

# Factory-made chimneys —

## Part 3: Specification for chimneys with stainless steel flue lining for use with oil fired appliances

# Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Building Services Standards Policy 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 Flue and Chimney Manufacturers' Association  
 British Gas plc  
 British Steel Industry  
 DSFAAS Ltd.  
 Department of the Environment (Building Research Establishment)  
 Department of the Environment (Construction Industries Directorate)  
 Institute of Domestic Heating and Environmental Engineers  
 Institute of Wastes Management  
 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 Policy Committee, was published under the authority of the Board of BSI and comes into effect on 31 December 1990

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First published January 1970  
 Second edition July 1976  
 Third edition December 1990

The following BSI references relate to the work on this standard:  
 Committee reference SEB/30  
 Draft for comment 89/11065 DC

ISBN 0 580 18992 9

## Amendments issued since publication

Amd. No.	Date	Comments
8381	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	1
5 Chimney support	1
6 Tolerances	1
7 Testing sequence	1
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 Strength test	2
15 Moisture test	2
16 Marking	2
<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	3
Table 2 — Materials and minimum thicknesses of outer casings of chimney sections not exposed to the external environment	3
Table 3 — Permitted reduction in declared internal diameter after testing or disc clearance	3
<hr/>	
Publication(s) referred to	Inside back cover
<hr/>	

# Foreword

This Part of BS 4543 has been prepared under the direction of the Building Services Standards Policy 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, and intended for use with oil fired appliances. It should be read in conjunction with BS 4543-1 and it supersedes BS 4543-3:1976 which is withdrawn. Part 2 of this standard specifies requirements for chimneys intended for use with appliances burning solid fuel.

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

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 6, 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 Scope

This Part of BS 4543 specifies 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 oil and having a rated output up to 45 kW with a flue gas temperature not exceeding 450 °C at the appliance exit after any permanent draught break or before any stabilizer. 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 6461-2<sup>1)</sup>.

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 of BS 4543-2:1990.

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 only be considered suitable for use with oil and gas burning appliances.

## 2 Definitions

For the purpose of this Part of BS 4543 the definitions given in BS 4543-1 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 of the types given 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 gas products 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.

**3.2.2** Chimney sections not exposed to the external environment shall be fabricated with outer casings which comply with either 3.1 or Table 2.

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

## 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 chimney outer casing on any one external diameter shall be 6 mm (3 mm radial).

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

## 5 Chimney support

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

## 6 Tolerances

Length shall be within  $\pm 3$  mm of the declared length and the internal diameter shall be within  $\pm 1.0$  mm of the declared internal diameter.

## 7 Testing sequence

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

### Test

- a) Measurement of length and internal diameter
- b) Chimney support test
- c) Leakage test
- d) Draught test
- e) Thermal performance test
- f) Leakage test
- g) Regularity of internal diameter test
- h) Strength test
- i) Regularity of internal diameter test
- j) Moisture test

<sup>1)</sup> It is envisaged that a revision of BS 6461-2 will be published.

## 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  $\pm 1\%$  of the average diameter, when measured as described in 4.1 of BS 4543-1:1990. The measured length shall comply with clause 6 of this standard 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 support.

## 10 Leakage test

When tested as described in clause 6 of BS 4543-1:1990 the leakage rate shall not exceed  $3 \text{ m}^3/\text{h}$  per metre of 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, given in 7.4 of BS 4543-1:1990 is used, there shall be no reduction greater than the permitted reduction given in Table 3.

## 12 Draught test

When tested as described in clause 8 of BS 4543-1:1990 to a nominal temperature of  $450 (440 + 20)^\circ\text{C}$  (see Table 1 of BS 4543-1:1990) a draught of not less than  $4.0 \text{ N/m}^2$  ( $0.4 \text{ mm}$  water gauge) per metre of chimney shall be produced.

## 13 Thermal performance test

When tested as described in 9.1 of BS 4543-1:1990 to a nominal flue gas temperature of  $450 (440 + 20)^\circ\text{C}$  (see Table 1 of BS 4543-1:1990), the maximum temperature attained on any surface of the test structure such as ceiling, enclosure, floor or joists, shall be not more than  $65^\circ\text{C}$  above ambient air temperature when equilibrium as described in 9.1 of BS 4543-1:1990 is reached.

## 14 Strength test

After completion of test 8 (see testing sequence in 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 of this standard.

## 15 Moisture test

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

## 16 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 date<sup>3)</sup> of this British Standard, i.e. BS 4543-3:1990;
- the required distance from combustible matter (specified distance X, see 3.1.1 of BS 4543-1:1990);
- direction of flow of flue gas;

<sup>2)</sup>  $1 \text{ N/m}^2 = 1 \text{ Pa}$ .

