



CD/K/046-1:2009
ICS 23.040.40

EAST AFRICAN STANDARD

Copper and copper alloys — Plumbing fittings — Part 1: Fittings with ends for capillary soldering or capillary brazing to copper tubes

EAST AFRICAN COMMUNITY

Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in East Africa. It is envisaged that through harmonized standardization, trade barriers which are encountered when goods and services are exchanged within the Community will be removed.

In order to meet the above objectives, the EAC Partner States have enacted an East African Standardization, Quality Assurance, Metrology and Test Act, 2006 (EAC SQMT Act, 2006) to make provisions for ensuring standardization, quality assurance, metrology and testing of products produced or originating in a third country and traded in the Community in order to facilitate industrial development and trade as well as helping to protect the health and safety of society and the environment in the Community.

East African Standards are formulated in accordance with the procedures established by the East African Standards Committee. The East African Standards Committee is established under the provisions of Article 4 of the EAC SQMT Act, 2006. The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

Article 15(1) of the EAC SQMT Act, 2006 provides that "Within six months of the declaration of an East African Standard, the Partner States shall adopt, without deviation from the approved text of the standard, the East African Standard as a national standard and withdraw any existing national standard with similar scope and purpose".

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

© East African Community 2010 — All rights reserved*

East African Community

P O Box 1096

Arusha

Tanzania

Tel: 255 27 2504253/8

Fax: 255-27-2504481/2504255

E-Mail: eac@eachq.org

Web: www.each.int

Introduction

In the preparation of this East African Standard, the following source was consulted extensively:

BS EN 1254-1:1998, *Copper and copper alloys — Plumbing fittings — Fittings with ends for capillary soldering or capillary brazing to copper tubes*

Assistance derived from this source and others inadvertently not mentioned is hereby acknowledged.

Draft for comments only — Not to be cited as East African Standard

BRITISH STANDARD

**BS EN
1254-1:1998**

*(Incorporating
Corrigendum No. 1)*

Copper and copper alloys — Plumbing fittings —

Part 1: Fittings with ends for capillary soldering or capillary brazing to copper tubes

The European Standard EN 1254-1:1998 has the status of a
British Standard

ICS 23.040.40

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW



National foreword

This British Standard is the English language version of EN 1254-1:1998. Together with BS EN 1254-2 it supersedes BS 864-2:1983 which is declared obsolescent.

The UK participation in its preparation was entrusted by Technical Committee NFE/34, Copper and copper alloys, to Subcommittee NFE/34/3, Copper and copper alloy fittings for tube and pipe, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled "International Standards Correspondence Index", or by using the "Find" facility of the BSI Standards Electronic Catalogue.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.



This British Standard, having been prepared under the direction of the Engineering Sector Board, was published under the authority of the Standards Board and comes into effect on 15 June 1998

© BSI 1998

ISBN 0 580 29438 2

Amendments issued since publication

Amd. No.	Date	Text affected
10099 Corr No. 1	July 1998	Indicated by a sideline in the margin

ICS 23.040.40

Descriptors: Copper tubes, copper, copper alloys, pipe fittings, connections for welding, joining, dimensions, dimensional tolerances, tests, designation, marking

English version

**Copper and copper alloys — Plumbing fittings —
Part 1: Fittings with ends for capillary soldering or capillary brazing
to copper tubes**

Cuivre et alliages de cuivre — Raccords —
Partie 1: Raccords à braser par capillarité pour
tubes en cuivre

Kupfer und Kupferlegierungen — Fittings —
Teil 1: Kapillarlötfittings für Kupferrohre
(Weich- und Hartlötten)

This European Standard was approved by CEN on 24 November 1997.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

© 1998 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN 1254-1:1998 E

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 133, Copper and copper alloys, the Secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 1998, and conflicting national standards shall be withdrawn at the latest by July 1998.

Within its programme of work, Technical Committee CEN/TC 133 requested CEN/TC 133/WG 8, Copper and copper alloy fittings, to prepare the following standard:

EN 1254-1, *Copper and copper alloys — Plumbing fittings — Part 1: Fittings with ends for capillary soldering or capillary brazing to copper tubes.*

This standard is one of five parts for copper and copper alloy fittings for joining copper tubes or plastics pipes. The other four parts of the standard are:

EN 1254-2, *Copper and copper alloys — Plumbing fittings — Part 2: Fittings with compression ends for use with copper tubes.*

EN 1254-3, *Copper and copper alloys — Plumbing fittings — Part 3: Fittings with compression ends for use with plastics pipes.*

EN 1254-4, *Copper and copper alloys — Plumbing fittings — Part 4: Fittings combining other end connections with capillary or compression ends.*

EN 1254-5, *Copper and copper alloys — Plumbing fittings — Part 5: Fittings with short ends for capillary brazing to copper tubes.*

It is recommended that fittings manufactured to this standard are certified as conforming to the requirements of this standard, based on third party testing and continuing surveillance, which should be coupled with an assessment of a supplier's quality system against the appropriate standard, i.e. EN ISO 9001 or EN ISO 9002.

In respect of potential adverse effects on the quality of water intended for human consumption, caused by the product covered by this standard:

- 1) this standard provides no information as to whether the product may be used without restriction in any of the Member States of the EU or EFTA;
- 2) it should be noted that, while awaiting the adoption of verifiable European criteria, existing national regulations concerning the use and/or the characteristics of this product remain in force.

