

Inset appliances including open fires fired by solid fuels — Requirements and test methods

ICS 97.100.30

National foreword

This British Standard is the UK implementation of EN 13229:2001+A2:2004, incorporating corrigenda September 2003, June 2006 and August 2007. It supersedes BS EN 13229:2001+A1:2003 which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by A1 A1.

The start and finish of text introduced or altered by corrigendum is indicated in the text by tags. Text altered by CEN corrigendum August 2007 is indicated in the text by AC1 AC1.

Conflicting national standards will need either to be withdrawn or amended and these are under consideration in Technical Committee RHE/28. It is the intention of the committee to reach a decision by April 2008 on which course of action will be taken.

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 secretary.

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

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

Amendments/corrigenda issued since publication

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	30 April 2008	Implementation of CEN corrigendum August 2007

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English version

Inset appliances including open fires fired by solid fuels — Requirements and test methods

Foyers ouverts et inserts à combustibles solides —
Exigences et méthodes d'essai

Kamineinsätze einschließlich offene Kamine für feste
Brennstoffe — Anforderungen und Prüfung

This European Standard was approved by CEN on 7 April 2001.

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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 Management Centre has the same status as the official versions.

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Foreword

This European Standard 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 December 2001, and conflicting national standards shall be withdrawn at the latest by December 2002.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Foreword to amendment A1

This document (EN 13229:2001/A1:2003) has been prepared by Technical Committee CEN/TC 295 "Residential solid fuel burning appliances", the secretariat of which is held by BSI.

This Amendment to the European Standard EN 13229:2001 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2003, and conflicting national standards shall be withdrawn at the latest by September 2003.

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Foreword to amendment A2

This document (EN 13229:2001/A2:2004) has been prepared by Technical Committee CEN/TC 295 "Residential solid fuel burning appliances", the secretariat of which is held by BSI.

This Amendment to the European Standard EN 13229:2001 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2005, and conflicting national standards shall be withdrawn at the latest by July 2007.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directives.

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

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1 Scope

This European Standard specifies requirements relating to the design, manufacture, construction, safety and performance (efficiency and emission), instructions and marking together with associated test methods for type testing, residential open fires and inset appliances fired by solid fuel.

This standard is applicable to hand fired appliances which are listed under categories 1b, 1c, 2b, 2c, 3a, 3b and 3c of Table 1. The surround of the appliances is integrated with the building with the exception of free-standing appliances and inset appliances which are installed into a fireplace recess or enclosure.

A1 This standard also covers ‘Kachelöfen’ and ‘Putzöfen’ inset appliances, having nominal heat outputs up to 15 kW in accordance with category 1c of table 1. **A1**

This standard is not applicable to appliances with fan assisted combustion air.

These appliances provide heat into the space where they are installed. Additionally, where fitted with a boiler, they also provide domestic hot water and/or central heating. They may burn either solid mineral fuels, peat briquettes, natural or manufactured wood logs or be multi-fuel in accordance with the appliance manufacturer's instructions.

Open fireplace components such as a bottomgrate with associated firefront which the manufacturer supplies for installation into an existing heat resistant, insulated firebox are not covered by this standard.

Table 1 - Categorisation of appliances

	a)	b)	c)
	Freestanding or inset appliances without functional modification	Freestanding or inset appliances which have functional modification	Inset appliances for fireplace recess and enclosure
1 appliances operating with firedoors closed	EN 13240	EN 13229	EN 13229
2 appliances operating with firedoors closed or open	EN 13240	EN 13229	EN 13229
3 open fires without firedoors	EN 13229	EN 13229	EN 13229
NOTE Without functional modification means a modification of the surround of an appliance, that only changes the transmission of heat, without effect on combustion.			

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication applies (including amendments).

- ^{A1} DIN 51060:1975 Refractory ceramic products and construction materials – Terms and definitions ■^{A1}
- EN 1561:1997 Founding - Grey cast irons
- EN 1563:1997 Founding - Spheroidal graphite cast irons
- EN 10025:1993 Hot rolled products of non-alloy structural steels - Technical delivery conditions
- EN 10027-2 :1992 Designation systems for steels - Part 2 : Numerical system
- EN 10028-2:1992 Flat products made of steels for pressure purposes - Part 2: Non-alloy and alloy steels with specified elevated temperature properties
- EN 10029:1991 Hot rolled steel plates 3 mm thick or above - Tolerances on dimensions, shape and mass
- EN 10088-2:1995 Stainless steels - Part 2: Technical delivery conditions for sheet/plate and strip for general purposes
- EN 10111:1998 Continuously hot-rolled low carbon steel sheet and strip for cold forming - Technical delivery conditions
- EN 10120:1996 Steel sheet and strip for welded gas cylinders
- ^{A2} EN 50165 Electrical equipment of non-electric appliances for household and similar purposes – Safety requirements ■^{A2}
- ISO 7-1: 1994 Pipe threads where pressure-tight joints are made on the threads - Part 1: Dimensions, tolerances and designation
- ISO 7-2: 2000 Pipe threads where pressure-tight joints are made on the threads - Part 2: Verification by means of limit gauges
- ISO 228-1: 2000 Pipe threads where pressure-tight joints are not made on the threads - Part 1: Dimension, tolerances and designation
- ISO 228-2: 1987 Pipe threads where pressure-tight joints are not made on the threads - Part 2: Verification by means of limit gauges

