BRITISH STANDARD

BS EN
1254-2:1998

Copper and copper alloys — Plumbing fittings —

Part 2: Fittings with compression ends for use with copper tubes

The European Standard EN 1254-2:1998 has the status of a British Standard

ICS 23.040.40

National foreword

This British Standard is the English language version of EN 1254-2:1998. Together with BS EN 1254-1 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.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 15 and a back cover.

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

ISBN 0 580 29439 0

Amendments issued since publication

Amd. No.	Date	Text affected

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1254-2

January 1998

ICS 23.040.40

Descriptors: Copper tubes, copper, copper alloys, pipe fittings, joining, dimensions, dimensional tolerances, design, manufacturing, tests, designation, marking

English version

Copper and copper alloys — Plumbing fittings — Part 2: Fittings with compression ends for use with copper tubes

Cuivre et alliages de cuivre — Raccords — Partie 2: Raccords à compression pour tubes en cuivre

Kupfer und Kupferlegierungen — Fittings — Teil 2: Klemmverbindungen für Kupferrohre

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

Ref. No. EN 1254-2:1998 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 1254-2, *Copper and copper alloys — Plumbing fittings — Part 2: Fittings with compression ends for use with 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 1254-1, *Copper and copper alloys — Plumbing fittings — Part 1: Fittings with ends for capillary soldering or capillary brazing to 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

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 or coating. Maximum permissible temperatures and pressures are also established. This part of EN 1254 specifies connection end dimensions of compression 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 1057, *Copper and copper alloys — Seamless, round copper tubes for water and gas in sanitary and heating applications.*

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

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

compression end

end in which the joint is made by the compression of a ring or sleeve on the outside wall of the tube

3.2.1

compression end, type A

end that requires no preparation of the ends of the tube other than that they are cut square and deburred, or chamfered when specified, and in which the joint is made by the compression of a ring or sleeve onto the outside wall of the tube with or without additional sealing elements and with or without an internal tube support

3.2.2

compression end, type B

end that requires forming of the tube at its end, and in which the joint is made by compressing the formed portion of the tube against the formed end of the fitting or a loose ring or sleeve within the fitting/tube

3.3

reducer (compression end for copper tube)

component or components used to enable a compression 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 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 shall also conform to these requirements.

4.2 Materials

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 1. Details of registered alloys can be obtained from the CEN/TC133 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.		

4.3 Dimensions and tolerances

4.3.1 *Minimum bore area*

The minimum cross-sectional area of the bore through each fitting, excluding any internal support, shall be not less than the theoretical minimum area of the bore given in Table 2, except that for unequal-ended or adaptor fittings with ends specified in EN 1254-1, 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 — Minimum bore

Dimensions in millimetres

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

4.3.2 *Minimum wall thickness*

The minimum wall thickness of fittings shall conform to the appropriate requirements of Table 3 for the points A, B and C shown for different types of fittings in Figures 1, 2 and 3.

The minimum wall thickness specified in Table 3 does not apply along the cone angle or to the thickness of the loose ring or sleeve where such a ring or sleeve has been or is intended to be deformed to form a seal.

