

Copper and copper alloys — Plumbing fittings —

Part 3: Fittings with compression ends for use with plastics pipes

The European Standard EN 1254-3:1998 has the status of a British Standard

ICS 23.040.40

National foreword

This British Standard is the English language version of EN 1254-3:1998. It supersedes BS 864-5:1990 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.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 13 and a back cover.

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English version

Copper and copper alloys — Plumbing fittings — Part 3: Fittings with compression ends for use with plastics pipes

Cuivre et alliages de cuivre — Raccords —
Partie 3: Raccords à compression pour tuyaux
en plastique

Kupfer und Kupferlegierungen — Fittings —
Teil 3: Klemmverbindungen für Kunststoffrohre

This European Standard was approved by CEN on 24 November 1998.

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CEN

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

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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of an identical text or by endorsement, at the latest by July 1998, and conflicting national standards shall be withdrawn at the latest by July 1998.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 1254-3, *Copper and copper alloys — Plumbing fittings — Part 3: Fittings with compression ends for use with plastics pipes*.

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

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:

- a) 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;
- b) 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.

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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. This part of EN 1254 specifies connection end dimensions of compression ends for the purpose of joining plastics pipes for use in cold or combined hot and cold water systems or non-fuel gas systems. 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 712, *Thermoplastics piping systems — End-load bearing mechanical joints between pressure pipes and fittings — Test method for resistance to pull-out under constant longitudinal force.*

EN 713, *Plastics piping systems — Mechanical joints between fittings and polyolefin pressure pipes — Test method for leaktightness under internal pressure of assemblies subjected to bending.*

EN 715, *Thermoplastics piping systems — End-load bearing joints between small diameter pressure pipes and fittings — Test method for leaktightness under internal water pressure, including end thrust.*

EN 911, *Plastics piping systems — Elastomeric sealing ring type joints and mechanical joints for thermoplastics pressure piping — Test method for leaktightness under external hydrostatic pressure.*

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

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

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.*

prEN 12201-5, *Plastics piping systems for water supply — Polyethylene (PE) — Part 5: Fitness for purpose of the system.*

prEN 12202-5, *Plastics piping systems for hot and cold water — Polypropylene (PP) — Part 5: Fitness for purpose of the system.*

prEN 12293, *Plastics piping systems — Thermoplastics pipes and fittings for hot and cold water — Test method for the resistance of mounted assemblies to temperature cycling.*

prEN 12294, *Plastics piping systems — Systems for hot and cold water — Test method for leaktightness under vacuum.*

prEN 12295, *Plastics piping systems — Thermoplastics pipes and associated fittings for hot and cold water — Test method for resistance of joints to pressure cycling.*

prEN 12318-5, *Plastics piping systems for hot and cold water — Cross-linked polyethylene (PE-X) — Part 5: Fitness for purpose of the system.*

prEN 12319-5, *Plastics piping systems for hot and cold water — Polybutylene (PB) — Part 5: Fitness for purpose of the system.*

EN 12731-5, *Plastics piping systems for hot and cold water — Chlorinated poly(vinyl chloride) (PVC-C) — Part 5: Fitness for purpose of the system.*

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 D.

3 Definitions

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

3.1

plumbing fitting

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

NOTE See annex A for types of fitting and description of parts.

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 pipe

3.2.1

compression end, type A

end that requires no preparation of the ends of the pipe 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 pipe with or without additional sealing elements and with or without an internal pipe support

3.2.2
compression end, type B

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

3.3
reducer (compression end with plastic pipe)

component or components used to enable a compression end to connect pipe 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 pipe

3.6
production test

test performed by the manufacturer on materials or components at specific intervals to confirm that the process continues to be capable of producing components conforming to the requirements of the product specification

NOTE Such tests are not required to release batches of components but are carried out as a measure of process control.

