent wire (see 7.2.3), for other forms the dimensions and tolerances (e.g. to EN 13599) shall be agreed between the purchaser and the manufacturer/supplier at the time of placing the order.

7.2.2 Rod

For rod the preferred diameters are 1 mm, 1,5 mm, 2 mm, 2,5 mm, 3 mm and 5 mm and the preferred lengths are 500 mm and 1000 mm. The tolerance on diameter shall be $\pm 3\%$ for drawn rod and $\pm 0,2$ mm for other fabrication processes. The tolerance on length shall be ± 5 mm.

7.2.3 Wire

For wire there are no preferred diameters and the tolerance on diameter shall be $\pm 3\%$.

7.3 Condition

The surface of brazing filler metals shall be free from contamination which could adversely affect brazing. With flux-coated rods, the coating shall firmly adhere to the rod and shall not break off during proper handling and usage.

7.4 Marking

Since in many cases, marking of brazing filler metals themselves is impracticable, reliance shall be placed on marking of packets. The outside of each smallest unit package shall be clearly marked with the following information:

- a) the designation in accordance with clause 6;
- b) the name of the manufacturer/supplier;
- c) the trade name (if any);
- d) the size and quantity of material (as applicable);
- e) the supplier's batch number;

- f) health and safety warnings (as required by national regulations).

7.5 Packaging

Brazing filler metals or products containing them shall be packed to provide sufficient safeguard against damage and deterioration during transportation and storage.

7.6 Product certificates

If certificates of conformity and/or analysis are required, details shall be agreed between the purchaser and the manufacturer/supplier at the time of placing the order.

8 Metal fume hazard

Although not directly relevant to the requirements of this standard, it should be noted that any national requirements for limiting exposure to metal fume must be observed. This is particularly important when using brazing filler metals containing cadmium as an alloying element.

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Table 2 — Class AL: Aluminium brazing filler metals

Code	Composition % by mass										Melting Range (approximate)		
	Si	Fe	Cu	Mn	Mg	Zn	Ti	Bi	Other elements		Al	Solidus	Liquidus
									Each	Total			
min/max	max	min/max	max	min/max	max	max	min/max	max	max	max	°C	°C	
AL 101	4,5/6,0	0,6	-/0,30	0,15	-/0,20	0,10	0,15	-/-	0,05	0,15	Remainder	575	630
AL 102	6,8/8,2	0,8	-/0,25	0,10	-/-	0,20	-	-/-	0,05	0,15	Remainder	575	615
AL 103	9,0/11,0	0,8	-/0,30	0,05	-/0,05	0,10	0,20	-/-	0,05	0,15	Remainder	575	590
AL 104	11,0/13,0	0,6	-/0,30	0,15	-/0,10	0,20	0,15	-/-	0,05	0,15	Remainder	575	585
AL 201	9,0/11,0	0,6	3,0/5,0	0,15	-/0,10	0,20	0,15	-/-	0,05	0,15	Remainder	520	585
AL 301	9,0/10,5	0,8	-/0,25	0,10	1,0/2,0	0,20	-	-/-	0,05	0,15	Remainder	555	590
AL 302	9,0/10,5	0,8	-/0,25	0,10	1,0/2,0	0,20	-	0,02/0,20	0,05	0,15	Remainder	555	590

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