



BSI Standards Publication

Residential solid fuel burning appliances

Part 2-5: Slow heat release appliances

National foreword

This British Standard is the UK implementation of EN 16510-2-5:2025. It supersedes BS EN 15250:2007, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee RHE/28, Domestic solid mineral fuel appliances.

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

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European foreword

This document (EN 16510-2-5:2025) has been prepared by Technical Committee CEN/TC 295 “Residential solid fuel burning appliances”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by October 2025, and conflicting national standards shall be withdrawn at the latest by October 2025.

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 supersedes EN 15250:2007.

EN 16510-2-5 includes the following significant technical changes with respect to EN 15250:2007:

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZA, which is an integral part of this document.

- the scope is updated with space heating appliances in residential buildings that can be fitted with a boiler or heat exchanger (integral part of the appliance containing water to be heated up) for the supply of hot water for central heating systems integral boiler or heat exchanger water heat output
- Measurement methods for NO_x, hydrocarbon and particulate matter emissions for solid fuel burning appliances;
- specifications for classification of solid fuel burning appliances and system boundaries for room sealed appliances;
- requirements for the safety of solid fuel burning appliances with water-bearing components added;
- Annex ZA updated according to requirements of M/577;
- Assessment and verification of constancy of performance – AVCP 3+ added;
- energy efficiency and energy class labelling and seasonal space heating efficiency added;
- requirements for environmental sustainability added.

This document has been prepared under a standardization request given to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For relationship with (EU) Regulation 305/2011, see informative Annex ZA, which is an integral part of this document.

The structure of EN 16510, *Residential solid fuel burning appliances*, is as follows:

- Part 1: *General requirements and test methods*;
- Part 2-1: *Roomheaters*;
- Part 2-2: *Inset appliances including open fires*;
- Part 2-3: *Cookers*;
- Part 2-4: *Independent boilers – Nominal heat output up to 50 kW*;
- Part 2-5: *Slow heat release appliances*;
- Part 2-6: *Mechanically by wood pellets fed roomheaters, inset appliances and cookers*.

Other sections of Part 2 will be added to cover residential solid fuel burning appliances not included in parts 2-1 to 2-6.

Subclauses and Figures which are additional to those in EN 16510-1:2022 are numbered starting with 501. Annexes which are additional to those in EN 16510-1:2022 are numbered starting with EA.

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 organisations 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

The energy efficiency classification is aligned with Commission Regulation (EU) 2015/1186, Annex II. Upon the revision of Regulation (EU) 2015/1186, the standard should be updated to reflect the new classification.

The threshold levels for OGC, CO, NO_x and PM emissions and the threshold levels for the seasonal space heating energy efficiency are aligned with Commission Regulation (EU) 2015/1185, Annex II. Upon the revision of Regulation 2015/1185, the standard should be updated to reflect the new classification.

1 Scope

This document is applicable to slow heat release appliances for solid fuel (freestanding manually fuelled intermittent burning slow heat release appliances (SHRA) having heat storage capacity such that they can provide heat and release it for an extended period after the fire has gone out).

The intended use of the appliances is space heating in residential buildings. They can be fitted with a boiler or heat exchanger (integral part of the appliance containing water to be heated up) for the supply of hot water for central heating systems.

These slow heat release appliances may be supplied either as an assembled appliance or as a pre-designed unit consisting of prefabricated components designed to be built on site in accordance with the specified assembly instructions.

These appliances can burn one or more types of the following solid fuels as specified:

- wood logs;
- compressed untreated wood;
- wood pellets;
- lignite briquettes;
- solid mineral fuels;
- peat briquettes.

