



BSI Standards Publication

Chimneys — Design, installation and commissioning

Part 1: Chimneys and connecting flue pipes for non-room sealed combustion appliances

National foreword

This British Standard is the UK implementation of EN 15287-1:2023. It supersedes BS EN 15287-1:2007+A1:2010, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/506, Chimneys.

A list of organizations represented on this committee can be obtained on request to its committee manager.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

National Annexes NA to NE (informative) identify the provisions currently required to meet the UK devolved administrations Building Regulations for chimneys (see Annex NE, Clause NE.2, for details) and encompass recommendations drawn from the requirements of BS 6461-1:1984 and BS 7566 (all parts). Annexes NA to ND inclusive detail recommendations for the installation of chimneys and flues for domestic appliances burning solid fuel (including wood and peat). Annex NE provides information relevant for chimneys to be used with gas and oil appliances.

© The British Standards Institution 2023
Published by BSI Standards Limited 2023

ISBN 978 0 539 16729 0

ICS 91.060.40

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 November 2023.

Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

English Version

Chimneys - Design, installation and commissioning - Part 1: Chimneys and connecting flue pipes for non-room sealed combustion appliances

Conduits de fumée - Conception, installation et mise en service - Partie 1: Conduits de fumée et conduits de raccordement pour appareils de combustion qui prélèvent l'air comburant dans la pièce

Abgasanlagen - Planung, Montage und Abnahme - Teil 1: Senkrechte Teile von Abgasanlagen und Verbindungsstücke für raumluftabhängige Verbrennungseinrichtungen

This European Standard was approved by CEN on 5 June 2023.

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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword	5
Introduction	6
1 Scope.....	7
2 Normative references.....	7
3 Terms and definitions	8
4 Design.....	16
4.1 General.....	16
4.2 Characteristics	16
4.2.1 Designation of an installed chimney.....	16
4.2.2 Temperature classes.....	16
4.2.3 Pressure classes	17
4.2.4 Condensate resistance classes	17
4.2.5 Corrosion resistance classes.....	18
4.2.6 Sootfire resistance classes.....	18
4.2.7 Minimum distance to combustibile material	18
4.3 Required information	19
4.3.1 Sources of data and information	19
4.3.2 Local conditions.....	19
4.3.3 Combustion appliance information	19
4.3.4 Combustion air supply	19
4.3.5 Building structure and chimney route.....	19
4.3.6 Existing chimney	20
4.3.7 Chimney product specification	20
4.4 Design requirements	20
4.4.1 General.....	20
4.4.2 Route of the chimney and the connecting flue pipe	20
4.4.3 Designation classes	22
4.4.4 Materials of construction.....	23
4.4.5 Chimney sizing and characteristics.....	24
4.4.6 Installation requirements	24
4.4.7 Accessories.....	29
4.5 Chimney plate and additional information	32
5 Installation	33
5.1 General.....	33
5.2 Construction of relined chimneys.....	33
5.3 Chimney plate.....	33
6 Commissioning/handover.....	34
Annex A (informative) Terminology	35
Annex B (informative) List of combustion appliance data required for the design of a chimney	38
B.1 For choosing the chimney type (required chimney designation)	38
B.2 For calculation of the chimney (sizing, see 4.4.5)	38

B.3	For combustion appliance/connecting flue pipe/chimney adapter design/choice.....	38
Annex C (informative)	Example of typical building structure designed to assist exchange of information	39
Annex D (informative)	Location of chimney outlets	42
Annex E (informative)	Correlation between the product designation of metal system chimneys, liners and connecting flue pipes and the corrosion loads in Member States (MS)	46
Annex F (informative)	Correlation between type of flue liner according to the designation of parameters for clay/ceramic flue liners, clay/ceramic flue blocks and concrete flue blocks and the designation according to EN 1443	53
Annex G (informative)	Example for chimney plates	55
Annex H (informative)	Determination of the chimney designation for custom-built and relined chimneys.....	56
H.1	General	56
H.2	Temperature class.....	56
H.3	Pressure class	64
H.4	Condensate resistance class	65
H.5	Corrosion resistance class.....	65
H.6	Sootfire resistance class.....	65
H.7	Minimum distance to combustible material.....	66
Annex I (informative)	Example for the determination of the designation of a relined chimney using a metal flue liner	67
I.1	Input data for a typical relined chimney.....	67
I.2	Temperature class.....	68
I.3	Pressure class	70
I.4	Condensate resistance class	70
I.5	Corrosion resistance class.....	70
I.6	Sootfire resistance class.....	70
I.7	Minimum distance to combustible material.....	70
I.8	Designation of the relined chimney	71
I.9	Chimney plate of the relined chimney in this example.....	71
Annex J (informative)	Example for the determination of the designation of a custom-built chimney using a clay/ceramic flue liner	72
J.1	Input data for a custom-built chimney	72
J.2	Temperature class.....	72
J.3	Pressure class	74
J.4	Condensate resistance class	74
J.5	Corrosion resistance class.....	74
J.6	Sootfire resistance class.....	75

J.7	Minimum distance to combustible material	75
J.8	Designation of the custom-built chimney	75
J.9	Chimney plate for the custom-built chimney in this example	75
Annex K (informative) Minimum distances to combustible material		76
K.1	Connecting flue pipes without designation according to 4.2	76
K.2	Access components	76
K.3	Plastic flue liners in a chimney stack.....	77
Annex L (informative) Calculating the temperature of adjacent material.....		79
L.1	Example for calculation of the temperature of adjacent material (e.g. weatherproofing)	79
L.2	Example for calculation of the temperature of adjacent materials (e.g. weatherproofing)	80
Annex M (informative) Useful hints for handling of materials and components on site		82
M.1	General.....	82
M.2	Check of existing chimney	82
M.3	Checking before installation.....	82
M.4	Checking on delivery of materials	82
M.5	Site handling and storage.....	82
M.6	Coordination of work	83
Annex N (informative) Chimney commissioning.....		84
N.1	General.....	84
N.2	Physical checks.....	84
N.3	Operational checks.....	85
Annex O (informative) Recommendations for inspection, cleaning and maintenance.....		88
O.1	General.....	88
O.2	Inspection and cleaning.....	88
O.3	Maintenance	88
Annex P (informative) Flue damper.....		89
P.1	General.....	89
P.2	Flue damper types	90
P.3	Additional information for the use of a flue damper type 2 and 4.....	92
Annex Q (informative) Terminals.....		94
Q.1	Terminal types.....	94
Q.2	Required information	94
Bibliography		96

European foreword

This document (EN 15287-1:2023) has been prepared by Technical Committee CEN/TC 166 “Chimneys”, the secretariat of which is held by ASI.

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 January 2024 and conflicting national standards shall be withdrawn at the latest by January 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document will supersede EN 15287-1:2007+A1:2010.

This European Standard is part of the series *Chimneys — Design, installation and commissioning*:

- *Part 1: Chimneys and connecting flue pipes for non-room sealed combustion appliances;*
- *Part 2: Chimneys and connecting flue pipes for room sealed combustion appliances.*

In comparison with the previous edition, the following technical modifications have been made:

- a) restructuring of the chapters and annexes;
- b) harmonization of the text with part 2;
- c) updating the content according to EN 1443:2019;
- d) adoption of all relevant terms from EN 1443:2019;
- e) description of the designation and classes of a chimney according to EN 1443:2019;
- f) expanding the specifications for accessories;
- g) recommendations for some minimum distances from combustible material;
- h) scope now also covers chimneys for medium and high positive pressure.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Introduction

CEN/TC 166 started with its programme on standardization of chimneys approximately 30 years ago, with standards for interfaces, for products, for tests and last but not least for design, installation, construction and commissioning matters.

In the last years, first priority in the work program was given to product and test standards.

In the meantime, most of the product and test standards were published or are nearly ready for publication. In order to introduce the products in a simple way on the markets of the different Member States, some common rules for design, installation, and commissioning especially with reference to the designation of a chimney were considered helpful.

Initially, CEN/TC 166/SC 2 started the work on execution standards for metal chimneys, the first standard being EN 12391-1 in 2003.

In order not to repeat this work in all material orientated WGs and SCs, CEN/TC 166 decided in 2002 to give the task to WG 1 to develop a material independent design, installation and commissioning standard.

CEN/TC 166/WG 1 started the work in 2003 and decided first to draft two documents, one for chimneys connected to non-room sealed combustion appliances and one for chimneys connected to room sealed combustion appliances.

Application of this document presupposes awareness of applicable legal requirements in the different CEN Member States and its affiliates. In CEN Member States and its affiliates where no applicable legal requirements exist, this document provides guidance for the design, installation and commissioning of chimneys.

NOTE Where “Member States” is mentioned in this document this also includes affiliates.

1 Scope

This document describes the method of specifying the design, installation and labelling criteria for system chimneys, construction of custom-built chimneys, the relining of existing chimneys and connecting flue pipes for non-room sealed combustion appliances as well as the use of chimney products. It also gives information on commissioning of an installed chimney.

This document applies to chimneys which are subject to the following limiting conditions:

- the distance between the supports not to exceed 4 m;
- the distance above the last structural attachment not to exceed 3 m;
- the free-standing height above the uppermost structural support attachment for chimneys with rectangular cross section is not more than five times the smallest external dimension.

The methods in this part of this document are applicable to chimneys and connecting flue pipes for non-room sealed combustion appliances. The methods in Part 2 of this document are applicable to chimneys and connecting flue pipes for room sealed combustion appliances.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1443:2019, *Chimneys - General requirements*

EN 1457-1, *Chimneys - Clay/ceramic flue liners - Part 1: Flue liners operating under dry conditions - Requirements and test methods*

EN 1457-2, *Chimneys - Clay/ceramic flue liners - Part 2: Flue liners operating under wet conditions - Requirements and test methods*

EN 1806, *Chimneys - Clay/ceramic flue blocks for single wall chimneys - Requirements and test methods*

EN 1856-1, *Chimneys - Requirements for metal chimneys - Part 1: System chimney products*

EN 1856-2, *Chimneys - Requirements for metal chimneys - Part 2: Metal flue liners and connecting flue pipes*

EN 1857, *Chimneys - Components - Concrete flue liners*

EN 1858, *Chimneys - Components - Concrete flue blocks*

EN 12446, *Chimneys - Components - Concrete outer wall elements*

EN 13063-1, *Chimneys - System chimneys with clay/ceramic flue liners - Part 1: Requirements and test methods for sootfire resistance*

EN 13063-2, *Chimneys - System chimneys with clay/ceramic flue liners - Part 2: Requirements and test methods under wet conditions*

EN 13069, *Chimneys - Clay/ceramic outer walls for system chimneys - Requirements and test methods*

EN 13084-1, *Free-standing chimneys - Part 1: General requirements*

EN 13216-1, *Chimneys - Test methods for system chimneys - Part 1: General test methods*

EN 13384-1, *Chimneys - Thermal and fluid dynamic calculation methods - Part 1: Chimneys serving one combustion appliance*

EN 13384-2, *Chimneys - Thermal and fluid dynamic calculation methods - Part 2: Chimneys serving more than one combustion appliance*

EN 13502, *Chimneys - Requirements and test methods for clay/ceramic flue terminals*

EN 14297, *Chimneys - Freeze-thaw resistance test method for chimney products*

EN 14471, *Chimneys - System chimneys with plastic flue liners - Requirements and test methods*

EN 16497-1, *Chimneys - Concrete System Chimneys - Part 1: Non-balanced flue applications*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1443:2019 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp/>

NOTE Examples of chimney construction identifying individual component terminology and definitions are given in Figures A.1, A.2 and A.3 in Annex A.

