BRITISH STANDARD

BS EN
14785:2006

Residential space heating appliances fired by wood pellets — Requirements and test methods

The European Standard EN 14785:2006 has the status of a British Standard

ICS 97.100.30

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 14785:2006.

The UK participation in its preparation was entrusted to Technical Committee RHE/28, Domestic solid mineral fuel appliances, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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

Textual error

The textual error set out below was discovered when the English language version of EN 14785:2006 was adopted as the national standard. It has been reported to CEN in a proposal to amend the text of the European standard.

In clause 2 correct the title of EN 10226-3 as follows:

EN 10226-3 Pipes threads where pressure tight joints are made on the threads — Part 3: Verification by means of limit gauges

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled "International Standards Correspondence Index", or by using the "Search" facility of the *BSI Electronic Catalogue* or of British Standards Online.

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Residential space heating appliances fired by wood pellets - Requirements and test methods

Appareils de chauffage domestique à convection à granulés de bois - Exigences et méthodes d'essai

Raumheizer zur Verfeuerung von Holzpellets - Anforderungen und Prüfverfahren

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document (EN 14785:2006) 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 2006, and conflicting national standards shall be withdrawn at the latest by December 2006.

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 Directive "Construction products".

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

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

1 Scope

This European Standard specifies requirements relating to the design, manufacture, construction, safety and performance (efficiency and emissions), instructions and marking together with associated test methods and test fuels for type-testing residential space heaters fired by wood pellets, and mechanically fed up to 50 kW nominal heat output.

These appliances may be freestanding or inset appliances and provide heat into the space where they are installed and may be operated with either natural draught or fan-assisted combustion air. Additionally, where fitted with a boiler, they also provide domestic hot water and/or central heating. These appliances burn wood pellets only, in accordance with the appliance manufacturer's instructions. They operate with firedoors closed only.

Non mechanically fed appliances burning solid mineral fuels, peat briquettes and natural or manufactured wood logs are not included in this European Standard, but are covered by EN 13229 and EN 13240.

NOTE These appliances may have an integral fuel hopper or be combined with an external fuel hopper.

2 Normative references

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

EN 1561:1997, *Founding — Grey cast irons*

EN 1563:1997, *Founding — Spheroidal graphite cast irons*

EN 10025:2004 (all parts), *Hot rolled products of structural steels*

EN 10027-2:1992, *Designation systems for steels — Part 2: Numerical system*

EN 10028-2:2003, *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 10088-2:2005, *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 10120:1996, *Steel sheet and strip for welded gas cylinders*

EN 10226-3, *Pipe threads where pressure-tight joints are made on the threads —Part 2: Verification by means of limit gauges*

CEN/TS 14774-1:2004, *Solid biofuels — Methods for determination of moisture content — Oven dry method — Part 1: Total moisture — Reference method*

EN 50165:1997, *Electrical equipment for non-electric appliances for houshold and simular purposes — Safety requirements*

EN ISO 228-1:2003, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimension, 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)*

ISO 7-1:1994, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

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 501:2003, *Hard 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 687:2004, *Solid mineral fuels — Coke — Determination of moisture in the general analysis test sample*

ISO 1171:1997, *Solid mineral fuels — Determination of ash*

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 document, 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 combustible materials, 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 doors designed to be installed into a fireplace recess or an enclosure, or into a firebox of an open fire

3.1.7
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. They may have an integral or external fuel hopper

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
burning rate
reduction in the mass of fuel per unit of time

3.2.3
combustion air
air supplied to the firebox, which is entirely or partially used to burn the fuel

3.2.4
combustion gases
compounds in gaseous form produced inside the appliance when the fuel is burned

3.2.5
efficiency
ratio of total heat output to total heat input expressed as a percentage during the test period

3.2.6
flue draught
differential between the static air pressure in the place of installation and the static pressure at the flue gas measurement point

3.2.7
flue gases
gaseous compounds leaving the appliance flue spigot and entering the flue gas connector

3.2.8
flue gas mass flow
mass of flue gas drawn off from the appliance per unit of time

3.2.9
flue gas temperature
temperature of the flue gas at the specified point in the measurement section

3.2.10
heat input
quantity of energy which the fuel provides to the appliance

3.2.11
maximum water operating pressure
limiting water pressure at which the boiler of an appliance can be safely operated

3.2.12
nominal heat output
total heat output of the appliance quoted by the manufacturer and achieved under defined test conditions when burning the specified test fuel

3.2.13
operating tool
device supplied with the appliance for handling movable and/or hot components

3.2.14
residue
ashes, including combustibles, which collect in the ashpit

3.2.15
routine test pressure
pressure to which all waterways are subjected during production at the manufacturer's plant or during setting up by the installer

3.2.16
space heating output
heat output furnished by convection and radiation to the room

3.2.17
steady state conditions
stage in the flue gas temperature does not change more than ± 5 K

NOTE Some appliances are fitted with an automatic cleaning procedure. In the cleaning time the flue gas temperature may rise or fall.

3.2.18
temperature in the fuel hopper
temperature at the hottest point, measured in the area of possible fuel storage

3.2.19
total heat output
rate of useful heat released by the appliance

3.2.20
type test pressure
pressure to which all waterways of the test appliance are subjected

3.2.21
water flow temperature
temperature of the heated water exiting the appliance

3.2.22
water heating output
heat output to water, averaged during the test period

3.2.23
water return temperature
temperature of the cooled water entering the return tapping connectors of the appliance

3.2.24
reduced heat output
minimum possible heat output of the appliance as a percentage of nominal heat output and achieved under defined test conditions when burning the specified test fuel

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 control convection air flow

3.3.3
ashpan
removable receptacle shaped to receive the residues from the firebed

3.3.4
ashpit
chamber designed to receive the residues from 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 falls into the ashpan and combustion air and/or combustion gases may pass

3.3.8
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

3.3.9
combustion control device
mechanism for setting the primary and/or secondary air in accordance with the burning rate required

3.3.10
cut-off device
mechanism to block the flue when the appliance is not in use

3.3.11
damper
mechanism to change the resistance to flow of the combustion gases

3.3.12
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.