The attention of the user of this standard is drawn to the fact that national or local regulations or practices might restrict the choice of dimensions and threads in the application of products conforming to this standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Contents

	Page
Foreword	2
1 Scope	3
2 Normative references	3
3 Definitions	3
3.1 plumbing fitting	3
3.2 capillary end	3
3.3 reducer (capillary soldering or brazing for copper tube)	3
3.4 adaptor fitting	3
3.5 nominal diameter	3
4 Requirements	3
4.1 General	3
4.2 Materials	3
4.3 Dimensions and tolerances	4
4.4 Design and manufacture	6
4.5 Production test requirements	10
4.6 Type test requirements	10
5 Test methods	10
5.1 Assembly dimensions	10
5.2 Leaktightness under internal hydrostatic pressure	10
5.3 Pressure test	10
5.4 Carbon in bore tests	12
5.5 Dezincification resistance test	12
5.6 Stress corrosion resistance test	12
6 Designation	14
7 Marking	14
7.1 General	14
7.2 Dezincification resistant copper-zinc alloys	14
8 Documentation	14
8.1 Declaration of conformity	14
8.2 User instructions	14
Annex A (normative) Carbon film test	14
Annex B (normative) Determination of mean depth of dezincification	15
Annex C (informative) Bibliography	15

1 Scope

This European Standard specifies materials, assembly dimensions and tolerances and test requirements for fittings of copper and copper alloys with or without plating. Maximum permissible temperatures and pressures are also established. This part of EN 1254 specifies connection end dimensions of capillary soldering and brazing ends for the purposes of joining copper tubes specified in EN 1057. Fittings may comprise a combination of any of the end types specified in EN 1254-1 to EN 1254-5 or other standards.

The standard establishes a designation system for the fittings.

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 723, *Copper and copper alloys — Combustion method for determination of carbon on the inner surface of copper tubes or fittings.*

EN 1057, *Copper and copper alloys — Seamless, round copper tubes for water and gas in sanitary and heating applications.*

EN 1254-2, *Copper and copper alloys — Plumbing fittings — Part 2: Fittings with compression ends for use with copper tubes.*

EN 1254-3, *Copper and copper alloys — Plumbing fittings — Part 3: Fittings with compression ends for use with plastics pipes.*

EN 1254-4, *Copper and copper alloys — Plumbing fittings — Part 4: Fittings combining other end connections with capillary or compression ends.*

EN 1254-5, *Copper and copper alloys — Plumbing fittings — Part 5: Fittings with short ends for capillary brazing to copper tubes.*

EN ISO 6509:1995, *Corrosion of metals and alloys — Determination of dezincification resistance of brass (ISO 6509:1981).*

ISO 6957, *Copper alloys — Ammonia test for stress corrosion resistance.*

NOTE Informative references to documents used in the preparation of this standard, and cited at the appropriate places in the text, are listed in a bibliography, see annex C.

3 Definitions

For the purposes of this standard, the following definitions apply.

3.1

plumbing fitting

device used in a tube system for the purpose of connecting the tubes either to each other or to a component part of a system

3.2

capillary end

end in which the joint is made by the flow of solder or brazing alloy by capillary action into the annular space

3.3

reducer (capillary soldering or brazing for copper tube)

component used to enable an end to connect tube of a smaller nominal diameter than the nominal diameter of the fitting end

3.4

adaptor fitting

fitting combining more than one type of end

NOTE For details of the other ends, see the relevant parts of this standard or other standards.

3.5

nominal diameter

nominal diameter of the fitting end expressed as the nominal outside diameter of the connecting tube

4 Requirements

4.1 General

Fittings shall conform to the requirements of 4.2 to 4.5 and shall be capable of meeting the type testing requirements of 4.6. Reducers also shall conform to these requirements.

4.2 Materials

4.2.1 General

Fittings shall be made from copper or copper alloys selected from materials either:

- specified in European copper and copper alloy product standards; or
- registered by CEN/TC 133;

provided that the fittings manufactured from them meet the functional requirements of this standard.

NOTE Some of the standardized coppers and copper alloys commonly used for the manufacture of fittings are shown in Table I. Details of registered alloys can be obtained from the CEN/TC 133 Secretariat.

Table 1 — Examples of commonly used materials

Material designation		Standard
Symbol	Number	
Cu-DHP	CW024A	prEN 12449
CuSn5Zn5Pb5-C	CC491K	prEN 1982
CuZn36Pb2As	CW602N	EN 12164
CuZn39Pb3	CW614N	EN 12164
CuZn33Pb2-C	CC750S	prEN 1982
CuZn15As-C	CC760S	prEN 1982

NOTE These examples do not constitute an exhaustive list.

4.2.2 Restrictions in the choice of materials

Cu-ETP (CW004A) is a permitted material only for integral solder ring fittings and shall not be used for other types of capillary fittings.

Leaded solders shall not be used for manufacture of integral solder ring fittings.

4.3 Dimensions and tolerances

4.3.1 Tolerances on diameters

The standardized nominal dimensions, diameters and their tolerances are given in Table 2.

The socket and male end tolerances on diameter shall be in accordance with Table 2, which shall be verified by the use of gauges shown in Figures 5 and 6 and Tables 7 and 8.

NOTE 1 Tolerances in accordance with Table 2 and the use of gauges in accordance with Tables 7 and 8 will ensure the distribution of solder or brazing alloy throughout the joint and will allow for the alignment of the male end of a fitting or the free end of a tube in the socket.

NOTE 2 When capillary fittings are used for soldering or brazing to copper tubes, the ends of the tubes should be sized to the outside diameter dimensions specified in Table 2 for a length not less than the length of engagement of the fitting.

NOTE 3 Socket and male ends are shown diagrammatically in Figures 1 and 2.

NOTE 4 The installation dimensions cannot be standardized due to varying manufacturing processes. The manufacturer should be consulted for these dimensions.

4.3.2 Minimum lengths of engagement

The minimum lengths of engagement of sockets and male ends shall be in accordance with Table 3.