3.7
type test

test or series of tests directed towards approval of a design, conducted to prove that an item is capable of meeting the requirements of the product specification

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, which are those required by the relevant plastics piping systems standards and are dependent on specific applications. Reducers shall also conform to these requirements.

4.2 Materials

Fittings shall be made from copper or copper alloys selected from materials that are 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 1 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/TC 133 Secretariat.

NOTE 2 Components other than bodies will possibly be made of suitable non-metallic materials. These materials should not cause degradation of the connected plastics pipe.

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 shall be in accordance with Table 2, except that for unequal-ended or adaptor fittings with ends specified in EN 1254-1, EN 1254-2, EN 1254-4 and EN 1254-5, or other standards, the smallest diameter shall apply provided that this diameter does not restrict other outlets

4.3.2 Minimum bore area through an internal support

When an internal support is provided, either as an integral part of the fitting or loose, the minimum cross-sectional area of the bore through the support shall be in accordance with Table 2.

4.3.3 Minimum wall thickness of metallic components

Minimum wall thickness at points A, B and C of the fitting shall be in accordance with Table 3 and Figures 1 and 2 for fittings from rods, pressings or castings.

The minimum wall thickness specified 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. It also does not apply to internal pipe supports.

NOTE The figures are diagrammatic only and other systems will possibly satisfy the requirements of this standard.

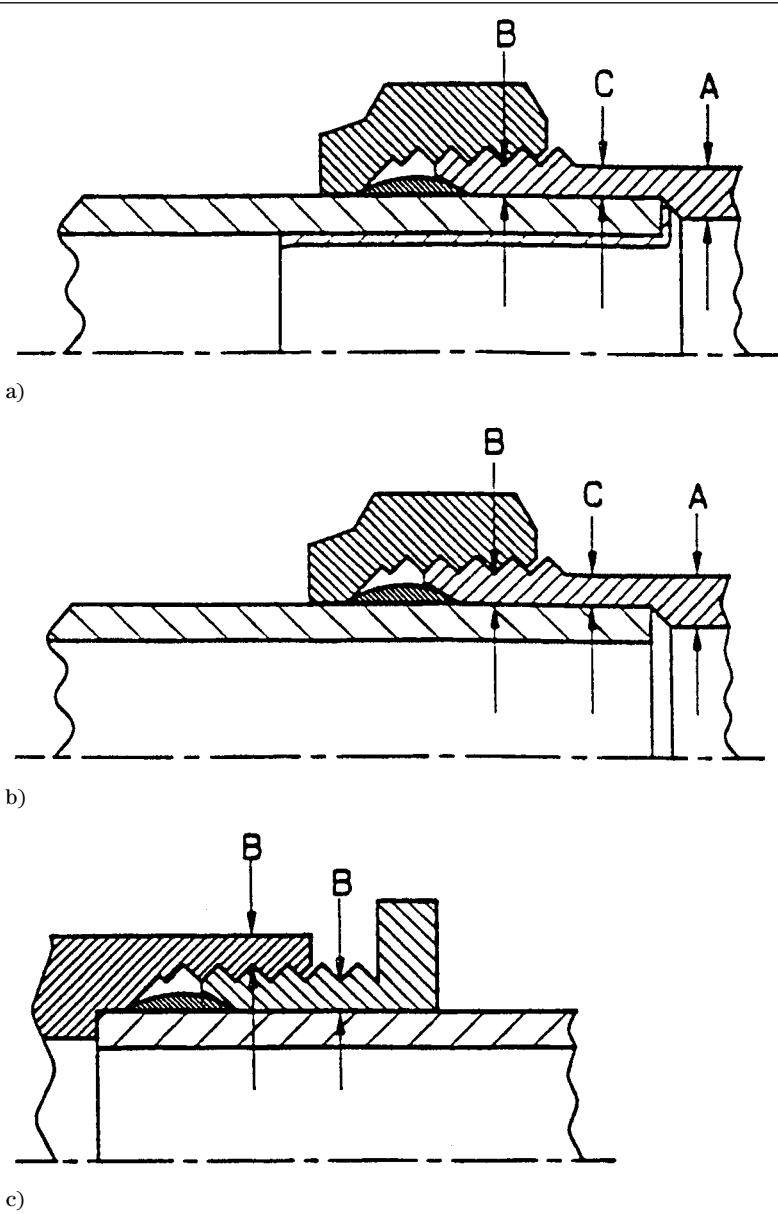
Table 2 — Minimum cross-sectional area of bores