ISO 331:1983	Coal - Determination of moisture in the analysis sample - Direct gravimetric method
ISO 334:1992	Solid mineral fuels - Determination of total sulfur - Eschka method
ISO 351:1996	Solid mineral fuels - Determination of total sulfur - High temperature combustion method
ISO 501:1981	Coal - Determination of the crucible swelling number
ISO 562:1998	Hard coal and coke - Determination of volatile matter
ISO 609:1996	Solid mineral fuels - Determination of carbon and hydrogen - High temperature combustion method
ISO 687:1974	Coke - Determination of moisture in the analysis sample
ISO 1171:1997	Solid mineral fuels - Determination of ash content
ISO 1928:1995	Solid mineral fuels - Determination of gross calorific value by the bomb calorimetric method, and calculation of net calorific value
ISO 2859 (all parts)	Sampling procedures for inspection by attributes

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

3.1 Appliances

3.1.1

appliance with boiler

heat generator consisting of a room heating component and a water heating component in one unit

3.1.2

continuous burning appliance

heating appliance designed to provide a source of heat by continuous burning and meeting the requirement of the slow combustion test

3.1.3

fireplace recess

space formed in a wall or chimney breast constructed from non combustibile materials and into which a heating appliance may be installed and from which a chimney flue leads

3.1.4

fireplace enclosure

assembly consisting of walls and ceiling of non-combustible materials which is built on site to surround a heat generator and heat exchanger and to form a space from which hot convection air is emitted into the living space e.g. by means of air grilles

3.1.5

freestanding appliance

appliance designed to operate without the need to be built into a fireplace recess or fireplace enclosure and which is not connected to the building except by the flue gas connector

3.1.6

inset appliance

appliance with or without firedoors designed to be installed into a fireplace recess or an enclosure, or into a firebox of an open fire

3.1.7

intermittent burning appliance

heating appliance designed to provide a source of heat by intermittent burning and meeting the requirement of the reduced combustion test

NOTE An appliance may be either a continuous burning appliance or an intermittent burning appliance according to the fuel used.

3.1.8

open fire

appliance which is built as an inset and designed to be connected to the building and surrounded by non combustible materials

3.1.9

roomheater

appliance having a fully enclosed firebox with firedoor which is normally closed, that distributes heat by radiation and/or convection and also provides hot water when fitted with a boiler

A1 3.1.10

“Kachelöfen” or “Putzöfen” inset

appliance consisting of a heat generator connected to a heat-exchanger forming the flueway and surrounded by an enclosure. The ‘Kachelöfen’ and ‘Putzöfen’ inset appliance may be fitted with a thermostat to automatically control the room temperature **A1**

3.2 Functional characteristics

3.2.1

ash content of the fuel

solid matter remaining after the complete combustion of solid fuel

3.2.2

basic firebed

quantity of glowing embers which ensures ignition of the test fuel to be charged

NOTE The basic firebed may be specified by the manufacturer.

3.2.3

burning rate

reduction in the mass of fuel per unit of time

3.2.4

combustion air

air supplied to the firebox, which is entirely or partially used to burn the fuel

3.2.5

combustion gases

compounds in gaseous form produced inside the appliance when the fuel is burned

3.2.6

efficiency

ratio of total heat output to total heat input expressed as a percentage during the test period

3.2.7

flue draught

differential between the static air pressure in the place of installation and the static pressure at the flue gas measurement point

3.2.8

flue gases

gaseous compounds leaving the appliance flue spigot and entering the flue gas connector

3.2.9

flue gas mass flow

mass of flue gas drawn off from the appliance per unit of time

3.2.10

flue gas temperature

temperature of the flue gas at the specified point in the measurement section

3.2.11

heat input

quantity of energy which the fuel provides to the appliance

3.2.12

maximum water operating pressure

limiting water pressure at which the boiler of an appliance can be safely operated

[A1] 3.2.13

nominal heat output

total heat output of the appliance without accumulation quoted by the manufacturer and achieved under defined test conditions when burning the specified test fuel **[A1]**

3.2.14

operating tool

device supplied with the appliance for handling movable and/or hot components

3.2.15

recovery capability

ability of the appliance to re-ignite existing or newly charged fuel after a defined burning period without external assistance

3.2.16

reduced combustion capability

ability of an intermittent burning appliance to continue burning for a minimum period, dependent on appliance type and fuel burned, without any input of fuel and without any external interference with the combustion process, in such a manner that at the end of the test the basic firebed can be recovered

3.2.17

refuelling interval

period of time for which the combustion may be maintained in the appliance with a single load of fuel, without intervention by the user

3.2.18

residue

ashes, including combustibles, which collect in the ashpit

3.2.19

routine test pressure

pressure to which all waterways are subjected during production at the manufacturer's plant or during setting up by the installer

3.2.20

slow combustion capability

ability of a continuous burning appliance to continue burning for a minimum period dependent on appliance type and fuel burned, without any input of fuel and without any external interference with the combustion process, in such a manner that the basic firebed can be recovered at the end of this period

3.2.21

slow combustion heat output

heat output achieved under slow combustion conditions during the test period

3.2.22

space heating output

heat output furnished by convection and radiation to the room

3.2.23

steady-state condition

stage in which values to be measured in successive equal periods of time do not exhibit significant change

3.2.24

temperature in the fuel storage container

temperature at the hottest point, measured in the area of possible fuel storage

3.2.25

total heat output

rate of useful heat released by the appliance

3.2.26

type test pressure

pressure to which all waterways of the test appliance are subjected

3.2.27

water flow temperature

temperature of the heated water exiting the appliance

3.2.28

water heating output

heat output to water, averaged during the test period

3.2.29

water return temperature

temperature of the cooled water entering the return tapping connectors of the appliance