3.3.13
direct water system
hot water system in which stored domestic hot water is heated directly by hot water circulating from the boiler

3.3.14
draught regulator
inlet device for admission air downstream of the firebed, enabling the flue draught to be controlled

3.3.15
firebox; combustion chamber
part of the appliance in which the fuel is burned

3.3.16
firedoor
door through which the fire may be viewed and which may be opened to allow cleaning of the firebox and the retort

3.3.17
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

3.3.18
flue gas connector
duct through which flue gases are conveyed from flue spigot of the appliance into the chimney flue

3.3.19
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

3.3.20
fuel hopper
fuel store either integral with the appliance or external from which fuel is fed to the retort

3.3.21
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

3.3.22
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 conveyor system to the fuel charging position

3.3.23
primary air
combustion air which passes through the fuel bed

3.3.24
safety heat exchanger
device which allows excess heat to be released from an appliance with boiler and which limits the maximum temperature of the water

3.3.25
secondary air
air supplied for the purpose of completing combustion of gases leaving the fuel bed

3.3.26
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

3.3.27
thermostat
temperature sensitive device which automatically changes the amount of combustion air and/or the mass flow of fuel

3.3.28
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.

3.3.29
conveyor system
device for feeding the fuel from the hopper to the retort

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 occuring or manufactured solid mineral fuels, natural or manufactured wood logs, pellets and peat briquettes

3.4.3
wood pellet
solid fuel, usually in cylindrical form, made from untreated pulverised wood of the whole tree and compressed with or without the aid of binders (e.g. molasses, paraffin wax, glucose)

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.

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."

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

— specification of the materials used in the construction of the appliance;

— nominal heat output and reduced 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:

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

NOTE 1 The symbol for the type of weld used is sufficient.

— permissible maximum operating water temperature in °C;

— permissible maximum operating pressure in bar;

— type test pressure in bar;

— water heating output in kW;

— reduced heat output in kW.

NOTE 2 The manufacturer should also have available any declarations of conformity of the appliance to all other applicable directives.

4.2 General construction requirements

The shape and dimensions of the components and equipment and the method of design and manufacture and, if partly 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 5.9.

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.

Adapters for increasing the flue spigot/socket diameter are permitted when they are part of the pellet stove.

They shall be tightly connected and fit any chimney flue connection.

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.

Their position in relation to their function shall be clearly recognizable.

4.5 Flueways

For appliances without automatic cleaning systems, 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 not be less than 40 mm. It shall be permissible to reduce it to not less than 15 mm provided an access door(s) is provided for cleaning the flueway.

When an automatic cleaning system is installed, it shall clean the flueways such that there is no risk of blockage within the flueways due to build-up of soot.

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

Where the appliance is fitted with a firedoor, 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, electronically 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 multi-fuel 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.

Appliances fitted with a boiler shall be fitted with a water temperature actuated, thermostatically controlled fuel and air supply.

NOTE The design should be such that during operation of the appliance, neither ash nor un-burnt 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 Retort

Where the retort 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 retort.

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.

4.11 Ashpan and ash removal

A means of removing the residue from the appliance shall be provided.

Where an ashpan is provided, for appliances with internal hoppers, it shall be capable of containing the residue from two full charges of fuel in the hopper whilst retaining sufficient space above to allow adequate primary air flow through the bottom grate or fire bed.

For appliances with external hoppers, the size of asphan shall be able to contain at least the ash from 12 h running the appliance at nominal heat output. If the manufacturer states a value for the possible running time greater than 12 h, it has to be verified by calculation if the value is correct.

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.

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.

4.12 Integral boiler

4.12.1.1 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.4.9.2.

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 1 shall be used for the manufacture of those parts of the appliance subject to water pressure.

Table 1 — Steel material types

References	Material Type	Material number in accordance with EN 10027-2
EN 10111	DD 11	1.0332
	DD 12	1.0398
	DD 13	1.0335
	DD 14	1.0389
EN 10025	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:	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	P245NB	1.0111
	P265NB	1.0423
	P310NB	1.0437
	P355NB	1.0557
EN 10088-2	X5CrNi18-10	1.4301
	X6CrNi17-12-2	1.4401
	X6CrNiTi18-10	1.4541
	X6CrNiNb18-10	1.4550
	X6CrNiMoTi 17-12-2	1.4571
	X6CrNiMoNb17-12-2	1.4580
	X3CrNiMo17-13-3	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.		

4.12.2 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 2.

The tolerances on the nominal minimum wall thicknesses for carbon steels given in Table 1 shall be as specified in EN 10029.

Table 2 — 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
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.			

4.12.3 Welding seams and welding fillers

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

4.12.4 Minimum wall thicknesses (cast iron)

The wall thicknesses given in the production drawing shall not be less than the minimum thickness listed in Table 3.

Table 3 — 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

4.12.5 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 4.

Table 4 — Minimum mechanical requirements for cast iron

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

4.12.6 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.

4.12.7 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.

4.12.8 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 5.

Where tapered threads are used, they shall be in accordance with the requirements of ISO 7-1 and EN 10226-3. Where parallel threads are used, they shall be in accordance with EN ISO 228-1 and EN ISO 228-2. The design and position of flow tappings shall be such that air will not be retained within the boiler shell.

Table 5 — Minimum thread size designation of flow and return tappings

Nominal heat output kW	**Gravity circulation thread size designation** [a]	**Pumped circulation thread size designation** [a]
≤ 22	1	½
> 22 ≤ 35	1¼	1
> 35 < 50	1½	1
[a] Designation in accordance with ISO 7-1 and EN 10226-3 or EN ISO 228-1 and EN ISO 228-2.		

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 6.