The length, L_1 , for integral solder ring fittings or integral brazing ring fittings shall not include the width of the solder or brazing alloy groove [see Figure 1b)].

Male ends intended for use with integral ring sockets shall include an allowance for the width of the solder or brazing alloy groove.

4.3.3 Minimum bore area

The minimum cross-sectional area of the bore through each fitting shall be not less than the theoretical minimum area of the bore given in Table 4, except that for unequal-ended or adaptor fittings with ends specified in EN 1254-2, EN 1254-3, EN 1254-4 and EN 1254-5 or other standards, the smallest diameter shall apply provided that this diameter does not restrict other outlets.

Table 2 — Tolerances on the nominal diameter

Values in millimetres

Nominal diameter <i>D</i>	Tolerances on the mean diameter ¹⁾ with respect to the nominal diameter <i>D</i>		Resulting diametrical difference	
	Outside diameter of male end	Inside diameter of socket	Max.	Min.
6	+0,04 -0,05	+0,15 +0,06	0,20	0,02
8				
9				
10				
12				
14				
14,7				
15				
16	+0,05 -0,06	+0,18 +0,07	0,24	0,02
18				
21				
22				
25				
27,4				
28				
34 ²⁾				
35 ²⁾	+0,06 -0,07	+0,23 +0,09	0,30	0,03
40 ²⁾				
40,5 ²⁾				
42 ²⁾				
53,6 ²⁾				
54 ²⁾				
64 ²⁾				
66,7 ²⁾				
70 ²⁾	+0,07 -0,08	+0,33 +0,10	0,41	0,03
76,1 ²⁾				
80 ²⁾				
88,9 ²⁾				
106 ²⁾				
108 ²⁾				

¹⁾ Arithmetical mean of two diameters at right angles in a cross-section taken anywhere on the length of the socket or of the male end.
²⁾ The soldering or brazing of tubes and fittings for these diameters requires special precautions regarding working practices.

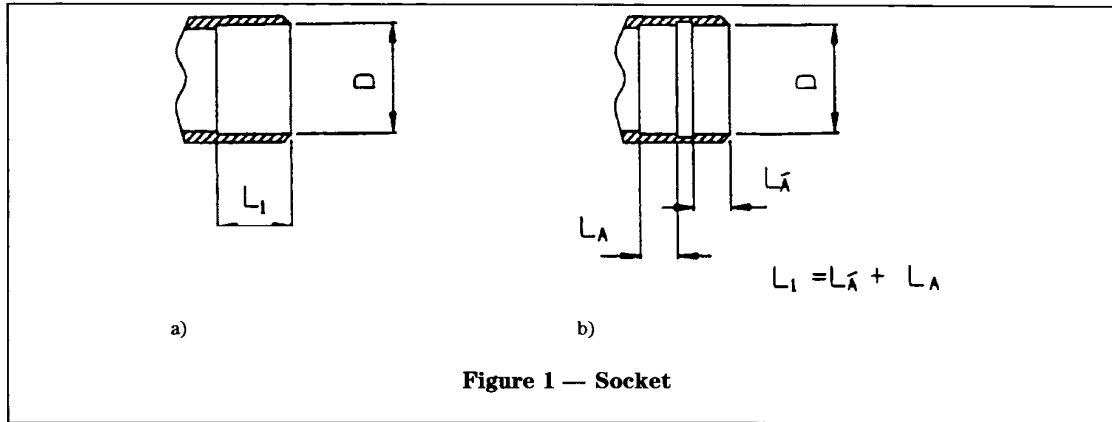


Figure 1 — Socket

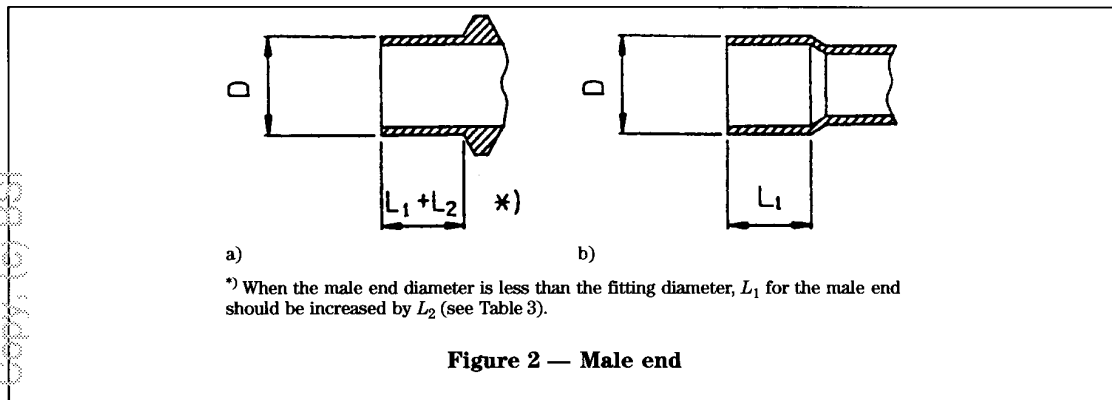


Figure 2 — Male end

4.3.4 Minimum wall thickness

Minimum wall thickness measured at any point shall be in accordance with dimension e in Table 5 (see Figure 3). The minimum wall thickness requirements do not apply under indented marking on the socket end.

In the case of integral solder ring fittings where a groove is made within the soldering length, the minimum wall thickness shall be in accordance with dimension e' in Table 5 (see Figure 3).

4.3.5 Tolerance for the alignment of the fitting ends

The alignment of the ends of the fitting shall be within 2° of the specified axis.