A₁ 3.2.30

heat output

quantity of useful heat released by the appliance

3.2.31

accumulation heat output

quantity of useful heat released by an appliance with accumulator (i.e. the heat output from both the appliance and the accumulator) when burning the test fuel load stated by the manufacturer and achieved under defined test conditions in accordance with this standard (see A.4.10) **A₁**

3.3 Characteristics

3.3.1

air inlet control

manual or automatic device to control the quantity of air supplied for combustion

3.3.2

air grilles

components in the inlet and outlet openings to distribute and direct convection air flow

3.3.3

ashpan

removable receptacle shaped to receive the residues falling from the firebed

3.3.4

ashpit

enclosed chamber designed to receive the residues or the ashpan

3.3.5

boiler

vessel in which water is heated, intended for fitting in or forming an integral part of a solid fuel appliance

3.3.6

boiler flueway

portion of the flueway formed wholly or in part by the surfaces of the boiler

3.3.7

bottomgrate

part of the appliance at the base of the firebox which supports the firebed and through which the ash fall into the ashpan and combustion air and/or combustion gases may pass

3.3.8

charging door

door which covers the refuelling opening

3.3.9

combustion air selector

device for adjusting the primary and/or secondary air according to the type of fuel burnt

3.3.10

combustion area

surface covered with fuel which may have openings for the passage of the combustion air or combustion gases

3.3.11

combustion control device

mechanism for setting the primary and/or secondary air in accordance with the burning rate required

3.3.12

combustion gas baffle

device to change the direction of flow of the combustion gases

3.3.13

cut-off device

mechanism to block the flue when the appliance is not in use

3.3.14

damper

mechanism to change the resistance to flow of the combustion gases

3.3.15

de-ashing mechanism

mechanism to agitate or disturb the residues to facilitate their removal from the firebed

NOTE May also be used to change the bottomgrate operating positions on some appliances.

3.3.16

direct water system

hot water system in which stored domestic hot water is heated directly by hot water circulating from the boiler

3.3.17

draught regulator

inlet device for admission air downstream of the firebed, enabling the flue draught to be controlled

3.3.18

firebox; combustion chamber

that part of the appliance in which the fuel is burned

3.3.19

firebox opening

aperture in the firebox through which the appliance may be fuelled

3.3.20

firedoor

door through which the fire may be viewed and which may be opened to allow refuelling of the firebed

3.3.21

flue gas adaptor

fitting between the flue spigot of an appliance and the inlet to the flue gas connector or chimney flue which allows for variations in size and shape of components

3.3.22

flue by-pass device

device which in the open position allows flue gases to pass directly to the flue spigot

NOTE This can be used as a preheating aid to overcome chimney condensation.

3.3.23

flue gas connector

A₂ duct through which flue gases are conveyed from the flue spigot of the appliance into the chimney flue **A₂**

3.3.24

flue spigot/flue socket

integral part of the appliance for connecting the flue gas connector, thus permitting the deliberate escape of products of combustion into the chimney flue

3.3.25

flueway

the part of the appliance designed to convey combustion gases from the firebox to the flue spigot

3.3.26

front firebars/deepening plate

grating or plate fitted at the front of a firebox opening to prevent spillage of fuel and ash or to change the firebox capacity, or both

3.3.27

fuel hopper

fuel store integral with the appliance from which fuel is fed to the firebox

3.3.28

indirect water system

hot water system in which stored domestic hot water is heated by a primary heater through which hot water from the boiler is circulated without mixing of primary (heating) water and the stored domestic hot water

3.3.29

integral fuel storage container

enclosed area forming part of the appliance, but not connected directly to the fuel charging area, in which fuel is stored prior to it being physically transferred by the user to the fuel charging position

3.3.30

primary air

combustion air which passes through the fuel bed

3.3.31

safety heat exchanger

device which allows excess heat to be released from an appliance

3.3.32

secondary air

air supplied for the purpose of completing combustion of gases leaving the fuel bed

3.3.33

thermal discharge control

mechanical device controlled by the water flow temperature which opens a drain in the water circuit of a safety heat exchanger when a specified flow temperature is attained

3.3.34

thermostat

temperature sensitive device which automatically changes the combustion air inlet cross sectional area

3.3.35

working surfaces

all surfaces of an appliance designed to transmit heat to the surrounding atmosphere

NOTE All external surfaces of an appliance including the flue gas connector in accordance with this standard are classified as working surfaces because they are designed to transmit heat to the room in which they are installed.

Ⓐ 3.3.36

accumulator

that part of the appliance forming the flueway consisting of ceramic materials and designed for accumulation of the heat released by the heat generator

3.3.37

accumulator load

quantity of heat which the fuel provides to the appliance for accumulation Ⓐ

A1 3.3.38

firedoor window

window through which the fire can be observed

3.3.39

heat exchanger

device connected to the heat generator by a flue gas pipe which extends the heat surface and may be used as an accumulator

3.3.40

heat generator

component of an inset in which the fuel is burned

3.3.41

heat generator flue spigot

part of the heat generator for connecting the flue gas pipe (see Figure A.13)

3.3.42

automatically operated inset

inset equipped with a temperature thermostat to adjust output and room temperature and, if applicable, with control devices operated by auxiliary energy

3.3.43

room temperature thermostat

device designed to keep nearly steady the manually set room temperature **A1**

3.4 Fuels

3.4.1

recommended fuels

fuel of commercial quality, listed in the appliance manufacturer's instructions, and shown to achieve the claimed performance when tested according to this European Standard

3.4.2

solid fuel

naturally occurring or manufactured solid mineral fuels, natural or manufactured wood logs and peat briquettes

3.4.3

solid mineral fuels

coal, lignite, coke and fuels derived from these

3.4.4

test fuel

fuel of commercial quality being characteristic of its type to be used for testing appliances

4 Materials, design and construction

4.1 Production documentation

The manufacturer shall state the type of appliance which he submits for type testing and the test laboratory shall test the appliance using the provisions appropriate to that claim.