<sup>3)</sup> Marking BS 4543-3:1990 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.

Table 1 — Compositions of stainless steels

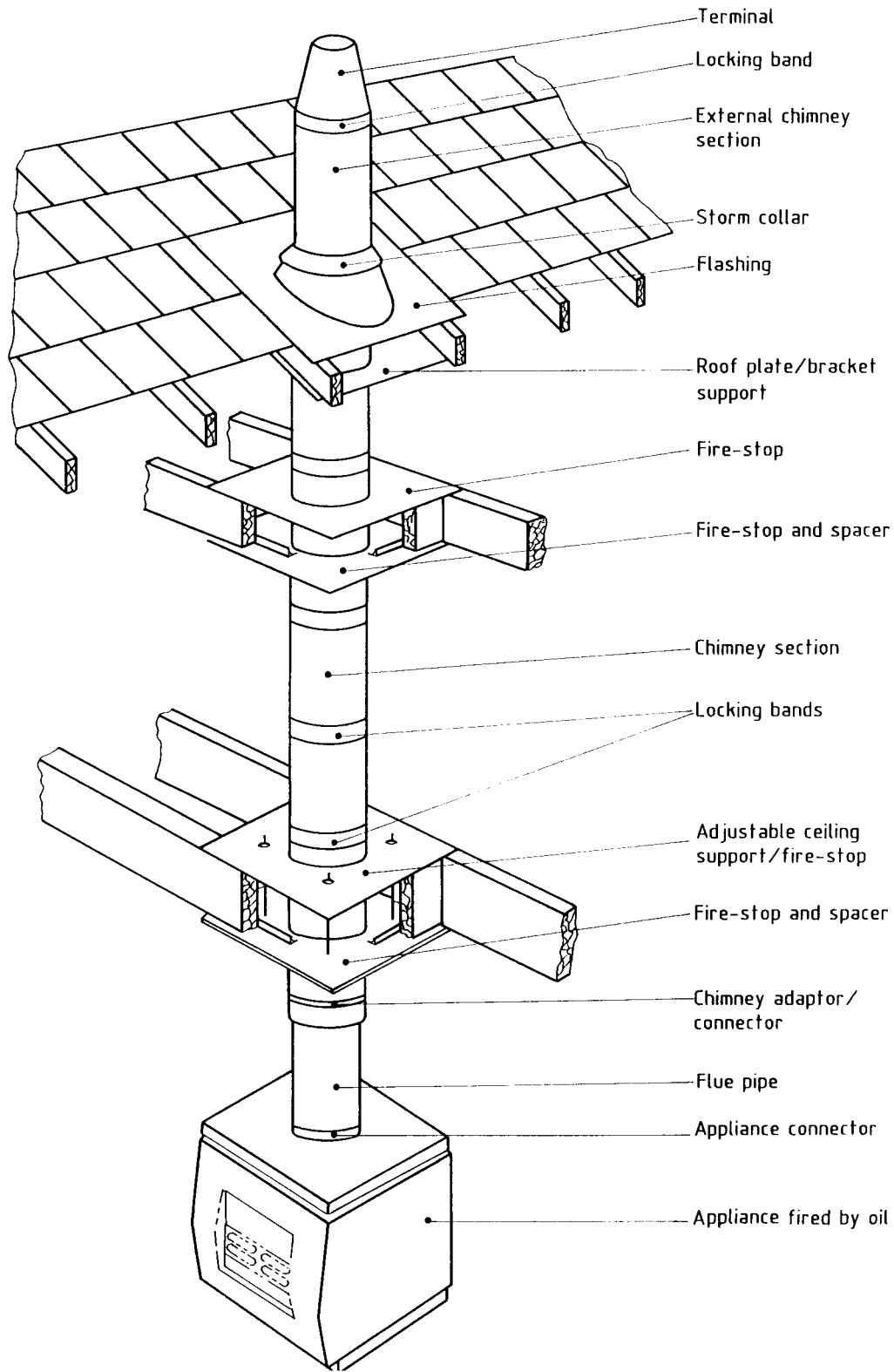
BS 4543 Stainless steel type	Composition (percentage by mass)										Designation of BS 1449-2 steel which comply	Nearest Euronorm 88-71 designation	
	C	Si	Mn	P	S	Cr		Mo		Ni			
4543/A	max. 0.07	max. 1.0	max. 2.0	max. 0.045	max. 0.030	min. 17.0	max. 20.0	min. —	max. —	min. 8.0	max. 11.0	304S15  304S16 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