4.4 Design and manufacture

4.4.1 Maximum temperatures and pressures

Temperatures and pressures for assembled joints shall not exceed the values in Table 6 for the relevant soldering or brazing alloy.

Table 3 — Minimum lengths of engagement

Nominal diameter <i>D</i>	Length of engagement	
	<i>L</i> ₁	<i>L</i> ₂
6	5,8	2
8	6,8	2
9	7,8	2
10	7,8	2
12	8,6	2
14	10,6	2
14,7	10,6	2
15	10,6	2
16	10,6	2
18	12,6	2
21	15,4	2
22	15,4	2
25	16,4	2
27,4	18,4	2
28	18,4	2
34	23	2
35	23	2
40	27	2
40,5	27	2
42	27	2
53,6	32	2
54	32	2
64	32,5	2
66,7	33,5	3
70	33,5	3
76,1	33,5	3
80	35,5	3
88,9	37,5	3
106	47,5	4
108	47,5	4

Table 4 — Minimum bore

Nominal diameter <i>D</i>	Minimum bore
6	4,0
8	6,0
9	7,0
10	7,0
12	9,0
14	10,0
14,7	11,0
15	11,0
16	12,0
18	14,0
21	18,0
22	18,0
25	21,0
27,4	23,0
28	23,0
34	29,0
35	29,0
40	35,0
40,5	36,0
42	36,0
53,6	47,0
54	47,0
64	55,0
66,7	57,0
70	60,0
76,1	65,0
80	68,0
88,9	76,0
106	92,0
108	92,0

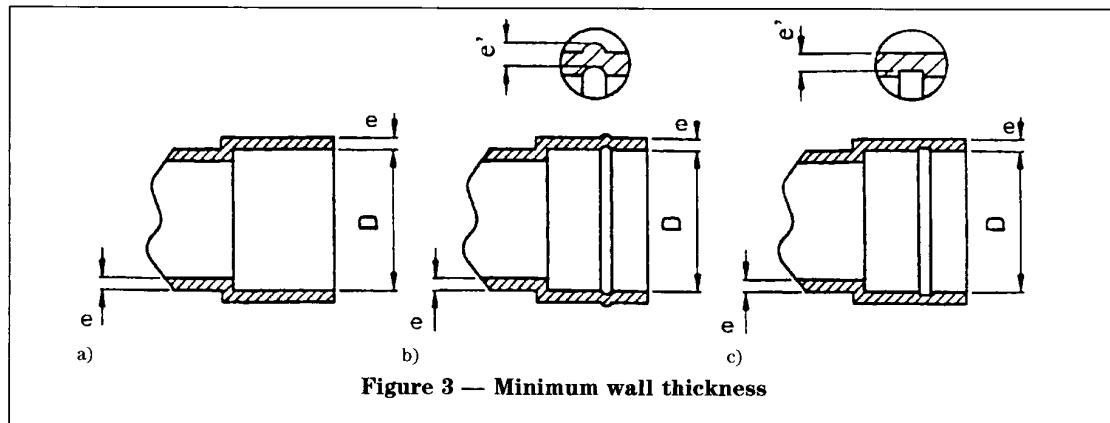


Figure 3 — Minimum wall thickness

Table 5 — Minimum wall thickness

Dimensions in millimetres

Nominal diameter <i>D</i>	Minimum wall thickness					
	Wrought coppers		Wrought copper alloys		Cast coppers and copper alloys	
	<i>e</i>	<i>e'</i>	<i>e</i>	<i>e'</i>	<i>e</i>	<i>e'</i>
6	0,6	0,54	1,0	0,55	1,0	0,65
8	0,6	0,54	1,0	0,55	1,0	0,65
9	0,6	0,54	1,0	0,55	1,0	0,65
10	0,6	0,54	1,0	0,55	1,0	0,65
12	0,6	0,54	1,1	0,60	1,1	0,71
14	0,6	0,54	1,1	0,60	1,1	0,71
14,7	0,7	0,63	1,2	0,66	1,2	0,78
15	0,7	0,63	1,2	0,66	1,2	0,78
16	0,7	0,63	1,2	0,66	1,2	0,78
18	0,8	0,72	1,4	0,77	1,4	0,91
21	0,9	0,81	1,4	0,77	1,4	0,91
22	0,9	0,81	1,4	0,77	1,5	0,97
25	0,9	0,81	1,4	0,77	1,6	1,04
27,4	0,9	0,81	1,5	0,82	1,6	1,04
28	0,9	0,81	1,5	0,82	1,8	1,17
34	1,0	0,90	1,6	0,88	1,8	1,17
35	1,0	0,90	1,6	0,88	1,8	1,17
40	1,1	0,99	1,8	0,99	2,0	1,30
40,5	1,1	0,99	1,8	0,99	2,0	1,30
42	1,1	0,99	1,8	0,99	2,0	1,30
53,6	1,2	1,08	1,9	1,04	2,3	1,49
54	1,2	1,08	1,9	1,04	2,3	1,49
64	1,4	1,26	2,0	1,10	2,4	1,56
66,7	1,4	1,26	2,0	1,10	2,4	1,56
70	1,4	1,26	2,3	1,26	2,6	1,69
76,1	1,6	1,44	2,6	1,43	2,8	1,82
80	1,8	1,62	2,8	1,54	2,9	1,88
88,9	1,8	1,62	2,9	1,59	3,1	2,01
106	2,1	1,89	3,3	1,80	3,5	2,27
108	2,1	1,89	3,3	1,80	3,5	2,27

Licensed Copy: KEBS Information Resource Centre, Kenya Bureau of Standards, 19/05/2008 10:35, Uncontrolled