3.1 fire compartment

part of the building comprising one or more rooms, spaces or storeys constructed to prevent the spread of fire

3.2 combustion appliance

unit generating products of combustion which need to be conveyed to the outside atmosphere

Note 1 to entry: E.g. heating appliances, cooking appliances, motors, CHPs (en: combined heat power).

[SOURCE: EN 1443:2019, 3.1]

3.3 flue

passage for conveying the products of combustion to the outside atmosphere

[SOURCE: EN 1443:2019, 3.2]

3.4 flue gas

gaseous portion of the products of combustion conveyed in a flue

[SOURCE: EN 1443:2019, 3.3]

3.5**products of combustion**

products resulting from the combustion of fuel (gaseous, liquid and solid constituents)

[SOURCE: EN 1443:2019, 3.4]

3.6**chimney**

structure consisting of a wall or walls enclosing a flue or flues conveying the products of combustion into the outside atmosphere

Note 1 to entry: The generic word “chimney”, when used in this document, refers to chimneys used to convey the products of combustion from any combustion appliance to the outside atmosphere, and thus includes all other terms of common use, such as: vents, flues, shafts, exhaust systems, flue ducts, etc.

[SOURCE: EN 1443:2019, 3.5]

3.7**chimney stack**

chimney enclosing more than one flue

3.8**single-wall chimney**

chimney with only one wall

[SOURCE: EN 1443:2019, 3.17]

3.9**multi-wall chimney**

chimney consisting of a flue liner and at least one additional wall

[SOURCE: EN 1443:2019, 3.18]

3.10**system chimney**

chimney that is installed using a combination of compatible chimney components, obtained or specified as a kit from one manufacturing source with product responsibility for the whole chimney

[SOURCE: EN 1443:2019, 3.19]

3.11**custom-built chimney**

chimney that is installed or built on-site using a combination of compatible components that may be from one or different sources

[SOURCE: EN 1443:2019, 3.20]

3.12**relining**

process of renovating or replacing the flue liner of a chimney

[SOURCE: EN 1443:2019, 3.21]

3.13

flue liner

rigid or flexible inner wall of a chimney consisting of components the inner surface of which is in contact with products of combustion

[SOURCE: EN 1443:2019, 3.6, modified — Replaced “surface” with “inner surface”.]

3.14

flue liner kit

flue liner that is installed using a combination of compatible flue liner components, obtained or specified as a kit from one manufacturing source with product responsibility for the whole flue liner including all its components

Note 1 to entry: A flue liner kit is not considered a system chimney.

[SOURCE: EN 1443:2019, 3.7]

3.15

rigid flue liner

flue liner that cannot bend without permanent deformation

3.16

flexible flue liner

tube having a single or multi-skin construction that is able to bend in any direction without permanent deformation

3.17

outer wall

external wall of a chimney, on the outer surface of which the minimum distance to combustible material is referred

[SOURCE: EN 1443:2019, 3.22, modified — Replaced “from the surface of which the distance to combustible is measured” with “, on the outer surface of which the minimum distance to combustible is referred”.]

3.18

enclosure

additional structure, combustible or non-combustible, built around a chimney

Note 1 to entry: An enclosure which is specified as a part of the chimney is considered an “outer wall” of the chimney.

Note 2 to entry: Enclosures can for example give additional safety in case of fire, provide additional heat transfer resistance, prevent accidental human contact, prevent impact damage and can be used for decorative purposes.

[SOURCE: EN 1443:2019, 3.23]

3.19

mid feather wall

dividing wall separating multiple flues within a chimney stack

3.20

flue block

factory-made single- or multi-wall chimney component with one or more flues

[SOURCE: EN 1443:2019, 3.24]

3.21

connecting flue pipe

component or components connecting the combustion appliance outlet and the chimney

[SOURCE: EN 1443:2019, 3.8]

3.22

component

any part of a chimney, of a flue liner or of a connecting flue pipe

[SOURCE: EN 1443:2019, 3.9]

3.23

section

straight chimney component of a flue liner or of a connecting flue pipe, conveying products of combustion

[SOURCE: EN 1443:2019, 3.10]

3.24

joint

connection between two components

[SOURCE: EN 1443:2019, 3.15]

3.25

seal

prefabricated element that joins two components in such a way as to fulfil leakage requirements

[SOURCE: EN 14241-1:2013, 3.7, modified — Replaced “prevent leakage” by “fulfil leakage requirements”.]

3.26

sealant

material which, applied in an unformed state to a joint, seals it by adhering to appropriate surfaces within the joint in such a way as to fulfil leakage requirements

3.27

fitting

component of a chimney, of a flue liner or of a connecting flue pipe conveying products of combustion except a section

[SOURCE: EN 1443:2019, 3.11]

3.28

elbow/bend

chimney fitting which provides a change of direction of the flue

3.29

T-piece

chimney fitting which allows a combustion appliance, connecting flue pipe or accessory to be connected to the chimney flue at an angle

3.30

access component

component installed in the chimney or in the connecting flue pipe to provide access to the flue for the purpose of inspection or cleaning

Note 1 to entry: An access component can be a part of a system chimney, flue liner or connecting flue pipe or can be an accessory.

3.31

back ventilation

ventilation of the space between two walls of the chimney or the chimney and an enclosure

3.32

centralising spacer

component to centralize the flue liner

3.33

support

component of a chimney, a flue liner or a connecting flue pipe used to fix, or transfer the load of components to structural elements

Note 1 to entry: Structural elements can be a building, a mast, etc.

[SOURCE: EN 1443:2019, 3.13]

3.34

sleeve

component which provides an aperture through a wall, floor or roof through which a chimney or a connecting flue pipe pass

3.35

flashing

prefabricated component or site fabricated materials used for weatherproofing the penetration of the roof by the chimney

3.36

fire stop

component intended to provide fire resistance to fire spread between rooms or compartments

3.37

chimney adapter

component which connects the chimney to the connecting flue pipe or a combustion appliance

3.38

combustion appliance adapter

component which connects the connecting flue pipe or the chimney to a combustion appliance

3.39

test point

component that provides access for flue gas sampling and measurement

3.40

accessory

additional flue gas carrying component added to a chimney or a connecting flue pipe to perform a particular function

[SOURCE: EN 1443:2019, 3.12]

3.41**draught regulator**

device with a flap in a flue opening to allow entry of secondary air into the flue to regulate the draught

Note 1 to entry: A draught regulator can be a part of a chimney, flue liner or connecting flue pipe or can be an accessory.

3.42**standstill opening devices**

device which is opened by a motor to allow air to enter the flue during the standstill period of the combustion appliance

Note 1 to entry: A stand still opening device can be a part of a chimney, flue liner or connecting flue pipe or can be an accessory.

3.43**combined secondary air device**

combination of a draught regulator and standstill opening device

Note 1 to entry: A combined secondary air device can be a part of a chimney, flue liner or connecting flue pipe or can be an accessory.

3.44**explosion relief**

device that protects the chimney against overpressure arising from deflagration or explosion in the flue

3.45**silencer**

product used in connecting flue pipes or on top of chimney for reducing noise emission caused by combustion appliances including emergency generators or fans

Note 1 to entry: A silencer can be a part of a chimney, flue liner or connecting flue pipe or can be an accessory.

3.46**condensate drain**

component to facilitate the disposal of condensate

3.47**flue damper**

device used to close or partially close the flue

Note 1 to entry: A flue damper can be a part of a chimney, flue liner or connecting flue pipe or can be an accessory.

3.48**terminal**

component installed at the outlet of a chimney or a flue liner

Note 1 to entry: There are terminals only for decorative purposes or terminals intended for specified performances.

[SOURCE: EN 1443:2019, 3.14]

3.49**rain cap**

part of the chimney that protects against the entry of rain

Note 1 to entry: A rain cap can be a part of a system chimney, flue liner or terminal or can be an accessory.

3.50

chimney fan

fan positioned on the outlet of the chimney (exhaust fan) or fan positioned in the connecting flue pipe (inline fan)

3.51

nominal working temperature

flue gas temperature under normal operating conditions of the combustion appliance at maximum heat input as specified in the appliance product standards

[SOURCE: EN 1443:2019, 3.25]

3.52

negative pressure chimney

chimney designed to operate with the pressure inside the flue equal or less than the pressure outside the flue

Note 1 to entry: The class for negative pressure is "N".

[SOURCE: EN 1443:2019, 3.26]

3.53

positive pressure chimney

chimney designed to operate with the pressure inside the flue greater than the pressure outside the flue

Note 1 to entry: Classes for positive pressure are e.g. "P", "M", "H".

[SOURCE: EN 1443:2019, 3.27]

3.54

condensate

liquid products formed when the flue gas is below the water dew point

[SOURCE: EN 1443:2019, 3.28]

3.55

dry operating condition

condition when the chimney is designed to operate normally with the temperature of the inner surface of the flue liner at or above the water dew point

Note 1 to entry: Dry operating condition is designated "D".

[SOURCE: EN 1443:2019, 3.29]

3.56

wet operating condition

condition when the chimney is designed to operate normally with the temperature of the inner surface of the flue liner below the water dew point

Note 1 to entry: Wet operating condition is designated "W".

Note 2 to entry: The characteristic "W" is not related to rainwater ingress.

[SOURCE: EN 1443:2019, 3.30]

3.57**sootfire**

combustion of the flammable residue deposited on the flue liner or connecting flue pipe

[SOURCE: EN 1443:2019, 3.31]

3.58**sootfire resistant chimney**

chimney that is resistant to sootfire and is reusable after

Note 1 to entry: Sootfire resistant chimneys are designated "G".

[SOURCE: EN 1443:2019, 3.32]

3.59**sootfire safe accessory**

accessory that may not perform its intended function during and after a sootfire but does not prevent the safe operation or change the designation "G" of the chimney or connecting flue pipe

Note 1 to entry: Sootfire safe accessories are designated "As".