A2 The parameters and characteristics considered in making the decisions in relation to either the family or range of appliances to be submitted for initial type testing (see 9.2.1) or further type testing where changes are made to an appliance (see 9.2.2) shall be recorded. A copy of the parameters and characteristics considered in making the decisions shall be included in the production documentation for each appliance. **A2**

To identify the appliance, the manufacturer shall have available documents and/or scaled assembly drawings showing the basic design and construction of the appliance. The documentation and/or the drawings shall include at least the following information:

- the specification of the materials used in the construction of the appliance,
- the nominal heat output in kW using fuels recommended by the manufacturer.

If the appliance is fitted with a boiler then the following additional details shall also be specified:

- the welding process used in the manufacture of the boiler shell;

NOTE The symbol for the type of weld used is sufficient.

- the permissible maximum operating water temperature in °C;
- the permissible maximum operating pressure in bar;
- the type test pressure in bar;
- the water heating output in kW.

4.2 General construction requirements

The shape and dimensions of the components and equipment and the method of design and manufacture and, if assembled on site, the method of assembly and installation shall ensure that, when operated in accordance with the provisions of the appropriate test and exposed to the associated mechanical, chemical and thermal stresses, the appliance shall operate reliably and safely such that during normal operation no combustion gases posing a hazard can escape into the room in which the appliance is installed nor can embers fall out.

Component parts such as covers, operating controls, safety devices and electrical accessories shall be arranged in such a way that their surface temperatures, under the test conditions described in A.4.7, do not exceed those specified either by the manufacturer or in the relevant component part standard.

No part of the appliance shall comprise of or contain asbestos. Hard solder, containing cadmium in its formulation, shall not be used.

Where thermal insulation is used, it shall be made of non-combustible material and shall not be a known hazard to health in its applied position.

NOTE The thermal insulation should withstand normal thermal and mechanical stresses.

Component parts which require periodic replacement and/or removal shall be either so designed or identified so as to ensure correct fitting.

Parts which act as a seal shall be located securely; for example by means of bolts or welding; to prevent the ingress or leakage of air, water or combustion products.

Where a seal is made with fire cement, the cement shall be supported by adjacent metal surfaces.

If the appliance is fitted with a boiler it shall meet the requirements given in 4.13 as appropriate to the material of construction and intended usage.

The boiler, if fitted, shall be capable of operating safely at the permissible maximum operating pressure declared by the manufacturer and shall meet the requirements of the type pressure test described in 5.8.

4.3 Flue spigot or socket

The flue spigot or socket where required for installation purposes shall be designed to enable a suitable gastight connection to be made between the flue gas connector and the appliance. The spigot or socket shall provide a good fit for the size of pipe recommended by the manufacturer. Where the flue gas connector fits over an outlet spigot the overlap shall be a length of at least 25 mm for a pipe diameter of 160 mm or less, and at least 40 mm for a pipe diameter greater than 160 mm. Where the flue gas connector fits into a socket, the insertion depth shall be a minimum of 25 mm.

NOTE It is recommended that provision is made for sealing internal connections with heat resistant sealing compound and/or sealing rope if required.

4.4 Combustion control device

The device shall be easily accessible and shall be permanently marked.

NOTE It is important that the effect of adjusting its controlling positions can be perceived by the user.

4.5 Flueways

[A1] 4.5.1 Kachelöfen or Putzöfen inset appliances

Flueways shall be tight and shall have tight cleaning openings, which allow a proper cleaning. Metal flueways shall be made of steel as given in Table 2 with a minimum thickness of 2 mm or cast iron as given in Table 5 with a thickness of 4 mm or of austenitic stainless steel with a thickness of 1 mm. Fireclay bricks, plates or components of flueways shall comply with DIN 51060. **[A1]**

[A1] 4.5.2 All other appliance types

It shall be possible to clean the flueways of the appliance completely using commercially available tools or brushes, unless special cleaning tools or brushes are provided by the manufacturer. The size of the flueway in its minimum dimension shall be not less than 30 mm except that where fuels other than bituminous coal are burned it shall be permissible to reduce it to not less than 15 mm provided an access door(s) is provided for cleaning the flueway. [A1]

4.6 Cleaning tools

The appliance manufacturer shall make available purpose designed brushes and scrapers where ordinary household brushes cannot be used effectively for cleaning internal flueways.

4.7 Firedoors and charging doors

Where the appliance is fitted with a firedoor or charging door they shall be large enough so that the appliance can be filled with the commercial fuels recommended by the manufacturer. When open any firedoors shall not obstruct the firebox opening. The door shall be designed to prevent accidental opening and to facilitate positive closure.

4.8 Combustion air supply

4.8.1 Primary air inlet control

The appliance shall be fitted with either a thermostatically controlled primary air inlet control or a manual primary air inlet control. The adjusting control shall be clearly visible or permanently marked so that its operation is readily understandable. Where an appliance is designed for multifuel use a means shall be provided for the user to identify the correct set position of the primary air inlet control for each fuel type. Means of identification of the thermostat shall also be provided by the appliance manufacturer.