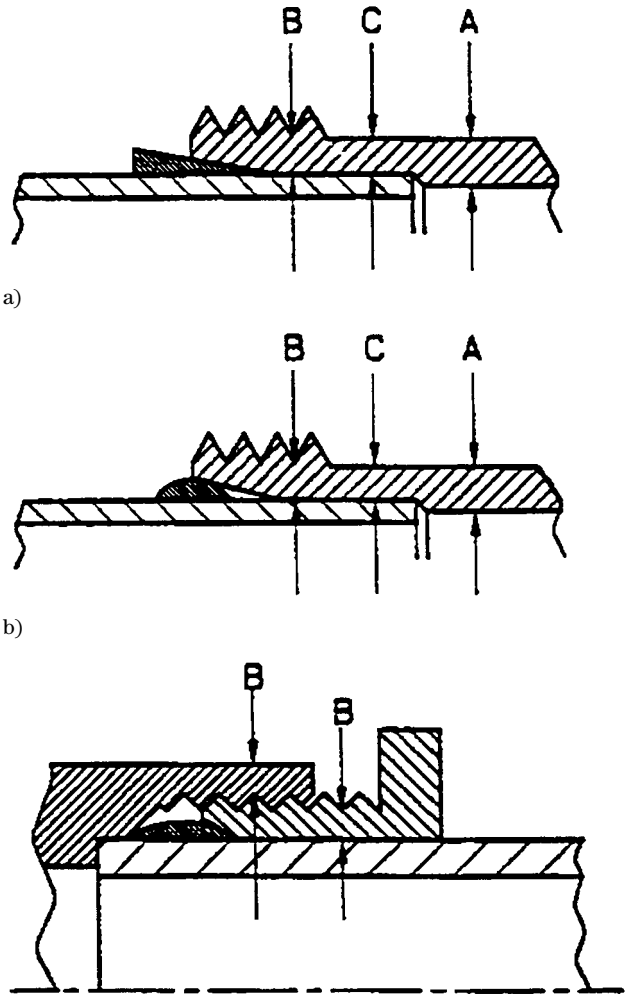
Table 3 — Minimum wall thicknesses

Dimensions in millimetres

Nominal diameter *D*	Minimum wall thickness of fitting at points A, B and C	
	Wrought coppers and copper alloys	Cast coppers and copper alloys
6	1,0	1,0
8		
9		
10		
12	1,1	1,1
14		
14,7	1,2	1,2
15		
16		
18	1,4	1,4
21		
22		1,5
25		1,6
27,4	1,5	
28		1,8
34	1,6	
35		
40	1,8	2,0
40,5		
42		
53,6	1,9	2,3
54		
64	2,0	2,4
66,7		
70[1)]	2,3	2,6
76,1[1)]	2,6	2,8
80[1)]	2,8	2,9
88,9[1)]	2,9	3,1
108[1)]	3,3	3,5

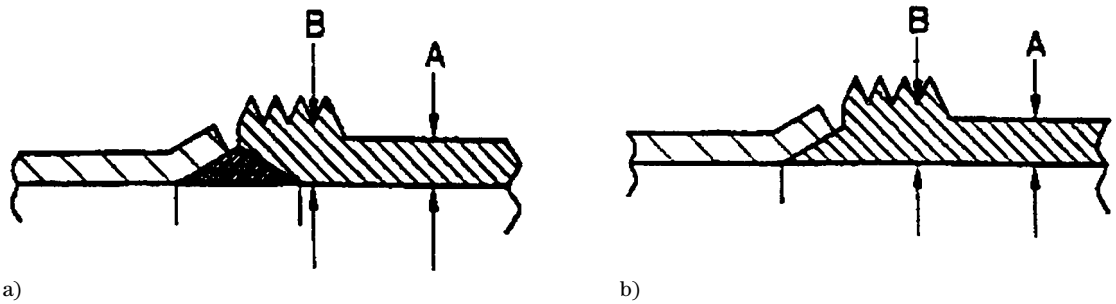
[1)] Flange type only, see Figure 3.

NOTE See Figures 1, 2 and 3 for lettered dimensions.