Note 2 to entry: "As" is used only for accessories and not for chimneys, flue liners and connecting flue pipes.

Note 3 to entry: Sootfire safe accessories are considered as replaceable without dismantling the chimney.

Note 4 to entry: Measures to be taken after the event of a sootfire are to be found in the relevant product standard.

[SOURCE: EN 1443:2019, 3.33]

3.60**minimum distance to combustible material**

minimum distance of the outer wall of the chimney to combustible material

Note 1 to entry: The minimum distance to combustible is designated with "xx".

[SOURCE: EN 1443:2019, 3.34, modified — Replaced "distance" with "minimum distance".]

3.61**fire resistance external to external**

ability of the chimney to prevent the spread of fire from one compartment to another

[SOURCE: EN 1443:2019, 3.35, modified – Deleted the note.]

3.62**thermal resistance of a chimney**

resistance to heat transfer through the wall or walls of the chimney

Note 1 to entry: The thermal resistance of a chimney is given as " $(1/\Lambda)$ ".

[SOURCE: EN 1443:2019, 3.36]

3.63**flow resistance**

pressure loss in a flue or in a combustion air supply duct opposed to the flow of the flue gas or combustion air in motion at a given temperature and velocity

[SOURCE: EN 1443:2019, 3.37]

3.64

coefficient of flow resistance

ratio between the flow resistance of a fitting and the dynamic pressure of the medium due to a directional and/or cross-sectional change in the fitting

[SOURCE: EN 1443:2019, 3.38]

3.65

freeze-thaw resistant chimney

chimney that is capable of withstanding freeze-thaw exposure

[SOURCE: EN 1443:2019, 3.39]

4 Design

4.1 General

In order to design a chimney, the following steps should be followed to achieve a safe chimney.

4.2 Characteristics

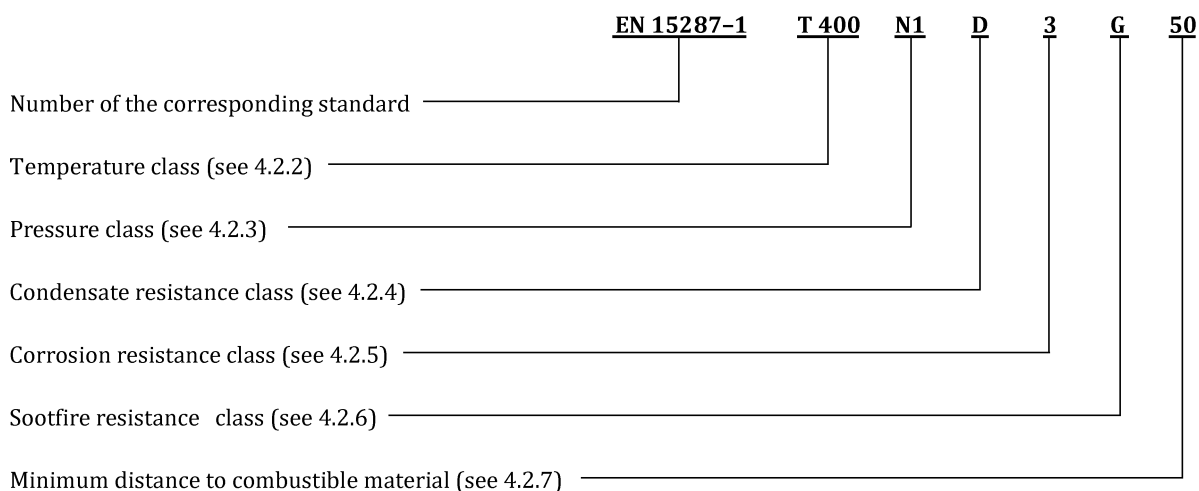
4.2.1 Designation of an installed chimney

In order to identify the characteristics of the chimney the installed chimney shall be designated.

The designation shall include information on the temperature class, the pressure class, the condensate resistance class, the corrosion resistance class and the sootfire resistance class and where appropriate the minimum distance to combustible material.

The meaning of the listed characteristics corresponds to the product characteristics of system chimneys and components for chimneys such as flue liners, connecting flue pipes and accessories.

EXAMPLE For a designation of an installed chimney:



4.2.2 Temperature classes

Temperature classes under normal operating conditions are given in Table 1.

Table 1 — Temperature classes

Temperature class	Nominal working temperature °C
T 080	≤ 80
T 100	≤ 100
T 120	≤ 120
T 140	≤ 140
T 160	≤ 160
T 200	≤ 200
T 250	≤ 250
T 300	≤ 300
T 400	≤ 400
T 450	≤ 450
T 600	≤ 600

4.2.3 Pressure classes

Pressure classes are given in Table 2 (value for a gas tightness determined by a threshold leakage rate appropriate to the pressure class).

Table 2 — Pressure classes

Pressure class	Pressure ^a Pa	Type of use	Leakage rate $\text{l} \cdot \text{s}^{-1} \cdot \text{m}^{-2}$
N 1	≤ 0	for negative pressure chimneys	≤ 2,0
N 2	≤ 0	for negative pressure chimneys	≤ 3,0
P 1	≤ 200	for low positive pressure chimneys	≤ 0,006
P 2	≤ 200	for low positive pressure chimneys	≤ 0,120
M 1	≤ 1 500	for medium positive pressure chimneys	≤ 0,006
M 2	≤ 1 500	for medium positive pressure chimneys	≤ 0,120
H 1	≤ 5 000	for high positive pressure chimneys	≤ 0,006
H 2	≤ 5 000	for high positive pressure chimneys	≤ 0,120
^a Pressure at steady-state condition under normal operating conditions.			

4.2.4 Condensate resistance classes

Condensate resistance classes are:

- D for chimneys, flue liners, connecting flue pipes, components and accessories operating under dry conditions;
- W for chimneys, flue liners, connecting flue pipes, components and accessories operating under wet conditions.

4.2.5 Corrosion resistance classes

Corrosion resistance classes are given in Table 3.

Table 3 — Corrosion resistance classes

Corrosion resistance class	Gaseous fuels	Liquid fuels	Solid fuels
1	– gas: sulfur-content $\leq 50 \text{ mg/m}^3$ – LNG – LPG	–	–
2	– gas: sulfur-content $\leq 2\,000 \text{ mg/m}^3$ – LNG – LPG	– oil: sulfur-content $\leq 2\,000 \text{ mg/kg}$ – kerosene	– chemically untreated wood and chemically untreated woody biomass ^a
3	– gas – LNG – LPG	– oil – kerosene	– wood – coal – peat
NOTE Table 3 does not categorize process gases or liquids.			
^a Natural wood and biomass from natural wood are considered as chemically untreated.			

4.2.6 Sootfire resistance classes

Sootfire resistance classes are:

- O for chimneys, flue liners, connecting flue pipes, components and accessories without sootfire resistance;
- G for chimneys, flue liners, connecting flue pipes, components and accessories with sootfire resistance;
- As for accessories that are sootfire safe.

NOTE 1 Chimneys, flue liners, connecting flue pipes, components and accessories designated “O” can only be used for combustion appliances for liquid and gaseous fuels.

NOTE 2 Chimneys, flue liners, connecting flue pipes, components and accessories designated “G” can be used for all types of fuels.

NOTE 3 Accessories designated “As” can be used for all types of fuels.

4.2.7 Minimum distance to combustible material

The minimum allowed distance of the outer surface of the chimney to walls, floors and roofs comprising combustible material is expressed as “xx”, where “xx” is the value in whole millimetres.

4.3 Required information

4.3.1 Sources of data and information

The data and information specified in 4.3.2 to 4.3.7 shall be obtained and documented as appropriate.

NOTE The sources can be:

- local building rules;
- architect's drawings, plans or site surveys;
- combustion appliance manufacturer's literature;
- chimney manufacturer's literature including installation instructions.
- Annexes of this document (e.g. material characteristics).

4.3.2 Local conditions

Building rules, environmental and topographical particulars of the site shall be obtained.

4.3.3 Combustion appliance information

The information for the intended combustion appliance(s) (see Annex B for an example) shall be obtained from the documentation for the combustion appliance or if not available, default values can be used (see EN 13384-1:2015+A1:2019, Annex B), but the source of the data shall be documented in the design (see 4.3.1).

4.3.4 Combustion air supply

Information on the size and position of apertures for combustion air supply into the room containing the combustion appliance shall be obtained (possible sources of data are given in 4.3.1). If an exhaust air ventilation system is installed or planned, the design criteria of the exhaust air ventilation system shall also be obtained.

If there is also an exhaust air ventilation system in the room where the combustion appliance is installed or in rooms connected to it, a safe functioning of the combustion appliance shall be ensured.

This could be done by

- a correct dimensioning of the combustion air openings for both, the combustions appliance and the exhaust air ventilation system, taking into account the sum of the ventilation volume flow and combustion air volume flow, or
- using a safety device for the simultaneous operation of a room air extracting system and a combustion appliance, e.g. a safety switch off device, or
- using a priority switching.

4.3.5 Building structure and chimney route

In order to allow the chimney route to be determined the relevant details of the building or support structure shall be obtained.

An example of information to be provided for a typical building design and chimney route, along with a corresponding check list of information is given in Annex C and Figure C.1.

4.3.6 Existing chimney

The following information shall be obtained for relining of an existing chimney:

- the type and/or materials of the existing chimney;
- dimensions of the existing chimney;
- restrictions of the existing chimney;
- previous use of the existing chimney.

4.3.7 Chimney product specification

The following information about the chimney product specification shall be obtained where appropriate (see 4.3.1):

- identification and designation of the system chimney or of the components for custom-built chimneys or for relining an existing chimney;
- design load or maximum allowed chimney height to be supported by lengths, fittings and supports;
- mass of components;
- installation instruction;
- condensate drainage system;
- additional information for chimney sizing (see EN 13384-1 or EN 13384-2).

4.4 Design requirements

4.4.1 General

The design of the chimney shall be detailed and documented and where appropriate also of the connecting flue pipe. The product information can fulfil this requirement. The design shall enable standard components to be used in carrying out the installation. Modification of components, e.g. producing openings or adjustments of length may only be undertaken in accordance with the instructions.

The finished chimney should have a chimney plate (see Annex G).

4.4.2 Route of the chimney and the connecting flue pipe

4.4.2.1 Location of chimney outlet

It is important that the chimney outlet is positioned in such a way that it allows adequate evacuation and dispersal of combustion products and avoids re-entry through openings into the building.

