

Residential solid fuel burning appliances

Part 1: General requirements and test methods

National foreword

This British Standard is the UK implementation of EN 16510-1:2018. Together with BS EN 16510-2-1 and BS EN 16510-2-6, it supersedes BS EN 13240:2001+A2:2004, which will be withdrawn on publication of BS EN 16510-2-1 and BS EN 16510-2-6. Together with BS EN 16510-2-2, it supersedes BS EN 13229:2001+A2:2004, which will be withdrawn on publication of BS EN 16510-2-2. Together with BS EN 16510-2-3, it supersedes BS EN 12815:2001+A1:2004, which will be withdrawn on publication of BS EN 16510-2-3. Together with BS EN 16510-2-4, it supersedes BS EN 12809:2001+A1:2004, which will be withdrawn on publication of BS EN 16510-2-4.

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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Residential solid fuel burning appliances - Part 1: General requirements and test methods

Appareils de chauffage domestiques à combustion solide - Partie 1: Exigences générales et méthodes d'essai

Häusliche Feuerstätten für feste Brennstoffe - Teil 1: Allgemeine Anforderungen und Prüfverfahren

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European foreword

This document (EN 16510-1:2018) 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of an identical text or by endorsement, at the latest by January 2019, and conflicting national standards shall be withdrawn at the latest by July 2021.

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 together with prEN 16510-2-1, prEN 16510-2-2, prEN 16510-2-3 and prEN 16510-2-4 will supersede EN 13240:2001, EN 13229:2001, EN 12815:2001, EN 12809:2001.

EN 13240:2001, EN 13229:2001, EN 12815:2001 and EN 12809:2001 will be totally superseded by the EN 16510 series. The revision of these European Standards takes into account the comments received at their 5-year review.

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

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: Appliances fired by wood pellets.*

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

EN 16510-1 should be used in conjunction with the appropriate Part 2. The Part 2-1 to 2-6 contain clauses to supplement or modify the corresponding clauses in this Part 1. Together Part 1 with the relevant Part 2 provides the requirements for each type of appliance. Regional / national specific regulations (for example on particulate matter emissions) may exist and these should be followed by the manufacturer.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, 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 is applicable to residential solid fuel burning appliances.

This European Standard specifies requirements relating to the design, manufacture, construction, safety and performance (efficiency and emission) of appliances fired by solid fuel (hereafter referred to as “appliance(s)”) and provides instructions for them. Furthermore, it also gives provisions for the evaluation of conformity i.e. initial type testing (ITT) and factory production control (FPC) and marking of these appliances.

This European Standard also covers CO, NO_x, OGC and particulate matter (PM / PME – see Annex F) emission test methods, however this European Standard does not contain any values for the limit on these emissions.

Appliances receiving combustion air through ductwork from outside the external envelope, which is not air tight, are not considered roomsealed. This European Standard is not applicable to appliances with boiler parts in contact with fire or flue gases other than when the boiler parts are manufactured from steel or cast iron.

This European Standard is not applicable to appliances with a boiler intended for water systems having

- water temperatures above 110 °C and/or an operating pressure of more than 3 bar;
- direct contact with sanitary hot water.

This European Standard does not cover appliances to be operated with ventilating systems which are intended to operate with pressure below - 15 Pa in the room of installation of the appliance in relation to the outside atmosphere.

This European Standard does not cover appliances intended to carry the load of a chimney.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 303-5:2012, *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 1561:2011, *Founding — Grey cast irons*

EN 1563:2011, *Founding — Spheroidal graphite cast irons*

EN 10025-1:2004, *Hot rolled products of structural steels — Part 1: General technical delivery conditions*

EN 10027-2, *Designation systems for steels — Part 2: Numerical system*

EN 10028-2, *Flat products made of steels for pressure purposes — Part 2: Non-alloy and alloy steels with specified elevated temperature properties*

EN 10028-3, *Flat products made of steels for pressure purposes — Part 3: Weldable fine grain steels, normalized*

EN 10029:2010, *Hot-rolled steel plates 3 mm thick or above — Tolerances on dimensions and shape*

EN 10088-1, *Stainless steels — Part 1: List of stainless steels*

EN 10088-2, *Stainless steels — Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes*

EN 10111, *Continuously hot rolled low carbon steel sheet and strip for cold forming — Technical delivery conditions*

EN 10120, *Steel sheet and strip for welded gas cylinders*

EN 10216-1, *Seamless steel tubes for pressure purposes — Technical delivery conditions — Part 1: Non-alloy steel tubes with specified room temperature properties*

EN 10222-4, *Steel forgings for pressure purposes — Part 4: Weldable fine grain steels with high proof strength*

EN 12619, *Stationary source emissions — Determination of the mass concentration of total gaseous organic carbon — Continuous flame ionisation detector method*

EN 12828, *Heating systems in buildings — Design for water-based heating systems*

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

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

EN 14792, *Stationary source emissions — Determination of mass concentration of nitrogen oxides — Standard reference method: chemiluminescence*

EN 14793, *Stationary source emissions — Demonstration of equivalence of an alternative method with a reference method*

EN 15250, *Slow heat release appliances fired by solid fuel — Requirements and test methods*

EN 60335-2-102, *Household and similar electrical appliances — Safety — Part 2-102: Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections (IEC 60335-2-102)*

EN 60730-1, *Automatic electrical controls for household and similar use — Part 1: General requirements (IEC 60730-1)*

EN ISO 228-1:2003, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation (ISO 228-1:2000)*

EN ISO 228-2:2003, *Pipe threads where pressure-tight joints are not made on the threads — Part 2: Verification by means of limit gauges (ISO 228-2:1987)*

EN ISO 9606-1, *Qualification testing of welders — Fusion welding — Part 1: Steels (ISO 9606-1)*

EN ISO 9606-2, *Qualification test of welders — Fusion welding — Part 2: Aluminium and aluminium alloys (ISO 9606-2)*

EN ISO 16948:2015, *Solid biofuels — Determination of total content of carbon, hydrogen and nitrogen (ISO 16948:2015)*

EN ISO 16994:2016, *Solid biofuels — Determination of total content of sulfur and chlorine (ISO 16994:2016)*

EN ISO 18122:2015, *Solid biofuels — Determination of ash content (ISO 18122:2015)*

EN ISO 18123:2015, *Solid biofuels — Determination of the content of volatile matter (ISO 18123:2015)*

EN ISO 18125:2017, *Solid biofuels — Determination of calorific value (ISO 18125:2017)*

EN ISO 18134-1:2015, *Solid biofuels — Determination of moisture content — Oven dry method — Part 1: Total moisture — Reference method (ISO 18134-1:2015)*

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 331:1983,¹ *Coal — Determination of moisture in the analysis sample — Direct gravimetric method*

ISO 334:2013, *Solid mineral fuels — Determination of total sulfur — Eschka method*

ISO 501:2012, *Hard coal — Determination of the crucible swelling number*

ISO 562:2010, *Hard coal and coke — Determination of volatile matter*

ISO 609:1996, *Solid mineral fuels — Determination of carbon and hydrogen — High temperature combustion method*

ISO 687:2010, *Solid mineral fuels — Coke — Determination of moisture in the general analysis test sample*

ISO 1171:2010, *Solid mineral fuels — Determination of ash*

ISO 1928:2009, *Solid mineral fuels — Determination of gross calorific value by the bomb calorimetric method and calculation of net calorific value*

ISO 10849:1996, *Stationary source emissions — Determination of the mass concentration of nitrogen oxides — Performance characteristics of automated measuring systems*

ISO 19579:2006, *Solid mineral fuels — Determination of sulfur by IR spectrometry*

3 Terms and definitions

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

3.1 accumulator

part of the appliance designed for accumulation of the heat released by the Kachelofen/Putzofen heat generator and which releases this heat slowly

3.2 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 batch stated by the manufacturer and achieved under defined test conditions in accordance with this European Standard (see A.4.10)

3.3 accumulator load

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

1) ISO 331:1983 is withdrawn.

3.4**air grilles**

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

3.5**appliance enclosure**

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

3.6**appliance family**

group of appliances of similar construction and/or performance characteristics where it is permissible to test only selected appliances in accordance with the requirements of this European Standard

3.7**appliance with boiler**

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

3.8**ash content of the fuel**

solid matter remaining after the complete combustion of solid fuel

3.9**ashpan**

removable receptacle shaped to receive the residue falling from the firebed

3.10**ashpit**

enclosed chamber designed to receive the residue or the ashpan

3.11**ashpit loss**

part of the residue which is combustible

3.12**basic firebed**

quantity of glowing embers (no visible flame) which ensures ignition of the test fuel to be charged, defined by mass of glowing embers or CO₂-content in the flue gas

3.13**batch**

1 fuel load, used during each cycle

3.14**batch charge (for slow heat release appliances)**

proportion of the test load as specified by the manufacturer for slow heat release appliances that can be added at specified intervals during the test period of the burning rate performance test

3.15**boiler**

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

3.16

boiler flueway

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

3.17

boiler waterways

space within a boiler which contains water

3.18

bottomgrate

part of the appliance at the base of the combustion chamber which supports the firebed through which the residue falls into the ashpan or ashpit and through which combustion air and/or combustion gases may be drawn

3.19

burning area

part of the combustion chamber floor limited by (front and lateral) firebars or a geometrically given zoning which is clearly evident for the operator to identify the fuel loading area(e.g. a vertical recess of at least 40 mm)

Note 1 to entry: A painting or a little step/vertical recess of e.g. 2 mm is not regarded as a geometrically given zoning.

