

Factory-made chimneys —

**Part 2: Specification for chimneys with
stainless steel flue linings for use with
solid fuel fired appliances**

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Building Services Standards Committee (SEB/-) to Technical Committee SEB/30 upon which the following bodies were represented:

Association of British Solid Fuel Appliances Manufacturers
 British Coal Corporation
 British Combustion Equipment Manufacturers' Association
 British Flue and Chimney Manufacturers' Association
 British Gas plc
 British Steel Industry
 Department of the Environment (Building Research Establishment)
 Department of the Environment (Construction Industries Directorate)
 Domestic Solid Fuel Appliances Approval Scheme
 National Association of Plumbing, Heating and Mechanical Services Contractors
 Royal Institute of British Architects
 Scottish Development Department

This British Standard, having been prepared under the direction of the Building Services Standards Committee, was published under the authority of the Board of BSI and comes into effect on 30 April 1990

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First published January 1970
 First revision July 1976
 Second revision April 1990

The following BSI references relate to the work on this standard:
 Committee reference SEB/30
 Draft for comment 82/12587 DC

ISBN 0 580 16989 8

Amendments issued since publication

Amd. No.	Date of issue	Comments
8380	September 1994	Indicated by a sideline in the margin

Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
<hr/>	
1 Scope	1
2 Definitions	1
3 Materials	1
4 Fire-stop and spacer	2
5 Support assembly	2
6 Tolerances	2
7 Testing sequence	2
8 Measurement of length and internal diameter	2
9 Chimney support test	2
10 Leakage test	2
11 Regularity of internal diameter test	2
12 Draught test	2
13 Thermal performance test	2
14 High temperature thermal shock test	3
15 Strength test	3
16 Moisture test	3
17 Bend test	3
18 Marking	3
<hr/>	
Appendix A Examples of chimney sections, chimney fittings and accessories not covered by this standard	7
<hr/>	
Figure 1 — Typical straight chimney installation	4
Figure 2 — Typical chimney installation incorporating bends	5
Figure 3 — Typical fire-stops and spacers	6
<hr/>	
Table 1 — Compositions of stainless steels	1
Table 2 — Materials and minimum thicknesses of outer casings of chimney sections not exposed to the external environment	2
Table 3 — Permitted reduction in declared internal diameter after testing	3
<hr/>	
Publications referred to	Inside back cover
<hr/>	

Foreword

This Part of BS 4543 has been prepared under the direction of the Building Services Standards Committee, and deals with factory-made chimneys intended for dry construction and for application within a dwelling, with a terminal assembly designed for exposure to the external environment.

This Part of BS 4543 specifies requirements for factory-made chimneys with stainless steel internal and metal external surfaces, for installation in accordance with BS 6461-2, and intended for use with solid fuel fired appliances. It should be read in conjunction with Part 1 and it supersedes BS 4543-2:1976 which is now withdrawn. Part 3¹⁾ of this Standard specifies requirements for chimneys intended for use with appliances burning oil.

In this revision the temperature of the high temperature thermal shock test has been increased from 930 °C to 1 100 °C. The thermal test cycle has been considerably modified to enable the thermal performance of the chimney to be tested before and after the high temperature thermal shock test. A number of new test criteria have been added including a check for distortion during testing, and an additional high temperature thermal shock test to enable chimneys with bends to be tested.

It is accepted that not every combination of accessories in any one manufacturer's range is tested in accordance with this standard (see Figure 1 and Figure 2). However, the ability of the representative chimney to meet the requirements as specified is taken as evidence that all such accessories are fit for purpose when used in accordance with the manufacturer's recommendations and are installed in accordance with BS 6461-2.

Durability testing does not form part of this standard.

Factory-made chimneys with non-metallic linings are not covered by this revision and will be considered at a later date.

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, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

¹⁾ Revisions of BS 4543-3 and BS 6461-2 are in preparation.

1 Scope

This Part of BS 4543 specifies the requirements for factory-made chimneys with stainless steel internal and metal external surfaces, having a flue of circular cross-section, which are supplied in component form needing assembly only and no site fabrication. They are intended for use with appliances burning solid fuel and having a rated output up to 45 kW.

With the exception of the terminal assembly exposed to the external environment (see 3.2.1), the chimney is for internal applications when installed in accordance with BS 6461-2²⁾.