Nominal diameter <i>D</i>	Relationship of bore area to the theoretical minimum area of the bore of the pipe, expressed as a percentage	
	For internal support with O-ring	For fitting and internal support without O-ring
10	20	35
12		
14		
14,7	30	50
15		
16		
17		
18		
20		
21	35	55
22		
25		
27,4	45	60
28		
32		
34	55	65
40		
40,5	60	70
50		
53,6		
63		
75		
90		
110		

Table 3 — Minimum wall thickness

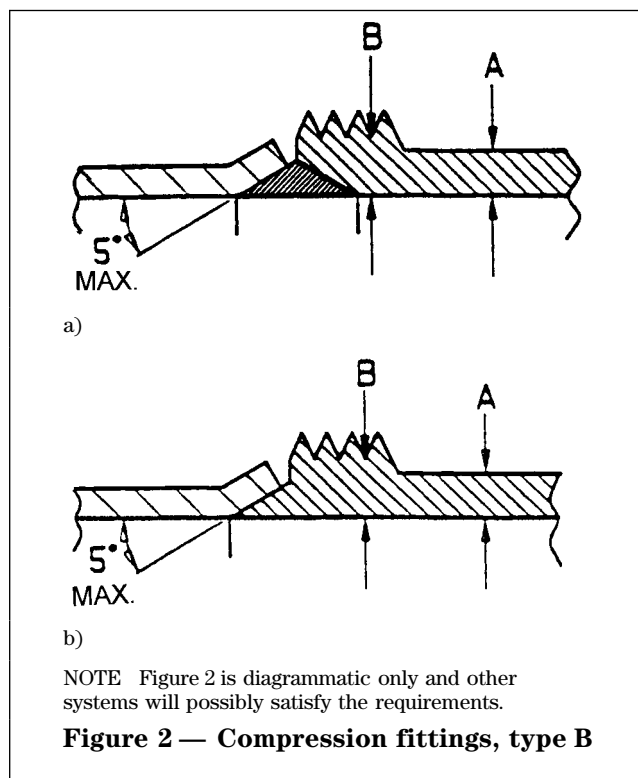
Dimensions in millimetres

Nominal diameter <i>D</i>	Minimum wall thickness of fitting at points A, B or C	
	Wrought coppers and copper alloys	Cast coppers and copper alloys
10	1,0	1,0
12	1,1	1,1
14		
14,7	1,2	1,2
15		
16		
17	1,4	1,4
18		
20		
21		1,5
22		
25		1,6
27,4	1,8	1,8
28		
32	1,6	1,8
34		
40	1,8	2,0
40,5		
50	1,9	2,3
53,6		
63	2,0	2,4
75	2,6	2,8
90	2,9	3,1
110	3,3	3,5



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

Figure 1 — Compression fittings, type A



4.3.4 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

The maximum temperature and maximum pressure for the assembled joint are related to plastics pipe material performance, details of which are specified in the relevant plastics piping systems standards.

4.4.2 Compression fittings, type A

Except for those fittings which include internal supports, type A compression fittings are suitable for use with various plastics pipes. Type A compression fittings with internal supports are recommended for use only with polyolefin pipe materials.

NOTE Internal supports are specific to the type of pipe and to each manufacturer of fittings. They should not be interchanged.

4.4.3 Compression fittings, type B

Type B compression fittings shall only be used with polyolefin pipe materials.