This could be achieved by:

- Considering Annex D which gives an example for chimney outlet positions for residential heating or comparable applications.
- Taking into account the calculation given in EN 13384-1 and EN 13384-2 which takes into account the location of the chimney outlet and the effects of outlets being in the pressure zone. The chimney outlet is considered to be in an adverse pressure zone if the chimney outlet position is less than 0,4 m above the ridge (see "a" in Figure D.1) and the distance of a horizontal line from the chimney outlet to the intersection with the roof is less than 2,3 m (see "c" in Figure D.1), and the chimney outlet is situated:

- on a roof with a slope of more than 40° (see “ γ ” in Figure D.1), or
- on a roof with a slope of more than 25° (see “ γ ” in Figure D.1) if the opening for combustion air and the outlet of the chimney are on different sides of the ridge and horizontal distance from the top to the ridge is more than 1,0 m.

A chimney should also be considered to be adversely affected by the proximity of adjacent obstructions e.g. buildings, trees, mountains. A chimney outlet within 15 m from adjacent structures which extends over a horizontal angle of 30° and their upper boundary raises more than 10° above the horizon as seen from the terminal outlet can be affected by wind turbulence. This can be overcome by a chimney extension or an aerodynamic terminal.

Termination inside this zone is possible if terminals with specified aerodynamic properties are applied, sufficient to generate a negative pressure at the outlet of the chimney to overcome positive pressure wind effects or ensuring adequate positive pressure generated e.g. by the combustion appliance.

Other positions, e.g. the prohibited zone (see Figure D.1, key 2), can be related to environmental issues e.g. flue gas re-entry and not the functioning capability of the chimney.

For other applications e.g. involving industrial combustion plant or process venting, the determination of the chimney outlet position can require other criteria, such as calculations for the dispersal of combustion products related to nearby surroundings.

4.4.2.2 Chimney route

The chimney route should be determined by the positions of the combustion appliances, the flue outlet, the air supply intake and the point of chimney termination.

The chimney route should be the shortest, most practicable direct route between the combustion appliance outlet and the chimney outlet and should be as straight and as near to vertical as practicable, with the chimney outlet should be as near as practicable to the highest part of the building (e.g. ridge) to ensure adequate draught and dispersion of flue gas.

The chimney route selected should enable the chimney standard components to be used in carrying out the installation, including offsets to be supported in compliance with the installation instructions.

For a chimney operating under wet conditions with multiple inlets, a means shall be provided for preventing condensate from re-entering an individual combustion appliance. This can be achieved by ensuring that the entering position of the lowest connecting flue pipe is above the level of condensate collecting at the base of the chimney or in the collector.

Attention should be given to heat emitted from the chimney in applications where whole year operation is likely to affect comfort. A thermal resistance value of minimum 0,22 m²·K/W is recommended for temperature class T300 and above.

4.4.2.3 Connecting flue pipe route

The connecting flue pipe shall not pass through a ceiling or into another fire compartment or voids which cannot be inspected.

A connecting flue pipe designated suitable for wet operating conditions, shall be inclined to allow condensate to be drained. It is recommended that it should be inclined a minimum of 3° to the horizontal.

A connecting flue pipe for a non-condensing combustion appliance shall be connected to a chimney operating under wet conditions so that condensate cannot enter the combustion appliance, e.g. by declining the connecting flue pipe to the chimney or providing a condensate trap.

It is recommended that the connecting flue pipe should be as short as possible.

It is recommended that the angle of entry of the connecting flue pipe into the chimney should be 45° measured between the axis of the connecting flue pipe and the vertical axis of the chimney.

For gas appliances type B₁ according to EN 1749 a vertical run of flue directly above the draught diverter, sufficient to prevent spillage from the gas appliance, should be provided unless otherwise stated in the gas appliance installation instructions.

The combustion appliance installation instructions shall be followed for any specific requirements.

Attention should be given to heat emitted from the connecting flue pipe in applications where whole year operation is likely to affect comfort. A thermal resistance value of a minimum of 0,22 m² · K/W is recommended for temperature class T300 and above.

4.4.3 Designation classes

4.4.3.1 General

The chimney and connecting flue pipes, chimney adapter and combustion appliance adapter shall have designation classes (see 4.2) each appropriate to the combustion appliance data as required in 4.3.3 and the building structure data as required in 4.3.5.

The connecting flue pipe can have a designation different from that of the chimney, e.g. where the combustion appliance output results in a positive pressure in the connecting flue pipe and the chimney design is such that it provides sufficient draft to operate under negative pressure. The designation parameters for both the chimney and the connecting flue pipe shall be taken into account in the calculation according to EN 13384-1 and EN 13384-2 (see 4.4.5).

Each designation parameter shall be of a class at least equal to that required class. The following sequence per class shall be taken into account:

- T600 > T450 > T400 > T300 > T250 > T200 > T160 > T140 > T120 > T100 > T080;
- Hz > Mz > Pz > Nz with z = 1 or 2;
- H1 > H2, M1 > M2, P1 > P2 und N1 > N2;
- Wy > Dy with Y = 1, 2 or 3;
- D3 > D2 > D1 and W3 > W2 > W1;
- Gxx > Oxx.

4.4.3.2 System chimney

The designation classes according to 4.2 of an installed system chimney shall be according, as far as possible, to the classes of the product designation or to a lower class according to 4.4.3.1.

For an installed metal system chimney according to EN 1856-1:2009, national regulations can exist with respect to the corrosion load in the chimney (the combination of condensate resistance and corrosion resistance). Annex E lists the correlation between material specification and corrosion load claimed to exist in the various member states at the time of publication of this document.

4.4.3.3 Custom-built and relined chimney

The designation classes according to 4.2 of an installed custom-built or a relined chimney can be determined according to Annex H.

The designation classes of single-wall custom-built chimney in accordance with EN 1806 and EN 1858 can also be made in accordance with the designation classes of the products, if necessary, taking into account Table F.1 in Annex F.

If the chimney consists of components with different designation classes, the lowest class according to the sequence in 4.4.3.1 shall be used.

NOTE Examples for the determination of the designation of relined and custom-built chimneys are given in Annexes I and J.

4.4.3.4 Connecting flue pipe

The designation classes according to 4.2 of an installed connecting flue pipe shall be according as far as possible to the classes of the product designation or to a lower class according to 4.4.3.1.

For an installed metal connecting flue pipe according to EN 1856-2:2009, national regulations can exist with respect to the corrosion load in the connecting flue pipe (the combination of condensate resistance and corrosion resistance). Annex E lists the correlation between the material specification and corrosion load claimed to exist in the various member states at the time of publication of this document.

The designation classes of connecting flue pipes made of system chimney components, e.g. EN 1856-1, EN 13063-1 and EN 14471 shall be determined according to 4.4.3.2. The designation classes of connecting flue pipes constructed in a custom-built manner using other products can be determined according to Annex H.

4.4.4 Materials of construction

4.4.4.1 System chimneys

System chimneys shall be in accordance with EN 1856-1, EN 13063-1, EN 13063-2, EN 14471, EN 16497-1 or an ETA.

4.4.4.2 Custom-built and relined chimneys

4.4.4.2.1 Flue liners

Flue liners for custom-built and relined chimneys shall be made from rigid flue liners according to the requirements of EN 1457-1, EN 1457-2, EN 1806, EN 1856-2, EN 1857, EN 1858 or an ETA. Flue liners for relined chimneys can also be made from flexible flue liners according to the requirements of EN 1856-2.

Positive pressure and wet designated flue liners and fittings (e.g. access component), including any seals/sealants shall be confirmed as a combination for that pressure class and condensate resistance class e.g. as a flue liner kit.

Chimney products according to the requirements of EN 1856-1, EN 14471 and EN 16497-1 can also be used as flue liners.

4.4.4.2.2 Insulation

Any insulation shall be fit for the intended use, dimensionally stable and not prevent free movement of the flue liner. It can also be an air gap.

If the insulation consists of loose material, it shall be installed in such a way that the free movement of the flue liner is not impaired and the insulation is prevented from sagging.

Care should be taken when using loose infill without binders to prevent the risk of flue blockage arising from the escape of the insulation into the flue, e.g. by choosing a material with adequate corrosion resistance.

4.4.4.2.3 Outer wall

In custom-built chimneys, chimney products in accordance with EN 12446, EN 1806, EN 1858 and EN 13069 can be used as outer wall components. Other products can be used, e.g. brick, steel, concrete.

In relined chimneys the existing chimney or its outer wall will become the outer wall.

4.4.4.3 Connecting flue pipe and adapters

The material of a metal connecting flue pipe shall comply with EN 1856-2. Chimney components including adapters complying with EN 1457-1, EN 1457-2, EN 1806, EN 1856-1, EN 1857, EN 1858 or EN 14471 can also be used. Connecting flue pipes and adapters can also be constructed in a custom-built manner, e.g. using glass, fibre products, or even clay products such as bricks.

4.4.4.4 Supplementary components or additional materials

Supplementary components or additional materials not supplied with the chimney products shall be fit for purpose (e.g. in terms of corrosion, temperature and strength), jointing compounds (e.g. cements, mortars, seals, sealants or mastics), rendering, waterproofing/sealing materials, fixings, screws or additional supports.

4.4.5 Chimney sizing and characteristics

The chimney and the connecting flue pipe shall be characterised for size, pressure class and thermal parameters to suit the combustion appliances which they serve in accordance with the thermal and fluid dynamic calculation methods based on EN 13384-1 and EN 13384-2.

NOTE 1 EN 13384-1 describes a calculation method for chimneys serving one combustion appliance.

NOTE 2 EN 13384-2 describes a calculation method for chimneys serving more than one combustion appliances.

The chimney manufacturer or the combustion appliance manufacturer can specify a flue size, but this should not conflict with the size range calculated according to either EN 13384-1 or EN 13384-2 as appropriate.

4.4.6 Installation requirements

4.4.6.1 Fire resistance external to external

A chimney design shall enable the fire resistance external to external required for the specific parts of the building through which it passes to be achieved.

This can be achieved by provision of one of the following:

- the chimney itself fulfils the required fire resistance;
- the chimney is built into a non-combustible enclosure which fulfils the required fire resistance;
- the chimney and its enclosure which together fulfil the required fire resistance.

This also applies to a chimney design which requires the use of fire stops, including those that act as combined fire stops and spacers or as ceiling or floor supports.

4.4.6.2 Minimum distance to combustible material (resistance to fire – internal to external)

For installed chimneys and connecting flue pipes the minimum distance to combustible material (walls and wall, floor or roof penetrations) Gxx or Oxx as specified with the soot fire class according to 4.2.6 should be observed.

Applicable national legal installation requirements might provide information on reduction of the minimum distance to combustible material

- where the expanse of the combustible material is small, e.g. skirting boards, rafters, joists,
- by shielding, or
- by installing non-combustible insulation around the connecting flue pipe or on the combustible material.

In some circumstances, the combustible material may touch.

NOTE 1 The word combustible material covers combustible construction products (e.g. timber walls, floor spaces, plastic window frames and thatched roofs).