NOTE The design should be such that during operation of the appliance, neither ash nor unburnt fuel can prevent the movement or the closure of the air inlet control.

4.8.2 Secondary air inlet control

Where a secondary air inlet control is provided the position of air entry shall be so designed that the passage of this air is not restricted when the firebox is filled to the manufacturer's recommended capacity.

NOTE A secondary air inlet control is recommended for admission of air to minimise the risk of condensation and the accumulation of combustion gases.

4.9 Internal flue gas diverter

Any internal flue gas diverter shall be capable of maintaining any position in which it is intended to be set and shall not isolate the firebox from the flue outlet. If a diverter is intended to be removable then it shall either be permanently and legibly marked or so designed and/or identified as to ensure correct assembly.

Any diverter control shall be permanently and legibly marked to identify its set position to the user.

4.10 Bottomgrate

Where the bottomgrate is removable it shall be designed or marked to ensure correct assembly. If a de-ashing mechanism is fitted it shall be capable of de-ashing the fuel bed in the area of the bottomgrate.

NOTE The preferred design should allow de-ashing to be carried out with the ashpit door closed. The de-ashing operation should be possible without undue effort. If it is necessary to remove the ashpit door to de-ash the fire, the appliance should be designed such that there is no undue spillage of ash or fuel from the appliance during the de-ashing operation.

[A1] Grate devices fitted to Kachelöfen or Putzöfen inset appliances shall be easy to de-ash without undue effort. **[A1]**

4.11 Front firebars and/or deepening plate

If the appliance is fitted with removable front firebars/deepening plates, they shall be designed such that they can be neither incorrectly fitted nor accidentally dislodged.

NOTE The front firebars/deepening plate should be designed to retain the fuel or ash during operation particularly during refuelling or de-ashing of the appliance.

4.12 Ashpan and ash removal

A means of removing the residue from the appliance shall be provided. Where an ashpan is provided, it shall be capable of containing the residue from two full charges of fuel whilst retaining sufficient space above to allow adequate primary air flow through the bottom grate or fire bed. If the ashpan resides in the appliance it shall locate in the ashpit in such a way that it allows the free passage of primary air and in such a position that does not obstruct any primary inlet control.

[A1] Kachelöfen or Putzöfen inset appliances designed to burn coal as well as wood shall be equipped with an ashpan having a minimum volume capacity of 0,8 dm³ per kW of nominal heat output. For Kachelöfen' or 'Putzöfen' insets which are specifically designed to burn wood logs and wood briquettes, and if they are equipped with an ashpan, the minimum volume capacity of this ashpan shall be 0,5 dm³ per kW of nominal heat output. **[A1]**

NOTE 1 An ashpan should be designed and constructed to ensure that:

- a) it effectively collects the residue material from beneath the bottomgrate;
- b) it can be easily and safely withdrawn, carried and emptied when hot, using the tool(s) provided, without undue spillage of residue material.

NOTE 2 The ashpan can be shovel shaped.

4.13 Integral boiler

4.13.1 General construction

The boiler shall be constructed from steel or cast iron and shall be capable of operating at the maximum water operating pressure stated by the manufacturer. This requirement shall be verified by the type pressure test in accordance with A.4.9.5.

The materials and dimensions for the boiler construction shall be in accordance with the specifications given in Tables 2 to 7.

One or more of the steel materials complying at least with the specifications given in Table 2 shall be used for the manufacture of those parts of the appliance subject to water pressure.

Table 2 - Steel material types

References	Material Type	Material number in accordance with EN 10027-2:1992
EN 10111:1998	DD 11	1.0332
	DD 12	1.0398
	DD 13	1.0335
	DD 14	1.0389
EN 10025 :1993	S235JR	1.0037
	S235JRG2	1.0038
	S235JO	1.0114
	S235J2G3	1.0116
	S275JR	1.0044
	S275JO	1.0143
	S275J2G3	1.0144
	S355JR	1.0045
	S355JO	1.0553
	S355J2G3	1.0570
	S355K2G3	1.0595
EN 10028-2:1992	P235GH	1.0345
	P265GH	1.0425
	P295GH	1.0481
	P355GH	1.0473
	16Mo3	1.5415
	13CrMo4-5	1.7335
	10CrMo9-10	1.7380
	10CrMo9-10	1.7383
EN 10120:1996	P245NB	1.0111
	P265NB	1.0423
	P310NB	1.0437
	P355NB	1.0557
EN 10088-2:1995	X5CrNi 18-10	1.4301
	X6CrNi 17-12-2	1.4401
	X6CrNiTi 18-10	1.4541
	X6CrNiNb 18-10	1.4550
	X6CrNiMo Ti 17-12-2	1.4571
	X6CrNiMoNb 17-12-2	1.4580
	X3CrNiMo 17-3-3	1.4436

NOTE Materials and wall thicknesses other than those specified may only be used on production of appropriate evidence as regards at least their equivalent corrosion resistance, heat resistance and strength to non-alloy steel at the material thicknesses specified in 4.13.2 for the particular application/usage.

4.13.2 Nominal minimum wall thickness (steels)

The nominal minimum wall thickness of steel sheets and tubes subject to water pressure shall be in accordance with Table 3.

The tolerances on the nominal minimum wall thicknesses for carbon steels given in Table 3 shall be as specified in EN 10029:1991.