4.4.4 Pipe abutment

Fittings shall be manufactured either:

- with an abutment to limit pipe insertion, and for type A fittings, to retain a loose internal support, if used; or
- 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 5.1. 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 5.2, 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 General

The requirements in 4.6.2 to 4.6.8 are applicable to tests dependent on the intended application and plastics pipe material, see annex B. The requirements in 4.6.9 are applicable for tests irrespective of the application and material.

4.6.2 Leaktightness under internal pressure

When tested in accordance with 5.3 fittings shall show no signs of leakage.

4.6.3 Resistance to pull-out

When tested in accordance with 5.4 fittings shall show no signs of loosening or separation of the joint.

4.6.4 Leaktightness under internal pressure whilst subjected to bending

When tested in accordance with 5.5 fittings shall show no signs of leakage.

4.6.5 Leaktightness under external hydrostatic pressure

When tested in accordance with 5.6 fittings shall show no signs of leakage.

4.6.6 Vacuum test

When tested in accordance with 5.7 fittings shall show no signs of leakage.

4.6.7 Temperature cycling test

When tested in accordance with 5.8 fittings shall show no signs of leakage.

4.6.8 Pressure cycling test

When tested in accordance with 5.9 fittings shall show no signs of leakage.

4.6.9 Resistance to stress corrosion

The fitting shall be resistant to stress corrosion. When tested in accordance with 5.10, components manufactured from copper alloys shall show no evidence of cracking.

5 Test methods

5.1 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 for the relevant size range at ambient temperature:

- for cold water systems, a minimum of 1,5 times nominal pressure according to the relevant plastics piping systems standard;
- for combined hot and cold water systems, a minimum of 15 bar.

5.2 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 C) 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 of 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.

5.3 Leaktightness under internal pressure

When a test for leaktightness under internal pressure is to be carried out (see annex B), the test method shall be in accordance with EN 715.

5.4 Resistance to pull-out

When a test for resistance to pull-out is to be carried out (see annex B), the test method shall be in accordance with EN 712.

5.5 Leaktightness under internal pressure whilst subjected to bending

When a test for leaktightness under internal pressure whilst subjected to bending is to be carried out (see annex B), the test method shall be in accordance with EN 713.

5.6 Leaktightness under external hydrostatic pressure

When a test for leaktightness under external hydrostatic pressure is to be carried out (see annex B), the test method shall be in accordance with EN 911.

5.7 Vacuum test

When a vacuum test is to be carried out (see annex B), the test method shall be in accordance with prEN 12294.

5.8 Thermal cycling test

When a thermal cycling test is to be carried out (see annex B), the test method shall be in accordance with prEN 12293.

5.9 Pressure cycling test

When a pressure cycling test is to be carried out (see annex B), the test method shall be in accordance with prEN 12295.

5.10 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, without prior pickling.

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 1254-3);
- c) size of the connecting ends by the nominal outside diameter of the connecting pipe 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) the specification of the plastics pipe with which the fitting is intended to be used;
- e) without abutment, if applicable;
- f) if required, the grade of dezincification resistance acceptance criteria;
- g) 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 R 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.