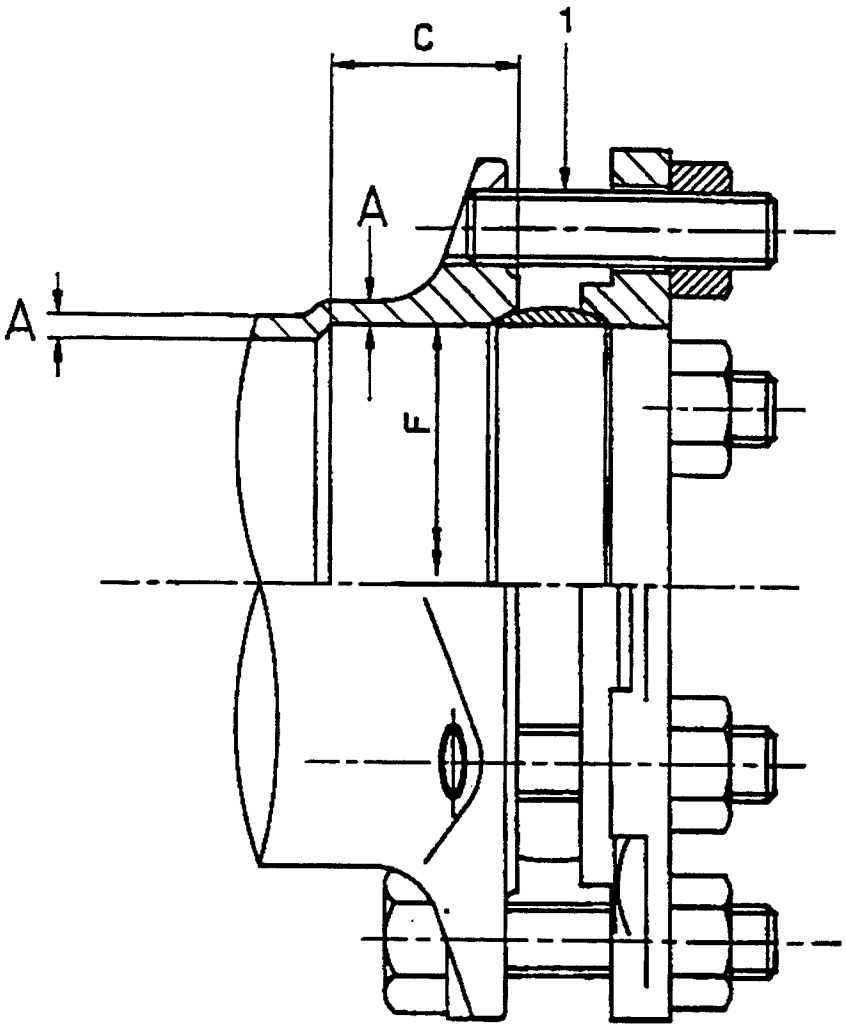
NOTE Figure 1 is diagrammatic only and other systems will possibly satisfy the requirements.

Figure 1 — Compression fittings type A



NOTE Figure 2 is diagrammatic only and other systems will possibly satisfy the requirements.

Figure 2 — Compression fittings type B



1 Minimum fastener size 8 mm

NOTE Figure 3 is diagrammatic only and other systems will possibly satisfy the requirements.

Figure 3 — Flanged compression fittings

4.3.3 *Tolerance for the alignment of the fitting ends*

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

4.3.4 *Minimum thread engagement*

The minimum length of thread engagement when a fitting is assembled hand tight shall be in accordance with Table 4 and shall be a minimum of 1 turn.

Table 4 — Minimum length of thread engagement when assembled hand tight, minimum socket depths and minimum bore diameters

Dimensions in millimetres

Nominal diameter	Minimum length of thread engagement	Minimum depth of type A socket		Minimum bore of socket
D	*A – B*	*H*	*E*	*F*
6	3,0	6,0	—	6,07
8	3,0	6,0	2,3	8,07
10	3,0	6,5	2,5	10,08
12	3,5	7,0	2,5	12,09
14	3,5	7,5	3,0	14,1
14,7	3,5	8,0	—	14,8
15	3,5	8,0	3,0	15,1
16	3,8	8,8	3,0	16,1
18	4,0	9,0	4,0	18,1
21	4,5	9,0	—	21,1
22	4,5	9,0	4,0	22,1
25	5,0	12,0	—	25,1
27,4	5,5	12,0	—	27,5
28	5,5	12,0	—	28,1
34	5,5	12,0	—	34,1
35	5,5	12,0	—	35,1
40	5,5	12,0	—	40,1
40,5	5,5	13,0	—	40,6
42	5,5	13,7	—	42,1
53,6	5,5	15,0	—	53,7
54	5,5	15,0	—	54,1
64	6,5	25,0	—	64,1
66,7	6,5	25,0	—	66,8
70	Flange type only see Figure 3	30,0	—	70,2
76,1		30,0	—	76,4
80		35,0	—	80,3
88,9		40,0	—	89,2
108		45,0	—	108,3

NOTE See Figure 4 for lettered dimensions.