Table 3 - Steel – Nominal minimum wall thicknesses

Application	Non-alloy steels mm	Stainless and corrosion protected steels mm	Non-alloy steels for appliances burning wood only and having maximum water operating pressures up to and including 2 bar mm
Walls of water backed surfaces of the combustion chamber in contact with burning fuel or products of combustion	5	2	3,5
Walls of convection heating surfaces outside combustion chamber (except circular tubes)	4	2	3
Circular tubes used in convection part of heat exchanger	3,2	1,5	3,2
Water cooled grate tubes	4	3	3
Surfaces other than those above	3	2	3
NOTE 1 The nominal minimum wall thicknesses apply to pressure loaded sheets and tubes, being part of the boiler construction. NOTE 2 The nominal minimum wall thicknesses listed have been specified taking into consideration the following parameters: - the permissible maximum water operating pressure (as stated by the manufacturer); - the material properties; - the heat transfer location.			

4.13.3 Welding and welding materials

The materials used shall be suitable for welding. The materials listed in Table 2 are suitable and do not require any additional heat treatment after welding.

4.13.4 Minimum wall thicknesses (cast iron)

The wall thicknesses given in the production drawing shall not be less than the minimum thickness listed in Table 4.

Table 4 - Cast Iron - Minimum wall thicknesses

Nominal heat output kW	Grey cast iron	Spheroidal Graphite cast iron
	Minimum wall thickness mm	
< 30	3,5	3,0
≥ 30 < 50	4,0	3,5

4.13.5 Cast iron parts subject to water pressure

The minimum mechanical properties of cast irons used for parts subject to water pressure shall meet the requirements given in Table 5.

Table 5 - Minimum mechanical requirements for cast iron

Grey cast iron (In accordance with EN 1561:1997)	
- Tensile strength R_m	> 150 N/mm ²
- Brinell hardness	160 HB to 220 HB
Spheroidal graphite cast iron (In accordance with EN 1563:1997)	
- Tensile strength R_m	> 400 N/mm ²
- Elongation	18 % A_3

4.13.6 Venting of the water sections

The water sections of the boiler shall be vented. The boiler shall be so designed that under normal operation in accordance with the manufacturer's instructions, no undue boiling occurs.

4.13.7 Water tightness

Holes, for screws and components which are used for the attachment or removal of parts shall not open into waterways or spaces through which water flows.

NOTE This does not apply to pockets for measuring, control and safety equipment.

4.13.8 Water side connections

The thread size of the flow and return tappings shall be not less than the minimum thread size designation given in Table 6.

Where tapered threads are used, they shall be in accordance with the requirements of ISO 7-1:1994 and ISO 7-2:2000. Where parallel threads are used, they shall be in accordance with ISO 228-1:2000 and ISO 228-2:1987. The design and position of flow tappings shall be such that air will not be retained within the boiler shell.

Table 6 - Minimum thread size designation of flow and return tappings

Nominal heat output kW	Gravity circulation thread size designation ¹⁾	Pumped circulation thread size designation ¹⁾
≤ 22	1	½
> 22 ≤ 35	1¼	1
> 35 < 50	1½	1
¹⁾ Designation in accordance with ISO 7-1:1994 and ISO 7-2:2000 or ISO 228-1:2000 and ISO 228-2:1987.		

If boilers are supplied with reducing bushes in horizontal flow tappings, these shall be eccentric and fixed so that the reduced outlet is uppermost. The minimum depth of tapping or length of thread shall conform to Table 7.

Table 7 - Minimum depth of tapping or length of thread

Thread size designation ¹⁾	Minimum depth or length of thread mm
½ to 1¼	16
1½	19
¹⁾ Designation in accordance with ISO 7-1:1994 and ISO 7-2:2000 or ISO 228-1:2000 and ISO 228-2:1987	

Where a drain socket is provided in the boiler shell, it shall be a minimum thread size designation of ½ and shall be in accordance with ISO 7-1:1994 and ISO 7-2:2000 or ISO 228-1:2000 and ISO 228-2:1987.

4.13.9 Boiler internal waterways

4.13.9.1 Design of all boiler waterways

The design of the boiler shall ensure a free flow of water through all parts. To minimise the build up of sediment, designed sharp or wedge shaped waterways with a taper towards the bottom shall be avoided. Where inspection holes are provided in the boiler to give access for inspection and cleaning of the waterways, they shall be of minimum size 70 mm x 40 mm or have a minimum diameter of 70 mm and be sealed with a gasket and cap.

4.13.9.2 Boiler waterways used with indirect water systems

The minimum internal dimension of waterways throughout the main body of the appliance shall be not less than 20 mm, except where waterways have to be reduced locally to facilitate manufacture or are in areas not in direct contact with burning fuel: in these cases the width of the waterways shall not be less than 15 mm.

4.13.9.3 Boiler waterways used with direct water systems

The minimum internal dimension of waterways in boilers designed for direct water systems shall not be less than 25 mm.

4.14 Control of flue gas

If a flue damper is fitted, it shall be a type which does not block the flue totally by accumulation of combustion residue. The damper shall be easy to operate and incorporate an aperture within the blade which, in a continuous area, occupies at least 20 cm² or 3 % of the cross-sectional area of the blade if this is greater.

The position of the damper shall be recognisable to the user from the setting of the device.

If a draught regulator is fitted the minimum cross sectional area requirement shall not be applicable but the device shall be easily accessible for cleaning.