Chimneys or connecting flue pipes which pass through a combustible wall, floor or roof construction shall be sleeved or shielded or separated to maintain the appropriate distance to combustible material or in the case of cavity wall construction to contain any infill. Any sleeve or shield opening to the outside of the building shall be weatherproofed.

NOTE 2 A chimney relined with a flue liner having the same characteristics as the previous flue liner can retain the existing distance to combustible material.

Specifications for minimum distances of connecting flue pipes to combustible material without designation according to 4.2 are given in Annex K, K.1.

Specifications for minimum distances of access components to combustible material are given in K.2.

Specifications for minimum distances of plastic flue liners in a chimney stack are given in K.3.

4.4.6.3 Accidental human contact

Where the chimney is not otherwise completely enclosed and there is a risk of accidental human contact causing burning (see Table 4), the design shall incorporate a shield or safety guard. It shall be fitted in accordance with the chimney installation instructions.

Table 4 — Maximum allowable outer surface temperatures where accidental human contact is possible according to EN ISO 13732-1

Material of the outer surface	Maximum allowed temperature
Metal – bare	70 °C
Metal – coated with lacquer	80 °C
Metal – coated with enamel	74 °C
Metal – coated with powder	94 °C
Plastic	93 °C
Clay/ceramic, glass	85 °C
Concrete, marble	80 °C
NOTE Values for a contact duration of up to one second: “Touching a hot surface and quickly withdrawing after feeling pain”.	

4.4.6.4 Accidental ignition of extraneous material

Chimneys and connecting flue pipes shall be protected in rooms in which highly flammable or explosive substances (e.g. straw, corn) are processed or stored or in which such substances can be generated in such a way that ignition or explosion of these substances is not possible either by radiant heat (e.g. radiation shield, safety distance) or by the surface temperature (e.g. thermal insulation). It shall be fitted in accordance with the chimney instruction.

4.4.6.5 Supports

Chimneys shall be adequately supported, either by foundations or support brackets attached to the building structure, or another free-standing structure e.g. a mast or windshield. Where the building is to support the chimney, the building structure shall be capable of supporting the load both vertical and lateral.

If a system chimney or a custom-built chimney is supported by a free-standing structure or windshield, the construction of the support shall comply with EN 13084-1.

The fixings shall be suitable for the loads required and compatible with the materials of construction of the building. This shall be checked before installing the chimney.

The combustion appliance shall not support the weight of the chimney except when the installation instructions for the combustion appliance states that the load bearing capacity is sufficient and where cleaning of the chimney can be undertaken without dismantling.

The installation instructions for supporting the flue liner shall be followed. Where the flue liners are to be supported on a lintel or foundations at the base of the chimney, they shall be adequate for the flue liner load, including any condensate collectors, access components, and T-pieces or elbows.

4.4.6.6 Joints

Joints shall be made in accordance with the installation instructions.

Joints between sections of non-enclosed system chimneys in accordance with EN 1856-1 shall not be placed inside a floor.

4.4.6.7 Condensate drainage and rainwater disposal

Condensate accumulating in chimneys or connecting flue for wet operation shall be properly drained and disposed of. Condensate drainage can be provided by:

- the combustion appliance if the combustion appliance is suitable for this purpose,
- a condensate drain located at the base of the chimney (e.g. in the form of a supporting elbow) or
- a condensate drain located at the lowest point of the connecting piece (usually before the combustion appliance connection).

The condensate drain shall be large enough to allow the maximum amount of condensate to be discharged. For this purpose, the inside diameter of any pipe work should be a minimum of 12 mm for oil and gas and a minimum of 19 mm for solid fuels.

The condensate drain shall be fitted with a gas trap against flue gas outlet and false air inlet, e.g. by use of a siphon made of corrosion-resistant material with a trap water height sufficiently for the expected negative or positive pressures. The siphon's trap water height should be a minimum of 10 cm. Unless otherwise specified, the siphon should be located outside of the chimney or connecting flue to ensure inspection and cleaning.

The domestic drainage system shall not be ventilated through the flue.

If it is not possible to discharge the condensate into the domestic drainage system at a declining gradient, connection to an automatically operating condensate lifting unit (conveying the condensate via the backflow level) is required.

If there is a possible risk of freezing, suitable measures shall be taken, e.g. by appropriate insulation, covering with electrical trace heating or enlarge the diameter of the condensate pipe.

NOTE A neutralizer to control acidity can be required.

Where rainwater can be collected in the chimney or in the combustion appliance, a rainwater drainage system which maintains the gas tightness of the chimney is recommended. It may be the condensate drainage.

4.4.6.8 Positive pressure chimneys

Chimneys and connecting flue pipes working under positive pressure inside buildings shall be

- positioned in free ventilated rooms or
- back ventilated over the whole length of the connecting flue pipe and chimney (see 4.4.6.12).

4.4.6.9 Chimney offsets

The design shall ensure that offsets are supported in accordance with the installation instructions, or with adequate supports and provision made for expansion.

4.4.6.10 Access for inspection, cleaning and measuring

Access to the flue shall be available so that the full length of the chimney from the combustion appliance to the chimney outlet can be inspected and where it is required the chimney can be cleaned.

Access for cleaning can be possible from the bottom or the top of the chimney, the loft access, explosion relief door, connecting flue pipe or through the combustion appliance, but shall be in accordance with the installation instructions for the combustion appliance or the chimney where approved.

The fittings used to provide an access shall be part of a system chimney product or of a flue liner product or an accessory in accordance with 4.4.7.1.

An access shall be located only in areas where there is no risk from fire or explosion.

Where a chimney is to be cleaned from the top a safe working environment should be available.

An access should be provided in the vicinity of offsets of more than 30° or any offset which otherwise could not be inspected or cleaned.

Where not provided in association with the combustion appliance a closable pressure tight test point should be provided in the connecting flue pipe. It is recommended that such a measuring point be positioned at a distance of twice the internal diameter in straight length from the combustion appliance outlet.

4.4.6.11 Minimum distance between openings in the chimney

Openings such as for accesses, draught regulators and any combustion appliance connection into the same flue shall be separated in the direction of flow by at least one nominal diameter from one another except where the configuration for such openings are otherwise demonstrated to evacuate products of combustion adequately.

4.4.6.12 Back ventilation

Where back ventilation is required between two walls of the chimney or the chimney and an enclosure (e.g. to evacuate the flue gases which can escape from the flue liner in positive pressure multi-wall system), the gap between the flue liner and the next walls of the chimney construction shall be sufficient to ensure adequate ventilation.

The ventilation of the gap shall be continuous from the room containing the combustion appliance or the bottom of the chimney to the outside atmosphere. Sufficient air shall be available for the gap. The recommended minimum gap for the back ventilation is 30 mm except where a circular inner wall of the gap is bounded by a square section outer wall of the gap when the minimum gap can be 20 mm. For rectangular cross-sections, the hydraulic diameter can be used as a basis, whereby a minimum distance shall not be less than 5 mm. The air inlet and outlet apertures and grills to the ventilation gap shall not restrict the back ventilation. This is fulfilled if the air inlet to the cavity and the air outlet have at least the same free area as the required cross section of the ventilated gap.

Access should be provided for inspecting and where necessary cleaning the gap.

4.4.6.13 External parts

4.4.6.13.1 System chimneys

The distance between the supports and the unsupported height of external parts of system chimneys in accordance with EN 1856-1, EN 13063-1, EN 13063-2, EN 14471 or EN 16497-1 shall not exceed the values declared in the DoP or installation instructions, unless a detailed structural analysis of the application is available.

4.4.6.13.2 Custom-built-chimneys

If no performance for the maximum height of external sections of custom-built chimneys is declared, the following applies for:

- metal chimneys, not more than 1,5 m above the last support, if the thickness of the load carrying wall has a minimum thickness equal to $1/200$ of the diameter and the distance between lateral supports below the external sections does not exceed 2 m;
- chimneys having a masonry or concrete outer wall, a maximum unsupported height of 4,5 times the lowest cross-sectional dimension of the chimney, but not more than 3 m, and shall not exceed 2,5 m or be supported according to the outer wall element product standards EN 13069 (clay) or EN 12446 (concrete).

The distance above the last attachment to a building can be extended by propping, use of lateral supports or guy wires or use of masts.

All props, struts, guy wire designs and masts should be in accordance with EN 13084-8.

The wall supports of custom-built-chimneys shall be rigid against lateral movement when fixed.

Wall fixings shall be used in accordance with the installation instructions and be suitable for the materials of the construction of the wall which itself shall be capable of transmitting the load to earth.

4.4.6.14 Weatherproofing

Where the chimney passes through a roof or wall a proprietary component or material shall be used to provide weatherproofing, at the appropriate angle of the roof slope and only the correct components shall be used. Where flashings are constructed on site, the design and application shall be in accordance with the roof and chimney design.

Where rain penetration is a problem weatherproofing of the chimney can be by cladding, rendering, or painting, according to the design and compatible with the substrate taking into account any freeze-thaw requirements.

Weatherproofing shall be undertaken with materials having a temperature capability appropriate to the outer surface temperature of the chimney.

NOTE The outer surface temperature can be taken from the product information or calculated using one of the formulae in Annex L.

Where the chimney is sootfire designated and where there is a risk of spark ignition by sootfire the weatherproofing material shall be non-combustible.

Where the weatherproofing material has a higher water vapour diffusion resistance than the chimney construction, back ventilation can be required between the outer wall of the chimney and the weatherproofing construction.

Where the system or design requires back ventilation, the weatherproofing shall not cause a restriction to the back ventilation.

If parts of the chimney are to be painted the paint system shall be compatible with the substrate and any chimney product requirements.

4.4.6.15 Lightning protection

Where lightning protection for the building is required, the chimney shall also have lightning protection, either separately or via the lightning protection for the building. A metal chimney shall not be used as lightning protection.

4.4.6.16 Earthing of chimneys

Consideration should be given to earthing protection of metal chimneys, which can be subject to local regulations.

4.4.7 Accessories

4.4.7.1 General

Accessories shall be selected so that they are suitable for the intended use and have a resistance to temperature, pressure, condensation and corrosion corresponding to the designation of the connecting flue pipe or chimney according to the place of installation.

Accessories for sootfire resistant connecting flue pipes or chimneys shall be at least sootfire safe, meaning marked with “As”. They have to be checked after a soot fire and replaced if necessary.

The position of accessories shall allow easy cleaning, maintain minimum distances from combustible material and, if necessary, provide electrical power supply.

Details of accessories can be found on the data plate or in the product information.

It can be assumed to be suitable for the following applications:

- chimney silencers according to EN 16475-1,
- chimney fans according to EN 16475-2,
- draught regulators, standstill opening devices and combined secondary air devices according to EN 16475-3, where draught regulators are only suitable for negative pressure chimneys,
- flue dampers according to EN 16475-4,
- access components according to EN 16475-6,
- rain caps according to EN 16475-7, and
- terminals according to EN 13502.