This document is not applicable to:

- mechanically fed appliances
- appliances with fan assisted combustion air
- one off installations

This document specifies procedures for assessment and verification of constancy of performance (AVCP) of characteristics of solid fuel burning slow heat release 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 15804:2012+A2:2019, *Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products*

EN 16510-1:2022, *Residential solid fuel burning appliances - Part 1: General requirements and test methods*

EN 16510-2-4:2022, *Residential solid fuel burning appliances - Part 2-4: Independent boilers - Nominal heat output up to 50 kW*

EN 993-1:2018, *Methods of test for dense shaped refractory products - Part 1: Determination of bulk density, apparent porosity and true porosity*

EN 993-10:2020, *Methods of test for dense shaped refractory products - Part 10: Determination of permanent change in dimensions on heating*

EN 993-12:1997, *Methods of test for dense shaped refractory products - Part 12: Determination of pyrometric cone equivalent (refractoriness)*

EN 1936:2006, *Natural stone test methods - Determination of real density and apparent density, and of total and open porosity*

EN 303-5:2021,¹ *Heating boilers - Part 5: Heating boilers for solid fuels, manually and automatically stoked, nominal heat output of up to 500 kW - Terminology, requirements, testing and marking*

EN 14597:2012, *Temperature control devices and temperature limiters for heat generating systems*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16510-1:2022 and the following apply.

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

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

3.14

EN 16510-1:2022 definition 3.14 is replaced in this document with following:

batch charge

for slow heat release appliances proportion of the test load as specified for slow heat release appliances that can be added at specified intervals during the test period of the performance test at nominal heat output

3.501

total energy

thermal energy of slow heat release appliance transferred to the room over whole heat release period of heating cycle, expressed in [kWh]

3.502

test load

mass of test fuel specified for the burning period

Note 1 to entry: The test load can be added as batch charges if this is specified in the appliance instructions.

3.503

burning period

period when test load is burned in SHRA

3.504

heat release period

period when the SHRA provides the heat by radiation and convection from the surface of the appliance into the space where the appliance is installed

¹ Impacted by EN 303-5:2021+A1:2022.

4 Characteristics

4.1 Load bearing capacity

The performance of the appliance in relation to the ability to carry a chimney shall be determined in accordance with A.4.10 of this document and EN 16510-1:2022, 4.6.

If for an appliance with an upper outlet the ability to carry a chimney is specified the value of the maximum load is to be given in [kg] as an integer according to EN 16510-1:2022, Table 22, no. 57 (m_{chim}).

4.2 Protection of combustible materials

The performance of the appliance in relation to protection of combustible materials shall be determined in accordance with A.4.10 of this document and EN 16510-1:2022, 5.6.

When tested in accordance with EN 16510-1:2022, 5.6, the protection measure(s) as specified according to Table 1 shall be given as minimum distance to combustibles and if appropriate as material type and thickness of protective insulation material.

The protection measures as specified shall be given in [mm] as an integer according to EN 16510-1:2022, Table 22, no. 33, 34, 35, 36, 37, 38, 39 and 41 (d_R , d_S , d_C , d_P , d_F , d_L , d_B , s).

Table 1 — Protection of combustible materials

Protection measure	Declared clearance distance to combustible material or thickness of protective insulation material [mm]	Protective insulation material if any
Minimum distance to combustibles - bottom (d_B)		-
Minimum distance to combustibles – floor in front (d_F)		-
Minimum distance to combustibles – ceiling (d_C)		-
Minimum distance to combustibles – rear (d_R)		-
Minimum distance to combustibles – side (d_S)		-
Minimum distance to combustibles – side radiation area (d_L)		-

Protection measure	Declared clearance distance to combustible material or thickness of protective insulation material [mm]	Protective insulation material if any
Minimum distance to adjacent combustible materials (e.g. furniture) (d_p)		-
Protective insulation material (s)		

4.3 Carbon monoxide emission (CO)

The performance of the appliance in relation to carbon monoxide emission at nominal heat output shall be determined in accordance with A.4.7 of this document and EN 16510-1:2022, 6.3.2.

The CO value specified at nominal heat output is to be given in $[\text{mg}/\text{m}^3]$ as an integer according to EN 16510-1:2022, Table 22, no. 17 (CO_{nom} (13 % O_2)).

When tested in accordance with A.4.7 and EN 16510-1:2022, 6.3.2 the CO emission at nominal heat output shall not exceed the threshold levels as given in Table 2.