4.15 Cleaning of heating surfaces

All heating surfaces shall be accessible from the flue gas side for inspection and cleaning. Where cleaning and servicing of the boiler and its components require special tools (eg. special brushes) these shall be supplied by the manufacturer.

5 Safety

5.1 Cut-off device for appliances without doors

If a cut-off device is fitted to an appliance without doors, it shall separate the appliance from the chimney. The cut-off device shall not hinder control or cleaning of the connecting parts, and the device shall maintain the position in which it is set.

The marking of the position of the operating handle shall enable identification of the position of the cut-off device. The cut-off device shall only be installed into the flue gas collector, flue spigot or flue gas connector and it shall separate the flueway from the chimney. The cut-off device shall only be used when the appliance is out to prevent heat loss from the room via the chimney and to prevent the fall of soot into the room when the chimney is swept.

5.2 Temperatures of adjacent combustible materials

A2 The appliance manufacturer shall provide in his installation instructions the necessary information for either insulating the walls and/or the floor and/or the ceiling or indicating the required clearance distances to ensure that the temperature of any adjacent walls, floor or ceiling or other structure constructed of combustible materials do not exceed the ambient temperature by more than 65 K.

When tested during the performance test at nominal heat output in accordance with A.4.7, and the temperature safety test in accordance with A.4.9, and when the appliance is installed in accordance with the clearance distances specified in the manufacturer's installation instructions, the temperature of the test hearth and walls and/or ceiling or any other structure surrounding the appliance comprising combustible material shall not exceed the ambient temperature by more than 65 K. **A2**

5.3 Operating tools

An operating tool shall be provided where it would otherwise be necessary to touch any surface having a temperature above ambient by more than the following values:

- 35 K for metal;
- 45 K for porcelain, vitreous enamel or similar materials;
- 60 K for plastics, rubber or wood.

These temperature requirements shall be assessed during the nominal heat output test in accordance with A.4.7.

NOTE A suitable glove is regarded as a tool.

5.4 Natural draught safety test

If the appliance manufacturer claims that the appliance is capable of continuous operation and/or claims that the duration of slow combustion for wood is greater than or equal to 8 hours and it is specified that the appliance may be installed into a shared flue i.e. a chimney serving more than one appliance it shall be tested in accordance with A.4.9.4. **A2** When tested in accordance with A.4.9.4 either the flue draught throughout the test period shall be not less than 3 Pa or where the flue draught falls below 3 Pa then over a further 10 h period from when the draught falls below 3 Pa the total quantity of carbon monoxide in the flue gas, calculated to NTP as detailed in A.6.2.8, shall not be greater than 250 dm³. **A2**

5.5 Safety test for spillage of combustion gas and discharge of embers

When operated under the test conditions described in A.4.7 to A.4.9 there shall not be any potentially harmful spillage of flue gases from the appliance into the room and embers shall not fall out.

5.6 Temperature in integral fuel storage container (other than the fuel hopper)

When tested during the temperature safety test in accordance with A.4.9.2 the temperature in any integral fuel storage container shall not exceed the ambient temperature by more than 65 K.

5.7 Thermal discharge control

For appliances fitted with a boiler designed to operate on a sealed system and where a thermal discharge control is fitted as part of the appliance, when tested in accordance with A.4.9.6, the control shall operate when the water flow temperature exceeds either 105 °C or the manufacturer's declared operating temperature whichever is the lower.

5.8 Strength and leaktightness of boiler shells

The boiler shell and its water carrying components shall not leak or become permanently deformed when subjected to the type pressure test described in A.4.9.5 or during the nominal heat output test described in A.4.7.

A1 5.9 Size of the firedoor window for Kachelöfen or Putzöfen inset appliances

The area of the firedoor window for Kachelöfen or Putzöfen inset appliances shall not be greater than 600 cm². Interrupted firedoor windows shall be considered as being connected. Where there are several firedoor windows, the different areas shall be added together.

5.10 Temperature at air grilles for Kachelöfen or Putzöfen inset appliances

For the test in compliance with A.4.7 and A.4.10 the temperature recorded at the central flow at a distance of 15 cm from outside of the air grilles shall not be greater than 85 °C when referenced to an ambient temperature of 25 °C. A1

A2 5.11 Electrical safety

The appliance shall comply with the electrical safety requirements of EN 50165 if mains operated electrical equipment is fitted as part of the appliance. A2

6 Performance

6.1 Flue Draught

6.1.1 Appliances with closed firebox

The flue draught values related to the appliance's nominal heat output given in Figure 1 shall be taken as the mean value for the static pressure to be applied in the measurement section during testing.