3.20

burning rate

mass of test fuel burnt per unit of time as fired

3.21

charging door

door which covers the refuelling opening

3.22

combustion air

air supplied to the combustion chamber which is entirely or partially used to burn the fuel

3.23

combustion air control device

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

3.24

combustion air inlet

integral component of the appliance e.g. for the connection of the combustion air pipe

3.25

combustion air selector

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

3.26

combustion chamber

part of the appliance in which the fuel is burnt

3.27

combustion chamber opening

aperture in the combustion chamber through which an appliance may be fuelled

3.28**combustion gas baffle**

device to change the direction of flow of the combustion gases

3.29**combustion gases**

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

3.30**constant volume sampling**

method to sample all exhaust gases of an appliance at constant flow rate

3.31**continuous burning appliance**

heating appliance designed for slow burning over an extended period of time (e.g. overnight) and meeting the requirements of the slow combustion test

3.32**conveyor system**

device for feeding the fuel from the hopper to the retort

3.33**cut-off device**

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

3.34**cycle**

period from reloading until basic fire bed is reached

3.35**damper**

mechanism to change the resistance to flow of the combustion gasways

3.36**de-ashing**

process of clearing a firebed and discharging the residue into the collecting receptacle

3.37**dilution ratio**

volume ratio of the total diluted gas volume and the undiluted flue gas volume at standard conditions on dry basis

3.38**dilution tunnel**

sampling duct to allow constant volume sampling of the appliance exhaust gases with dilution air

3.39**dilution tunnel gas flow rate**

flow rate of the diluted gases in the dilution tunnel

3.40**draught regulator**

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

3.41

dry cooker

appliance without water boiler which primarily provides the facility to cook by means of a hotplate and/or oven

Note 1 to entry: It also provides heat to the room in which it is installed.

3.42

efficiency

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

3.43

firebed

ash, ember and fuel contained in the combustion chamber

3.44

fireplace recess

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

3.45

flue draught

difference between the static pressure in the place of installation and the static pressure at the specified point in the measurement section

3.46

flue gas adaptor

insulated fitting between connection pipe and measurement section which allows in addition variations in size and shape of the flue components (see Figure A.3)

3.47

flue gas connector

un-insulated duct through which flue gases are conveyed from the flue gas outlet of the appliance into the chimney flue (see Figure A.3)

3.48

flue gas mass flow

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

3.49

flue gas temperature

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

3.50

flue gas outlet

integral component of the appliance for the connection to the connector

3.51

flue gas outlet temperature

calculated temperature of the flue gas at the exit of the appliance

3.52**flueway**

that part of an appliance designed to convey combustion gases from the combustion chamber to the flue gas outlet

3.53**freestanding appliance**

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

3.54**front (lateral) firebars (deepening plate)**

grating or plate fitted at the front of the combustion chamber opening (lateral) to prevent spillage of fuel and ash or to change the combustion chamber capacity, or both

3.55**fuel hopper**

fuel store integral with the appliance from which fuel is fed to the combustion chamber

3.56**fuel storage**

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

3.57**gas sample**

portion of gaseous material on which observations can be made in order to provide data on the gaseous material from which it has been removed

Note 1 to entry: A sample is taken as being representative of the gaseous material if the same observations are supplied on any other samples taken from this gaseous material to furnish the same data within preset intervals.

3.58**heat input**

quantity of energy which the fuel provides to the appliance

3.59**heat output**

quantity of useful heat released by the appliance

3.60**hydrocarbon (OGC) emissions**

mean OGC concentration calculated to 13 % oxygen (O₂) content in the flue gas, measured in accordance with Annex F

3.61**inset appliance**

appliance with or without doors designed to be installed into a fireplace recess or a appliance enclosure, or into a combustion chamber of an open fire

3.62

intermittent burning appliance

heating appliance intended to be operated in short intervals for any period of time by successively refueling

Note 1 to entry: An appliance may be either a continuous burning appliance or an intermittent burning appliance according to the fuel used.

3.63

Kachelofen/Putzofen heat generator

component of an inset in which the fuel is burned

3.64

Kachelofen/Putzofen heat generator flue gas outlet

part of the Kachelofen/Putzofen heat generator for connecting the flue gas pipe (see Figure A.16)

3.65

Kachelofen or Putzofen inset

appliance consisting of a heat generator connected to a heat-exchanger forming the flueway and surrounded by an enclosure

Note 1 to entry: The 'Kachelofen' and 'Putzofen' inset appliance may be fitted with a thermostat to automatically control the room temperature.

3.66

leakage

volumetric flow that might spill into the installation room, at a certain inside pressure, through parts of the appliance that are not tight, maybe at the connector or the combustion air pipe

Note 1 to entry: The air flow rate that shall be supplied, when a defined overpressure in the appliance is reached, in order to keep this overpressure.

Note 2 to entry: In this case, the limit of system depends on the type of appliance (see Clause 4).

3.67

maximum water operating pressure

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

3.68

measured value

value of the air quality characteristics derived from an output signal; this usually involves calculations related to the calibration process and conversion to required quantities

3.69

nominal heat output

specified maximum expected heat output of an appliance when using the fuel load and refuelling periods specified in the operating instructions

3.70

NO_x emissions

mean NO_x concentration expressed as NO₂ calculated to 13 % oxygen (O₂) content in the flue gas, measured in accordance with Annex E

3.71**open fire**

appliance without doors or intended for open operation

3.72**operating tool**

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

Note 1 to entry: For example, a glove is to be regarded as an operating tool.

3.73**part load heat output**

heat output achieved during the test under part load conditions (see A.4.8)

3.74**particulate emission sample gas volume**

total volume of gas collected during a cycle in the particulate emission sampling train

3.75**PM**

particles, measured via a heated filter in the measuring section (see G.2)

3.75a**PME**

particles, measured via a full flow dilution tunnel (see G.3)

3.76**primary air**

combustion air which passes through the fuel bed

Note 1 to entry: Primary air does not necessarily have separate inlets neither does it necessarily pass through a bottomgrate.

3.77**recommended fuel**

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

3.78**recovery capability**

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

3.79**heat output at slow combustion**

heat output achieved during the test period under slow combustion conditions (see A.4.9)

3.80**reference material**

material or substance one or more of whose property values is sufficiently homogeneous and well established to be used for the calibration of an apparatus, the assessment of measurement method, or for assigning values to materials

3.81

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

3.82

residential space heating appliance fired by wood pellets (pellet stove)

free standing or inset appliance with closed door only and automatically stoked by a conveyor system

Note 1 to entry: They may have an integral or external fuel hopper.

3.83

residue

ashes, including combustibles, which collect in the ashpit

3.84

resolution

smallest difference between indications, for an identifiable component, of a recording or display device that can be meaningfully distinguished

3.85

retort (burner pot)

vessel forming the firebox of a wood pellet stove into which the pellets are automatically fed from the fuel hopper and in which they are burned

3.86

roomheater

appliance having a fully enclosed combustion chamber with charging door(s) which are normally closed, that distributes heat by radiation and/or convection and also provides hot water when fitted with a boiler

3.87

roomsealed appliance

appliance in which the combustion circuit is sealed off from the area where the appliance is installed

Note 1 to entry: The appliance is receiving its combustion air via leak tight air ducts directly from outside.

Note 2 to entry: It will not be possible for a dangerous amount of combustion gas to spill into the installation room in the case of a static overpressure in the appliance compared to the installation room.