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

Metal	Minimum thickness including coating
	mm
Hot-dip zinc coated steel sheet G275, in accordance with BS 2989:1982	0.5
Aluminium coated steel sheet, the coating to be not less than 115 g/m <sup>2</sup> on each side	0.5
Aluminium-zinc coated steel GA 185, in accordance with BS 6830:1987	0.5

Table 3 — Permitted reduction in declared  
internal diameter after testing or disc  
clearance (see clause 11)

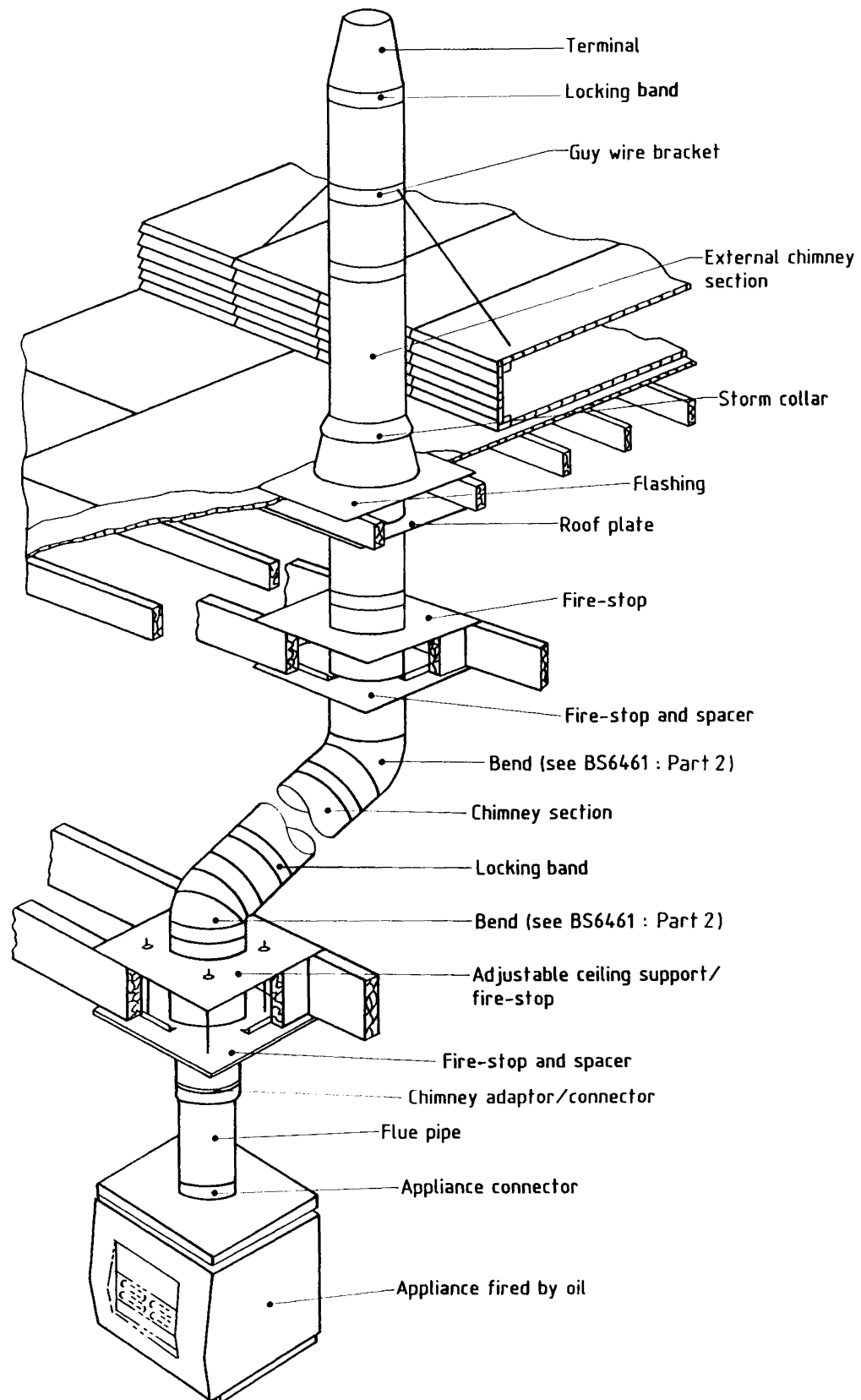
Chimney size (see Table 1 of BS 4543-1:1990)	1 and 2	3 and 4	5
Permitted reduction/clearance in mm	8	10	12