4.4 Design and manufacture

4.4.1 *Maximum temperatures and pressures*

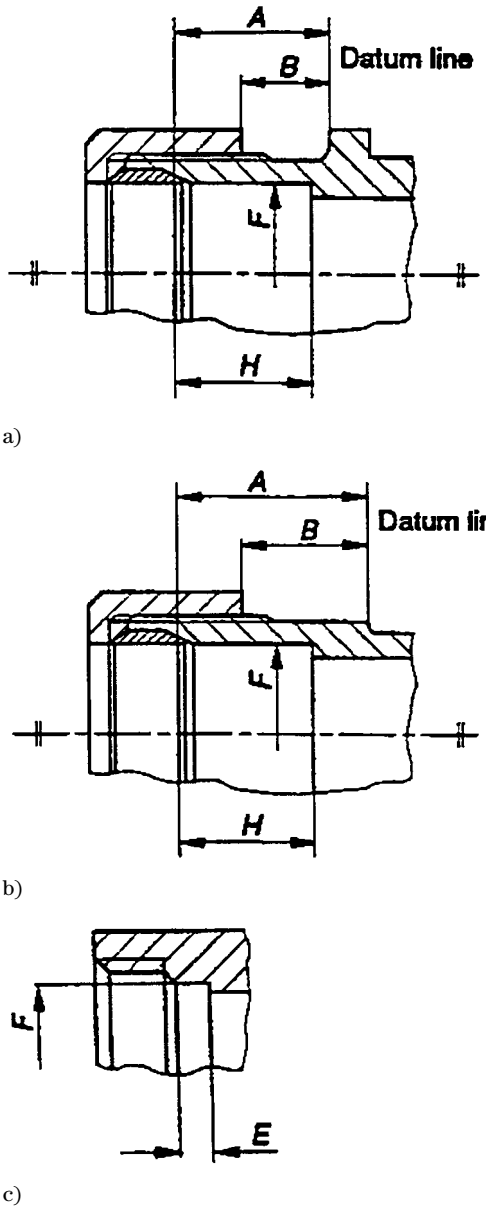
Temperatures and pressures for assembled joints shall not exceed the values in Table 5.

Table 5 — Maximum temperatures and pressures

Maximum temperature	Maximum pressures for nominal diameters	
	from 6 mm up to and including 54 mm	over 54 mm up to and including 108 mm
°C	bar	bar
30	16	10
65	10	6
110	6	4
120	5	3

NOTE 1 Intermediate pressure ratings shall be determined by interpolation.

NOTE 2 Certain designs of compression fittings are suitable for use at temperature/pressure ratings outside those given in this table. For such applications the advice of the manufacturer should be sought.



NOTE Figure 4 is diagrammatic only and other systems will possibly satisfy the requirements.

Figure 4 — Alternative type A socket

4.4.2 *Compression fittings, type A*

Compression fittings, type A, are suitable for use with all grades of copper tube to EN 1057 but fittings 18 mm and above require an internal support when used with R220 (annealed) tube.

NOTE Compression fittings, type A, below 18 mm will possibly require internal support for use with annealed tube and the manufacturer's advice should be sought.

4.4.3 *Compression fittings, type B*

Compression fittings, type B, shall only be used with R220 (annealed) or R250 (half hard) copper tube to EN 1057.

4.4.4 *Tube abutment*

Fittings shall be manufactured either:

a) with an abutment to limit tube insertion, and for type A fittings, to retain a loose internal support, if used;

or

b) without an abutment.

4.4.5 *Tightening systems*

Shapes for transmitting tightening torques are required on compression nuts and straight bodies.

4.4.6 *Surface condition*

Fittings shall be clean and free from sharp edges.

4.4.7 *Plated or coated surfaces*

Requirements for plated or coated surfaces 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 **5.7**. Fittings bodies which leak shall be scrapped. No reclamation procedure shall be undertaken.

4.5.2 *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 **5.8**, the depth of dezincification, in any direction, shall be:

— for grade A: maximum 200 μm;

— 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 **5.4** the fittings shall show no signs of leakage or other defects for the duration of the test.

If any of the samples fail the internal hydrostatic pressure test then a further three samples shall be submitted for pressure testing before proceeding to the pull-out or bending tests. If any of these further samples fail, the product shall be rejected.