3.88

sample line

line provided to take a representative sample from a gas to be analysed and to transport it from the sample point to the analyser

3.89

safety heat exchanger

device which allows excess heat to be released from an appliance

3.90

safety test

abused test considering conditions in excess of what would be expected in worse case operation and carried out to give a factor of safety for distances to combustible materials

3.91**secondary air**

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

3.92**slow combustion heat output**

heat output achieved during the test under slow combustion conditions

3.93**slow heat release appliance**

intermittent burning appliance having thermal storage capacity to accumulate heat into its mass such that it provides heat for a period of hours, specified by the manufacturer, after the fire has gone out

3.94**solid fuel**

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

3.95**solid mineral fuel**

coal, lignite, coke and fuels derived from these

3.96**space heat output**

heat output provided by convection and radiation to the room

3.97**standard condition**

volume of gas at 273 K (0 °C) and 1 013,25 hPa

3.98**start-up device**

mechanism different from the primary and secondary air valve system to divert the path of the heating gases and/or to change the combustion air opening cross section during the ignition period

3.99**steady-state**

stage at which the values of the measured temperature in 2 consecutive cycles do not differ by more than 2 K

3.100**surround**

outside components or assembly enclosing the appliance or parts of it

3.101**temperature in the fuel hopper**

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

3.102**test**

full procedure from start to end, e.g. safety test is 1 test

3.103**test cycle duration**

elapsed time between the start and the end of a cycle according to this European Standard

3.104

test fuel

fuel of commercial quality being characteristic for recommended fuels to be used for testing appliances

3.105

thermal discharge control

mechanical device controlled by the maximum water temperature in the boiler which opens a valve to the water circuit of a safety heat exchanger when a specified maximum water temperature is reached

3.106

Thermal output

thermal energy of a slow heat release appliance transferred to the room over the whole dissipation period given as a curve and its integral expressed as well in [MJ]

3.107

thermostat

temperature sensitive device which automatically changes the air inlet cross-sectional area or other functional devices of the appliance (e.g. water circulation pump if any)

3.108

top plate

top of the appliance including and surrounding the hotplate of a cooker

3.109

total heat output

complete useful heat released by the appliance being the sum of water heat output and space heat output

3.110

type test pressure

pressure at which all waterways of the appliance are tested

3.111

water flow temperature

temperature of the heated water exiting the appliance

3.112

water heat output

heat output to water, averaged during the test

3.113

water return temperature

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

3.114

wet cooker

appliance that provides the facility to cook by means of a hotplate and/or an oven but which is also fitted with a boiler that provides hot water for central heating and/or domestic use

Note 1 to entry: The cooker also provides heat to the room in which it is installed.

3.115

winter/summer mode operation

alternative methods of operating certain appliances by a suitable control or by adaptation to give a lower output for summer usage or a higher output in winter

3.116**wood pellet**

solid fuel, usually in cylindrical form, made from untreated pulverized wood of the whole tree and compressed with or without the aid of binders (e.g. molasses, paraffin wax, glucose)

3.117**working surfaces**

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

Note 1 to entry: All external surfaces of an appliance including the flue gas connector in accordance with this European Standard are classified as working surfaces because they are designed to transmit heat into the room in which they are installed.

4 Classification of appliances and system boundary for roomsealed appliances**4.1 Classification of appliances**

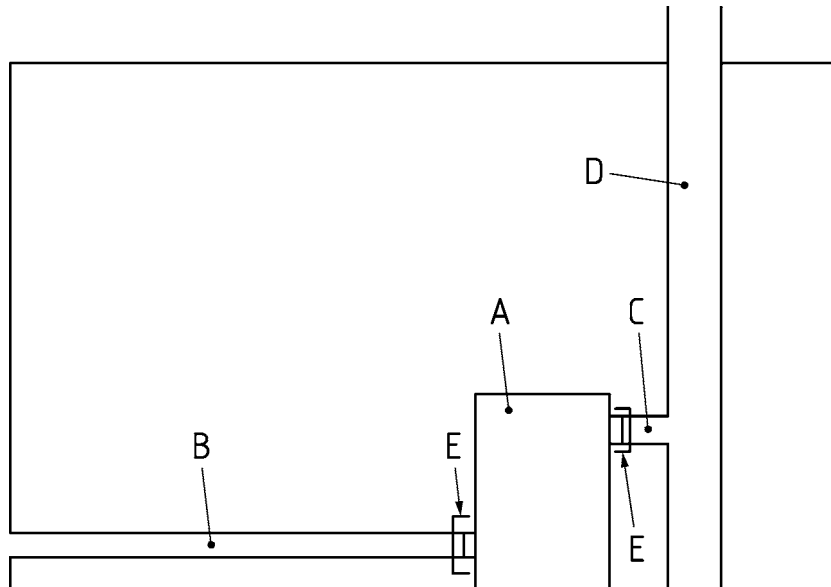
This European Standard deals with different types of appliances as given in Table 1.

Table 1 — Types of appliances

Type	Room-Sealed	Leakage declaration	Combustion air supply connection	Door closure	Tightness requirement
Type B	-	No	No specific requirement	No specific requirement	No specific requirement
Type BE	-	No	Yes	No specific requirement	Appliance intended to be supplied with combustion air via a combustion air duct. No specific requirements for tightness
Type BF	-	Yes	Yes	No specific requirement	The leakage is tested in accordance with 6.9 on delivery only. A leakage is measured and given in the instructions, no further requirement on the tightness.
Type CA	Yes	Yes	Yes	Mechanism to close the doors automatically	In accordance with 6.9 after closing the door without further action of the user
Type CM	Yes	Yes	Yes	Manually closed and locked door	In accordance with 6.9 after closing the door
Type CC	Yes	Yes	Yes	Manually closed and locked door controlled by an alarm or fail safe system	In accordance with 6.9 after closing the door

4.2 System boundary

Figure 1 shows the system boundary limit of the appliance for room sealed operation as covered by the requirements of this European Standard.



Key

- A appliance
- B combustion air duct
- C connecting flue pipe
- D chimney
- E system boundary limit

Figure 1 — System boundary limit for appliance

5 Performance requirements in relation to materials, design and construction

5.1 Production documentation

The parameters and characteristics considered when deciding the relation to either the family or range of appliances to be submitted for initial type testing (see 9.2) shall be recorded. Where changes are made to an appliance in either the design, raw material, component supplier, or the production process, which would significantly alter the performance characteristics of the appliance, especially in respect of one or more of the list of characteristics detailed in Table 10 and Table 11, (see 9.2) 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. To identify the appliance, related documents and/or scaled assembly drawings shall be available 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 manufacturer's specified nominal heat output in kW using fuels recommended by the manufacturer together with the specified minimum refuelling intervals for these fuels;
- combustion chamber dimensions.

If the appliance is fitted with a boiler or a water heat exchanger the following additional details shall 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 Pa and bar;
- the type test pressure, in Pa and bar;
- the water heat output, in kW.

5.2 Construction and materials

5.2.1 General construction

5.2.1.1 Design, manufacture and assembly

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 as specified in accordance with the test procedures of this European Standard and exposed to the associated mechanical, chemical and thermal stresses, the appliance shall operate reliably and safely such that during normal operation no combustion gas posing a hazard can escape into the room in which the appliance is installed nor can embers fall out. Non-combustible materials shall be used, except that it shall be permissible to use combustible materials for the following applications:

- components or accessories fitted outside the appliance;
- internal components of controls and safety equipment;
- operating handles;
- electrical equipment.

No part of the appliance shall comprise any material known to be harmful. Especially no part of the appliance shall comprise of or contain asbestos. Hard solder, containing cadmium in its formulation, shall not be used.

When fired with solid mineral fuels, the appliance shall have a bottomgrate and an ashpan.

Component parts, which require periodic replacement and/or removal shall be designed or marked for identification to ensure correct fitting. Provision shall be made for parts, which form a seal, to be located securely by means of bolts, gaskets or welding to prevent the leakage of air/water or combustion products. Adjacent surfaces between metal components in the combustion chamber or the flueways shall be gastight.

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

NOTE Because the entire heat dissipating surfaces of the appliance including the flue gas outlet and the flue gas connector are working surfaces, there is no requirement for limiting the surface temperature of the appliance.

All operations which the user carries out, including loading and emptying of the appliance, adjusting controls and de-ashing should be easy, safe and effective.

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.

The thermal insulation shall withstand normal thermal and mechanical stresses. 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.

5.2.1.2 Durability

The durability of the appliance shall be satisfied if it is shown to meet the constructional requirements specified in 5.2.2 to 5.2.13, the safety requirements specified in Clause 6 and the performance requirements specified in Clause 7.

NOTE Historical experience with appliances have indicated this approach for durability is appropriate.

5.2.1.3 Dangerous substances

National regulations on dangerous substances may require verification and declaration on the release and sometimes content of dangerous substances when construction products covered by this European Standard are placed in those markets.

In the absence of European test methods verification and declaration on the release / content should be done taking into account national provisions in the place of use.

NOTE 1 An informative database covering European and national provisions on dangerous substances is available at the Construction website on EUROPA (accessed through http://ec.europa.eu/growth/tools-databases/cp-ds_en).

The manufacturer shall declare that no dangerous substances have been used for the production of the appliance. For this declaration in addition the European regulation No 1907/2006 (REACH) shall be considered.

NOTE 2 For type testing the Notified Body shall verify the existence of such a declaration.