Table 6 — Maximum temperatures and pressures

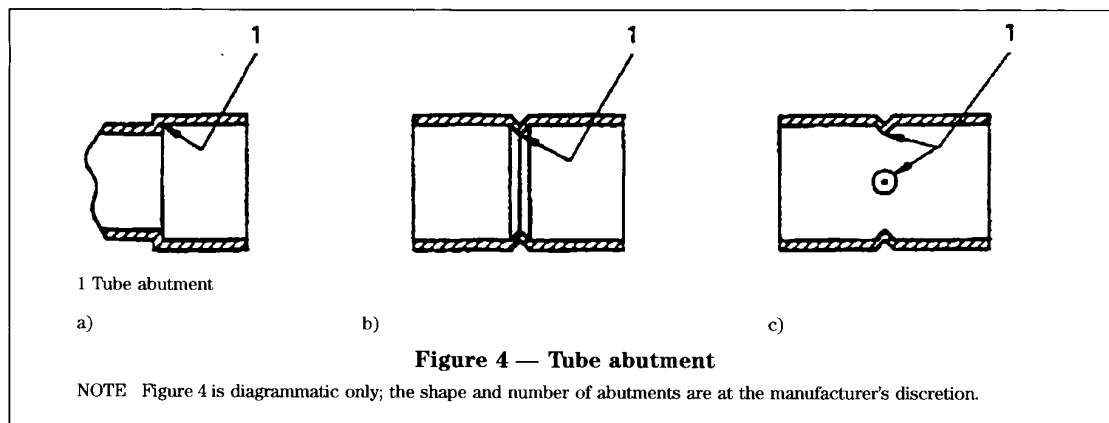
Soldering/brazing	Typical examples of soldering/brazing alloys		Maximum temperature ¹⁾ °C	Maximum pressures for nominal diameters ^{1), 2)} bar		
				From 6 mm up to and including 34 mm	Over 34 mm up to and including 54 mm	Over 54 mm up to and including 108 mm
Soldering	I	Lead/tin 50/50 % or 60/40 %	30	16	16	10
			65	10	10	6
			110	6	6	4
	II III	Tin/silver 95/5 % Tin/copper Cu 3 % max. 0,4 % min. remainder Sn	30	25	25	16
			65	25	16	16
			110	16	10	10
Brazing	IV	Silver/copper cadmium-free 55 % to 40 % Ag	30	25	25	16
	V	Silver with cadmium 30 % or 40 % Ag	65	25	16	16
	VI	Copper/ phosphorus 94/6 % or copper/phosphorus with 2 % silver 92/6/2 %	110	16	10	10

¹⁾ For use in applications outside the scope of this table, the approval of the manufacturer should be obtained.
²⁾ Intermediate pressure ratings shall be obtained by interpolation.
NOTE Soldering alloys with lead and brazing alloys with cadmium are not permitted in installations for water for human consumption.

4.4.2 Tube abutment

Fittings shall be manufactured either:

- a) with an abutment incorporated to control the joint length, even with a male end having the minimum tolerance for outside diameter (see Figure 4); or
- b) without an abutment.



4.4.3 Surface condition

Fittings shall be clean and free from sharp edges.

4.4.4 Surface finish

Requirements for plated surface finishes shall be the subject of agreement between the purchaser and the manufacturer.

4.5 Production test requirements

4.5.1 Pressure test for fittings bodies with as-cast microstructure

Fittings bodies shall give no visual indication of leakage when tested in accordance with 5.3. Fittings bodies which leak shall be scrapped. No reclamation procedure shall be undertaken.

4.5.2 Carbon in bore

The internal surface of copper capillary fittings for soldering or brazing shall not contain any detrimental film nor present a carbon level high enough to allow the formation of such a film during installation. The maximum total carbon level on internal surfaces shall not exceed 1,0 mg/dm² when tested in accordance with 5.4.

4.5.3 Resistance to dezincification

Components which are manufactured from alloys containing more than 10 % zinc and which are required to be resistant to dezincification, shall be capable of meeting the acceptance criteria for resistance to dezincification. When tested in accordance with 5.5, the depth of dezincification, in any direction, shall be:

- a) for grade A: maximum 200 µm;
- b) for grade B: mean not to exceed 200 µm and maximum 400 µm.

4.6 Type test requirements

4.6.1 Leaktightness under internal hydrostatic pressure

When tested in accordance with 5.2, fittings shall show no signs of leakage or permanent distortion.

4.6.2 Resistance to stress corrosion

The fitting shall be resistant to stress corrosion. When tested in accordance with 5.6, components manufactured from copper alloys shall show no evidence of cracking.

5 Test methods

5.1 Assembly dimensions

Socket and male end diameters shall be confirmed on a sampling basis by the use of go and not go plain gauges in accordance with Figures 5 and 6 and Tables 7 and 8.

5.2 Leaktightness under internal hydrostatic pressure

When a leaktightness test is required to be performed, the fitting shall be assembled on relevant tube in accordance with the manufacturer's instructions and subjected to a hydrostatic pressure test of a minimum of 1,5 times the maximum pressure given in Table 6 for the relevant size range. The pressure shall be applied gradually and maintained for a minimum period of 15 min at ambient temperature.

5.3 Pressure test

When required, the bodies of fittings with as-cast microstructure, after machining, shall be pressure tested by the manufacturer. At the option of the manufacturer, they shall be submitted to a hydrostatic pressure test or to a pneumatic pressure test or to any other pressure test of equivalent performance.

The reference method of test shall be either by the application of an internal pneumatic pressure of a minimum of 5 bar with the fitting entirely immersed in water, or an internal hydrostatic pressure test of a minimum of 1,5 times maximum pressure given in Table 6 for the relevant size range, and at ambient temperature.