4.6.2 *Resistance to pull-out*

When tested in accordance with **5.5**, the maximum axial movement of the tube relative to the fitting in each joint shall not exceed 1 mm, when measured at the fitting/tube interface.

4.6.3 *Leaktightness under internal hydrostatic pressure whilst subjected to bending*

When tested in accordance with **5.6**, the fitting under test shall show no visible signs of leakage or damage.

4.6.4 *Resistance to stress corrosion*

The fitting shall be resistant to stress corrosion. When tested in accordance with **5.9**, components manufactured from copper alloys shall show no evidence of cracking.

5 Test methods

5.1 Sampling procedure

Samples for performance of the tests in **5.3** shall be randomly selected and shall be accompanied by the manufacturer's assembly instructions. Where a manufacturer maintains the same design principle throughout a range of sizes, then three samples only, from the largest size within each of the sampling groups listed in Table 6, need be subjected to type approval.

Where an intermediate size within a group is type tested successfully, then only that size and smaller within that group, are approved.

Table 6 — Sampling groups

Dimensions in millimetres

Sampling group	1	2	3	4
Nominal diameter mm	≤ 10	> 10 ≤ 28	> 28 ≤ 54	> 54

5.2 Preparation of fittings for testing

The fittings to be tested in accordance with **5.3** shall be assembled in accordance with the manufacturer's instructions.

If the number of turns or torque for tightening the compression nut is given as a tolerance, then the lower value shall be used. The fitting shall be assembled with tube which is in accordance with EN 1057. For assembly with type A compression fittings, the tube shall be R250 (half hard) temper. For assembly with type B compression fittings, the tube shall be R220 (annealed) temper.

The minimum distance between the fitting under test and each end of the assembly shall be 100 mm, but for one sample, the tube length shall be sufficient to carry out the bending test specified in **5.6** and Table 8.

5.3 Test sequence

Tests shall be conducted in the following sequence:

a) leaktightness under internal hydrostatic pressure (types A and B);

b) resistance to pull-out (types A and B);

c) leaktightness under internal hydrostatic pressure whilst subjected to bending (type A only).

All three samples selected from each sampling group in accordance with **5.1**, shall be subjected firstly to the internal hydrostatic pressure test. After this pressure test, one of these samples shall be subjected to the pull-out resistance test, and for type A fittings another pressure tested sample shall be subjected to the bending test.

5.4 Leaktightness under internal hydrostatic pressure

5.4.1 *Apparatus*

The fitting and tube shall be arranged as schematically shown in Figure 5.

5.4.2 *Procedure*

Apply an internal hydrostatic pressure of 1,5 times the maximum working pressure at 30 °C stated in Table 5.

Pressure accuracy 5 %.

The pressure shall be applied gradually and maintained for a minimum period of 15 min at ambient temperature.

5.5 Resistance to pull-out

5.5.1 *Apparatus*

The fitting and tube shall be arranged as schematically shown in Figure 6.

5.5.2 *Procedure*

Without disturbing the joints, apply a tensile force up to the values shown in Table 7 to the tube assembly from the pressure test, gradually, over a period of not less than 30 s.

Tensile force accuracy 5 %.

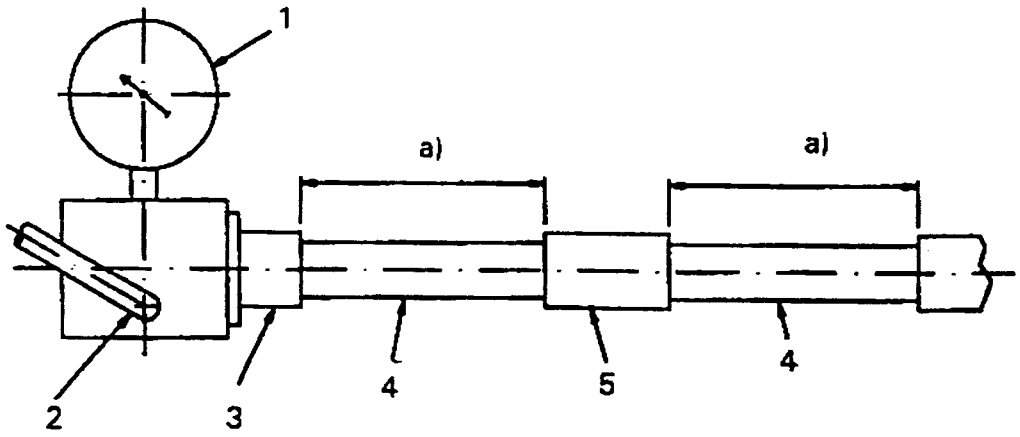
Maintain this force for a minimum period of 5 min at ambient temperature.