5.2.2 Integral boiler or heat exchanger

5.2.2.1 General

The following requirements for the integral boiler of an appliance shall be checked on the basis of drawings and declarations delivered by the manufacturer regarding the production process of the boiler including welding.

The boiler shell shall be constructed from cast iron and/or steel and shall be capable of operating at the maximum operating pressure specified by the manufacturer. The integral boiler shall be verified by the type pressure test in accordance with A.4.10.5.

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

5.2.2.2 Boilers constructed of steel

Manufacturers who carry out welding shall meet the requirements of EN ISO 9606-1 and EN ISO 9606-2 as follows:

- only welders who are qualified in welding of the materials to be processed shall be used;
- equipment shall be available to allow defect-free welding to be carried out;
- supervision of the welding process shall be carried out by staff qualified in welding (at least one supervisor shall be qualified).

The materials shall be suitable for welding.

NOTE 1 The materials in Table 3 are suitable for welding and do not require additional heat treatment after welding.

The welded seams shall not show any cracks or lack of fusion and shall be defect free over the whole cross-section for butt welds. One-sided fillet welds, and half Y-welds which have been welded through, shall be kept substantially free from bending stresses. Smoke tubes, inserted stays and similar components need not be counter welded.

Double fillet welds are only permissible when sufficiently cooled. Projections into the flue gas side in areas of high thermal stresses shall be avoided.

Corner welds, edge welds and similar welded connections, which would be subject to high bending stresses during production and operation, are to be avoided.

When welding longitudinal stay bars or stay tubes, the shearing cross section of the fillet weld shall be 1,2 times the required stay bar or stay tube cross sectional area.

The permissible types of weld and appropriate material thicknesses are given in Table 2 and these parameters shall be met.

Welding fillers shall be suitable for the material being used.

NOTE 2 The terms given in Table 2 are in accordance with EN ISO 2553; the reference numbers of welding processes are in accordance with ISO/TR 25901-3, ISO 857-2 and EN ISO 4063.

Table 2 — Steel - Nominal minimum wall thicknesses

Application	Non-alloy steels	Stainless and corrosion resistant steels	Non-alloy steels for appliances burning wood only and having maximum water operating pressures of up to and including 0,2 MPa (2 bar)
	mm	mm	mm
Walls of water backed surfaced of the combustion chamber in contact with burning fuel or products of combustion	5	2	3
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 other than immersion coils, safety heat exchangers.			
NOTE 2 Thinner wall thicknesses are only permissible with proof of equivalent corrosion resistance, heat resistance and strength.			
NOTE 3 The nominal minimum wall thicknesses listed have been specified taking into consideration:			
— the maximum water operating pressure (as stated by the manufacturer),			
— the material properties,			
— the heat transfer location.			

The tolerances on the nominal minimum wall thicknesses for non-alloyed steels given in Table 2 shall be as specified in EN 10029:2010.

Table 3 — Steel material types

References	Material type	Material numbers ^a
EN 10111	DD11	1.0332
	DD12	1.0398
	DD13	1.0335
	DD14	1.0389
EN 10025-1	E235	1.0308
	S235JR	1.0037
	S235JRG2	1.0038
	S235J0	1.0114
	S235J2G3	1.0116
	S275JR	1.0044
	S275J0	1.0143
	S275J2G3	1.0144
	S355JR	1.0045
	S355J0	1.0553
	S355J2G3	1.0570
	S355J2H	1.0576
	S355K2G3	1.0595
EN 10028-2	P235GH	1.0345
	P265GH	1.0425
EN 10028-3	P355NL1	1.0566
	P295GH	1.0481
	P355GH	1.0473
	16Mo3	1.5415
	15NiCuMoNb5-6-4	1.6368
	13CrMo4-5	1.7335
	10CrMo9-10	1.7380
	11CrMo9-10	1.7383
EN 10222-4	P355QH1	1.0571
	P285QH	1.0478
EN 10120	P245NB	1.0111
	P265NB	1.0423
	P310NB	1.0437
	P355NB	1.0557

References	Material type	Material numbers ^a
EN 10088-2	X5CrNi18-10	1.4301
	X5CrNi17-12-2	1.4401
	X2CrNiMo17-13-2	1.4404
	X2CrTiNb18	1.4509
	X6CrNiTi18-10	1.4541
	X6CrNiNb18-10	1.4550
	X2 CrMnNiN 22-5-2	1.4162
	X2 CrNiN 23-4	1.4362
	X2 CrNiMoN 22-5-3	1.4462
	X1 NiCrMoCuN 25-20-7	1.4529
	X1 NiCrMoCu 25-20-5	1.4539
	X6CrNiMoTi17-12-2	1.4571
	X6CrNiMoNb17-12-2	1.4580
	X3CrNiMo17-3-3	1.4436
EN 10088-1	X15CrNiSi20-12	1.4828
	X15CrNiSi25-21	1.4841
EN 10216-1	P195TR1	1.0107
	P235TR1	1.0254
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 4.2.2.2.2 for the particular application/usage.		
^a In accordance with EN 10027-2.		

5.2.2.3 Boilers constructed of cast iron

5.2.2.3.1 Cast iron parts subject to water pressure

The mechanical properties of cast iron used for parts subject to water pressure shall, as a minimum, correspond to the values listed in Table 4.

Table 4 — Minimum mechanical requirements for cast irons

Grey cast iron ^a	
- Tensile strength R_m	> 150 N/mm ²
- Brinell hardness	160 HB to 220 HB
Spheroidal graphite iron ^b	
- Tensile strength R_m	> 400 N/mm ²
- Elongation	18 % A ₃
^a In accordance with EN 1561:2011.	
^b In accordance with EN 1563:2011.	

5.2.2.3.2 Minimum wall thicknesses (cast iron)

The wall thickness of the casting section shall be not less than the minimum thicknesses listed in Table 5.

Table 5 — Cast iron - Minimum wall thicknesses

Nominal heat output (water and room combined) kW	Grey cast iron mm	Spheroidal graphite cast iron mm
< 30	3,5	3,0
≥ 30 and < 50	4,0	3,5

5.2.2.4 Boiler shell tappings

The threads of boiler shell tappings, for flow and return pipes, 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 EN ISO 228-1:2003 and EN ISO 228-2:2003. The design and position of flow tappings shall be such that air is not retained within the boiler shell.

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

Nominal heat output (water and room combined) [kW]	Gravity circulation thread size designation ^a ["]	Pumped circulation thread size designation ^a ["]
≤ 22	1	½
> 22 ≤ 35	1 ¼	¾
> 35 < 50	1 ½	1
^a Designation in accordance with ISO 7-1:1994 and ISO 7-2:2000 or EN ISO 228-1:2003 and EN ISO 228-2:2003.		

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 ^a ["]	Minimum depth or length of thread mm
1/2 to 1 1/4	16
1 1/2	19
^a Designation in accordance with ISO 7-1:1994 and ISO 7-2:2000 or EN ISO 228-1:2003 and EN ISO 228-2:2003.	

Where a drain socket is provided in the boiler shell, it shall be a minimum thread size designation of $\frac{1}{2}$ " and shall be in accordance with ISO 7-1:1994 and ISO 7-2:2000 or EN ISO 228-1:2003 and EN ISO 228-2:2003.

5.2.2.5 Boiler waterways

5.2.2.5.1 General

For appliances designed to be used in open systems, the minimum internal dimension of waterways throughout the main body of the appliance shall not be less than 20 mm except where waterways shall be locally reduced 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.

For heat exchangers with waterways consisting of tubes that are in direct contact with fire or hot combustion gases the internal diameter shall not be less than 20 mm.

5.2.2.5.2 Design of all boiler waterways

The design of the boiler shall ensure a free flow of water through all parts. To minimize the build-up of sediments, 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 have a minimum dimension of (70 × 40) mm or have a minimum diameter of 70 mm and be sealed with a gasket and cap. For appliances designed to be used in water systems with a pump, the flow resistance of the appliance shall be measured between the water inlet and water outlet of the appliance in accordance with to A.2.5. The measured value shall be in accordance with manufacturer's instructions.

5.2.2.5.3 Venting of the water sections

The boiler and its components shall be designed in such a way that their respective water sections can be vented.

The boiler shall be so designed that under normal operation in accordance with the manufacturer's installation instructions, no undue boiling noises occur.

5.2.2.5.4 Water tightness

Holes, for screws and similar 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.

5.2.2.6 Heat exchangers that are not directly in contact with fire or flue gases

Heat exchangers that are not directly in contact with fire or flue gases shall be constructed from the materials suitable for the operating temperatures of heat storing stoves. The construction of the heat exchanger should ensure that no undue stress is built up in the cover, even at the maximum stagnation temperature of the heat exchanger. The materials of heat exchanger components should be selected and constructed so that they can withstand the maximum temperature which may occur at stagnation conditions and the thermal shocks they may be exposed to during the heating period.