Table 6 — Minimum depth of tapping or length of thread

Thread size designation [a]	Minimum depth or length of thread mm
½ to 1¼	16
1½	19
[a] Designation in accordance with ISO 7-1 and EN 10226-3 or EN ISO 228-1 and EN ISO 228-2.	

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 and EN 10226-3 or EN ISO 228-1 and EN ISO 228-2.

4.12.9 Boiler internal waterways

4.12.9.1 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.

4.12.9.2 Boiler waterways used with indirect water systems

The minimum internal dimension of waterways throughout the main body of the appliance shall not be 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 14 mm.

4.12.9.3 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 if there is a possible contact with burning fuel, and not less than 12 mm if there is no possible contact with burning fuel.

4.13 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 cm^2 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.

A flue damper shall not be fitted to an appliance having a forced fan air supply.

4.14 Cleaning of heating surfaces

All heating surfaces shall be accessible from the flue gas side for inspection and cleaning. A sufficient number and appropriate arrangement of cleaning openings shall be provided. Where cleaning and servicing of the boiler and its components require special tools (e.g. special brushes) these shall be supplied by the manufacturer.

5 Safety

5.1 Temperatures 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 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.

5.2 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.

5.3 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.

5.4 Temperature in the fuel hopper

When tested during the temperature safety test in accordance with A.4.9.1 the temperature in any integral fuel storage container shall not exceed the ambient temperature by more than 65 K.

5.5 Safety against back burning through the fuel conveyor system

The appliance shall have a safety system to ensure that back burning from the retort to the fuel hopper shall not occur.

When tested during the temperature safety test in accordance with A.4.9.1 the temperature in the hopper shall not exceed the ambient temperature by more than 65 K.

In case of electrical power failure the appliance shall remain safe. The temperature in the hopper shall not exceed the ambient temperature by more than 65 K.

Operation of any of the safety systems shall stop the supply of fuel from the fuel hopper.

NOTE Safety systems can be one (fail-safe) or more devices such as drop chutes, an enclosed cell feeder or a water sprinkler system, operated by temperature, pressure and/or temperature switches. If the stove has a bottom-fed fuel supply, the fuel container needs to have a tight-fitting lid in combination with a device that interrupts the fuel supply if the cover is not closed as a safety system.

5.6 Safety against overheating the boiler water

The appliance shall include a function which stops the operation of the burner if the temperature of the boiler water exceeds either 105 °C or such lesser value specified by the manufacturer.

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.4.9.3, 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.4.9.2 or during the nominal heat output test described in A.4.7.

5.9 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.

NOTE Some clauses of EN 50165 may not apply to the different types of appliances within the scope of this European Standard.

6 Performance

6.1 Flue draught

Appliances with a nominal heat output less than or equal to 25 kW shall be tested at a flue draught of (12 ± 2) Pa or at the draught given by the manufacturer during the nominal heat output test. The temperature safety test shall be carried out at the same draught.

Appliances having a nominal heat output greater than 25 kW shall be tested during the nominal heat output test at such flue draught given by the manufacturer in the appliance instructions.

For the partial load test all appliances shall be tested either at a flue draught of (10 ± 2) Pa or at such draught as declared by the appliance manufacturer in the appliance instructions.

6.2 Flue gas temperature

During the performance test at nominal heat output and at reduced heat output test in accordance with A.4.7 or A.4.8 the mean flue gas temperature in the test measurement section shall be measured and recorded.

6.3 Carbon monoxide emission for pellet stoves

When measured in accordance with A.4.7 and A.4.8, the mean carbon monoxide concentration calculated to 13 % oxygen (O_2) content in the flue gas from the mean of at least two results shall not exceed 0,04 % (500 mg/m³) at nominal heat output and 0,06 % (750 mg/m³) at reduced heat output.

NOTE In some countries national laws also set limits for particulate and organic compound emissions, emissions under slow and reduced combustion conditions and for weighted values for emissions to be used. In some countries clean air legislation is based upon the use of authorised fuels.

6.4 Efficient energy utilization

6.4.1 General

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

6.4.2 Efficiency at nominal heat output and at reduced heat output

When tested in accordance with A.4.7 and A.4.8, the measured total efficiency from the mean of at least two test results at nominal heat output and at reduced heat output shall be at least 75 % at nominal heat output and 70 % at reduced heat output.

NOTE In some countries national laws set limits for minimum efficiency under slow and/or reduced combustion conditions and for weighted values for efficiency to be used.

6.5 Nominal heat output

The mean value of the measured heat output obtained during the test in accordance with A.4.7 shall equal or exceed the nominal heat outputs declared by the manufacturer.

6.6 Reduced heat output

The mean value of the measured heat output obtained during the test in accordance with A.4.8 shall be less than or equal to the reduced heat output declared by the manufacturer.

6.7 Water heating output

The water heating output declared by the manufacturer shall not exceed the boilers output measured under the test conditions described in A.4.7.

6.8 Space heating output

When tested in accordance with A.4.7, the space heating output declared by the manufacturer shall not exceed the test space heating output.

6.9 Hopper capacity

For appliances with internal hoppers only, the hopper capacity shall be such as to maintain reduced heat output over at least 6 h and nominal heat output over at least 3 h without refilling. If the manufacturer claims a longer period of time that can be maintained at nominal heat output without refilling this shall be verified.

For appliances with external hoppers, it shall be checked that the minimum size stated by the manufacturer fulfils the above requirements.

NOTE See calculation of fuel load in A.4.2.

6.10 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.

7 Appliance instructions

7.1 General

Instructions written in the language of the country of intended destination of the appliance 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 specified in this European Standard.