Only ranges of chimney sections and fittings forming part of the straight configuration (see Figure 1) or a configuration with one offset (see Figure 2) are specified in this standard. Other sections and fittings do not form part of the standard, see Appendix A.

CAUTION. When burning solid fuel it is imperative that the recommendations of BS 6461 are followed.

NOTE 1 The titles of the publications referred to in this standard are listed on the inside back cover.

NOTE 2 Chimneys to this Part of this standard may also be considered suitable for use with oil and gas burning appliances, see BS 4543-3²⁾.

2 Definitions

For the purpose of this Part of BS 4543 the definitions given in Part 1 of BS 4543 apply.

3 Materials

3.1 Flue linings and end-caps

3.1.1 The material for a flue lining and end-caps shall be stainless steel sheet complying with type 4543/C in Table 1. The sheet shall have a minimum specified thickness of 0.4 mm and the tolerance on the specified thickness shall comply with Table 9 of BS 1449-2:1983.

3.1.2 When the design of the section is such that the end-cap is not in contact with the flue products the material of manufacture shall comply with the stainless steel types given in Table 1. The sheet shall have a minimum specified thickness of 0.3 mm and the tolerance on the specified thickness shall comply with Table 9 of BS 1449-2:1983.

3.2 Outer casing

3.2.1 The material and minimum thickness of the outer casing, to be used for terminal chimney sections exposed to the external environment, shall be in accordance with 3.1.2.

3.2.2 Chimney sections not exposed to the external environment shall be fabricated with outer casings which comply with either 3.1.2 or Table 2.

3.2.3 Any accessory which comes in contact with the outer casing, which is exposed to the external environment, shall be manufactured from the materials listed in Table 1.

Table 1 — Compositions of stainless steels

BS 4543 Stainless steel type	Composition (percentage by mass)										Designation of BS 1449:2 steel which comply	Nearest Euronorm 88-71 designation	
	C	Si	Mn	P	S	Cr		Mo		Ni			
4543/A	max. 0.07	max 1.0	max. 2.0	max. 0.045	max. 0.030	min. 17.0	max. 20.0	min. —	max. —	min. 8.0	max. 11.0	304S15 304S16 304S31	X6 CrNi 18 10
4543/B	0.07	1.0	2.0	0.045	0.030	16.5	18.5	1.25	1.80	8.0	11.0	315S16	No equivalent
4543/C	0.03	1.0	2.0	0.045	0.030	16.0	18.5	2.0	3.0	10.0	14.5	316S11 316S13	X3 CrNiMo 17 12 2 X3 CrNiMo 17 13 3
	0.07	1.0	2.0	0.045	0.030	16.0	18.5	2.0	3.0	10.0	14.0	316S31 316S33	X6 CrNiMo 17 12 2 X6 CrNiMo 17 13 3

²⁾ Revisions of BS 4543-3 and BS 6461-2 are in preparation.

Table 2 — Materials and minimum thicknesses of outer casings of chimney sections not exposed to the external environment

Metal	Maximum thickness including coating
Hot-dip zinc coated steel sheet G275, in accordance with BS 2989:1975	0.5
Aluminium coated steel sheet, the coating to be not less than 115 g/m ² on each side	0.5

4 Fire-stop and spacer

Where the chimney passes through a floor or ceiling it shall be provided with a fire-stop arrangement of non-combustible material (see Figure 3). The maximum permissible gap between fire-stop and the chimney outer casing on any one diameter shall be 6 mm (3 mm radial).

NOTE For further guidance on the fire-stops see clause 5 of BS 6461-2:1984.

5 Chimney support

Any chimney support shall be manufactured from non-combustible material and shall comply with clause 9.

6 Tolerances

Length shall be within ± 3 mm of the declared length and the internal diameter shall be within ± 1.0 mm of the declared internal diameter.

7 Testing sequence

The tests specified below and described in Part 1 of this standard shall be carried out in the following sequence:

Test

- 1) Measurement of length and internal diameter
- 2) Chimney support test
- 3) Leakage test
- 4) Draught test
- 5) Thermal performance test
- 6) High temperature thermal shock test
- 7) Leakage test
- 8) Thermal performance test
- 9) Leakage test
- 10) Regularity of internal diameter test
- 11) Strength test
- 12) Regularity of internal diameter test

³⁾ 1 N/m² = 1 Pa.

