



NSAI
Standards

Irish Standard
I.S. EN 13384-1:2015+A1:2019&LC:2019

Chimneys - Thermal and fluid dynamic calculation methods - Part 1: Chimneys serving one heating appliance

I.S. EN 13384-1:2015+A1:2019&LC:2019

Incorporating amendments/corrigenda/National Annexes issued since publication:

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation — recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

This document replaces/revises/consolidates the NSAI adoption of the document(s) indicated on the CEN/CENELEC cover/Foreword and the following National document(s):

NOTE: The date of any NSAI previous adoption may not match the date of its original CEN/CENELEC document.

This document is based on:

Published:

This document was published under the authority of the NSAI and comes into effect on:

2019-09-09

ICS number:

91.060.40

NOTE: If blank see CEN/CENELEC cover page

NSAI
1 Swift Square,
Northwood, Santry
Dublin 9

T +353 1 807 3800
F +353 1 807 3838
E standards@nsai.ie
W NSAI.ie

Sales:
T +353 1 857 6730
F +353 1 857 6729
W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

National Foreword

I.S. EN 13384-1:2015+A1:2019&LC:2019 is the adopted Irish version of the European Document EN 13384-1:2015+A1:2019, Chimneys - Thermal and fluid dynamic calculation methods - Part 1: Chimneys serving one heating appliance

This document does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

For relationships with other publications refer to the NSAI web store.

Compliance with this document does not of itself confer immunity from legal obligations.

In line with international standards practice the decimal point is shown as a comma (,) throughout this document.

This page is intentionally left blank

Correction Notice

Reference: EN 13384-1:2015+A1:2019

Title: Chimneys - Thermal and fluid dynamic calculation methods - Part 1: Chimneys serving one combustion appliance

Work Item: 00166120

Brussels, 2019-07-17

With reference to the above, please include the following minor editorial correction(s) in the document related to:

the following language version(s) :

- English
- French
- German

for the following procedure :

- PQ/UQ
- Enquiry
- 2nd Enquiry
- Parallel Enquiry
- 2nd Parallel Enquiry
- Formal Vote
- 2nd Formal Vote
- Parallel Formal Vote
- 2nd Parallel Formal Vote
- UAP
- TC Approval
- 2nd TC Approval
- Publication
- Parallel Publication

It has been brought to our attention that this document, issued on 2019-07-03, requires modification.

The title of the document, and the reference in the European Foreword, have been corrected.

Please find enclosed the updated English version.

We apologise for any inconvenience this may cause.

This page is intentionally left BLANK.

EUROPEAN STANDARD

EN 13384-1:2015+A1

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 2019

ICS 91.060.40

Supersedes EN 13384-1:2015

English Version

Chimneys - Thermal and fluid dynamic calculation methods - Part 1: Chimneys serving one combustion appliance

Conduits de fumée - Méthodes de calcul thermo-aéraulique - Partie 1: Conduits de fumée ne desservant qu'un seul appareil

Abgasanlagen - Wärme- und strömungstechnische Berechnungsverfahren - Teil 1: Abgasanlagen mit einer Feuerstätte

This European Standard was approved by CEN on 24 January 2015 and includes Amendment 1 approved by CEN on 27 April 2019.