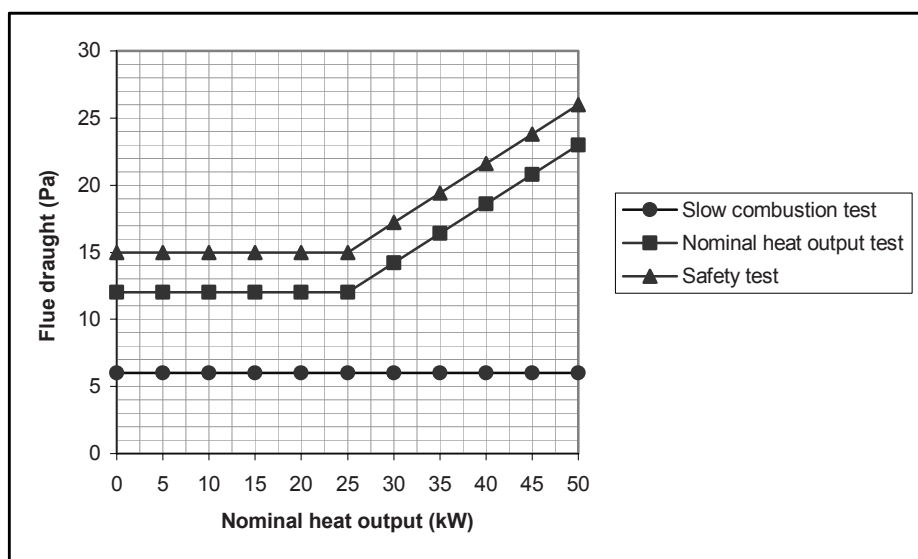


Figure 1 - Flue draught values

Appliances with a nominal heat output less than or equal to 25 kW shall be tested at a flue draught of (12 ± 2) Pa during the nominal output test and at (15^{+2}_0) Pa during the temperature safety test.

Appliances having a nominal heat output greater than 25 kW shall be tested during the nominal heat output test either at a flue draught related to the nominal heat output of the appliance as given in Figure 1 or at such flue draught given by the manufacturer in the appliance instructions. For the temperature safety test these appliances shall be tested at a flue draught 3 Pa greater than that used during the nominal heat output test and shall be kept within $^{+2}_0$ Pa of this value.

The slow combustion test shall be carried out with a flue draught of (6 ± 1) Pa.

6.1.2 Appliances with open firebox

When measuring nominal heat output, water heating output and space heating output in accordance with A.4.7 the mean flue draught shall be (10 ± 2) Pa. When testing for safety in accordance with A.4.9.3 the flue draught shall be (14^{+2}_0) Pa.

A1 6.1.3 Kachelöfen or Putzöfen inset appliances

The following flue draughts shall be met during the appropriate test:

For the test at nominal heat output, the test of heat output for accumulation, the safety-test with fir timber and the recovery test the flue draught shall be (15 ± 2) Pa.

For the slow combustion test the flue draught shall be (7 ± 2) Pa. **A1**

6.2 Flue gas temperature

During the performance test at nominal heat output in accordance with A.4.7 the mean flue gas temperature in the test measurement section shall be measured and recorded.

[A1] 6.3 Carbon monoxide emission for appliances with closed doors

6.3 1 Carbon monoxide emission for Kachelöfen or Putzöfen inset appliances

When tested in accordance with A.4.7 and A.4.10 the mean carbon monoxide content of the dry flue gas shall not exceed 0,2 % related to 13 % O₂ when the test fuels corresponding to Table B.1 are burned. **[A1]**

[A2] 6.3.2 Carbon monoxide emission for all other appliances with closed doors

When measured at nominal heat output in accordance with A.4.7, the mean carbon monoxide concentration calculated to 13 % oxygen (O₂) content in the flue gas shall be less than or equal to the manufacturer's declared value and shall not exceed 1,0 %.

Some countries have existing national legislation which set limits for maximum carbon monoxide concentration levels under nominal heat output and/or slow or reduced combustion, in these cases the carbon monoxide level shall be measured during the nominal heat output test in accordance with A.4.7 and the slow or reduced combustion test in accordance with A.4.8 for appliances sold in that country.

[AC1] NOTE In some countries national laws also require limits for particulate and organic compound emissions, emissions under slow combustion conditions and for weighed values for emissions to be used. In some countries clean air legislation is based on the use of authorized fuels. **[AC1]**

6.4 Efficient energy utilization

6.4.1 General

When the appliance is operated as specified by the manufacturer, burning the specified fuels representing the recommended fuels listed in the operating instructions, it shall meet the requirements of 6.4.2 or 6.4.3 as appropriate to the appliance type.

6.4.2 Efficiency of Kachelöfen or Putzöfen inset appliances

When tested in accordance with A.4.7, the measured total efficiency from the mean of at least two test results at nominal heat output shall be greater than or equal to the manufacturer's declared value and shall be not less than 75 %.

6.4.3 Efficiency for all other appliance types

When tested in accordance with A.4.7, the measured total efficiency from the mean of at least two test results at nominal heat output shall be greater than or equal to the manufacturer's declared value and shall equal or exceed 30 %.

Some countries have existing national legislation which set limits for minimum efficiency under nominal heat output and/or slow or reduced combustion, in these cases the minimum efficiency shall be determined during the nominal heat output test in accordance with A.4.7 and the slow or reduced combustion test in accordance with A.4.8 for appliances sold in that country. **[A2]**

6.5 Refuelling intervals at nominal heat output

When tested in accordance with A.4.7, the refuelling interval at nominal heat output on one charge of test fuel shall be not less than the values given in Table 10 as appropriate to the appliance type and/or test fuel used.

A₁

Table 10 - Minimum refuelling intervals at nominal heat output

Appliance type	Test fuel type (as detailed in Table B1)	Minimum refuelling intervals	
		Firedoors open	Firedoors closed
Continuous burning appliance	Wood logs or peat briquettes	no requirements	1 h
	All other test fuels	1,5 h	4 h
Intermittent burning appliance	Wood logs or peat briquettes	no requirements	0,75 h
	All other test fuels	no requirements	1 h
Kachelöfen or Putzöfen inset appliance	Wood logs or peat briquettes	Not applicable	90 ⁺¹⁰ - ₂₀ min
	All other test fuels	Not applicable	≥ 4 h

A₁

A₂ The nominal load shall be calculated using the refuelling intervals, the manufacturer's declared efficiencies and the calorific values of the fuels as detailed in A.4.2. **A₂**