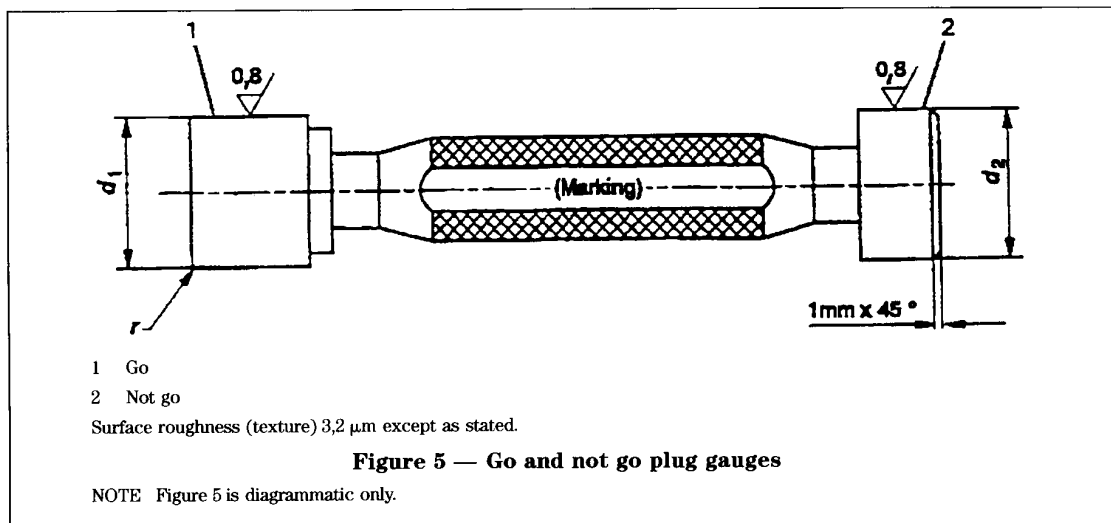


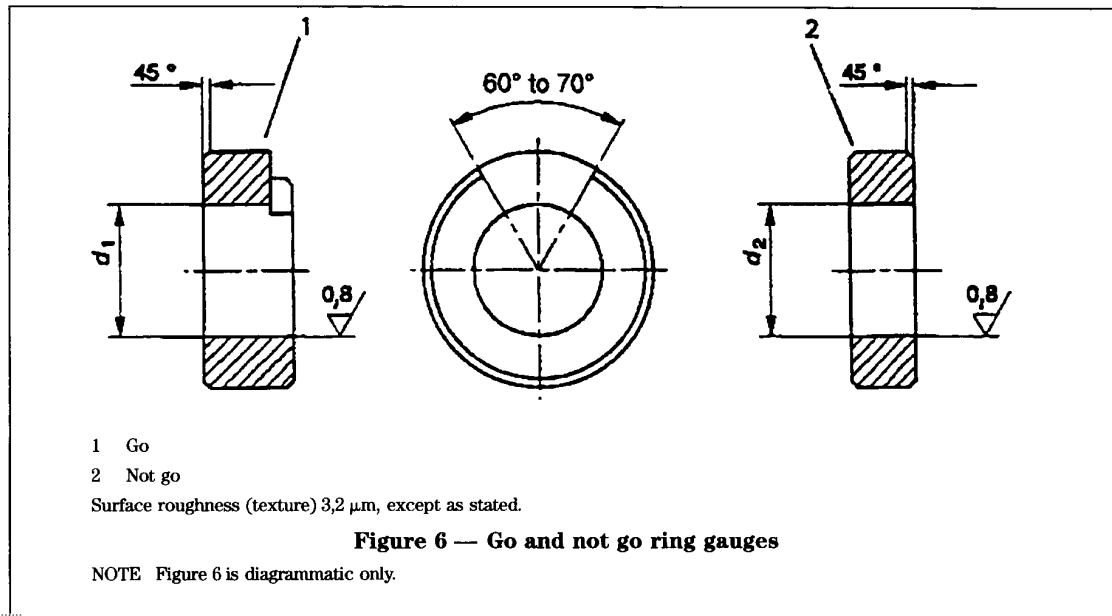
Figure 5 — Go and not go plug gauges

NOTE Figure 5 is diagrammatic only.

Table 7 — Dimensions of go and not go plug gauges

Values in millimetres

Nominal diameter <i>D</i>	Gauge dimensions (see Figure 5)						
	<i>d</i> ₁	Tolerance on <i>d</i> ₁	<i>d</i> ₁ after wear	<i>d</i> ₂	Tolerance on <i>d</i> ₂	<i>r</i>	
6	6,068	±0,00125	6,060	6,150	±0,00125	0,7	
8	8,068		8,060	8,150			
9	9,068		9,060	9,150			
10	10,068		10,060	10,150			
12	12,069	±0,0015	12,060	12,150	±0,0015		
14	14,069		14,060	14,150			
14,7	14,769		14,760	14,850			
15	15,069		15,060	15,150			
16	16,069		16,060	16,150			
18	18,069		18,060	18,150			
21	21,080	±0,0020	21,070	21,180	±0,0020		1,0
22	22,080		22,070	22,180			
25	25,080		25,070	25,180			
27,4	27,480		27,470	27,580			
28	28,080		28,070	28,180			
34	34,096		34,090	34,230			
35	35,096		35,090	35,230			
40	40,096		40,090	40,230			
40,5	40,596		40,590	40,730			
42	42,096		42,090	42,230			
53,6	53,697	±0,0025	53,690	53,830	±0,0025	1,5	
54	54,097		54,090	54,230			
64	64,108		64,100	64,330			
66,7	66,808		66,800	67,030			
70	70,108		70,100	70,330			
76,1	76,208		76,200	76,430			
80	80,108	±0,0030	80,100	80,330	±0,0030	2,0	
88,9	89,008		89,000	89,330			
106	106,108		106,100	106,330			
108	108,108		108,100	108,330			



5.4 Carbon in bore tests

5.4.1 Carbon film test

The detection and assessment of carbon film shall be carried out in accordance with the method described in annex A.