Bushings and ducts, leading through the stove construction should be constructed so that no leakage can occur caused by thermal expansion. The components and the materials of the heat exchanger should be able to withstand the mechanical loads resulting from the heating up and cooling down of the heat exchanger.

The heat exchanger shall be capable of operating at the maximum operating pressure and temperature specified by the manufacturer.

5.2.3 Cleaning of heating surfaces

All surfaces in contact with the combustion products should be able to be cleaned.

For appliances with an integrated water heat exchanger, the surfaces of the water heat exchanger that are in contact with flames or hot combustion gases shall be accessible for cleaning. Means shall be provided for cleaning the appliance outlet and flue connector. Advice on how this cleaning is to be carried out shall be given in the appliance operating instructions.

Where cleaning and servicing requires the use of special tools (e.g. special brushes), these shall be supplied by the appliance manufacturer.

5.2.4 Flue gas outlet

For vertical flue connection, the fitting shall overlap by at least 25 mm. Where a pipe diameter of 160 mm is exceeded the overlap shall be at least 40 mm.

For non-vertical flue connections, the flue gas outlet shall be designed to allow fitting, internal or external, over a length of at least 40 mm, of a flue gas connector.

The flue gas outlet is a fixed and indispensable part of the appliance as tested and sold and shall not be extended for type test purposes. It is not part of the test rig and shall not be confused with the un-insulated flue gas connector (see A.2.1). However if an extended flue gas outlet or fluepipe is part of the appliance design it shall be included for the type test provided that it is supplied as part of the appliance for fitting whenever the appliance is marketed.

A flue gas outlet adapter is allowed, even when the diameter of the adapter is different from the flue gas outlet. The test shall be performed with this adapter.

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

5.2.5 Flueways

The size of the flueway in its minimum dimension shall be not less than 30 mm except it shall be permissible to reduce it to not less than 15 mm for appliances designed only to burn fuels other than bituminous coals and peat briquettes, and where an access door(s) is provided for cleaning the flueway. It shall be possible to clean the flueways of the appliance completely using commercially available tools or brushes, unless special tools or brushes are provided by the appliance manufacturer.

For other than rectangular cross sections the equivalent hydraulic diameter of any cross section can be used.

5.2.6 Ashpan and ash removal

A means for the removal of the ash residue from the appliance shall be provided. When an ashpan is provided, it shall be at least capable of containing the combustion residue from two full charges of fuel whilst retaining sufficient space above to allow adequate primary air flow through the bottomgrate or firebed. 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 it does not obstruct any primary air inlet control.

The ashpan should be designed and constructed to ensure that:

- a) it effectively collects the residue 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 The ashpan can be shovel shaped.

5.2.7 Bottomgrate

Where the bottomgrate is removable it shall be so designed or marked as to ensure correct fitting.

If a de-ashing mechanism is fitted it shall be capable of effectively de-ashing the firebed. The bottomgrate shall not become dislodged during the de-ashing process.

The preferred design with the charging door(s) and ashpit door(s) closed should allow de-ashing to be carried out. The de-ashing 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 to minimize ash or fuel spillage during the de-ashing operation.

5.2.8 Combustion air supply

5.2.8.1 Primary combustion air control device

The appliance shall be fitted with a primary combustion air control device. The adjusting control shall be clearly visible or permanently marked so that its operation is readily understandable.

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

The minimum or 'cold' setting of the primary combustion air control device shall be clearly marked and the method of adjustment shall be described in the user instructions.

For appliances with a boiler and combustion intended to be controlled by the water temperature, the thermostat operating on the primary combustion air control device shall have a variable temperature range and be of the immersion or dry pocket type. For appliances with sealed water systems the thermostat shall be of dry pocket type. The pocket shall be positioned so that the thermostat senses the highest temperature of the flow water of the appliance.

5.2.8.2 Secondary combustion air control device

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

In case of direct external air supply, a secondary combustion air control device is recommended for admission of air to minimize the risk of condensation and the accumulation of combustion gases.

5.2.9 Damper

If a flue damper is fitted it shall be of a type, which does not block the flue totally. 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, whichever is greater. The continuous area shall prevent blockage and therefore be a circle or a part of a circle, an annular gap is not allowed.

The position of the damper shall be recognizable from the setting of the device.

5.2.10 Charging doors and ash-pit doors

When the appliance is equipped with a charging door, that door shall be large enough to allow the appliance to be filled with the commercial fuels recommended by the manufacturer. Charging doors and ash-pit doors shall be designed to prevent accidental opening and to facilitate closure.

The combustion chamber side bricks and in particular detachable flue baffle plate(s) shall be easily removable through the charging doors or any dedicated cleaning door.

5.2.11 Flue bypass device

Any flue bypass device shall be easily operable. The extreme positions corresponding to full opening and closing shall be stable and easily identifiable.

5.2.12 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 combustion chamber from the flue gas 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.

5.2.13 Front firebars

Front firebars shall be designed to retain the fuel or ash such that there is no undue spillage of ash or burning fuel from the appliance during normal operations, particularly during refuelling or de-ashing.

If the appliance is fitted with removable front firebars, they shall be of a design such that they can neither be incorrectly fitted nor accidentally dislodged.

5.2.14 Solid mineral fuel and peat briquettes burning appliances

When the recommended fuels are solid mineral fuel and peat briquettes, the appliances shall have a bottomgrate and an ashpan.

5.2.15 Draught regulator

If a draught regulator is fitted the device shall be easily accessible for cleaning.

5.3 Sound level

Any appliance burning solid fuel that does not have a fan does not emit relevant noise.

Appliances which have a fan assisted combustion (no overpressure at the appliance's spigot, the fan is just to overcome the flow resistance of the appliance) or which have a convection air fan do not emit noise in a harmful level.

6 Performance requirements in relation to safety

6.1 Natural draught

Where the appliance manufacturer claims:

- that a continuous burning appliance can be connected to a chimney serving more than one appliance and;
- can be operated with solid mineral fuel and peat briquettes as suitable fuels;

When tested in accordance with A.4.10.4 either the flue draught throughout the test 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 as detailed in A.6.2.8 shall not be greater than 0,250 m³. Such an appliance shall be clearly labelled to indicate whether or not it can be installed into a shared flue (see 8.2).

6.2 Open operation of an appliance

For open appliances (appliances without doors) and for those which are intended for operation with charging doors open the following events shall not occur under the test conditions, described in A.4.10.2:

- any continuous escape of combustion gases, and
- any glowing ember dropping out.

For appliances with doors which are intended for open and closed operation according to the manufacturers specification both modes of operation are to be regarded for safety tests, nominal heat output tests and, if specified, part load and slow combustion tests.

6.3 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.4.10.5, and during the nominal heat output test, described in A.4.7.

6.4 Temperature rise in the fuel storage (other than the fuel hopper)

When tested in accordance with A.4.7 and A.4.10, the temperatures measured in the fuel storage shall not exceed the ambient room temperature by more than 65 K.

6.5 Temperature rise of the operating components

If the manipulation of the operating components does not require the assistance of tools, the surface temperatures, measured only in the areas to be touched, shall not exceed the ambient room temperature by more than the following, when tested in accordance with A.4.7:

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

If these temperatures are exceeded, the manufacturer shall indicate in the instructions the need to use an operating tool. This tool shall be supplied with the appliance.

NOTE A suitable glove is regarded as a tool.

6.6 Temperature of adjacent combustible materials

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 the test is conducted in compliance with A.4.10).

6.7 Safety devices for appliances fitted with a boiler

6.7.1 General

EN 12828 shall be followed.

All necessary safety and control devices which are not an integral part of the appliance shall be given in the installation instruction.

6.7.2 Appliances intended for sealed water systems

6.7.2.1 General

A safety device shall prevent the temperature in the boiler exceeding 110 °C at any operation condition of the appliance. This shall also be fulfilled in case of malfunction of the water circulation.

6.7.2.2 Thermal discharge control

For appliances fitted with a thermal discharge control, when tested in accordance with A.4.10.6, the control shall operate when the water flow temperature exceeds either 105 °C or the manufacturer's specified operating temperature, whichever is the lower.

The thermal sensor of the discharge control shall be positioned so that the thermostat senses the maximum temperature of the flow water of the appliance.

A thermal discharge control shall fulfil the requirements of EN 14597.

6.7.2.3 Safety heat exchanger

For appliances fitted with a safety heat exchanger, the safety heat exchanger shall be dimensioned such as to ensure that the water temperature in the boiler does not exceed 110 °C, when the appliance is tested in accordance with A.4.10.6.