13) Moisture test

14) Bend test (when applicable)

8 Measurement of length and internal diameter

The internal diameters of sections and fittings including end-caps but excluding any localized forming such as swaging or crimping shall be substantially circular to the extent that the deviation of any single internal diameter shall be within ± 1 % of the average diameter, when measured as described in 4.1 of BS 4543-1:1990. The measured length shall comply with clause 6 when measured as described in 4.2 of BS 4543-1:1990.

9 Chimney support test

When tested as described in clause 5 of BS 4543-1:1990 there shall be no permanent deformation of the chimney assembly.

10 Leakage test

When tested as described in clause 6 of BS 4543-1:1990 the leakage rate shall not exceed 3 m³/h per metre chimney.

11 Regularity of internal diameter test

When tested as described in clause 7 of BS 4543-1:1990 the disc allowing the clearance given in Table 3 shall pass freely down the full extent of the chimney. When the alternative test, 7.4 is used there shall be no reduction greater than the permitted reduction given Table 3.

12 Draught test

When tested as described in clause 8 of BS 4543-1:1990 to a nominal temperature of 540 (530 + 20) °C a draught of not less than 5.0 N/m²³⁾ (0.5 mm water gauge) per metre of chimney shall be produced.

13 Thermal performance test

13.1 When tested as described in 9.1 of BS 4543-1:1990 at a nominal flue gas temperature of 540 (530 + 20) °C the maximum temperature attained on any surface of the test structure such as ceiling, enclosure, floor or joists, shall not be more than 65 °C above ambient air temperature when equilibrium as described in 9.1 of BS 4543-1:1990 is reached, (see also 3.2.7 of BS 4543-1:1990).

13.2 When tested, as described in **9.3** of BS 4543-1:1990 at a nominal flue gas temperature of $760 (750 + 20) ^\circ\text{C}$, the maximum temperature attained on any surface of the test structure such as ceiling, enclosure, floor or joists, shall not be more than $78 ^\circ\text{C}$ above ambient air temperature when equilibrium as described in **9.1** of BS 4543-1:1990 is reached, (see also **3.2.7** of BS 4563-1:1990).

14 High temperature thermal shock test

When tested three times as described in clause **10** of BS 4543-1:1990 to a nominal temperature of $1\ 100 (1\ 080 + 40) ^\circ\text{C}$ the chimney shall subsequently comply with clause **7**, tests 7 to 13 inclusive.

15 Strength test

After completion of test 10, see testing sequence clause **7**, when tested as described in clause **11** of BS 4543-1:1990, the chimney shall not open up or break apart and shall subsequently comply with clause **11**.

16 Moisture test

When the sections and fittings to be exposed to the external environment, from just below the nominal roof line are removed in their assembled state and tested as described in clause **12** of BS 4543-1:1990 there shall be less than 25 g/m increase in mass.

17 Bend test

When tested three times as described in clause **13** of BS 4543-1:1990 the bend sections shall subsequently comply with the clearance given in Table 3 when measured as described in **7.4** of BS 4543-1:1990.

Table 3 — Permitted reduction in declared internal diameter after testing
(see clauses **11** and **17**)