Where required accessories shall have freeze-thaw resistance in accordance with EN 14297, EN 13502 or EN 13216-1.

4.4.7.2 Draught regulator, standstill opening device and combined secondary air device

A draught regulator, standstill opening devices or combined secondary air device can be installed in the connecting flue pipe or the chimney. It should be in the same indoor area as the combustion appliance.

NOTE The same indoor area can also cover several floors and include, for example, cellar rooms.

It shall be ensured that:

- the proper discharge of the flue gases is not affected,
- the flue gases cannot escape in dangerous amount in case of congestion or backflow, and
- the inspection and cleaning of the chimney systems is not affected.

For solid fuels, the distance between a draft regulator in a chimney and the base of the chimney should be a minimum of 20 cm and, if possible, placed below the connection of the connecting flue pipe to the chimney.

4.4.7.3 Explosion relief

If required, the explosion relief shall be in the same indoor area as the combustion appliance. It shall be guarded and positioned so as to prevent a hazard when operating and shall be self-resetting.

4.4.7.4 Silencer

Where noise transmission between the combustion appliance and the chimney occurs to unreasonable nuisance, an appropriate noise attenuation system (silencer) is recommended.

When a silencer is installed, the pressure loss characteristic and its influence on system capacity shall be included in the flue size calculation (see 4.4.5).

4.4.7.5 Rain cap

Where rain water can enter the chimney and is otherwise not disposed of (see 4.4.6.7) a rain cap can be installed, if allowed.

Where ice formation can occur (e.g. in condensing applications or geographical conditions), the rain cap shall have an overlap of a minimum of 50 mm greater than the chimney outer dimension in all directions.

When a rain cap is installed, the flow resistance shall be taken into account in the flue sizing (see 4.4.5).

4.4.7.6 Flue damper

Flue dampers are used to regulate the flow in a chimney or to prevent back flow of soot during cleaning of the chimney, reduce the burning rate, reduce the stand-still energy loss or to prevent the backflow of the flue gas e.g. in case of chimneys serving more than one combustion appliance.

The following types of flue dampers are suitable:

- type 1: totally manually closeable for the use e.g. in connecting flue pipes of solid fuel combustion appliances without a fan as soot shut-off devices to prevent soot from escaping during chimney cleaning or as shut-off devices in connection with open fireplaces to reduce ventilation losses when the open fireplace is not in operation;
- type 2: totally mechanically closeable for the use e.g. in connecting flue pipes as a shut-off device to reduce ventilation losses when the combustion appliance is not in operation or, in case of chimneys serving more than one combustion appliance, to prevent the return flow of flue gases from other combustion appliances;
- type 3: partially manually closeable for the use e.g. in connecting flue pipes of solid fuel combustion appliances without a fan as throttle device to adjust the combustion rate by increasing the flow resistance of the flue;
- type 4: partially mechanically closeable for the use e.g. in connecting flue pipes as throttle device to adjust the combustion rate by increasing the flow resistance of the flue;
- type 5: partially closeable and fixed manually for the use e.g. in connecting flue pipes as throttle device to reduce the combustion rate by increasing the flow resistance of the flue.

The different flue damper types and their use are described in Annex P.

The setting of a flue damper type 3 (throttle device) shall be visible to the user.

A flue damper type 1 (soot shut-off device) may only totally close the flue for cleaning purposes. Otherwise the flue damper type 1 shall be totally open.

Flue dampers type 1 and type 2 shall have an internal gas tightness, meaning the ability of the flue damper flap to limit the rate of leakage within the flue damper flap from one side of the flap to the other.

Flue dampers type 1 are suitable for use in connecting flue pipes with

- pressure class N1 or N2, if the internal leakage rate does not exceed a value of $1,1 \text{ l} \cdot \text{s}^{-1} \text{ m}^{-1}$.

Flue dampers type 2 are suitable for use in connecting flue pipes with

- pressure class N1, if the internal leakage rate does not exceed a value of $2,2 \text{ l} \cdot \text{s}^{-1} \text{ m}^{-1}$,
- pressure class N2, if the internal leakage rate does not exceed a value of $3,1 \text{ l} \cdot \text{s}^{-1} \text{ m}^{-1}$,
- pressure class P1, P2, M1, M2, H1 or H2, if the internal leakage rate does not exceed a value of $0,7 \text{ l} \cdot \text{s}^{-1} \text{ m}^{-1}$.

4.4.7.7 Chimney fans

Chimney fans are used to create a stable positive or negative pressure for the chimney.

The fan shall be sized, both for its physical dimensions and for its extract capacity, to ensure full clearance of combustion products including wind influences in accordance with EN 13384-1 or EN 13384-2.

Chimney fans can be installed inline in the connecting flue pipe (inline fans) or mounted on the chimney outlet (exhaust fans) if the conveying capacity of the chimney is ensured in the case of a fan failure. This is considered to be fulfilled if:

- for gas and oil combustion appliances the fan is interlocked for draught failure with the combustion appliance according to the installation instructions for the combustion appliance;
- for mechanical solid fuel combustion appliances, the combustion system is interlocked and the chimney has enough capacity (draught) to evacuate the residual products of combustion to the outside atmosphere in the event of fan failure;
- for natural draught solid fuel combustion appliances which have rapid response combustion, e.g. gravity fed boilers, the chimney without the fan running has the capacity to evacuate the flue gas volume flow at minimum heat output of the combustion appliance.

Inline fans shall only generate positive pressure in connecting flue pipes and chimneys, if both are suitable for positive pressure. In systems for negative pressure fans shall be positioned so that they cannot produce an incorrect pressure in the connecting flue pipe and chimney.

The chimney fan and the connecting flues shall be positioned so that easy maintenance is possible.

The chimney fan can have its own structural support. When necessary the additional structural loading on the chimney shall be included in the structural design.

4.4.7.8 Terminals

A terminal which is installed in the pressure zone as defined in EN 13384-1 or EN 13384-2 shall have aerodynamic properties capable of evacuating combustion products taking into account wind influences.

The different types of terminals according to CEN/TS 16134 are described in Annex Q.

Terminals shall not affect the operational safety of the combustion appliance or the fire safety and stability of the chimney. They shall be fitted to the chimney safely. This is deemed to be fulfilled if the terminals are installed on chimneys

- do not generate any improper positive pressure in the chimney, e.g. by taking into account the flow resistance of the terminals when dimensioning the chimney,

- in dry operation are designed, e.g. thermally insulated, so that no damage to the chimney is caused by condensing moisture,
- in wet operation cannot cause icing at the chimney outlet,
- do not impede the thermal expansion of the flue of multi-wall chimneys and
- do not restrict the cross-sections of back-ventilations inadmissibly.

Terminals shall be designed or placed in such a way that the chimney can be easily cleaned.

4.4.7.9 Particulate matter filters or separators

Particulate matter filters or separators in connecting flue pipes or chimneys with combustion appliances for solid fuel have to be at least soot fire safe.

Particulate matter filters or separators shall not cause unreasonable nuisance (e.g. sound nuisance from self-cleaning dust collectors).

If a particulate matter filters or separators shall be installed, the pressure loss for the loaded condition has to be taken into account when dimensioning the flue (see 4.4.5).

4.5 Chimney plate and additional information

During the design phase the contents of the chimney plate should be determined.

The chimney plate and additional information shall be in the language of the country of installation.

The chimney plate shall be permanent and indelibly marked, e.g. engraved metal plate, impressed or printed plastic plate.

The chimney plate shall carry a warning that the plate shall not be covered or defaced.

The following information should be included on the chimney plate where appropriate:

- installed chimney designation determined in accordance with 4.4.3;
- nominal flue size;
- constructor/installer identification (name/address/telephone);
- date of construction/installation.

And where appropriate, the following additional information should be made available:

- chimney location if the plate is not attached to the chimney;
- flue liner, or single wall block product identification, e.g. Declaration of Performance;
- product designations in accordance with EN 1457-1, EN 1457-2, EN 1806, EN 1856-1, EN 1856-2, EN 1857, EN 1858, EN 13063-1, EN 13063-2, EN 14471 and EN 16497-1;
- thermal resistance at the nominal working temperature;
- flow resistance information where available;
- installed accessory products;
- intermediate cleaning access;
- cleaning method;

- neutralization unit;
- information about offset, e.g. number, angles.

Other information can be supplied for example with the handover documents.

An example of a chimney plate is given in Annex G.

5 Installation

5.1 General

The design of system chimneys, custom-built chimneys and relined chimneys and the installation instructions shall be followed.

Information on checking, handling and site storage of materials and components is given in Annex M.

Chimney components shall not be modified unless specifically allowed in the installation instructions.

Additional items shall not be attached which affect structural stability or function or cleaning capability, e.g. satellite dishes or other aerials or wind turbines.

Special attention should be paid to the following items:

- location of centralizing spacers;
- pulling force and/or load on installing flexible flue liners;
- alignment of flue liners;
- alignment of fittings to avoid undue stress/strain.

5.2 Construction of relined chimneys

The existing chimney shall be checked that it is fit for its intended use, taking into account any repair.

Sufficient openings in the existing chimney shall be prepared for the installation of the required components into the chimney. The entry of the combustion appliance connection/connecting flue pipe into the chimney shall be in accordance with 4.4.3.4.

Any opening in existing chimneys shall only be made with methods suitable to create a sufficient opening without damage of the existing structure. The stability of the existing chimney shall not be compromised. For this reason, it should, e.g. only be opened on one side to the maximum width of the inner cross-section of the existing chimney or its outer wall.

For installation of the new flue liner from the top of the chimney a safe working area shall be available.

All temporary openings shall be closed with suitable material to achieve the resistance to fire and thermal resistance required for the relined chimney appropriate to the application. Ensure that free movement of the liner is maintained.

5.3 Chimney plate

The chimney plate shall be completed in accordance with 4.5. The chimney plate shall be fixed in a visible position.

NOTE 1 Possible locations are by the cleaning/inspection access, the side of the fireplace, at the chimney inlet or possibly by the electricity-gas-water-meter.

NOTE 2 The chimney plate can be supplied with the system chimney or flue liner product.

Examples of a chimney plate are given in Annex G.