6.7.3 Safety devices for appliances fitted with a heat exchangers that are not directly in contact with fire

Heat exchangers that are not directly in contact with fire or flue gases shall fulfil the requirements of 6.7.1 to 6.7.2.

A heat exchanger that is not directly in contact with fire or flue gases and where the design of the appliances is such that the water temperature in the heat exchanger does not reach 105 °C under the test conditions of A.4.10.6 shall be equipped with a pressure release valve (1,5 bar) to ensure that over pressure is released from the heat exchanger.

6.8 Electrical safety and functional safety of electrical components

6.8.1 General

Safety aspects for electrical components shall cover both

- the requirements on electrical safety regarding common hazards such as electrical shock or fire by overheating of electrical components and
- the safety of control functions in the case of malfunction of the electrical components at abnormal operation, where these components may be used as sensor, control or actuator (functional safety).

The electrical safety regarding common hazards of the appliance and the electrical components are handled in 6.8.2 while 6.8.3 handles the functional safety of relevant control functions.

NOTE The electrical safety may be specified on the basis of EN 60335-2-102 by the manufacturer and is then not subject to type testing by the Notified Body.

6.8.2 Electrical safety

The electrical safety of the appliance and the interfaces (e.g. connectors) between control devices shall comply with EN 60335-2-102.

The electrical safety of control devices shall comply with either EN 60335-2-102, EN 60730-1 or its relevant part 2 or with the electrical requirements of the standards listed in Annex ZBB of EN 60335-2-102:2006.

The documentation of the electrical connections for the individual components shall be provided by means of an electrical wiring and connection diagram.

NOTE The electrical safety may be specified by the manufacturer and is then not subject to type testing by the Notified Body.

6.8.3 Functional safety of control functions with electrical components

For abnormal operation as fault condition according to EN 60335-2-102:2006, 19.11.2 f) (failure of integrated circuits), only output signals which cause only one malfunction shall be considered as relevant. Combinations of output signals which cause malfunction in more than one actuator are not considered relevant in the sense of abnormal operation because it is unlikely that any hazardous situation can occur.

For safety relevant control functions which are fulfilling the requirements of class B or class C of EN 60730 failure of the control function does not need to be taken into account.

6.9 Safety requirements of roomsealed appliances

For appliances of type CA, CM and CC (see Table 1) the following requirements shall be met.

The mean value of CO concentration as measured in the combustion products of the appliance, given in ppm is measured during the test at nominal heat output according to A.4.7 and at part load heat output according to A.4.8 (combustion air control devices are set at the settings specified by the manufacturer).

The product of the CO concentration in the flue gas [ppm] (at 13 % O₂) and the leakage of the appliance [Nm³/h] determined according to A.4.11.2.2, A.4.11.2.3 and A.4.11.2.4 shall not exceed the value of 2 400 [ppm Nm³/h] at nominal heat output and at part load heat output (if specified by the manufacturer).

In addition the leakage of the appliance determined according to A.4.11.2.2, A.4.11.2.3 and A.4.11.2.4 shall not exceed 3 Nm³/h.

The manufacturer shall give detailed information in the installation instructions on the combustion air supply ducts and the flue gas connector in relation to tightness.

6.10 Minimum distances from non combustible walls

The manufacturer shall specify minimum distances from non combustible walls in the installation instructions.

If the manufacturer specifies minimum distances from non combustible walls which differ from those to combustible walls and if the value is below 50 mm, the test at nominal heat output according to A.4.7 shall be carried out using the distances of these instructions of the manufacturer.

6.11 Requirements for appliances suitable for a shared flue system

The appliance shall not have a combustion chamber opening of more than 0,05 m² or shall be fitted with **self-closing doors that leave** an opening of not more than 0,05 m².

The function of the chimney shall be proved according to EN 13384-2 depending on the individual situation on site.

6.12 General safety aspects of the water system

All appliances with water systems shall comply with the PED (97/23/EG or 2014/68/EU from 2016 on)

Appliances having a pressure-volume product > 50 bar l shall be tested by a Notified Body under PED.

Appliances having a pressure-volume product ≤ 50 bar l may be self-declared by the manufacturer.

7 Performance requirements in relation to the appliance operation

7.1 General

The following Table 8 gives an overview of the test to be carried out on the appliance operation.

Table 8 — Overview of the tests to be carried out on the appliance operation

	P_{nom}^{a, b}	P_{part}^{a, b}	P_{slow}^b
P	x	x	x
η	x	x	-
Emission	x	x	x
Recovery	-	-	x
Minimum draught (p) flue	12 Pa (see Figure 2) or manufacturer's claim	$p_{part} = \frac{P_{part}}{P_{nom}} \cdot p_{nom}$ min. 6 Pa or manufacturer's claim	6 Pa
Minimum burning period	x	Give info in report	x
where $P_{part} < 0,4 \cdot P_{nom} + 2kW$ for appliances ≥ 5 kW and $P_{part} < 0,8 \cdot P_{nom}$ for appliances < 5 kW			
a Intermittent burning appliances b Continues burning appliances * P_{part} optional for intermittent and continuous burning appliances x value to be given and verified - value not to be given and verified			

For appliances with doors which are intended for open and closed operation according to the manufacturers' specification both modes of operation are to be regarded for safety tests, nominal heat output tests and, if specified, part load and slow combustion tests. In this case, the values for efficiency and emissions shall be determined and given in both modes.

Test results for emissions and efficiency shall be derived from the same cycles.

7.2 Flue gas temperature and flue gas outlet temperature

When tested in accordance with A.4.7 and A.4.8, the flue gas temperature shall be measured and the mean value used for efficiency, emission and flue gas outlet temperature calculation only.

The flue gas outlet temperature shall be calculated by adding 20 % of the mean value of the flue gas temperature to this mean flue gas temperature. The calculated flue gas outlet temperature shall be recorded in the installation instructions.

When tested in accordance with A.4.10.3 the flue gas temperature shall be measured and the mean value of the cycle giving the highest mean value is determined. This value shall not exceed the designated Tclass of the chimney by more than 100 K. The chimney designation shall be at least T400 G.

EXAMPLE For a T400 designated chimney the value shall not exceed 500°C.

7.3 Emissions

7.3.1 General

The tests for emissions as well as efficiency shall be carried out burning the specified test fuels representing the recommended fuels listed in the operating instructions. Except for wood logs all tests shall be carried out on 2 consecutive cycles and these cycles shall be considered for the calculation of the mean value of the relevant emissions. For wood logs 3 cycles shall be considered for the mean value, 2 of these shall be consecutive.

All emissions are to be measured for all appliances and for appliances with a combustion chamber door, the door shall be closed for the measurements.

NOTE 1 Due to excess air for open appliances the emission determination may not be very accurate.

These values are subject to be given in instructions, on the data plate of the appliance and on the CE-mark.

For nominal heat output follow A.4.7, for part load heat output follow A.4.8 and for heat output at slow combustion follow A.4.9.

NOTE 2 CR 1404:1994 gives advice on the measuring procedure of CO, CO₂ and O₂.

7.3.2 Carbon monoxide emission

At all heat output rates specified by the manufacturer the mean carbon monoxide concentration calculated to 13 % oxygen (O₂) content, (dry, 273 K, 1 013 hPa) in the flue gas shall be less than or equal to the manufacturer's specified value expressed in mg/m³.

7.3.3 NO_x emissions

At all heat output rates specified by the manufacturer the mean NO_x concentration expressed as mg NO₂/m³ calculated to 13 % oxygen (O₂) content, (dry, 273 K, 1 013 hPa) in the flue gas shall be measured and the value given by the manufacturer shall not be higher than the measured value.

See also Annex D (normative) for measurement procedure.

7.3.4 Emission of organic gaseous carbon (OGC)

At all heat output rates specified by the manufacturer the mean organic gaseous carbon concentration as mg C/m³ calculated to 13 % oxygen (O₂) content, (dry, 273 K, 1 013 hPa) in the flue gas shall be measured and the value given by the manufacturer shall not be higher than the measured value.

See also Annex E (normative) for measurement procedure.

7.3.5 Particulate matter (PM / PME) emissions

At all heat output rates specified by the manufacturer the mean particulate matter concentration expressed as mg/m³ for PM calculated to 13 % oxygen (O₂) content, (dry, 273 K, 1 013 hPa) or as g/kg for PME in the flue gas shall be measured and the value given by the manufacturer shall not be higher than the measured value.

See also Annex F (normative) for measurement procedure.

7.4 Efficiency

The tests for efficiency shall be carried out burning the specified test fuels representing the recommended fuels listed in the operating instructions. Except wood logs all tests shall be carried out on 2 consecutive

cycles and these cycles shall be considered for the creation of the mean value of efficiency. For wood logs 3 cycles shall be considered for the mean value, 2 of these shall be consecutive.