7.2 Installation instructions

The installation instructions shall contain at least the following information:

— statement to the fact that “all national and local regulations and European Standards shall be complied with when installing the appliance”;

— full assembly instructions for the appliance, especially if supplied in parts;

— appliance model, number or type;

— nominal heat output in kilowatts or watts for each type of recommended fuel;

— reduced heat output in kilowatts or watts;

— water heating output in kilowatts or watts for each type of recommended fuel if appropriate;

— requirements for the electrical power supply;

— indication of the heat released to the room in which the appliance is installed for each type of recommended fuel;

— maximum operating water pressure in bar, where applicable;

— mass of the appliance in kilograms;

— any necessary safety clearance distances from combustible materials and/or any other recommendations for protective measures to protect the building construction against the risk of fire;

— requirements for the supply of combustion air and where necessary the ventilation and air supply requirements for simultaneous operation with other heating appliances;

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

— need for any air inlet grilles to be so positioned that they are not liable to blockage;

— minimum chimney draught requirements (in Pa) for safe operation, nominal heat output and reduced heat output;

— flue gas mass flow in grams per second at nominal heat output and reduced heat output where required by national/local regulation (or alternatively the nominal heat output and the appliance efficiency and mean CO_2 concentration when operating at nominal heat output and reduced heat output should be given for all test fuel types);

— mean flue gas temperature directly downstream of the flue spigot/socket in °C for nominal heat output and reduced heat output;

— advice on the need to provide access for cleaning the appliance and the flue gas connector and the chimney flue;

— whether or not the appliance is suitable for installation in a shared flue;

— installation of cut-off and damper devices, as well as all safety devices where applicable;

— requirements for the installation space within the surround and outside the surround in the radiation area, taking outcoming convective hot air into consideration as well as the surface temperature of the surround;

— for the installation of the appliance its mass shall be taken into account;

— for inset appliances, in all cases the minimum dimension of the required builder's opening and/or firefront opening in the surround;

— water capacity of any boiler and instructions for fitting a drain-cock in the lowest part of the system (where applicable);

— setting of the temperature controller and method of adjusting the "cold" setting distance;

— advice on a means of dissipating excess heat from the boiler, such as using a radiator;

— any commissioning instructions, as appropriate;

— installation and operation of any control and safety equipment;

— 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.

7.3 User operating instructions

The user operating instructions shall contain at least the following information:

— statement to the fact that "all national and local regulations and European Standards shall be complied with when operating the appliance";

— list of the types and sizes of recommended fuels in accordance with the requirements of this European Standard;

— any modifications necessary to the appliance and/or to the operation of the appliance when using different fuels (e.g. diameter);

— instructions for refuelling the hopper;

— instructions for the safe and efficient operation of the appliance including the ignition procedure;

— advice that the appliance shall not be used as an incinerator and that no other fuels than pellets shall be used;

— advice on the correct operation of any adjusting devices and controls;

— correct operation for seasonal use and for adverse flue draught or weather conditions particularly where there is the potential for freezing;

— warning that the firebox shall always be closed when the appliance is in operation;

— advice on the correct operation of any thermal discharge control or other control or safety equipment, where applicable;

— ventilation requirements for simultaneous operation with other heating appliances;

— advice on the regular cleaning of the appliance, flue gas connector and chimney flue and highlight the need to check for blockage prior to lighting after a prolonged shutdown period;

— instructions on ensuring the adequate provision of combustion air and ventilation air and safe removal of flue gases;

— 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;

— warning that the appliance, especially the external surfaces, will be hot to touch when in operation and that due care will need to be taken;

— need to adhere to any necessary safety clearances from combustible materials and guidance on protecting against the risk of fire in and outside the radiation area;

— warning against any unauthorized modification of the appliance;

— recommendation to use only replacement parts recommended by the manufacturer;

— advice about action in the event of a chimney fire;

— appliance efficiency and CO values;

— advice on the adjustment of any air grilles, where fitted.

8 Marking

Each appliance shall be permanently and legibly marked in a place where it is accessible so that the information can be read when the appliance is in its final location, with the following minimum information:

— manufacturer’s name or registered trademark;

— type and model number or designation to enable the appliance to be identified;

— nominal boiler (where relevant) and space heating output in kilowatts, or a range of outputs (dependent on fuel types, as applicable), reduced heat output in kW;

— number of this European Standard, i.e. EN 14785;

— measured CO concentration at 13 % oxygen content and the determined appliance efficiency at nominal heat output and reduced heat output, as defined in 6.3 and 6.4 respectively;

— permissible maximum water operating pressure [in bar], if applicable;

— “read and follow the operating instructions”;

— “use only recommended fuels”;

— minimum safety clearance distances from combustible materials if applicable;

— consumption of electrical auxiliary energy.

If a label is used it shall be durable and abrasion proof. Under normal operating conditions, the label shall not discolour, thus making information difficult to read. Self-adhesive labels shall not become detached as a result of moisture or temperature.

9 Evaluation of conformity

9.1 General

The compliance of a residential space heating appliance fired by wood pellets with the requirements of this European Standard and with the stated values shall be demonstrated by:

— type testing;

— factory production control by the manufacturer, including product assessment.

For the purposes of testing, appliances may be grouped into families, where it is considered that the selected performance characteristic or characteristics, especially in respect of those detailed in Table 7 and Table 8, is/are common to all appliances within that family.

9.2 Type testing

9.2.1 Initial type testing

Initial type testing shall be performed to demonstrate conformity to this European Standard. In the case of an appliance already in production, the appliance to be tested shall be chosen at random and be representative of general production. The manufacturer shall provide a written declaration to this effect.

In the case of a prototype, the appliance tested shall be a model representative of the intended future production and the manufacturer shall provide a written declaration that this is the case. When the appliance goes into production a dimensional and constructional check shall be undertaken on the production appliance to confirm it is in agreement with the originally type tested prototype model. If the dimensions of the production appliance diverge by more than 1 % of the dimension or ± 3 mm, whichever is the lesser, from that of the prototype in relation to the firebox and/or combustion chamber and any other dimension considered to be critical to the safety or performance of the appliance (especially in respect of the characteristics of Table 7 and Table 8), then the production appliance itself shall be subjected to further type testing as detailed in 9.2.2.