To confirm the internal pressure security of the joints, the fitting under test shall be subjected to a further pressure test with an internal hydrostatic pressure of 3 bar $\pm$ 5 %, held for a minimum of 5 min at ambient temperature. The fitting under test shall show no visible signs of leakage or damage.

5.6 Leaktightness under internal hydrostatic pressure whilst subjected to bending

5.6.1 *Apparatus*

The fitting and tube assembly shall be arranged as schematically shown in Figure 7. The centre line of the fitting shall be equidistant from the support centres.



1 Pressure gauge

2 Pump

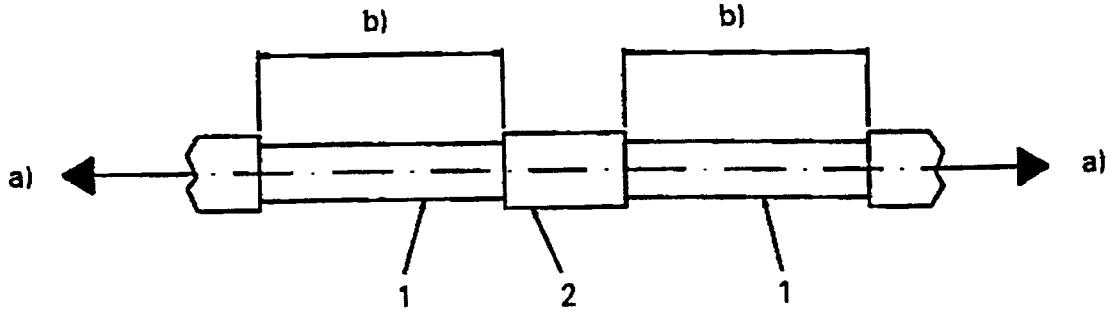
3 Pump connection

4 Tube

5 Fitting under test

a) For dimensions, see **5.2**

Figure 5 — Arrangement of apparatus for leaktightness test under internal hydrostatic pressure



1 Tube

2 Fitting under test

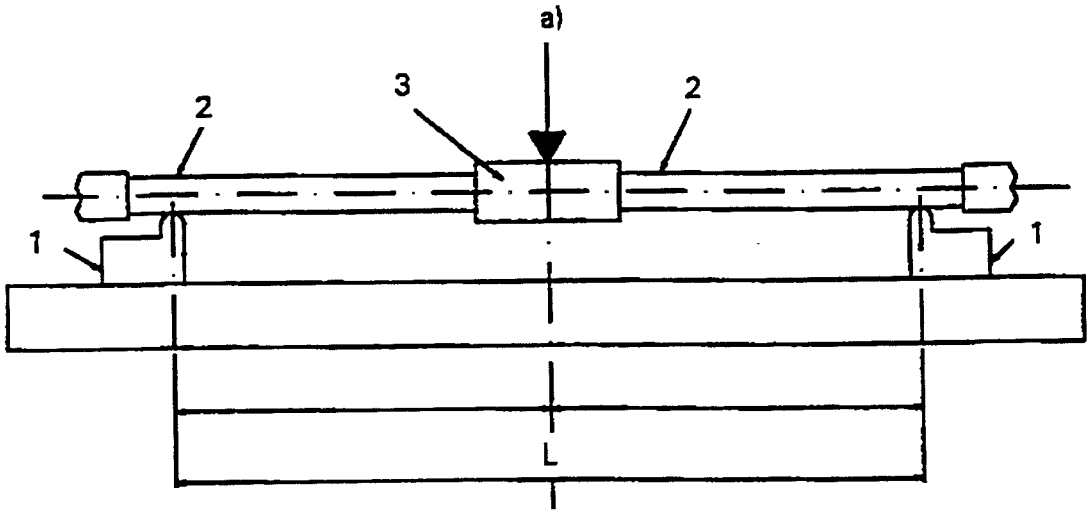
a) For magnitude of test force, see Table 7