5.4.2 Carbon content test

The determination of carbon content shall be carried out in accordance with the reference method described in EN 723.

NOTE For routine controls in the course of quality assurance procedures, other methods, e.g. the carbon black test (modified VTR method), can be used as an alternative.

5.5 Dezincification resistance test

When a dezincification resistance test is to be carried out, the test method given in EN ISO 6509 shall be used.

At the completion of the test:

- for grade A, the maximum depth of dezincification shall be measured;
- for grade B, the mean depth of dezincification (see annex B) and the maximum depth of dezincification shall be measured.

If any of the test pieces fail the dezincification resistance test, further test samples from the same batch shall be selected for retesting.

If all the further test pieces pass the test, the batch represented shall be deemed to conform to the requirements of this standard for dezincification resistance. If any of the further test pieces fail, then the batch represented shall be deemed not to conform to this standard.

NOTE If the user needs to heat the fitting to a temperature exceeding 550 °C, advice should be sought from the manufacturer.

5.6 Stress corrosion resistance test

When a stress corrosion resistance test is to be carried out, fittings shall be tested according to the method in ISO 6957 using test solution of pH 9,5 but without prior pickling.

Table 8 — Dimensions of go and not go ring gauges

Values in millimetres

Nominal diameter <i>D</i>	Gauge dimensions (see Figure 6)				
	<i>d</i> ₁	Tolerance on <i>d</i> ₁	<i>d</i> ₁ after wear	<i>d</i> ₂	Tolerance on <i>d</i> ₂
6	6,037	±0,0020	6,050	5,950	±0,0020
8	8,037		8,050	7,950	
9	9,037		9,050	8,950	
10	10,037		10,050	9,950	
12	12,036	±0,0025	12,050	11,950	±0,0025
14	14,036		14,050	13,950	
14,7	14,736		14,750	14,650	
15	15,036		15,050	14,950	
16	16,036		16,050	15,950	
18	18,036		18,050	17,950	
21	21,045	±0,0030	21,060	20,940	±0,0030
22	22,045		22,060	21,940	
25	25,045		25,060	24,940	
27,4	27,445		27,460	27,340	
28	28,045		28,060	27,940	
34	34,054	±0,0035	34,070	33,930	±0,0035
35	35,054		35,070	34,930	
40	40,054		40,070	39,930	
40,5	40,554		40,570	40,430	
42	42,054		42,070	41,930	
53,6	53,653	±0,0040	53,670	53,530	±0,0040
54	54,053		54,070	53,930	
64	64,063		64,080	63,920	
66,7	66,763		66,780	66,620	
70	70,063		70,080	69,920	
76,1	76,163		76,180	76,020	
80	80,062	±0,0050	80,080	79,920	±0,0050
88,9	88,962		88,980	88,820	
106	106,062		106,080	105,920	
108	108,062		108,080	107,920	

6 Designation

Fittings shall be designated by quoting:

- a) common term or manufacturer's catalogue number (see note 1);
- b) number and part of this standard (EN 1254-1);
- c) size of the connecting ends by the nominal outside diameter of the connecting tube or, in the case of fittings incorporating threaded connections in accordance with EN 1254-4 or other standards, by the thread designation (see note 2 for sequence of specifying ends);
- d) without abutment, if applicable;
- e) if required, the grade of dezincification resistance acceptance criteria;
- f) if required, the type of plating.

NOTE 1 Fittings are normally designated either by a manufacturer's catalogue number or by the common terms, coupling, bend, elbow, tee, etc.

NOTE 2 The preferred sequence a) for specifying ends is run-branch-run-branch (omitting where necessary for tees). The non-preferred sequence b) is run-run-branch-branch (omitting where necessary for tees). Ordering details should state if the non-preferred sequence system was used.

For fittings with equal ends, the nominal size can be specified by the one diameter. For fittings with unequal ends, the largest size should be quoted first. For adaptor fittings, the ends are specified in the same order, but the largest end of the run should be quoted first.

7 Marking

7.1 General

Each fitting shall be legibly and durably marked, at the minimum, with the manufacturer's identity symbol and, if it is practicable, with the nominal diameter and the number and part of this standard.

7.2 Dezincification resistant copper-zinc alloys

Fittings manufactured from dezincification resistant copper-zinc alloys and capable of meeting the requirements of 4.5.3 shall be legibly and durably marked in accordance with either a) or b), as follows:

- a) for grade A material, use symbol CR or characters DRA;
- b) for grade B material, use characters DRB.

8 Documentation

8.1 Declaration of conformity

When requested by the purchaser, the supplier shall give a written declaration that the fittings are manufactured in accordance with the requirements of this standard.

8.2 User instructions

When requested, user instructions shall be provided by the manufacturer.

Annex A (normative)

Carbon film test

A.1 Preparation of the test piece

A test piece is required with internal surface area 10 dm² or a complete fitting, whichever is the smaller. The test piece shall be cleaned on its outside surface, either abrasively, in order to remove all traces of the original surface finish, or chemically, by sealing the ends with acid resistant plugs and then immersing in concentrated nitric acid to pickle the outside surface, then rinsing with deionized water and drying.

If the test piece is a complete fitting, using a clean saw blade, cut the test piece longitudinally. Degrease both halves by dipping in acetone. If the test piece is a portion from a fitting, without further cutting, degrease by dipping in acetone.