Similarly, if there is a change to the construction materials used which will adversely alter the performance characteristics of the appliance, especially as regards its safety and/or the meeting of the performance

characteristics of Table 8, then the production appliance itself shall be subject to further type testing as detailed in 9.2.2. This requirement regarding re-testing shall be applied if during the subsequent production or at the start of a new production run such a change is made to dimensions and/or construction materials. To ensure that this takes place there shall be a dimensional/constructional check on a current production appliance over an ongoing period not exceeding 3 years to demonstrate conformity to type.

Where tests have been previously performed in accordance with the provisions of this European Standard (same product, same characteristic(s), test method, sampling procedure, system of attestation of conformity etc.) then the results of these tests shall be taken into account in assessing continuing conformity to type.

For a family or range of appliance it shall be permissible to test only selected appliances across the family or range and to only verify selected constructional and performance characteristics on the others, subject to a clear decision being made that the appliances are part of a family or range of appliances. For the initial type test at least a sufficient number of the appliances shall be chosen from across the family or range so as to represent adequately the family or range. The chosen appliances shall be subjected to complete testing to fully verify their compliance with all of the constructional and performance characteristics in accordance with this European Standard. For the other appliances in the family or range not chosen for complete testing it shall be permissible to only verify selected constructional and/or performance characteristics to ensure their compliance with the requirements of this European Standard and/or to ensure they will perform the same as the fully type tested appliances of the family or range.

In selecting appliances for type testing from a product range based upon their nominal heat outputs as representing such a family, then the appliances having the highest and lowest claimed nominal heat outputs shall be tested together with sufficient appliances chosen from within the range such that the ratio of nominal heat output between each of the appliances does not exceed 1,6 : 1.

Further, in deciding that the appliances belong to a family or range, due account shall be taken of the construction and performance characteristics of each appliance, especially in respect of the list of characteristics detailed in Table 7 and Table 8. The list of characteristics in Table 7 and Table 8 is not definitive and other aspects may need to be considered in making this judgement. Where a range of appliances of the same firebox and output have differing canopies or external cladding both in size and materials of construction (e.g. where the hot surface would be likely to be closer to combustible surfaces or there is a change from a lower to a higher conductivity or emissivity material), then at least one appliance shall be chosen which will be the worst case scenario and will demonstrate the safety of the range as regards surface temperature and safety of adjacent combustible materials.

Where the manufacturer claims conformity to the standard for a family of appliances on a number of different fuel types, a selection of tests shall be made which demonstrates the conformity of the family in respect of the safety (Clause 5) and performance (Clause 6) on these fuels on the appliances and to the list of characteristics detailed in Table 7 and Table 8.

The parameters, characteristics examined and considerations taken into account in making the decisions in relation to the family or range of appliances shall be recorded and a copy included in the production documentation for each appliance of the family or range (see 4.1).

9.2.2 Further type testing

Whenever a change occurs in either the appliance design, the raw material, the supplier of the components, 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 7 and Table 8, the type tests shall be repeated for the appropriate characteristic(s).

It shall be permissible for this further type testing to verify only selected constructional and/or performance characteristics to ensure their compliance with the requirements of this European Standard and/or with the fully type tested appliances of the family or range.

For a family or range of appliances it shall be permissible to test only selected appliances across the family or range and to verify only selected constructional and performance characteristics on the others, subject to a clear decision being made that the appliances are part of a family or range of appliances.

In deciding the constructional and/or performance characteristics to be verified or the appliances to be tested (in the case of a family or range of appliances) due account shall be taken of the performance characteristics detailed in Table 8 together with the list of characteristics detailed in Table 7. The list of characteristics in Table 7 and Table 8 is not definitive and other aspects may need to be considered in making this judgement.

Where tests have been previously performed in accordance with the provisions of this European Standard then these test results shall also be taken into account in making the decision.

The parameters and characteristics considered in making either the decisions in relation to the constructional and/or performance 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 4.1).

Table 7 — Characteristics to take account of in deciding 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
B	**Combustion chamber**
☐	Dimensions of combustion chamber
☐	Flue baffle plate(s) arrangement
☐	Refractory material/insulation
☐	Front firebars/deepening plate
☐	Temperature conditions
☐	Firedoor arrangement, glass component/area
☐	Bottom grate, de-ashing system
☐	Other issues _____
C	**Flue ways**
☐	Cross sectional area
☐	Length of flue gas passages
☐	Flue spigot
☐	Pressure loss
☐	Transfer of heat
☐	Insulation
☐	Other issues _____

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 _____
E	**Integral fuel storage container**
☐	Size
☐	Protection against 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, leaktightness of boiler shell
☐	Other issues _____
G	**Fuel feeding system**
☐	Safety system against back burning

Table 8 — Performance characteristics to take account of in deciding family of appliances

Performance characteristic	Requirement clauses in this EN
Fire safety	4.2, 4.3, 4.7, 4.8, 4.10, 4.11, 4.15, 5.1, 5.3, 5.4, 5.5, 5.8, 6.10
Emission of combustion products	4.2, 4.3, 4.7, 4.8, 4.9, 4.13, 4.14, 5.3, 5.4,
Surface temperature	4.2, 4.13, 5.1, 5.2, 5.4, 5.5
Electrical safety	5.8
Cleanability	4.5, 4.6, 4.10, 4.12, 4.14
Maximum operating pressure (applicable only where the appliance is fitted with a boiler)	4.2, 5.6, 5.7
Flue gas temperature	6.2
Mechanical resistance (to carry a chimney/flue)	4.2, 4.3
Thermal output/energy efficiency	6.1, 6.4 to 6.10

9.3 Factory production control (FPC)

9.3.1 General

The manufacturer shall establish, document and maintain a permanent FPC system and identify areas of responsibility to ensure that the products placed on the market conform with the stated performance characteristics. The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control raw and other incoming materials or components, equipment, the production process and the product and shall comply with the requirements specified in 9.3.2 to 9.3.8.