b) For dimensions, see **5.2**

Figure 6 — Arrangement of apparatus for resistance to pull-out test

Table 7 — Tensile loads for resistance to pull-out tests

Sampling group	1	2	3	4
Nominal diameter mm	≤ 10	> 10 ≤ 28	> 28 ≤ 54	> 54
Test force N	1 000	1 500	2 000	2 500



1 Support

2 Tube

3 Fitting under test

a) For magnitude of bending force, see **5.6.2**

L Distance between support centres

Figure 7 — Arrangement of apparatus for leaktightness test under internal hydrostatic pressure whilst subjected to bending

5.6.2 ***Procedure***

The assembly shall be subjected to the internal hydrostatic pressure shown in Table 8.

Pressure accuracy 5 %.

The pressure shall be applied gradually and maintained throughout the period of the test, at ambient temperature. A bending force shall be applied gradually to cause a deflection of 20 mm, with an accuracy of ±1 mm. This force shall be maintained for a period of 5 min after the required deflection is reached.

5.7 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 5 for the relevant size range, and at ambient temperature.

5.8 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 A) 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.

5.9 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 — Internal hydrostatic pressures for leaktightness test whilst subjected to bending

Nominal diameter *D*	**Distance between test support centres** *L* mm	**Internal hydrostatic test pressure** bar
6	900	10
8		
9		
10		
12	1 200	
14		
14,7		
15		
16		
18		
21	1 800	
22		
25		
27,4		
28		
34		
35		
40	2 400	
40,5		
42		
53,6	2 700	
54		
64	3 000	6
66,7		
70		
76,1		
80		
88,9		
108		

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 1254-2);

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 or coating.

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

With the exception of compression rings, components manufactured from dezincification resistant copper-zinc alloys and capable of meeting the requirements of **4.5.2** shall be legibly and durably marked in accordance with either a) or b), as follows:

a) for grade A material, use symbol **DR** 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)

Determination of mean depth of dezincification

A.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.

A.2 Procedure

Having determined the maximum depth of dezincification in a longitudinal direction, in accordance with clause **7** of EN ISO 6509:1995 (see **5.8**), 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 A.1 a)] 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 A.1 b)].

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 A.1 c)].

A.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 B (informative)

Bibliography

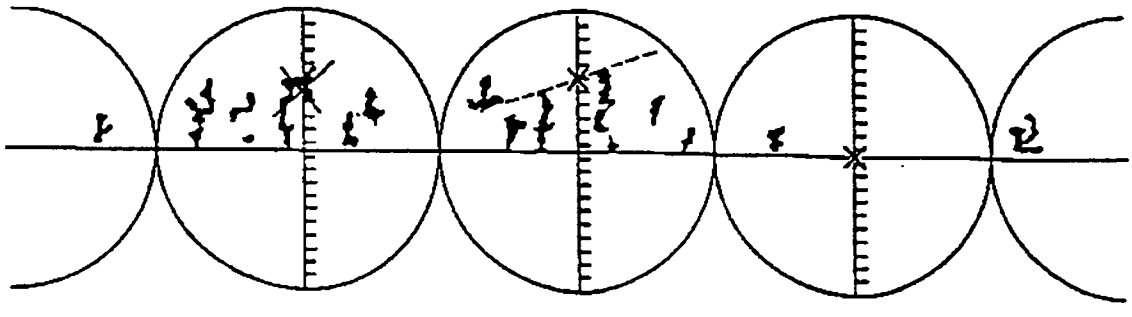
prEN 1982, *Copper and copper alloys — Ingots and castings.*

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)



a) b) c)

NOTE The locations for the measurement of dezincification depth, in three different cases, are marked X.

Figure A.1 — Example of contiguous fields

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

BSI
389 Chiswick High Road
London
W4 4AL