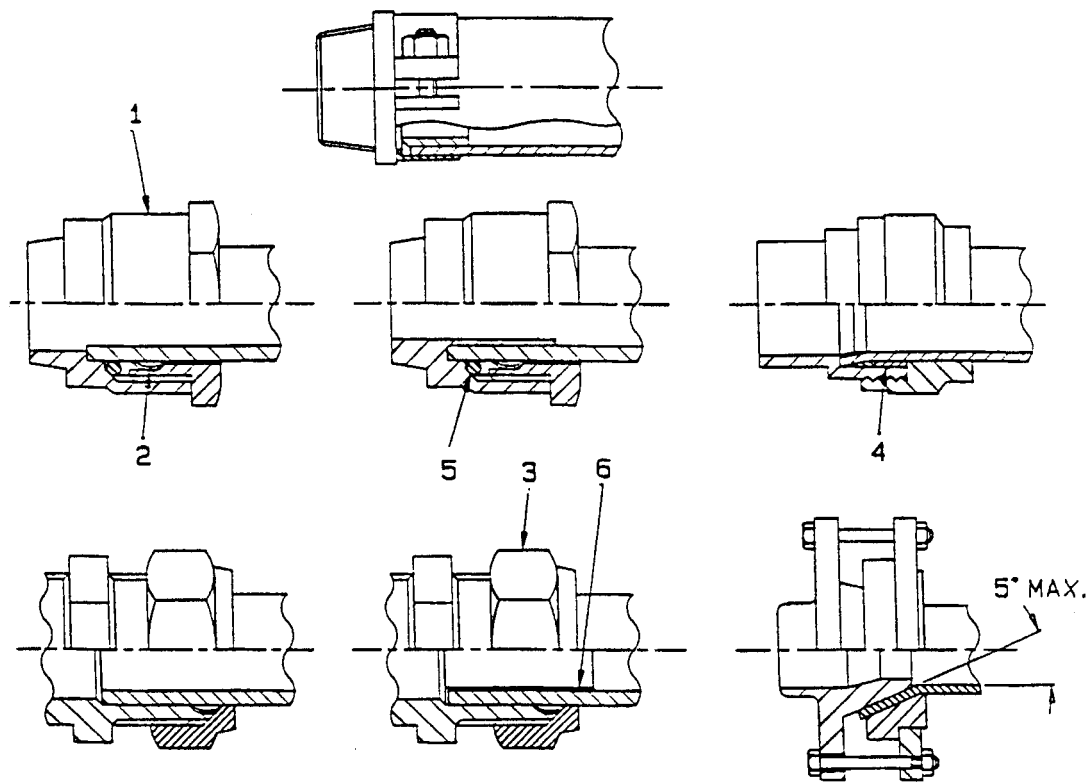
8.2 User instructions

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

Annex A (informative)

Types of fitting and description of parts

The figures below show examples of different types of compression ends.