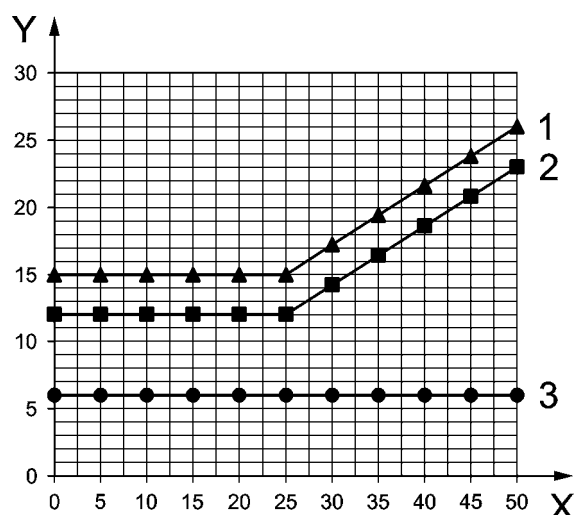
The mean value of the efficiency expressed as % in an integer shall be greater than or equal to the manufacturer's specified efficiency value. The efficiency is determined at nominal heat output (in accordance with A.4.7) and if specified by the manufacturer at part load heat output (in accordance with A.4.8). The efficiency is not determined for heat output at slow combustion.

7.5 Flue draught

The flue draught values, related to the appliance's nominal heat output, given in Figure 2, shall be taken as the values for the static pressure to be applied in the measurement section (see Figures A.10, A.11 and A.12) when undertaking the nominal heat output test in accordance with A.4.7, the part load heat output test in accordance with A.4.8, the slow combustion test for continuous burning appliances in accordance with A.4.9 and the safety test in accordance with A.4.10.

Where the flue draught values given in Figure 2 need to be exceeded in order to obtain the manufacturer's specified nominal output, the required flue draught shall be clearly stated in the appliance's installation instructions.

NOTE 1 This means that the manufacturer may claim a value above 12 Pa, but not below 12 Pa.



Key

- X nominal heat output (kW)
- Y flue draught (Pa)
- 1 safety test (A.4.10.3)
- 2 nominal heat output test (see A.4.7)
- 3 open operation safety test (see A.4.10.2)
- part load heat output test (A.4.8)
- heat output at slow combustion test (A.4.9)

Figure 2 — Flue draught values

When undertaking the nominal heat output test in accordance with A.4.7 the flue draught shall be set to the value given in Figure 2 or, if necessary, such higher value specified by the manufacturer and the mean value shall be within ± 1 Pa of this specified flue draught value. During the test the individual measurements shall be within ± 2 Pa of this specified flue draught value.

NOTE 2 It is not allowed to set the value at 11 Pa for a given value of 12 Pa.

For the slow combustion test for continuous purpose or part load heat output test for intermittent purpose in accordance with A.4.8 the flue draught shall be a target value of 6 Pa as given in Figure 2 and shall be kept within ± 1 Pa of this specified value. For the temperature safety test in accordance with A.4.10 the appliance shall be tested at a target flue draught 3 Pa greater than that used during the nominal heat output test and the static pressure shall be kept within $(\begin{smallmatrix} +2 \\ 0 \end{smallmatrix})$ Pa of this specified value.

7.6 Recovery test

At the conclusion of the slow combustion test described in A.4.9, it shall be possible to satisfactorily revive the fire.

Recovery shall be deemed to be satisfactory if the refuel charge is visibly ignited under the test conditions described in A.4.9.4 within a time of 20 min with a flue draught of $(10 \begin{smallmatrix} +2 \\ 0 \end{smallmatrix})$ Pa.

7.7 Refuelling intervals

When tested in accordance with A.4, and when the appliances is operated with closed doors, the minimum times for maintenance of combustion with one added batch of fuel shall be not less than the values given in Table 9 of the relevant parts 2 of EN 16510, as appropriate to the appliance type and/or the test fuel used.

Table 9 — Minimum refuelling intervals

Table 9 is given in the relevant parts 2 of EN 16510.

Where the refuelling interval at nominal heat output, specified by the manufacturer, is greater than the minimum refuelling interval given in Table 9 of the relevant parts 2 of EN 16510, or where the manufacturer states a refuelling interval for appliances under part load heat output conditions, then the manufacturer's specified value shall be verified when tested during the tests in accordance with A.4.7 and A.4.8. If either no refuelling interval or no part load heat output is claimed by the manufacturer no test is to be performed for part load heat output conditions.

The slow and part load test batches shall be according to the manufacturer's specification. The nominal fuel load shall be calculated using the refuelling intervals, the manufacturer's specified efficiencies and the calorific values of the fuels as detailed in A.4.2. The slope formed by the batch shall not obstruct, even partially, any flue.

7.8 Space heat output

The space heat output, specified by the manufacturer, shall be demonstrated when measured in accordance with A.4.7 or A.4.8.

7.9 Water heat output

The water heat output, specified by the manufacturer, shall be demonstrated when measured in accordance with A.4.7 or A.4.8 if any.

7.10 User operations

All operations which the user carries out, including loading and emptying of the appliance, adjusting controls and de-ashing, shall be easy, safe and efficient. These requirements shall be assessed during all the performance tests.

8 Appliance instructions

8.1 General

Each appliance shall be accompanied by instructions in the language of the country in which it is intended to be operated, containing all important details regarding the operation and installation for the concerned appliance.

These instructions shall accompany the appliance and shall describe the installation, operation, maintenance and, if assembled on site, the assembly of the appliance. The instructions shall not be in contradiction to the requirements or test results in accordance with this European Standard.

The instructions shall not be in contradiction to local and national installation regulations in the country where the appliance is intended to be installed.

8.2 Installation instructions

The installation instructions shall contain at least the following information:

- 1) a statement to the fact that “all local regulations, including those referring to national and European Standards need to be complied with when installing the appliance”;
- 2) the type (model or number) of the appliance;
- 3) the type of the appliance in accordance with Clause 4;
- 4) all parameters to be given on the marking of the appliance (see Clause 10 Table 13);
- 5) the requirements for the electrical power supply (where applicable);
- 6) the requirements for the supply of combustion air, for the simultaneous operation with other appliances and for the operation of exhaust air devices;

NOTE 1 Extractor fans, when operating in the same room or space as the appliance, may cause problems.

- 7) the need of any air inlet grilles to be so positioned that they are not liable to becoming blocked or closed off accidentally;
- 8) the mass of the appliance, in kg;
- 9) The overall dimensions of the appliance and the position and size of the flue gas outlet;

If an appliance is tested together with an integral duct, this duct shall be considered for the overall dimensions and the appliance flue gas outlet is at the end of this integral duct.

- 10) the minimum flue draught for nominal heat output, (where applicable, with open and closed charging doors);
- 11) the flue gas mass flow in g/s, where applicable, with open or closed charging door operations as specified by the manufacturer, (or alternatively the nominal heat output and the appliance efficiency and mean CO₂ concentration when operating at nominal heat output should be given for all test fuel types);
- 12) an advice for the chimney temperature class, it shall be at least T400 sootfire resistant;
- 13) whether the appliance is suitable for installation in a shared flue system;

- 14) the inset of appliances: in all cases the minimum dimensions of the required builder's opening and/or firefront opening in the surround;
- 15) the floors: the appliance shall be installed on floors with an adequate load-bearing capacity. If an existing construction does not meet this prerequisite, suitable measures (e.g. load distributing plate) shall be taken to achieve it;
- 16) the assembly of the appliance on-site, if applicable;
- 17) advice on the need to provide access for cleaning the appliance, the flue gas connector and the chimney flue;
- 18) the installation and operation of any control and safety equipment;
- 19) the installation of cut-off and damper device, if applicable;
- 20) the water flow resistance in mbar for appliances intended for use in sealed water systems only;
- 21) all necessary information to operate the temperature controller;
- 22) advice on a means of dissipating excess heat from the boiler, such as using a "heat leak" radiator for an open vented hot water system;
- 23) for an appliance fitted with a boiler suitable for installation into a sealed hot water system and where a thermal discharge control is not fitted as part of the appliance then the instructions shall specify the nature and type of the safety thermal control devices that shall be fitted into the system to prevent the water temperature exceeding 110 °C;
- 24) the water capacity and instructions for fitting a drain-cock in the lowest part of the system (where applicable);
- 25) advice on the installation of any air grilles, especially in relation to the temperature of surrounding walls, floor, ceiling or other structure around the appliance;
- 26) a table explaining the symbols and information used on the marking label as detailed in Clause 10;
- 27) the requirements for the installation space within the surround and outside the surround in the radiation area, taking outcoming convective hot air into consideration;
- 28) any commissioning instructions, as appropriate;
- 29) instructions for the installation of the accumulator (dimensions, assembly) and parameters for calculation, if applicable;
- 30) information on the suitable chimney (e.g. by referencing EN 15287-1, EN 15287-2, EN 13384-1, EN 13384-2).