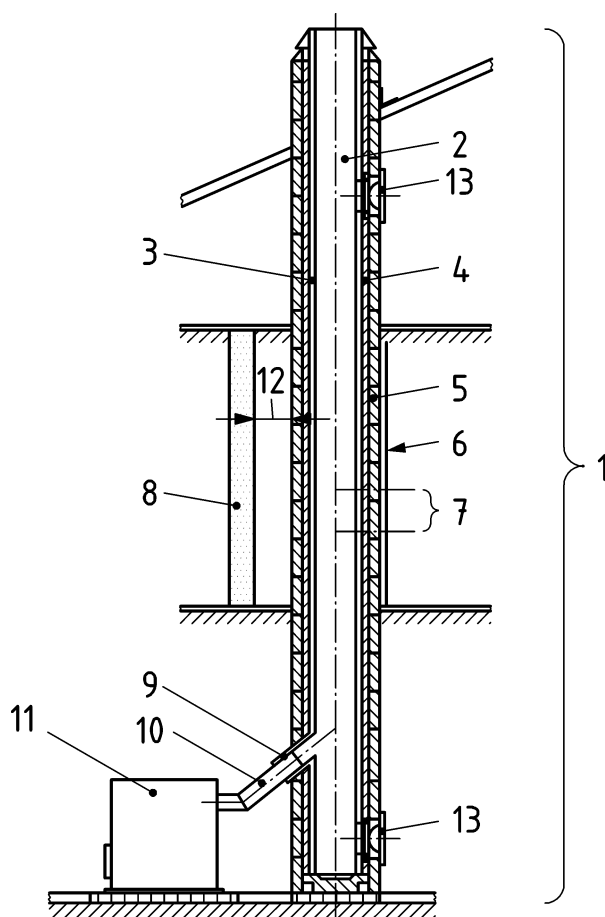
6 Commissioning/handover

After finishing the installation, the chimney shall be commissioned to ensure that it has been correctly installed. In the absence of specific instruction, a recommended checklist of items is given in Annex N.

On satisfactory completion of the commissioning all relevant documentation and recommendations for inspection, cleaning and maintenance (see Annex O) shall be handed over, e.g. to the user, owner or his agent.

Annex A (informative)

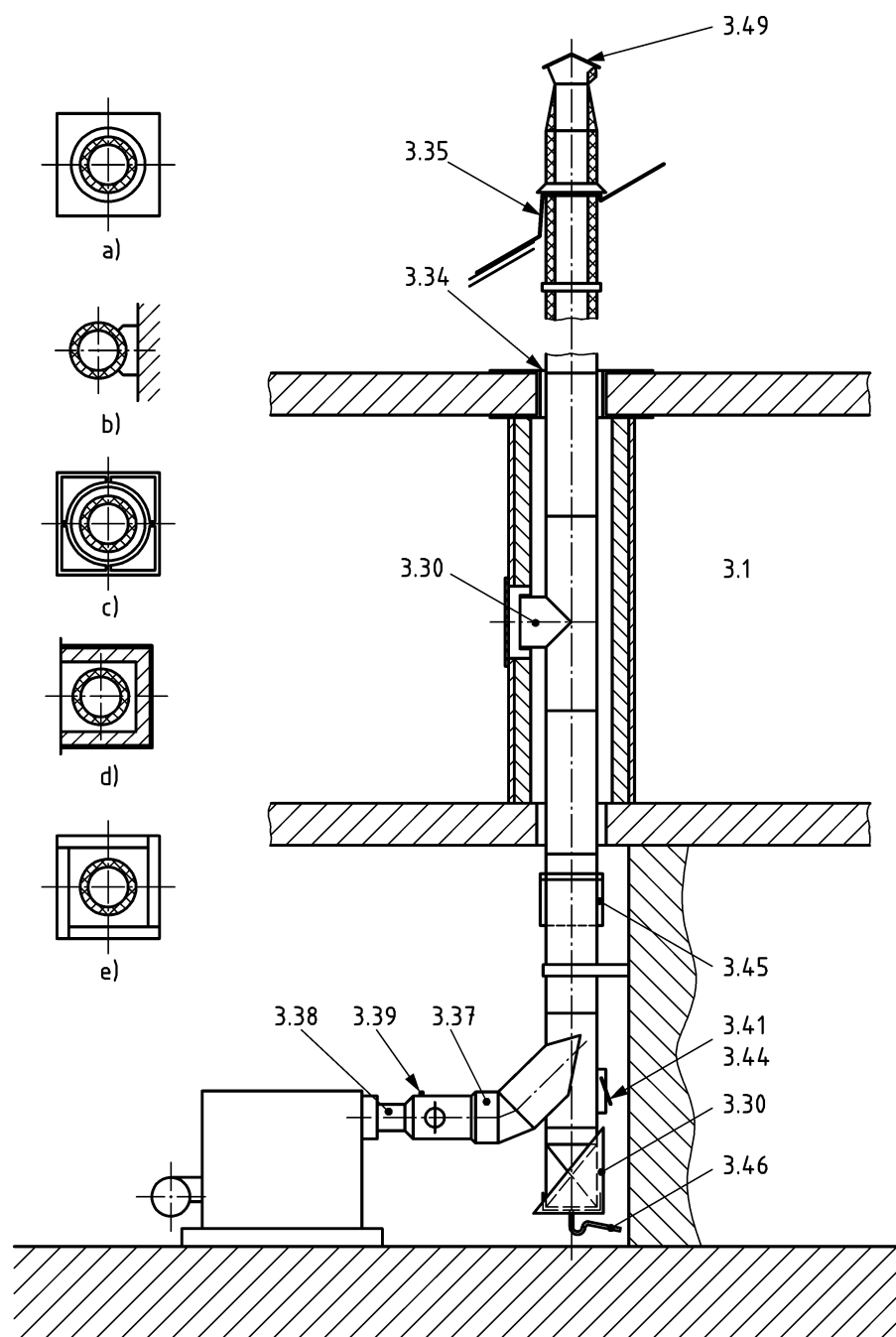
Terminology



Key

1 chimney	8 adjacent combustible wall or enclosure or cladding
2 flue	9 fitting
3 flue liner	10 connecting flue pipe
4 thermal insulation	11 combustion appliance
5 outer wall	12 distance to combustible material
6 non-combustible enclosure or cladding	13 access component
7 chimney section	

Figure A.1 — Chimney components of a multi-wall chimney



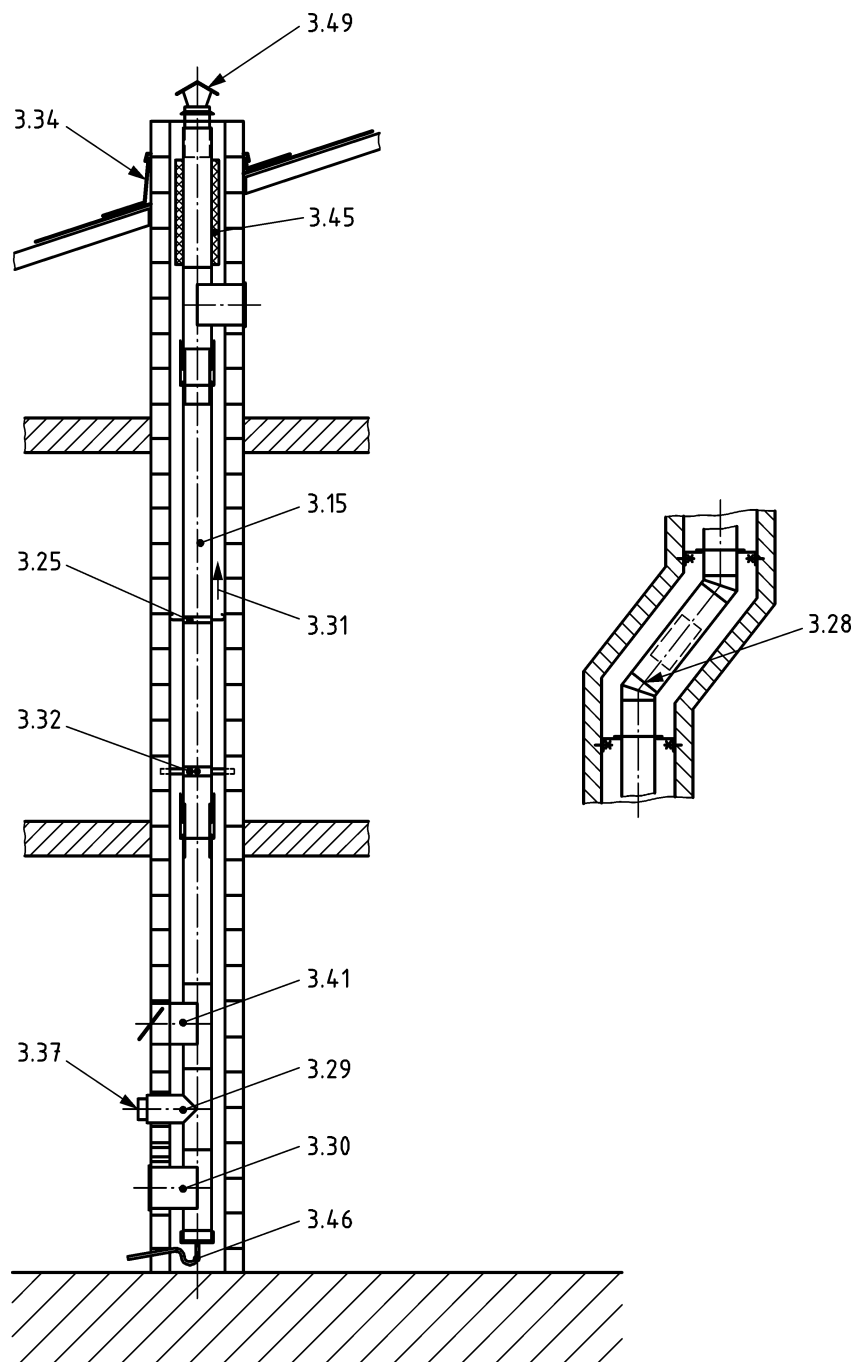
Key

- a chimney in a masonry enclosure
- b internal or external chimney without enclosure
- c chimney in a cavity block
- d chimney in an enclosure as a part of the building structure
- e chimney in a separate enclosure

See Clause 3.

NOTE The flue liner can be of clay, concrete, metal or plastic.

Figure A.2 — Terminology for a system chimney



See Clause 3.

NOTE The flue liner can be of clay, concrete, metal or plastic.

Figure A.3 — Terminology for a custom-built or a relined chimney

Annex B (informative)

List of combustion appliance data required for the design of a chimney

B.1 For choosing the chimney type (required chimney designation)

- Kind/type of combustion appliance(s)/burner(s);
- kind of fuel;
- maximum flue gas temperature;
- for chimneys operating under wet condition, information if condensate from the chimney is allowed to flow back through the combustion appliance.