NOTE A permanent FPC system conforming to the requirements of EN ISO 9001 or otherwise equivalent and made specific to the requirements of this European Standard, is considered to satisfy the requirements specified in 9.3.2 to 9.3.8.

The manufacturer shall carry out FPC tests to monitor the conformity of the product. Sampling, testing or assessment shall be undertaken in accordance with ISO 2859. The results of inspections, tests or assessments requiring action shall be recorded, as shall any action taken. The action to be taken when control values or criteria are not met shall be recorded.

9.3.2 Raw materials and components

The specifications of all incoming raw materials and components shall be appropriate for the intended use and shall be documented, as shall the inspection and testing scheme for ensuring the conformity of these materials and components.

9.3.3 Control of inspection, measuring and test equipment

All weighing, measuring and testing equipment used to demonstrate conformance of the product shall be calibrated and regularly inspected according to documented procedures, frequencies and criteria.

9.3.4 Process control

The manufacturer shall identify and plan the production processes, which directly affects the product characteristics and shall ensure that these processes are carried out under controlled conditions. Where the required product characteristics cannot be fully verified by subsequent inspection and testing of the product, then the production processes shall be carried out by operators specifically trained to undertake this work.

9.3.5 Product inspection, testing and evaluation

The manufacturer shall establish and maintain documented procedures for in-process and final inspection and testing, as appropriate to the product type, to ensure that the stated values of all of the product characteristics are maintained.

At least the following product characteristics, their criteria and means of control shall be included in the factory production control scheme.

9.3.5.1 Materials of construction

a) Type – composition/specifications;

b) thickness;

c) dimensions;

d) finish.

A supplier's declaration for material type and properties is accepted, provided that the supplier has an appropriate factory production control system to ensure the adequacy, consistency and accuracy of the material type and properties.

9.3.5.2 Insulation material

a) Specification of insulation material;

b) density value - thermal conductivity.

A supplier's declaration for material type and properties is accepted, provided that the supplier has an appropriate factory production control system to ensure the adequacy, consistency and accuracy of the material type and properties.

9.3.5.3 Seals and sealant materials

a) Type - Including identification or composition, when a conformity certificate is not available;

b) dimensions.

A supplier's declaration for material type and properties is accepted, provided that the supplier has an appropriate factory production control system to ensure the adequacy, consistency and accuracy of the material type and properties.

9.3.5.4 Manufacturing checks

9.3.5.4.1 Construction and dimensions

Construction and dimensions of critical parts shall be confirmed during the manufacturing and/or on completion as follows:

a) flue spigot;

b) flueways;

c) ashpan;

d) bottomgrate;

e) air supply – thermostat, manual control, inlet size etc.;

f) control of flue gas (damper);

g) firedoors/charging doors;

h) flue by pass;

i) front firbars;

j) boiler construction – dimensions, waterways, tappings etc. (if fitted);

k) firebox/combustion chamber construction;

l) convection system;

m) conveyer system.

9.3.5.4.2 Other checks

At least the following checks shall be carried out during the manufacturing process:

a) sealing of components to avoid leakage;

b) fitment of moving/interconnecting parts.

9.3.6 Non conforming products

The manufacturer shall establish and maintain documented procedures to ensure that where the product does not conform to the specified requirements then it is clearly identified and its placing on the market is prevented. These procedures shall provide for documentation and segregation of the product and for notification to the various functions concerned. Any repaired and/or reworked products shall be re-inspected in accordance with the inspection, testing and evaluation plan.

9.3.7 Corrective and preventive action

The manufacturer shall establish and maintain documented procedures for implementing corrective and preventive action. The manufacturer shall implement and record any changes to the documented procedures resulting from corrective and preventive action.

9.3.8 Handling, storage, packaging, preservation and delivery

To the extent necessary to ensure conformity of the product to the specified requirements the manufacturer shall establish and maintain documented procedures for handling, storage, packaging, preservation and delivery of the finished product following final inspection and test.”

Annex A
(normative)

Test methods

A.1 Test environment

A.1.1 Ambient room temperature

The ambient room temperature of the test laboratory shall be measured at a distance from either side of the appliance represented by a point lying on a circumference of a circle with a radius of (1,2 ± 0,1) m traced from the mid-point of the side of the appliance, at a height of (0,50 ± 0,01) m above the platform scale and away from direct radiation.

For measurement of the ambient room temperature, a thermocouple or other temperature measuring device shall be used, and shall be protected from radiation by an open-ended cylindrical screen made of polished aluminium or material of equivalent reflectivity, approximately 40 mm in diameter and 150 mm long. The thermocouple or other temperature measuring device shall meet the accuracy requirements specified in A.3.

A.1.2 Cross-draught

Cross-draught in the vicinity of the test appliance and its surroundings shall not be greater than 0,5 m/s measured at the location specified in A.1.1.

A.1.3 External sources

The test assembly shall be protected from direct influence of other heat sources, e.g. adjacent test assemblies and sunlight.

A.2 Test assembly

A.2.1 General

The test assembly shall consist of the test appliance installed according to the manufacturer's installation instructions in a trihedron in accordance with A.2.2, mounted on a platform scale that enables the fuel consumption to be measured such that the accuracy requirements specified in A.3 are met.

NOTE 1 The appliance should be installed either directly into the trihedron in the case of a free standing appliance, or in an arrangement simulating the construction specified by the appliance manufacturer in the case of inset appliances.

The appliance shall be positioned so that the sides facing the trihedron walls are at the manufacturer's minimum declared distance from combustible material.

A measurement section constructed in accordance with A.2.3 shall be provided with means for determining the flue gas temperature in accordance with A.2.3.2, the flue gas composition in accordance with A.2.3.3 and the applied flue draught in accordance with A.2.3.4.