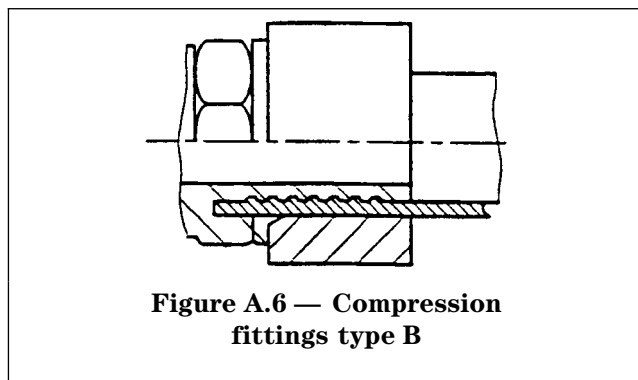
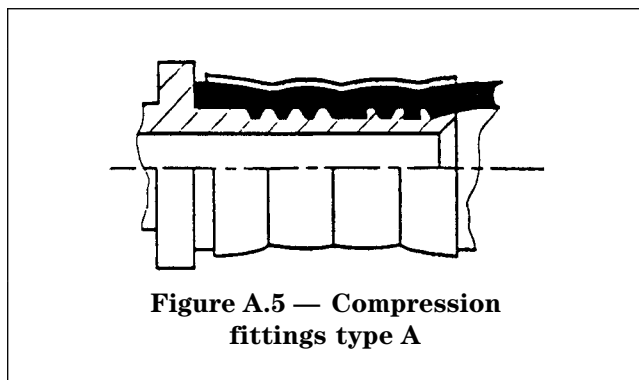
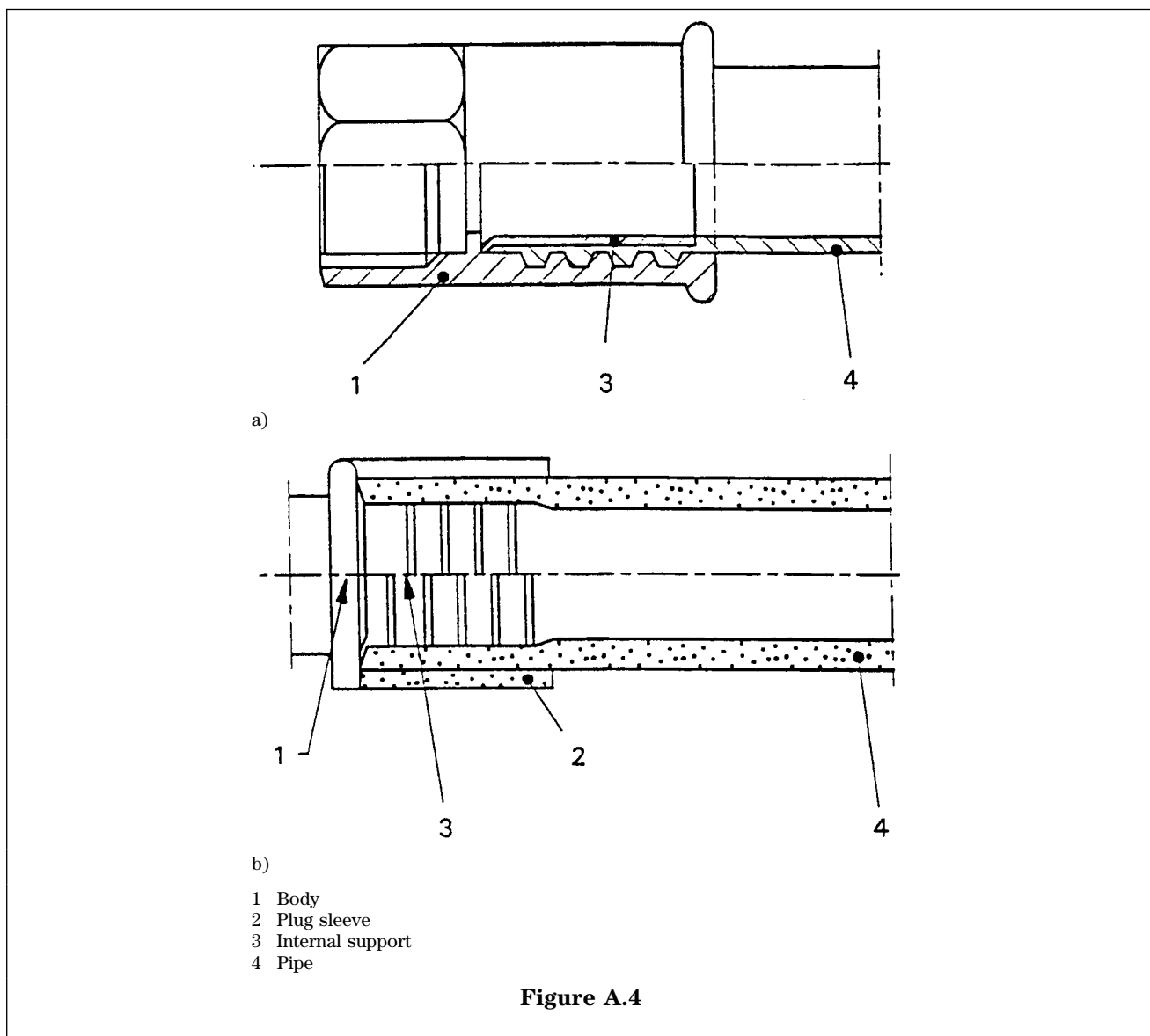
- 1 Body
- 2 Compression ring
- 3 Nut
- 4 Pressure ring
- 5 Sealing ring
- 6 Internal support

NOTE Figures A.1, A.2 and A.3 are diagrammatic only and other systems will possibly satisfy the requirements.