Additional information to be specified in the instructions of roomsealed appliances (types CA; CM; CC);

- 31) basic requirements for installation rooms as well as information concerning rooms in which appliances may not be installed;
- 32) information on the applicable combustion air pipe system taking into account the flow restriction of the pipe (at least minimum and maximum lengths, diameters and materials) if any;

- 33) information on the suitable air-flue chimney system if any (e.g. by referencing EN 13063-3, EN 14989-2);
- 34) connections of the appliance to the connection pipe, further to the chimney and combustion air supply pipe or to the air-exhaust-system as applicable;
- 35) instructions of the manufacturer shall state clearly how the connection of the combustion air supply to the appliance and the appliance to the chimney shall be carried out;
- 36) minimum size of the room of installation [m³] (corresponding to the result of A.4.11.2);

NOTE 2 The value is 80 m³ as this value corresponds to 2 400 (see 6.9) – as an example the minimum size may be 40 m³ if the determined value is 1 200 (see 6.9).

- 37) information that the appliance shall not be installed with ventilating systems which have pressure below - 15 Pa.

8.3 User operating and maintenance instructions

The operating instructions shall contain at least the following information:

- 1) a statement to the fact that “all local regulations, including those referring to national and European Standards need to be complied with when operating the appliance”;
- 2) a list of the recommended fuels including type and size in accordance with this European Standard and an instruction to “use only recommended fuels” including their “Recommended fuel designation” (see Table B.2);
- 3) any modifications necessary to the appliance and/or to the operation of the appliance when using different fuels;
- 4) all parameters to be given on the marking of the appliance (see Clause 10 Table 13);
- 5) details of the method of refuelling and de-ashing the appliance and the maximum filling height in the combustion chamber and typical refuelling intervals at nominal heat output and at part load heat output, if any, for various recommended fuels;
- 6) a description of the correct instructions for safe and efficient operation of the appliance including the ignition procedure;
- 7) warning that radiation especially through glass surfaces may set combustible objects surrounding the appliance on fire and a minimum distance of such object to the appliance;
- 8) advice against the use of the appliance as an incinerator and the use of unsuitable and non-recommended fuels, including advice against the use of liquid fuels;
- 9) the operation of all adjusting devices such as dampers and controls;
- 10) ventilation requirements for simultaneous operation with other heating appliances (where applicable);
- 11) advice on safe operation of the appliance especially under adverse flue draught conditions or adverse weather conditions;
- 12) advice on the need for regular maintenance;

- 13) a warning that the combustion chamber and ashpit cover shall be kept closed except during ignition, refuelling and removal of residue material to prevent fume spillage, unless the appliance is intended to be operated with an open combustion chamber;
- 14) operation with open combustion chamber, where applicable;
- 15) operation of the thermal discharge control, where applicable;
- 16) the need for regular cleaning of the appliance, of the flue gas connector and the chimney flue and highlighting the need to check for blockage prior to re-lighting after a prolonged shut down period;
- 17) advice on the adequate provision of combustion and ventilation air and on keeping air intake grilles; supplying combustion air, free from any accidental blockage while the appliance is operated;
- 18) instructions on simple fault finding and the procedure for the safe shut down of the appliance in event of malfunction e.g. overheating, interruption of water supply;
- 19) warning that parts of the appliance, especially the external surfaces, will be hot to touch when in operation and due care will need to be taken;
- 20) the means of protection against risk of fire in and outside the heat radiation area;
- 21) warning against any unauthorised modification of the appliance;
- 22) use of only replacement parts recommended by the manufacturer;
- 23) advice about the actions to be taken in the event of a chimney fire;
- 24) whether the appliance is suitable for installation in a shared flue system;
- 25) advice on whether the appliance is capable of continuous or intermittent operation and instructions on how this is achieved;
- 26) instructions on how to achieve slow combustion;
- 27) instructions for use of the accumulator, if any;
- 28) advice on the adjustment of any air grilles, where fitted;
- 29) general cooking instructions (for cookers only);
- 30) flammable liquids: Never use gasoline, gasoline-type lantern fuel, kerosene, charcoal lighter fluid, ethyl alcohol or similar liquids to start or "reignite" a fire in the heater. Keep all such liquids well away from the heater while it is in use.

Additional information to be specified in the instructions of roomsealed appliances (types CA; CM; CC):

- 31) basic requirements for installation rooms as well as information concerning rooms in which appliances may not be installed;
- 32) indication concerning the combustion air pipe (open shut-off damper during operation and cleaning of the air grid);
- 33) door of the combustion chamber shall always be closed when operating and shall only be opened for adding fuel, ignition and deashing;

- 34) state that the appliance shall not be used if the seals around the door are damaged;
- 35) Close all combustion air control valves when not in use after the burning process is completely finished;
- 36) WARNING — Fumes resulting from blocked chimneys are dangerous. Keep the chimney and flue-pipe clear; sweep according to manufacturer's instructions. Keep boiler flueways clear; clean according to manufacturer's instructions. Use only recommended fuels. Read operating instructions;
- 37) An explanation of the sign  meaning "read and follow the user operating instructions";
- 38) An explanation of the sign "**burning logs**" meaning "use recommended fuels" followed by the recommended fuel designation(s).

9 Assessment and verification of constancy of performance – AVCP

9.1 General

The compliance of the residential solid fuel burning appliance with the requirements of this European Standard and with the performances declared by the manufacturer in the DoP shall be demonstrated by

- determination of the product type on the basis of type testing,
- factory production control by the manufacturer, including product assessment.

The manufacturer shall always retain the overall control and shall have the necessary means to take responsibility for the conformity of the product with its declared performance(s).

NOTE The assignment of tasks to the notified body(ies) and the manufacturer is shown in Annex ZA, Table ZA.3. of parts 2.

All documentation on the assessment and verification of constancy of performance – AVCP shall be retained by the manufacturer for at least 10 years after the last date of production.

9.2 Type testing

9.2.1 General

All performances related to characteristics included in this European Standard shall be determined when the manufacturer intends to declare the respective performances unless the standard gives provisions for declaring them without performing tests (e.g. use of previously existing data, CWFT (Classified Without Further Testing) and conventionally accepted performance).

Assessment previously performed in accordance with the provisions of this European Standard, may be taken into account provided that they were made to the same or a more rigorous test method, under the same AVCP system on the same product or products of similar design, construction and functionality, such that the results are applicable to the product in question.

NOTE Same AVCP system means testing by an independent third party.

For the purposes of assessment, the manufacturer's products may be grouped into families, where it is considered that the results for one or more characteristics from any one product within the family are representative for those same characteristics for all products within that same family (see Annex G).

The parameters and items considered in making either the decisions in relation to the characteristics to be verified or the appliances to be tested (in the case of a family or range of appliances) shall be recorded and a copy included in the production documentation for each appliance (see 5.1).

Table 10 — Items related to design and construction to take account in order to decide family of appliances

A Design, materials etc. ☐ Exterior design, dimensions, weight etc. ☐ System for air convection/radiation ☐ Ashpan ☐ Materials ☐ Assembling methods, welding etc. ☐ Other issues _____ ☐ Sketches/Drawings	D Combustion air ☐ Cross sections of air ducts (primary/secondary) ☐ Length of air ducts (primary/secondary) ☐ Number of bendings (primary/secondary) ☐ Air inlets in combustion chamber (primary/secondary) ☐ Pre-heating of air ☐ Air control system ☐ Other issues _____
B Combustion chamber ☐ Dimensions of combustion chamber ☐ Flue baffle plate(s) arrangement ☐ Refractory material/insulation ☐ Front firebars ☐ Temperature conditions ☐ Charging door arrangement, glass component/area ☐ Bottom grate, de-ashing system ☐ Other issues _____	E Fuel storage ☐ Size ☐ Protection against transfer of heat ☐ Insulation ☐ Other issues _____
C Flue ways ☐ Cross sectional area ☐ Length of flue gas passages ☐ Flue gas outlet ☐ Pressure loss ☐ Transfer of heat ☐ Insulation ☐ Other issues _____	F Integral boiler ☐ Design, size of heating surface, heat output ☐ Materials ☐ Tapping sizes, position ☐ Waterway dimensions, venting etc. ☐ Strength, leak tightness of boiler shell ☐ Other issues _____ G Cooking facilities (where appropriate) ☐ Hotplate and top plate ☐ Main / additional ovens

Products may be grouped in different families for different characteristics.

Reference to the assessment method standards should be made to allow the selection of a suitable representative sample.

In addition, the determination of the product type shall be performed for all characteristics included in the standard for which the manufacturer declares the performance:

- at the beginning of the production of a new or modified residential solid fuel burning appliance (unless a member of the same product range), or