The appliance flue spigot/socket shall be connected by means of an un-insulated flue gas connector and an insulated flue gas adaptor to the measurement section in accordance with A.2.4.

The flue gases shall be extracted from the top of the measurement section and means of adjustment shall be provided to enable a constant flue draught pressure as specified in the relevant test procedures to be maintained in the measurement section (e.g. by an extraction fan).

NOTE 2 Examples of typical installations are given in Figures A.1 and A.2.

The appliance shall be connected to a water circuit as specified in A.2.5.

A.2.2 Trihedron

The trihedron shall consist of a hearth, a side wall and a rear wall each at right angles one to the other. For those appliances where it is necessary to measure the temperature of the ceiling then a ceiling shall also be fitted in accordance with the manufacturer's installation instructions.

NOTE 1 Examples of the general arrangement and opening construction of the trihedron are given in Figures A.3 and A.4. An example of an installation with walls and ceiling is given in Figure A.12.

The trihedron hearth and walls and/or ceiling, if required, shall be constructed as illustrated in Figure A.5 or have a construction of equivalent thermal performance. The trihedron shall extend laterally beyond the appliance's external dimensions by at least 150 mm, and vertically by at least 300 mm above the topmost surface of the appliance.

For appliances with a horizontal outlet the rear wall shall have an opening through which the flue gas connector can pass, with a clearance of (150 ± 5) mm around the connector

The maximum surface temperatures of the trihedron test hearth and walls and/or ceiling shall be determined. These temperatures shall be measured using calibrated equipment meeting the accuracy requirements specified in A.3. The position of the measurement points shall be as illustrated in Figure A.6. However only a sufficient number of those measurement points in and around the hottest zone need be fitted with calibrated thermocouples and used for measurement purposes provided it is ensured that the maximum surface temperature achieved shall be recorded. Each thermocouple shall be secured so that its junction is level with the trihedron surface as illustrated in Figure A.7.

NOTE 2 Other measurement equipment similar to thermocouples may be used provided it is ensured that the actual maximum surface temperatures of the trihedron test hearth and walls are measured and recorded and that the equipment used is calibrated such that it meets the accuracy requirements specified in A.3.

If the highest temperature is measured at the periphery of the trihedron and/or ceiling then the trihedron floor or walls and/or ceiling shall be extended by at least 150 mm beyond the point of highest temperature.

A.2.3 Measurement section

A.2.3.1 General arrangement

The general constructional arrangement and some details of the measurement section are shown in Figure A.8.

The measurement section shall be provided with means of measuring the temperature and composition of the flue gas and also with means of measuring the applied flue draught pressure as detailed in A.2.3.2 to A.2.3.4.

The measurement section shall be fully lagged with nominal 40 mm thick mineral fibre (e.g. rock-wool) or similar material in order to provide a thermal conductivity of at least 0,04 W/m·K at an average temperature of 20 °C. The dimensions of the measurement section shall be as detailed in Figures A.9 and A.10 and be sized according to the diameter of the flue gas outlet of the appliance.

A.2.3.2 Flue gas temperature measurement

The flue gas temperature shall be measured by a sensing element e.g. a thermocouple located inside a suction pyrometer probe as shown in Figure A.8, with the sealed end touching the opposite wall of the measurement section and with the open outlet end connected to a suction pump. The thermocouple shall be protected by a sheath. A suitable fitting shall be provided to give a gas-tight seal between the suction pyrometer and the wall of the measurement section and between the sensing element and the outlet of the pyrometer.

The suction pyrometer probe shall have 3 sampling holes, each (2,5 ± 0,5) mm in diameter, one positioned at the centre of the measurement section and the other two positioned either side at one quarter of the flue diameter distance from the side walls of the measurement section. The extremity of the temperature sensing element shall be placed at the position shown in Figure A.8.

The inside diameter of the suction pyrometer shall be (5 ± 1) mm and the flow rate shall be adjusted in order to obtain a flow velocity within the range of 20 m/s to 25 m/s.

NOTE The high flow rate necessary to achieve the specified range of flow velocity may be limited through the flue gas analysers by use of a bypass arrangement.

A.2.3.3 Flue gas sampling

The suction pyrometer probe shall also be used for flue gas sampling. The outlet end of the suction pyrometer shall be connected to a flue gas analysis system meeting the accuracy requirements specified in A.3. Means of cooling, cleaning and drying the flue gas sample shall be incorporated in the sampling line.

The materials used for the gas sampling line and probe connections shall be resistant to the expected temperature and shall not react with or allow diffusion of flue gases. There shall be no leaks in either the sampling probe connections or the gas sampling line.

A.2.3.4 Static pressure measurement

A tube, with an internal diameter of 6 mm, shall be located into the measurement section as shown in Figure A.8. The end of the tube shall be sealed flush with the inner wall of the measurement section.

A.2.4 Connection of appliance to measurement section

The appliance flue spigot/socket shall be connected to the measurement section specified in A.2.3 by an un-insulated flue gas connector and an insulated flue gas adaptor. The flue gas connector shall be made of unpainted mild steel with a thickness of (1,5 ± 0,5) mm. Its length shall be (330 ± 10) mm and correspond to the diameter of the flue spigot/socket of the appliance.

A flue gas adaptor shall be connected between the measurement section and the flue gas connector. The flue gas adaptor shall have the same diameter as the measurement section and shall be insulated to the same level as detailed in A.2.3.1.

For appliances with a non-circular outlet or with a diameter differing from that of the measurement section, the flue gas connector shall be an adaptor, which accommodates the necessary changes in shape and/or dimensions to match the measurement section diameter.

For appliances with horizontal outlet, the flue gas adaptor shall have a radius of (225 ± 5) mm at its centre. For appliances with vertical outlet the flue gas adaptor shall be straight and be (350 ± 10) mm long.

NOTE Some general arrangements are shown in Figures A.1, A.2, A.9 and A.10.