Figure A.1 — Type A fitting without internal pipe-supporting insert

Figure A.2 — Type A fitting with internal pipe-supporting insert

Figure A.3 — Type B fitting with internal conical supporting insert



Annex B (normative)

Test criteria, depending on application and plastics pipe material, to test pipe joints of metallic fittings with compression ends

Table B.1 — Test criteria

Test requirements and methods stated in plastics piping system standards	Application and plastics pipe material				
	Cold water	Hot and cold water			
	PE	PE-X	PB	PP	PVC-C
	Relevant plastics piping system standard				
	prEN 12201-5	prEN 12318-5	prEN 12319-5	prEN 12202-5	prEN 12731-5
	Test relevant				
Leaktightness under internal pressure	yes	yes	yes	yes	yes
Leaktightness under internal pressure whilst subjected to bending	yes	yes	yes	yes	no
Resistance to pull-out	yes	yes	yes	yes	yes
External pressure test	yes	no	no	no	no
Vacuum test	no	yes	yes	yes	yes
Temperature cycling test	no	yes	yes	yes	yes
Pressure cycling test	no	yes	yes	yes	yes

Annex C (normative)

Determination of mean depth of dezincification

C.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.

C.2 Procedure

Having determined the maximum depth of dezincification in a longitudinal direction, in accordance with clause 7 of EN ISO 6509:1995 (see 5.2), 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.

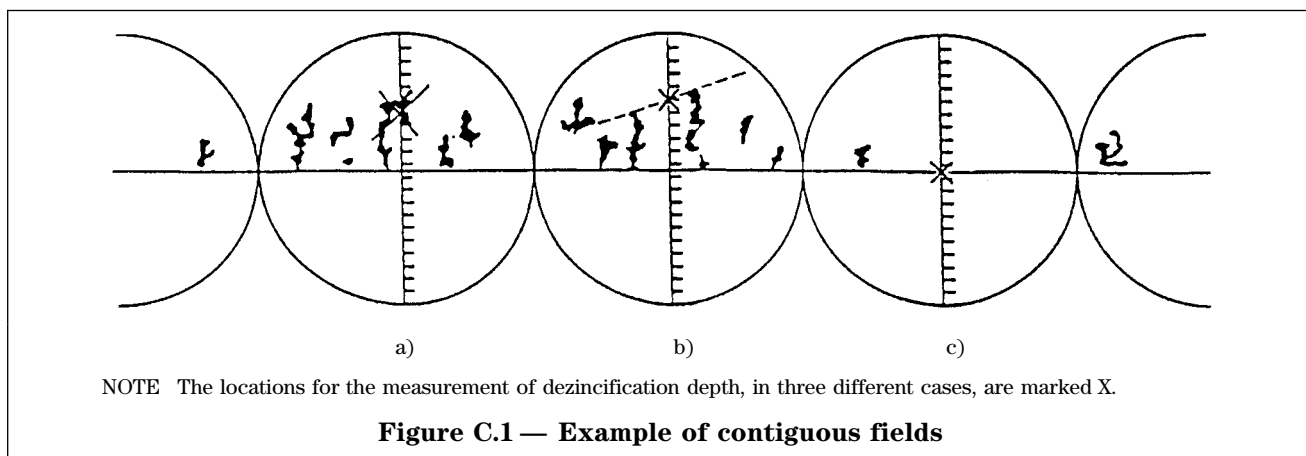
NOTE To ensure the best accuracy of measurement, the largest number of contiguous fields at the greatest possible magnification should be measured.

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 C.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 C.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 C.1 c)].

C.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 D (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.*

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(ISO 9001:1994)

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

(ISO 9002:1994)

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