Table 2 — Threshold levels for CO emission

Appliance type	Threshold level at 13 % O_2
open fronted solid fuel local space heaters	2000 mg/m^3
closed fronted solid fuel local space heaters using solid fuel other than compressed wood in the form of pellets including cookers	1500 mg/m^3
closed fronted solid fuel local space heaters using compressed wood in form of pellets including cookers	300 mg/m^3

4.4 Nitrogen oxides (NO_x) emissions

The performance of the appliance in relation to nitrogen oxides emissions at nominal heat output shall be determined in accordance with A.4.7 of this document and EN 16510-1:2022, 6.3.3.

The NO_x value specified at nominal heat output is to be given in $[\text{mg}/\text{m}^3]$ as an integer according to EN 16510-1:2022, Table 22, no. 20 ($\text{NO}_{x\text{nom}}$ (13 % O_2)).

When tested in accordance with A.4.7 and EN 16510-1:2022, 6.3.3 the NO_x emissions at nominal heat output shall not exceed the threshold levels as given in Table 3.

Table 3 — Threshold levels for NO_x emissions (expressed as NO₂)

Appliance type	Threshold level at 13 % O ₂
open fronted solid fuel local space heaters, closed fronted solid fuel local space heaters and cookers using biomass	200 mg/m ³
open fronted solid fuel local space heaters, closed fronted solid fuel local space heaters and cookers using fossil solid fuel	300 mg/m ³

4.5 Emission of organic gaseous compounds (OGC)

The performance of the appliance in relation to organic gaseous compounds emission at nominal heat output shall be determined in accordance with A.4.7 of this document and EN 16510-1:2022, 6.3.4.

The OGC value specified at nominal heat output is to be given in [mg/m³] as an integer according to EN 16510-1:2022, Table 22, no. 23 (OGC_{nom} (13 % O₂)).

When tested in accordance with A.4.7 and EN 16510-1:2022, 6.3.4 the OGC emission at nominal heat output shall not exceed the threshold levels as given in Table 4.

Table 4 — Threshold levels for OGC emission (expressed as C)

Appliance type	Threshold level at 13 % O ₂
open fronted solid fuel local space heaters	120 mg C/m ³
closed fronted solid fuel local space heaters using solid fuel other than compressed wood in the form of pellets including cookers	120 mg C/m ³
closed fronted solid fuel local space heaters using compressed wood in form of pellets including cookers	60 mg C/ m ³

4.6 Particulate matter (PM) emissions

The performance of the appliance in relation to particulate matter emissions at nominal heat output shall be determined in accordance with A.4.7 of this document and EN 16510-1:2022, 6.3.5.

The particulate matter value specified at nominal heat output is to be given in [mg/m³] as an integer according to EN 16510-1:2022, Table 22, no. 26 (PM_{nom} (13 % O₂)).

When tested in accordance with A.4.7 and EN 16510-1:2022, 6.3.5 the particulate matter (PM) emissions at nominal heat output shall not exceed the threshold levels as given in Table 5.

Table 5 — Threshold levels for PM emissions

Appliance type	Threshold level at 13 % O ₂
open fronted solid fuel local space heaters	50 mg/m ³
closed fronted solid fuel local space heaters using solid fuel other than compressed wood in the form of pellets and cookers	40 mg/m ³
closed fronted solid fuel local space heaters using compressed wood in form of pellets	20 mg/m ³

4.7 Safety and accessibility in use

4.7.1 General

The data for the installation to a chimney are to be evaluated at nominal heat output. Specific data are to be evaluated at safety test heat output.

4.7.2 Flue gas outlet temperature at nominal heat output

The performance of the appliance in relation to flue gas outlet temperature at nominal heat output shall be determined in accordance with A.4.7 of this document and EN 16510-1:2022, 6.2.1.

The value of the flue gas outlet temperature for the installation of the appliance to a chimney if specified is to be given in [°C] as an integer according to EN 16510-1:2022, Table 22, no. 47 (T_{snom}).

4.7.3 Minimum flue draught at nominal heat output

The performance of the appliance in relation to the minimum flue draught at nominal heat output shall be determined in accordance with A.4.7 of this document and EN 16510-1:2022, 6.5.