B.2 For calculation of the chimney (sizing, see 4.4.5)

- Kind/type of combustion appliance/burner;
- kind of fuel;
- maximum and where there is a range minimum flue gas mass flow;
- minimum flue gas temperature for the nominal and where there is a range the minimum heat output/input;
- minimum draught of the combustion appliance (for negative pressure chimneys) or maximum differential pressure of the combustion appliance (for positive pressure chimneys) at nominal and where there is a range at minimum heat output/input;
- CO₂-content (if not previously provided);
- size and shape of flue gas outlet.

B.3 For combustion appliance/connecting flue pipe/chimney adapter design/choice

- Size and shape of flue gas outlet;
- position/height of flue gas outlet.

Annex C (informative)

Example of typical building structure designed to assist exchange of information

The following list of information should be supplied where appropriate (see Figure C.1):

- H_1 height from ground to ceiling (structural or finished);
- H_2 height from intermediary floor to ceiling (structural or finished);
- H_3 height of ridge;
- γ pitch of roof;
- T_1 depth and thickness of intermediate floor joist timbers and distances between centres;
- T_2 depth and thickness of roof space floor joist timbers and distances between centres;
- T_3 depth and thickness of roof timbers (rafters) and distance between centres;
- L_1 horizontal distance between the centre line of the chimney above roof level and the gable end of the building;
- L_2 horizontal distance between the centre line of the chimney above roof level and the ridge of the roof;
- C_1 distance through loft measured at centre line of the chimney;
- C_2 height from the ground to the centre line of each flue inlet;
- C_3 height from the ground to the bottom of the liner;
- C_4 total chimney height from the ground to the chimney outlet;
- C_5 height from the ground to the centre of each access opening;
- C_6 height from the ground to the lower bend of each offset where the centre line of the flue liner changes the direction;
- C_7 vertical distance between the lower and upper bends of each offset where the centre line of the flue liner changes the direction;
- C_8 horizontal distance between the vertical centre lines of each offset;
- F_1 horizontal distance 1 from the centre of combustion appliance-outlet to the centre of the flue;
- F_2 horizontal distance 2 from the centre of combustion appliance-outlet to the centre of the flue;

- F_3 height from ground to the centre of combustion appliance outlet:
 - materials of each floor;
 - materials of each ceiling;
 - roof finish;
- existing chimney details for relining, including:
 - internal dimensions throughout its length D;
 - designation of existing chimney;
 - construction materials to determine thermal resistance and fire resistance external to external;
 - condition and nature of inner flue surface of the existing chimney;
 - structural details, e.g. position of access openings;
 - proximity of chimney outlet position to adjacent buildings, obstructions and other building openings, e.g. windows, skylights.

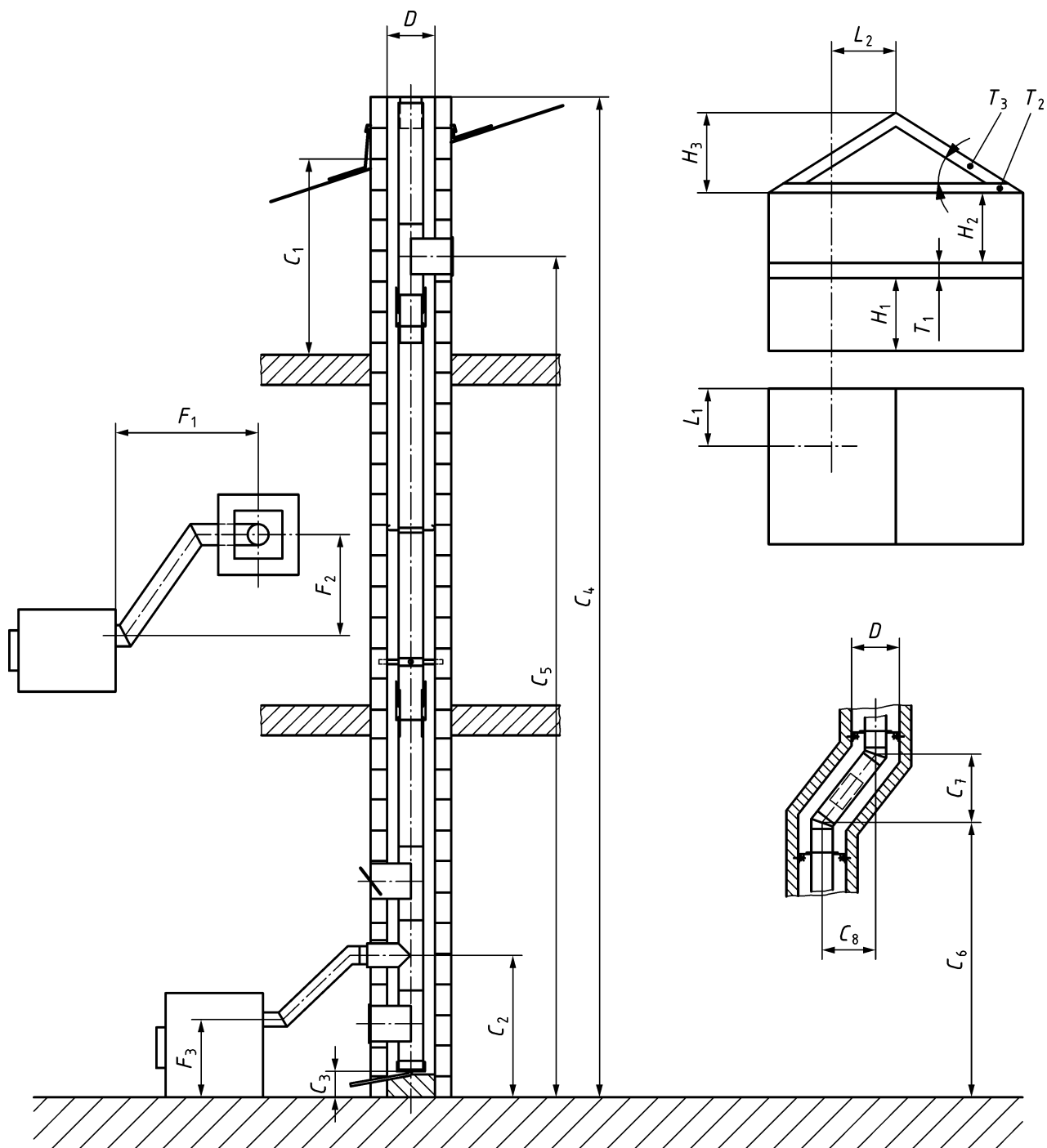


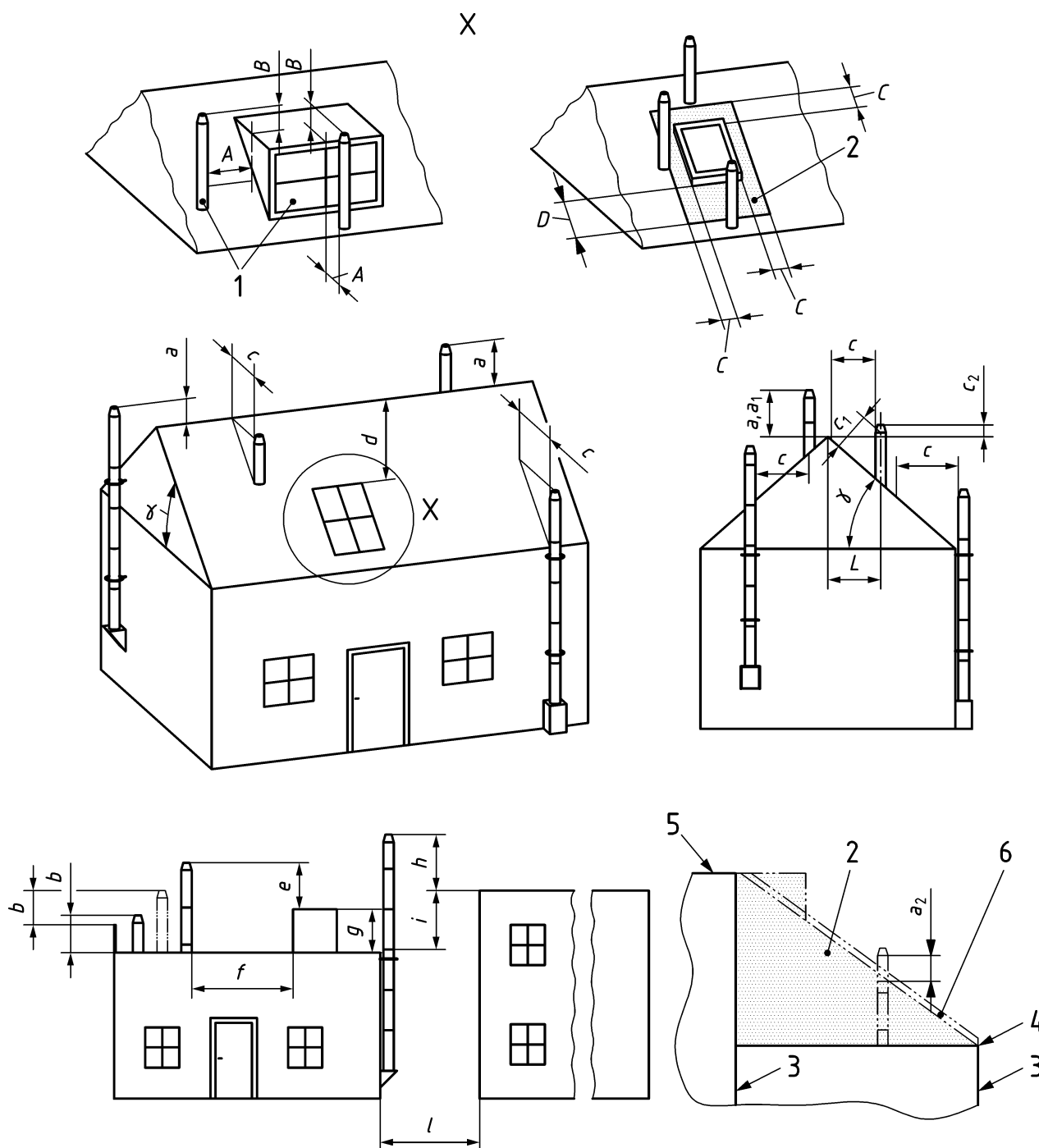
Figure C.1 — Example of typical building structure designed to assist exchange of information

Annex D
(informative)

Location of chimney outlets

Figure D.1 gives an example of chimney outlet positions for residential heating or comparable applications.

Table D.1 contains examples of dimensions for the location of chimney outlets.



Key

- 1 terminal location adjacent windows and openings on pitched roof
- 2 prohibited zone
- 3 these walls can be part of same buildings or be part of adjacent buildings
- 4 edge of lower structure of flat roof extension or 10 m along from structure whichever is the greatest
- 5 top of adjacent higher building
- 6 open flue terminals locations on roofs adjacent to high buildings or structures

Figure D.1 — Example of the location of chimney outlets