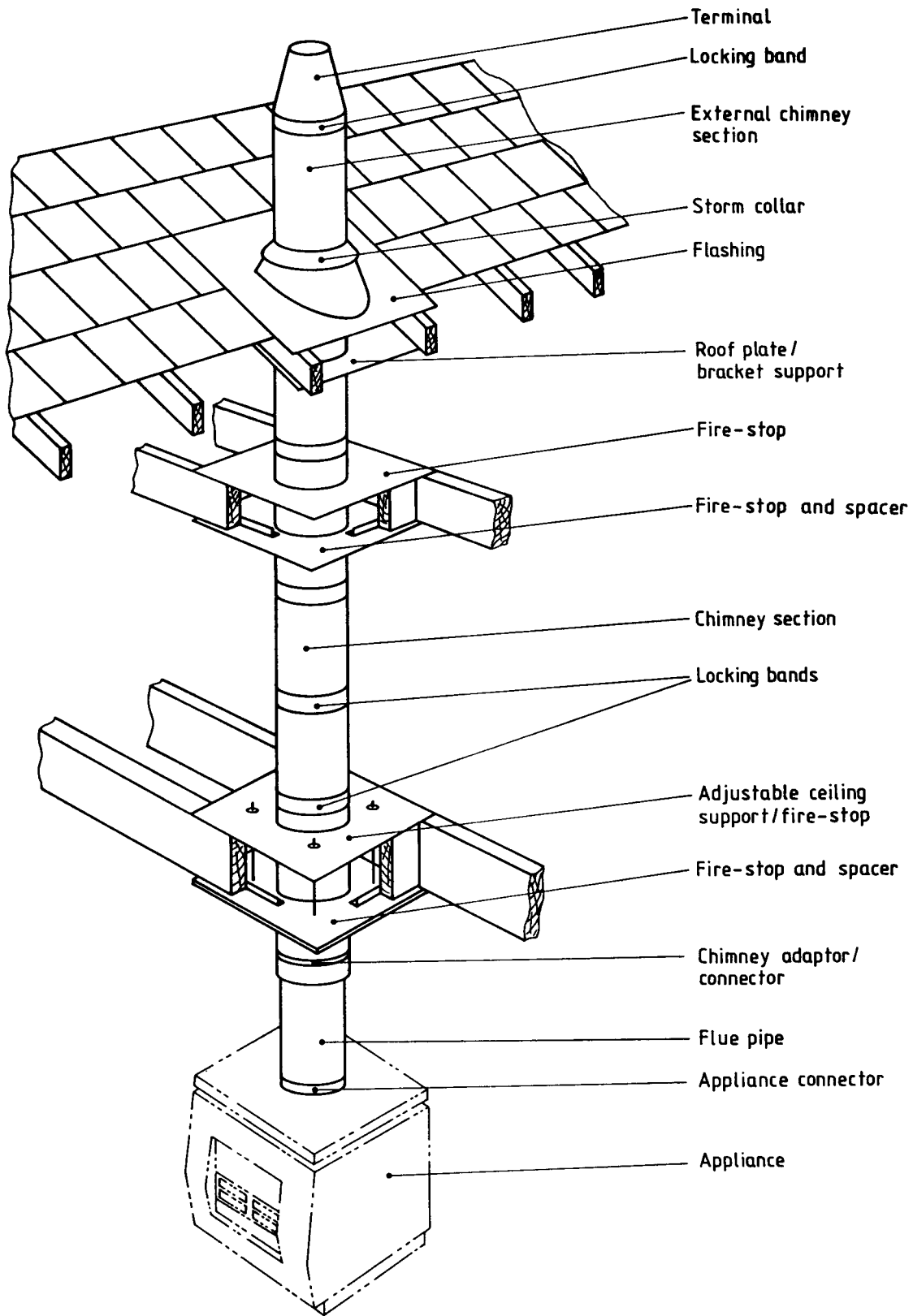
Chimney size see Table 1 of BS 4543-1:1990	1 and 2	3 and 4	5
Permitted reduction/ clearance in mm	8	10	12

18 Marking

Each section and fitting shall be marked by means of a label with the following information:

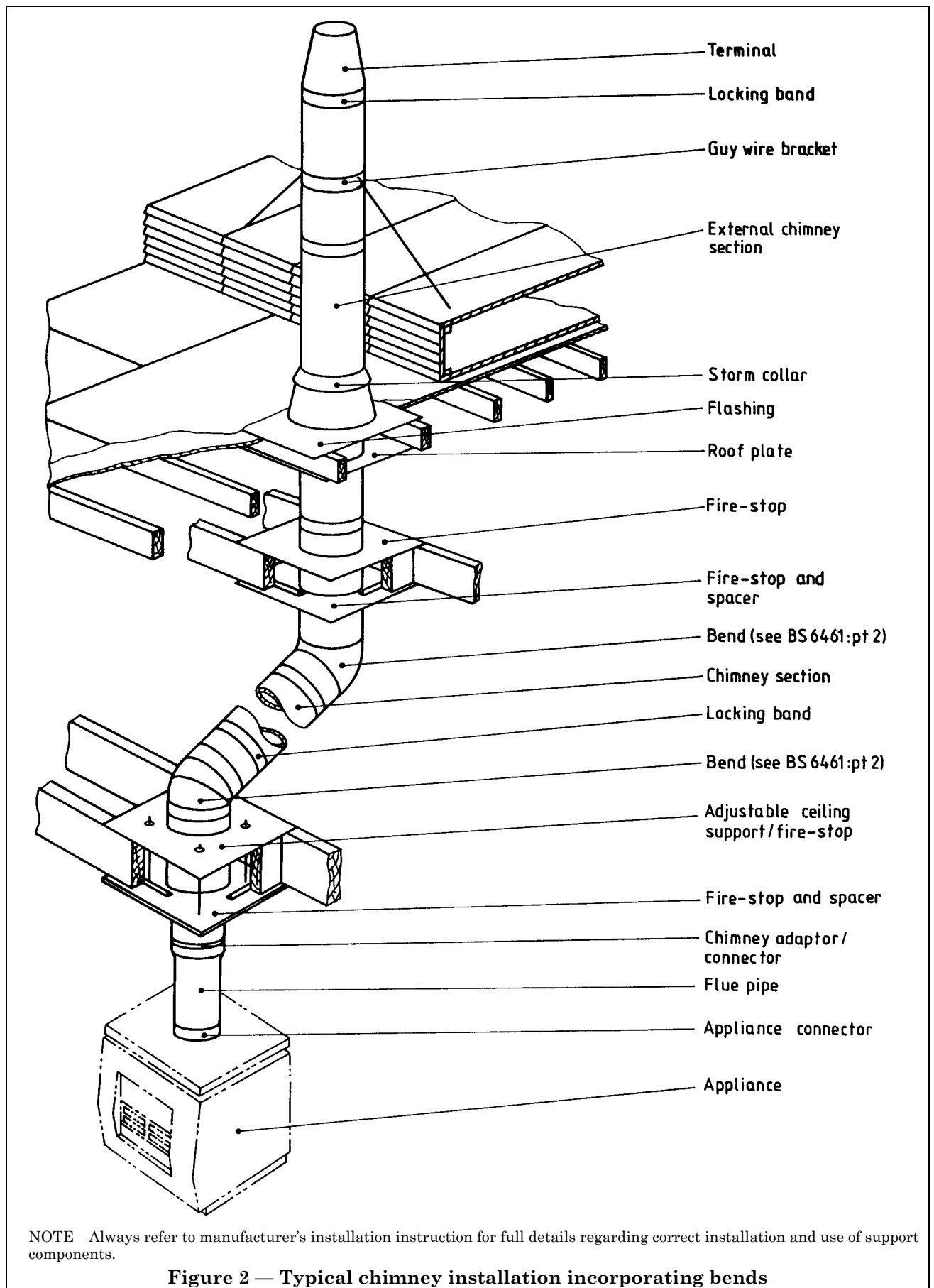
- the name and/or distinguishing mark of the manufacturer;
- the number and date⁴⁾ of this British Standard, i.e. BS 4543-2:1990;
- the required distance from combustible matter (specified distance X, see **3.1.3** of BS 4543-1:1990);
- direction of flow of flue gas;