The value of the minimum flue draught if specified at nominal heat output for the installation of the appliance to a chimney is to be given in [Pa] as an integer according to EN 16510-1:2022, Table 22, no. 29 (p_{nom}).

4.7.4 Flue gas mass flow at nominal heat output

The performance of the appliance in relation to the flue gas mass flow at nominal heat output shall be determined in accordance with A.4.7 of this document and EN 16510-1:2022, 6.12.

The flue gas mass flow value if specified at nominal heat output for the installation of the appliance to a chimney is to be given in [g/s] with 1 decimal according to EN 16510-1:2022, Table 22, no. 50 ($\phi_{\text{f,g nom}}$).

4.7.5 Fire safety of installation to the chimney

The performance of the appliance in relation to the flue gas temperature (mean value) at safety test shall be determined in accordance with A.4.10 of this document.

The data for installation of the appliance to a chimney with regards to the fire safety if specified is to be given as the Tclass of the chimney required according to EN 16510-1:2022, 6.2.2 and EN 16510-1:2022, Table 22, no. 49.

4.8 Energy economy and heat retention

4.8.1 Space heat output at nominal heat output

The performance of the appliance in relation to space heat output at nominal heat output shall be determined in accordance with A.4.7 of this document.

The space heat output of the appliance if specified at nominal heat output is to be given in [kW] with 1 decimal according to EN 16510-1:2022, Table 22, no. 2 (P_{SHnom}).

For the proper performance of the appliance the following shall be considered as well for those essential characteristics and descriptive features assessed during the nominal heat output test (A.4.7 of this document).

Additional devices, such as flue gas outlet components, components built-in the flue ways, combustion air supply control devices, charging doors and ash-pit doors, flue bypass devices, internal flue gas diverters, front fire bars and/or draught regulators for the safety or function of the appliance may be present.

Some of these devices are optional, but if present their influence on the performance of the appliance shall be checked according to EN 16510-1:2022, 4.4.4, 4.4.6, 4.4.9, 4.4.11, 4.4.12, 4.4.13, 4.4.14, and 4.4.16.

4.8.2 Water heat output, if existing at nominal heat output

The performance of the appliance in relation to water heat output (where appropriate) at nominal heat output shall be determined in accordance with A.4.7 of this document.

The water heat output of the appliance if specified at nominal heat output is to be given in [kW] with 1 decimal according to EN 16510-1:2022, Table 22, no. 3 (P_{Wnom}).

4.8.3 Efficiency at nominal heat output

The performance of the appliance in relation to efficiency at nominal heat output shall be determined in accordance with A.4.7 of this document.

The efficiency of the appliance if specified at nominal heat output is to be given in [%] as an integer according to EN 16510-1:2022, Table 22, no. 13 (η_{nom}).

4.8.4 Seasonal space heating efficiency at appliance's nominal heat output

The performance of the appliance in relation to seasonal space heating efficiency at nominal heat output shall be determined in accordance with EN 16510-1:2022, 6.4.2.

The seasonal space heating efficiency of the appliance if specified at nominal heat output is to be given in [%] as an integer according to EN 16510-1:2022, Table 22, no. 15 (η_s).

When tested in accordance with EN 16510-1:2022, 6.4.2 the seasonal space heating efficiency at nominal heat output shall not underrun the threshold levels as given in Table 6.

Table 6— Threshold level of seasonal space heating energy efficiency

Appliance type	Threshold level
open fronted solid fuel local space heaters	30 %
closed fronted solid fuel local space heaters using solid fuel other than compressed wood in the form of pellets	65 %
closed fronted solid fuel local space heaters using compressed wood in the form of pellets	79 %

4.8.5 Energy efficiency

The performance of the appliance in relation to energy efficiency classification shall be determined in accordance with EN 16510-1:2022, 6.4.3.

The energy efficiency classification of the appliance if specified shall be given according to EN 16510-1:2022, Table 22, no. 16 (EEI) and shall be determined according to Table 7.