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, Turkey 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
1 Scope	7
2 Normative references	7
3 Terms and definitions	7
4 Symbols and abbreviations	12
5 Calculation method for non-balanced flue chimneys	17
5.1 General principles.....	17
5.2 Pressure requirements.....	17
5.2.1 Negative pressure chimneys	17
5.2.2 Positive pressure chimneys.....	18
5.3 Temperature requirement.....	19
5.4 Calculation procedure	19
5.5 Flue gas data characterising the $\boxed{A_1}$ combustion $\langle A_1 \rangle$ appliance.....	20
5.5.1 General.....	20
5.5.2 $\boxed{A_1}$ Flue gas mass flow and combustion air mass flow	20
5.5.3 Flue gas temperature.....	21
5.5.4 Minimum draught for the $\boxed{A_1}$ combustion $\langle A_1 \rangle$ appliance (P_w) for negative pressure chimney	22
5.5.5 Maximum draught for the $\boxed{A_1}$ combustion $\langle A_1 \rangle$ appliance (P_{wmax}) for negative pressure chimney.....	23
5.5.6 Maximum differential pressure of the $\boxed{A_1}$ combustion $\langle A_1 \rangle$ appliance (P_{w0}) for positive pressure chimney.....	23
5.5.7 Minimum differential pressure of the $\boxed{A_1}$ combustion $\langle A_1 \rangle$ appliance (P_{w0min}) for positive pressure chimney.....	23
5.6 Characteristic data for the calculation	23
5.6.1 General.....	23
5.6.2 Mean value for roughness (r)	23
5.6.3 Thermal resistance ($1/\Lambda$).....	23
5.7 Basic values for the calculation.....	24
5.7.1 Air temperatures.....	24
5.7.2 External air pressure (p_L)	26
5.7.3 Gas constant	26
5.7.4 Density of the external air (ρ_L).....	26
5.7.5 Specific heat capacity of the flue gas (c_p)	27
5.7.6 Condensing temperature (T_{sp})	27
5.7.7 Correction factor for temperature instability (S_H).....	27
5.7.8 Flow safety coefficient (S_E).....	27
5.8 Determination of the temperatures	27
5.8.1 General.....	27
5.8.2 Calculation of the coefficient of cooling (K).....	28
5.8.3 Coefficient of heat transmission (k_b).....	28
5.9 Determination of the density of the flue gas and the velocity of the flue gas.....	31
5.9.1 Density of the flue gas (ρ_m)	31
5.9.2 Velocity of the flue gas (w_m)	31

5.10	Determination of the pressures	31
5.10.1	Pressure at the flue gas inlet into the chimney.....	31
5.10.2	Theoretical draught available due to chimney effect (P_H).....	32
5.10.3	Pressure resistance of the chimney (P_R).....	33
5.10.4	Wind velocity pressure (P_L).....	34
5.11	Minimum draught required at the flue gas inlet into the chimney and maximum allowed draught (P_{Ze} and P_{Zemax}) and maximum and minimum differential pressure at the flue gas inlet into the chimney (P_{ZOe} and P_{ZOemin})	35
5.11.1	General	35
5.11.2	Minimum and maximum draught for the $\boxed{A_1}$ combustion $\langle A_1 \rangle$ appliance (P_W and P_{Wmax}) and maximum and minimum differential pressure of the $\boxed{A_1}$ combustion $\langle A_1 \rangle$ appliance (P_{W0} and P_{W0min})	36
5.11.3	Effective pressure resistance of the connecting flue pipe (P_{FV})	36
5.11.4	Pressure resistance of the air supply (P_B)	37
5.12	Calculation of the inner wall temperature at the chimney outlet (T_{iob}).....	38
6	Secondary air for negative pressure chimneys	40
6.1	General	40
6.2	Calculation method.....	40
6.3	Basic values for the calculation of secondary air	40
6.3.1	General	40
6.3.2	Mixing calculations	40
6.4	Pressures	41
6.4.1	Pressure resistance for the air supply with secondary air (P_{BNL})	41
6.4.2	Draught required for the secondary air devices (P_{NL}).....	43
6.4.3	Pressure resistance for that part of the connecting flue pipe before the secondary air device (P_{FV1})	44
6.4.4	Pressure requirement with secondary air	44
6.5	Temperature requirement with secondary air	44
7	Calculation method for balanced flue chimneys	45
7.1	General principles	45
7.2	Pressure requirements.....	46
7.3	Temperature requirements.....	46
7.4	Calculation procedure.....	46
7.5	Flue gas data characterizing the $\boxed{A_1}$ combustion $\langle A_1 \rangle$ appliance	47
7.6	Characteristic data for the calculation.....	47
7.7	Basic values for the calculation	47
7.7.1	Air temperatures	47
7.7.2	Other basic values	48
7.8	Determination of the temperatures.....	48
7.8.1	Non-concentric (separate) ducts.....	48
7.8.2	Concentric ducts – calculation based on a correction factor for heat radiation	49
7.8.3	Concentric ducts – calculation based on calculated heat radiation	64
7.8.4	Mean temperatures for pressure calculation.....	68
7.9	Determination of densities and velocities.....	69
7.9.1	Density and velocity of the flue gas.....	69
7.9.2	Density and velocity of the $\boxed{A_1}$ combustion $\langle A_1 \rangle$ air.....	69
7.10	Determination of pressures.....	70
7.10.1	Pressure at the flue gas inlet into the chimney.....	70
7.10.2	Theoretical draught due to chimney effect in the chimney segment (P_H)	70
7.10.3	Pressure resistance in the chimney segment (P_R)	70
7.10.4	Wind velocity pressure (P_L)	70