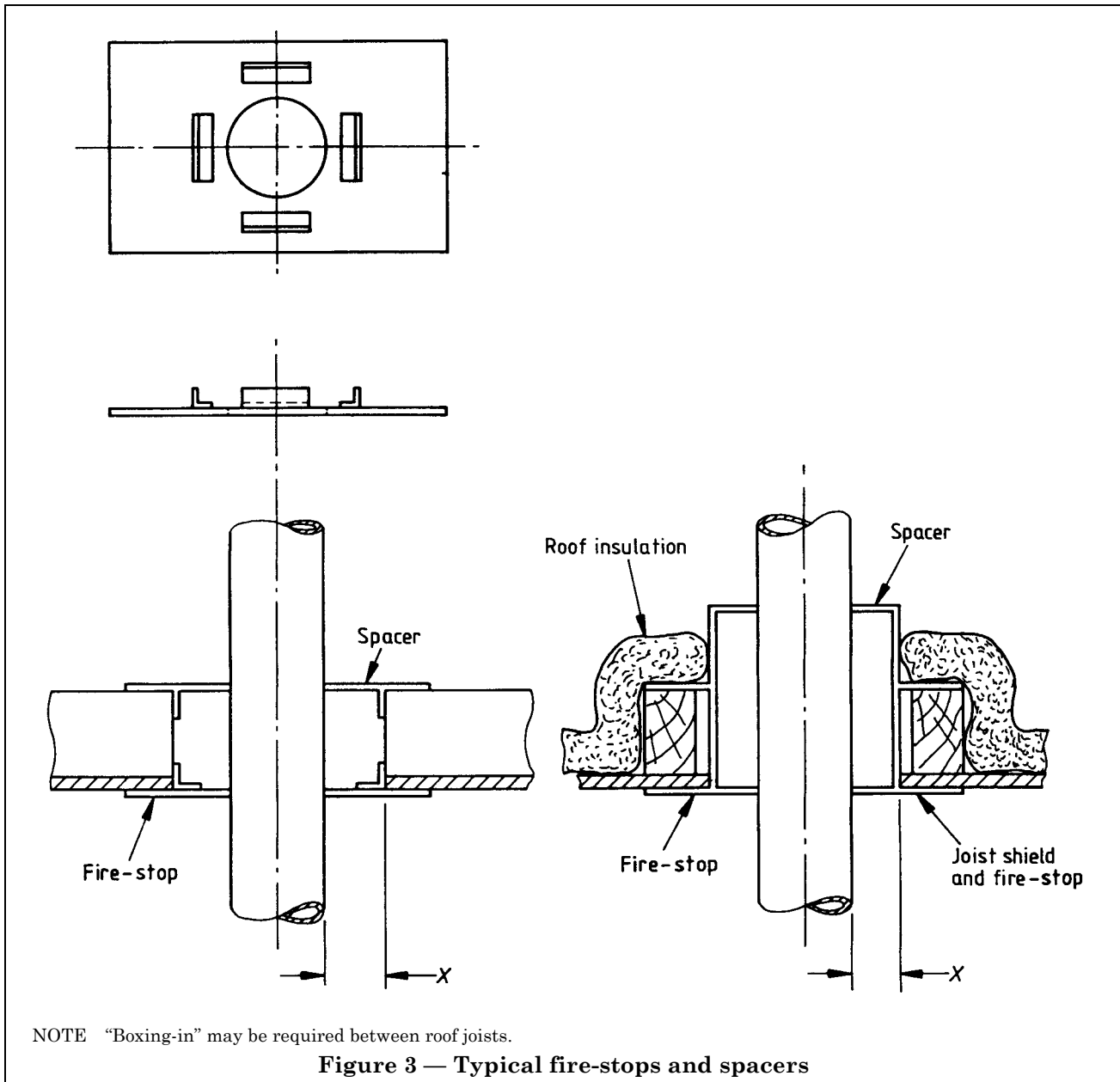
⁴⁾ Marking BS 4543-2:1990 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.



NOTE Always refer to manufacturer's installation instruction for full details regarding correct installation and use of support components.

Figure 1 — Typical straight chimney installation





Appendix A Examples of chimney sections, chimney fittings and accessories not covered by this standard

A number of the items listed here may be required to ensure a successful installation of the chimney, and are subject to agreement between purchaser and supplier. In some cases the purchaser may be required to make a choice. All such items should be installed in accordance with BS 6461-2.

- 1) Extending sections
- 2) "T" sections
- 3) Inspection box
- 4) Cleaning traps
- 5) Condensate collector
- 6) Ventilated sections
- 7) Rain cap
- 8) Adaptors
- 9) Locking plug
- 10) Intermediate supports
- 11) Flashing and coping cap
- 12) Storm collar
- 13) Guy wire bracket
- 14) Terminals

Publications referred to

BS 1449, *Steel plate, sheet and strip.*

BS 1449-2, *Specification for stainless and heat-resisting plate, sheet and strip.*

BS 2989, *Specification for hot-dip zinc coated and iron-zinc alloy coated steel: wide strip, sheet/plate and slit wide strip.*

BS 4543, *Factory-made insulated chimneys.*

BS 4543-1, *Methods of test for factory-made insulated chimneys.*

BS 4543-3, *Specification for chimneys for oil fired appliances.*

BS 6461, *Installation of chimneys and flues for domestic appliances burning solid fuel (including wood and peat).*

BS 6461-2, *Code of practice for factory-made insulating chimneys for internal applications.*

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