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

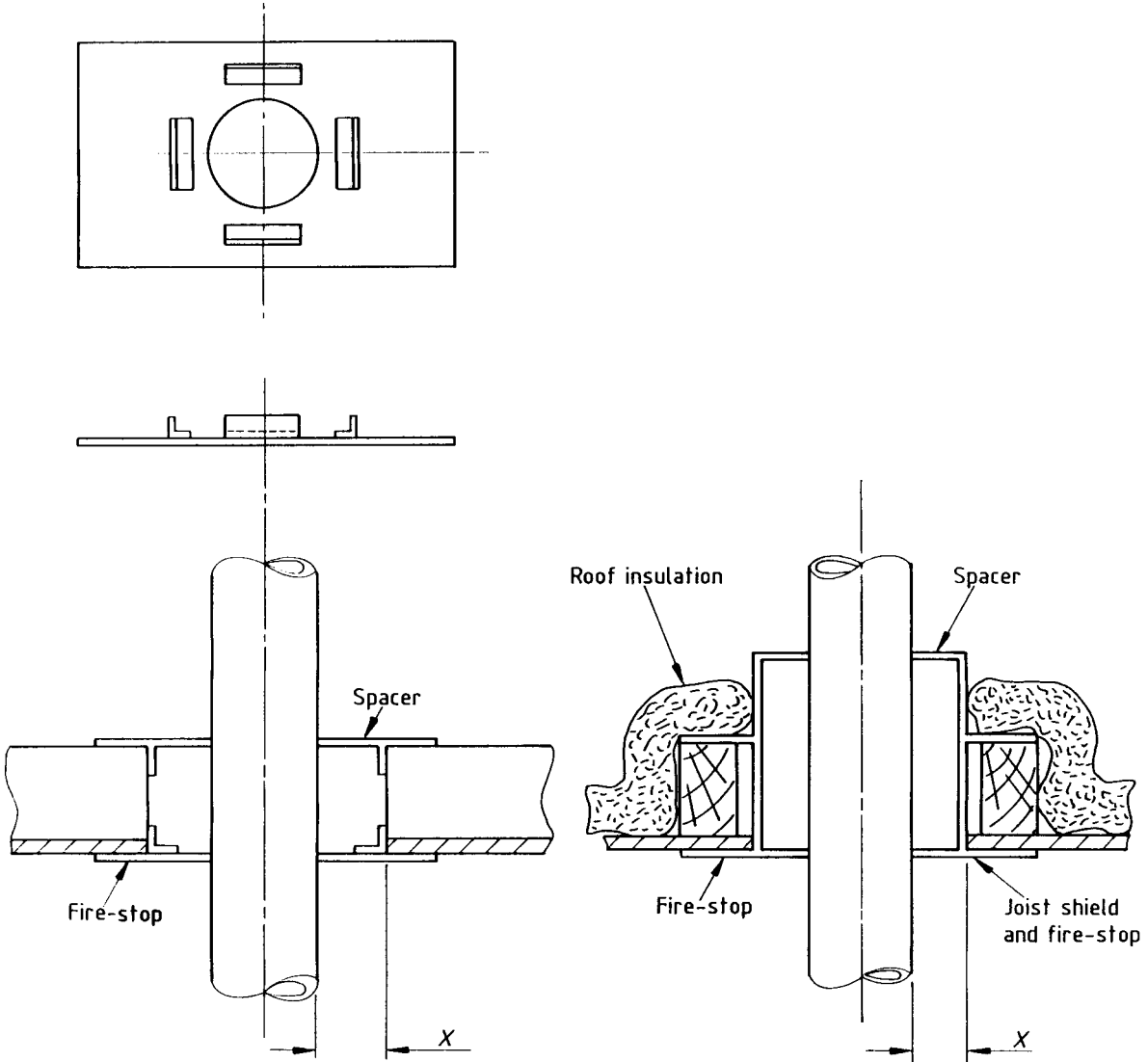
**Figure 1 — Typical straight chimney installation**





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

Figure 2 — Typical chimney installation incorporating bends



NOTE "Boxing-in" may be required between roof joists.

Figure 3 — Typical fire-stops and spacers

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## Publication(s) referred to

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

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

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

BS 4543, *Factory-made chimneys.*

BS 4543-1, *Methods of test.*

BS 4543-2, *Specification for chimneys with stainless steel flue linings for use with solid fuel 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 insulated chimneys for internal applications.*

BS 6830, *Specification for continuously hot-dip aluminium/zinc alloy coated cold rolled carbon steel flat products.*

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