A.2 Method

The degreased test piece shall be placed, with its internal surface upwards, in a small, white flat bottomed porcelain or glass dish and the test piece covered with 25 % (v/v) nitric acid at ambient temperature.

The acid causes loosening of surface deposits which will float to the surface. When the acid turns blue in colour, the test piece shall be removed and rinsed with deionized water to wash back into the acid any particles adhering to the test piece.

A.3 Detection and assessment of films

The reaction of the test piece in the acid shall be observed with a microscope of approximately $\times 10$ magnification.

The initial observation will assess whether a material released by the acid is in the form of a film or particulate. If particulate or if nothing is detected, the test is passed.

If clearly visible films are seen floating to the surface, these are carbon or oxide.

To distinguish between carbon and oxide, the porcelain or glass dish shall be gently heated and the acid allowed to boil for about 5 min to dissolve any oxide films.

If on re-examination the films have been eliminated or only particles remain, the test is passed. If there is no reduction in the film element, then it is carbon and the test is failed.

In the case of a failure, new samples shall be selected and subjected to testing in accordance with EN 723.

Annex B (normative)

Determination of mean depth of dezincification

B.1 Introduction

EN ISO 6509 specifies a method for the determination of the maximum depth of dezincification of a brass specimen. In accordance with the ruling given in 7.5.3 of EN ISO 6509:1995, the following procedure extends the method to cover the determination of the mean depth of dezincification, in order to verify conformity to the dezincification resistance acceptance criteria for dezincification resistant alloy grade B products.

The principle of the method, the reagents, materials and apparatus required and the procedure for the selection and preparation of the test pieces, are all in accordance with EN ISO 6509.

B.2 Procedure

Having determined the maximum depth of dezincification in a longitudinal direction, in accordance with clause 7 of EN ISO 6509:1995 (see 5.5), carry out the following operations to determine the mean depth of dezincification.

Adjust the magnification of the microscope to suit the general depth of dezincification and use the same magnification for all measurements. Examine the entire length of the section for evaluation, in contiguous visual fields of the microscope.

NOTE To ensure the best accuracy of measurement, the largest number of contiguous fields at the greatest possible magnification should be measured.

Using the measuring scale incorporated in the microscope, measure and record the dezincification depth, i.e. the point of intersection of the scale and the dezincification front [see Figure B.1a)] for each contiguous field. If the scale lies between two dezincified areas within the visual field, the dezincification depth shall be recorded as the point of intersection of the scale and an imaginary line joining the extremities of the two dezincification fronts adjacent to the scale [see Figure B.1b)].

If there is no evidence of dezincification in the field examined, or only one dezincified area which does not intersect the scale, then record the dezincification depth of that field as zero [see Figure B.1c)].

B.3 Expression of results

After measurement of all the contiguous fields along the entire length of the section for evaluation, calculate and report the mean dezincification depth as the sum of the measured depths for every field, divided by the number of contiguous fields examined.

Annex C (informative)

Bibliography

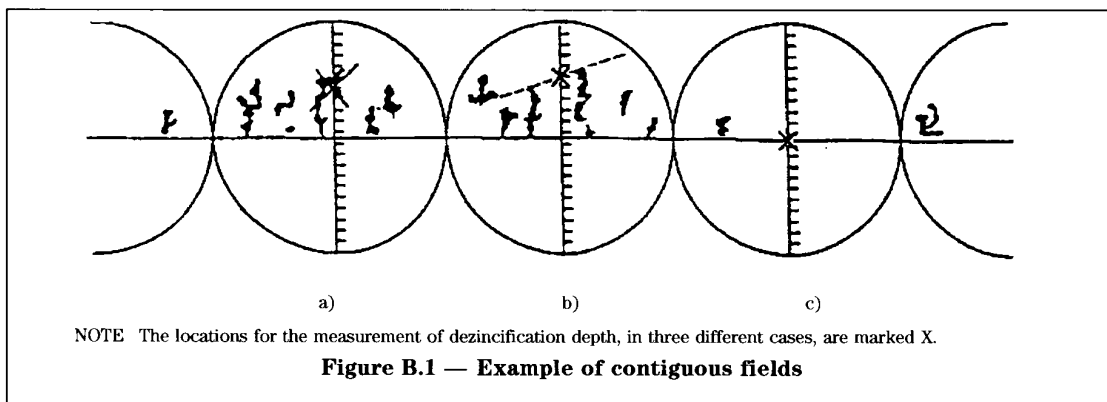
prEN 1982, *Copper and copper alloys — Ingots and castings*.

EN 12164, *Copper and copper alloys — Rod for free machining purposes*.

prEN 12449, *Copper and copper alloys — Seamless, round tubes for general purposes*.

EN ISO 9001, *Quality systems — Model for quality assurance in design/development, production, installation and servicing* (ISO 9001:1994).

EN ISO 9002, *Quality systems — Model for quality assurance in production, installation and servicing* (ISO 9002:1994).



BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: 020 8996 9000. Fax: 020 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: 020 8996 9001. Fax: 020 8996 7001.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: 020 8996 7111. Fax: 020 8996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: 020 8996 7002. Fax: 020 8996 7001.

Copyright

Copyright subsists in all BSI publications. BSI also holds the copyright, in the UK, of the publications of the international standardization bodies. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI.

This does not preclude the free use, in the course of implementing the standard, of necessary details such as symbols, and size, type or grade designations. If these details are to be used for any other purpose than implementation then the prior written permission of BSI must be obtained.

If permission is granted, the terms may include royalty payments or a licensing agreement. Details and advice can be obtained from the Copyright Manager. Tel: 020 8996 7070.

Draft for comments only — Not to be cited as East African Standard