Table 7— Energy efficiency classification based on the energy efficiency index (EEI)

Energy efficiency class	Energy efficiency index (EEI)
A++	$EEI \geq 130$
A+	$107 \leq EEI < 130$
A	$88 \leq EEI < 107$
B	$82 \leq EEI < 88$
C	$77 \leq EEI < 82$

Energy efficiency class	Energy efficiency index (EEI)
D	$72 \leq \text{EEI} < 77$
E	$62 \leq \text{EEI} < 72$
F	$42 \leq \text{EEI} < 62$
G	$\text{EEI} < 42$

4.8.6 Electric power consumption at nominal heat output, if existing

The performance of the appliance in relation to electric power consumption at nominal heat output shall be determined in accordance with A.4.7 of this document and EN 16510-1:2022, 6.11.

The electric power consumption of the appliance if specified at nominal heat output is to be given in [kW] with 3 decimals according to EN 16510-1:2022, Table 22, no. 43 (e_{max}).

4.8.7 Standby mode power consumption, if existing

The performance of the appliance in relation to standby mode power consumption at standby mode (where appropriate) shall be determined in accordance with A.4.7 of this document and EN 16510-1:2022, 6.11.

The standby mode power consumption of the appliance if specified is to be given in [kW] with 3 decimals according to EN 16510-1:2022, Table 22, no. 42 (e_{SB}).

4.8.501 Total energy at nominal heat output

The performance of the SHRA in relation to total energy at nominal heat output shall be determined in accordance with A.4.7 and A.6.2.501 of this document. Total energy (E_{kWh}) at nominal heat output is to be given in [kWh] with 1 decimal.

4.8.502 Heat release period at nominal heat output

The performance of heat release period of SHRA shall be determined from the surface temperatures defined in Clauses A.4.7 and A.2.501 of this document. The times T100 %, T50 %, T25 % of heat release period at nominal heat output is to be given [h] with 1 decimal.

When tested in accordance with A.4.7 of this document the minimum heat release time defined by T50 % - T100 % at nominal heat output shall not be less than 4 h.

For the calculation of time specific heat output use Annex EA.

4.9 Environmental sustainability

All relevant elements of the performance related to the whole life cycle of the appliance shall be identified and enumerated on the basis on the information modules of EN 15804:2012+A2:2019.

The necessary environmental sustainability information shall be determined to enable the life cycle analysis of the appliance concerned and the declaration of its performance in relation to the essential characteristic environmental sustainability. This shall comprise in particular the definition of the scenarios required for this complete period, including the reference service life, where appropriate.

The performance of the appliance in relation to the environmental sustainability shall be determined in accordance with EN 16510-1:2022, Clause 8.

The environmental sustainability elements are given in Table 8.

Table 8 —Elements for the environmental sustainability

Environmental sustainability elements	to be given in
Global Warming Potential total (GWP-total)	kg CO ₂ equivalent
Global Warming Potential (GWP-fossil)	kg CO ₂ equivalent
Global Warming Potential (GWP-biogenic)	kg CO ₂ equivalent
Global Warming Potential land use and land use change (GWP-luluc)	kg CO ₂ equivalent
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 equivalent
Acidification potential, Accumulated Exceedance (AP)	mol H ⁺ equivalent
Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	kg PO ₄ equivalent
Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	kg N equivalent
Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	mol N equivalent
Formation potential of tropospheric ozone (POCP)	kg NMVOC equivalent
Abiotic depletion potential for non-fossil resources (ADP-minerals and metals)	kg Sb equivalent
Abiotic depletion potential for fossil resources (ADP-fossil)	MJ, net calorific value
Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	m ³ world equivalent deprived
Potential incidence of disease due to PM emissions (PM)	Disease incidence
Potential Human exposure efficiency relative to U235 (IRP)	kBq U235 equivalent
Eco-toxicity (freshwater) (ETP-fw)	CTUe
Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe
Potential Comparative Toxic Unit for humans (HTP-c)	CTUh
Potential Comparative Toxic Unit for humans (HTP-nc)	CTUh
Potential soil quality index (SQP)	dimensionless
Hazardous waste disposed	kg
Non-hazardous waste disposed	kg
Radioactive waste disposed	kg
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ, net calorific value
Use of renewable primary energy resources used as raw materials	MJ, net calorific value
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ, net calorific value
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ, net calorific value