EN 13384-1:2015+A1:2019 (E)

7.11	Minimum draught required at the flue gas inlet into the chimney and maximum allowed draught (P_{Ze} and P_{Zemax}) and maximum and minimum differential pressure at the flue gas inlet into the chimney (P_{ZOe} and P_{ZOemin})	71
7.11.1	General	71
7.11.2	Minimum and maximum draught for the \square_{A1} combustion \square_{A1} appliance (P_W and P_{Wmax}) and maximum and minimum differential pressure of the \square_{A1} combustion \square_{A1} appliance (P_{W0} and P_{W0min})	71
7.11.3	Effective pressure resistance of the connection pipe (P_{FV})	71
7.11.4	Pressure resistance of the air supply	71
7.12	Calculation of the inner wall temperature at the chimney outlet (T_{iob})	74
8	Consideration of the condensation heat of the flue gas water vapour	75
8.1	General	75
8.2	Onset of condensation	75
8.3	Calculation of the flue gas temperature at the outlet of a chimney segment with condensation ($j \geq NsegK$)	78
9	Consideration of chimney fans	83
9.1	General	83
9.2	Inline fans	84
9.3	Exhaust fans	85
Annex A	(informative) Calculation of thermal resistance	86
Annex B	(informative) Tables	87
Annex C	(informative) Chimney outlet with regard to adjacent buildings	104
Annex D	(informative) Determination of the gas constant R considering the condensation	105

European foreword

This document (EN 13384-1:2015+A1:2019) 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 2020, and conflicting national standards shall be withdrawn at the latest by January 2020.

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

This document supersedes A1 EN 13384-1:2015 A1.

This document includes Amendment 1 approved by CEN on 26 June 2019.

According to EN 13384-1:2002+A2:2008 and EN 13384-1:2015+A1:2019 the following fundamental changes are given:

- editorial mistakes have been corrected;
- mistakes in formulas have been corrected;
- for wood the rise of the dew point to take into account the acid condensation has been deleted;
- table for material characteristics in Table B.5 has been adapted to EN 15287-1 and supplemented by radiation coefficients;
- in Calculation of thermal resistance according to Annex A are linked to the method of EN 15287-1 for taking into account the temperature dependence has been added;
- for non-concentric ducts the calculation of the mean temperature of the air supply has been amended;
- for chimney fans a calculation procedure has been added;
- “heating appliance” replaced by “combustion appliance”;
- New calculation for combustion air mass flow introduced;
- “Supply air” replaced by “combustion air”.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

This European Standard “Chimneys — Thermal and fluid dynamic calculation methods” consists of three Parts:

- Part 1: Chimneys serving one combustion appliance

EN 13384-1:2015+A1:2019 (E)

- Part 2: Chimneys serving more than one combustion appliance
- Part 3: Methods for the development of diagrams and tables for chimneys serving one heating appliance

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

1 Scope

This European Standard specifies methods for the calculation of the thermal and fluid dynamic characteristics of chimneys serving one A_1 combustion A_1 appliance.

The methods in this part of this European Standard are applicable to negative or positive pressure chimneys with wet or dry operating conditions. It is valid for chimneys with A_1 combustion A_1 appliances for fuels subject to the knowledge of the flue gas characteristics which are needed for the calculation.

The methods in this part of this European Standard are applicable to chimneys with one inlet connected with one appliance. The methods in Part 2 of this European Standard are applicable to chimneys with multiple inlets and one inlet with multiple appliances. Part 3 describes methods for the development of diagrams and tables for chimneys serving one A_1 combustion A_1 appliance.

2 Normative references

A_1 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. A_1

EN 1443, *Chimneys - General requirements*

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

EN 1859, *Chimneys — Metal chimneys — Test methods*

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

EN 15287-1:2007+A1:2010, *Chimneys - Design, installation and commissioning of chimneys - Part 1: Chimneys for non-roomsealed heating appliances*

prEN 16475-2, *Chimneys - Accessories - Part 2: Chimney fans - Requirements and test methods*

CEN/TR 1749, *European scheme for the classification of gas appliances according to the method of evacuation of the combustion products (types)*

3 Terms and definitions

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

A_1 ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp> A_1

3.1

heat output

Q

amount of heat produced by a A_1 combustion A_1 appliance per unit of time

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

-
- [Looking for additional Standards? Visit Intertek Inform Infostore](#)
 - [Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation](#)
-