A.2.5 Water circuit for appliances with boilers

The water circuit shall consist of a constant head water flow circuit of a design which maintains a flow of water constant to within ± 5 % of the set flow rate. The circuit shall enable a mean outlet temperature of (80 ± 5) °C to be achieved during the test at nominal output. The circuit shall have a means of measuring the water flow, in order to monitor the constancy of the flow rate. The water circuit used shall be either closed or open circuit provided the specified requirements for constancy of water flow rate and outlet temperature are met.

NOTE A suitable water circuit is shown in Figure A.11, but other suitable circuits may be used.

The water circuit shall be connected to the appliance by inlet and outlet pipes in a manner that allows free movement of the appliance for weighing purposes.

The temperature of the inlet and outlet water shall be measured using calibrated equipment inserted into the pipes, and meeting the uncertainty of measurement tolerances specified in A.3.

A.3 Measurement equipment

The measurement equipment used shall be selected to ensure that for each measurement parameter the uncertainty of measurement requirements specified in Table A.1 are met. The peak value of the parameter to be measured shall be in the range of the measurement equipment used.

Table A.1 — Uncertainty of measurement

Parameter measured	Uncertainty of measurement
Gas analysis	
CO	≤ 2 % of the limit value of 0,06 %
CO_2	≤ 2 %
O_2	≤ 2 %
Temperature	
Flue gas	≤ 5 K
Ambient room	≤ 1,5 K
Water	≤ 0,5 K
Surface	≤ 2 K
Touchable Areas	≤ 2 K
Water flow	≤ 0,005 m^3/h
Cross-draught	≤ 0,1 m/s
Static pressure	≤ 1 Pa
Mass	
Fuel consumption	± 20 g
Residue	± 5 g
Fuel load ≤ 7,5 kg	± 5 g
> 7,5 kg	± 10 g
Rate of electrical power input	≤ 2 W

A.4 Test procedures

A.4.1 Appliance installation

The appliance shall be installed into the test assembly as specified A.2.1, following the appliance manufacturer's installation instructions, and the appliance flue spigot/socket shall be connected to the measurement section as specified in A.2.4.

If the appliance is supplied in individual parts, the appliance manufacturer's specifications as given in the installation instructions shall be followed during assembly.

For appliances with a rear flue outlet, the flue gas connector shall pass through the trihedron wall. The hole around the flue connector shall be filled with insulating material (see Figure A.4).

Where a flue draught regulator shall be fitted between the firebed and the flue gas spigot/socket then, for the performance test at nominal heat output, either the regulator shall be removed and the opening sealed with a suitably sized solid plate or the regulator itself shall be sealed e.g. with heat resistant tape so as to avoid the ingress of air through the regulator opening.

A.4.2 Calculation of fuel load

The fuel load for each firing regime shall be calculated with the following equation:

$$B_{fl} = 360\,000 \times P_n \times t_b / (H_u \times \eta) \qquad (1)$$

where

B_{fl} is the mass of fuel load, in kg;

H_u is the lower calorific value of the test fuel, as fired basis, in kJ/kg;

η is the minimum efficiency according to this appliance standard or such higher value as declared by the manufacturer, in %;

P_n is the nominal heat output, in kW;

t_b is the minimum refuelling time or duration as declared by the manufacturer, in h.

A.4.3 Fuelling and de-ashing the fire

Select and prepare the test fuel according to Annex B.

The hopper shall be loaded in accordance with the appliance manufacturer's instructions.

Remove the residues in accordance with the manufacturers instructions.

A.4.4 Flue gas losses

A.4.4.1 General

Calculate the flue gas losses from the composition and temperature of the flue gases according to A.6. The composition and temperature of the flue gases and the ambient room temperature shall be measured as specified in A.4.4.2 and A.4.4.3.

A.4.4.2 Composition of the flue gases

Measure the concentration of the products of combustion (CO_2 or O_2 and CO) either continuously or at intervals not exceeding 1 min using calibrated instruments meeting the uncertainty of measurement requirements specified in A.3. Determine the mean values of concentrations of the products in the dry flue gas as specified in A.6.

A.4.4.3 Ambient room and flue gas temperatures

Measure both the flue gas temperature and ambient room temperature using calibrated instruments that meet the uncertainty of measurement requirements specified in A.3.

Measure and record both the ambient room temperature and the flue gas temperature either continuously or at intervals not exceeding 1 min.

At the end of the test period, calculate and record the mean ambient room temperature and the mean flue gas temperature as specified in A.5.

A.4.5 Water heating output

A.4.5.1 General

For appliances fitted with a boiler, measure the heat given to the water by a constant flow method using the flow circuit described in A.2.5. Measure the water flow rate and temperature rise across the boiler using calibrated equipment, which meets the uncertainty of measurement requirements specified in Table A.1.

A.4.5.2 Procedure

Set the water flow rate at a value determined according to the manufacturer's declared boiler heat output so that the requirements for the mean outlet temperatures as specified in A.2.5 are met during the test period. During the test, maintain this set flow rate to within ± 5 % by reference to the water flowmeter. Do not change the water flow rate to compensate for the short period variation in flow temperature that occurs after refuelling.

During the test period, measure and record the inlet and outlet temperatures, either continuously or at intervals not exceeding 1 min, in accordance with A.2.5.

At the end of the test period, calculate the mean rise in water temperature between the boiler inlet and outlet. Also calculate the mean water flow rate, in kg/h.

A.4.6 Combustible heat losses in the residue

The combustible heat loss in the residue for wood pellets shall be taken as 0,2 % points of efficiency.

A.4.7 Performance test at nominal heat output

A.4.7.1 General

The performance test at nominal heat output shall be carried out at the settings given by the manufacturer to achieve the required nominal heat output. It shall consist of two parts:

— ignition and one or more pre-test period(s);

— test period.

The test may start from cold or may follow another test provided that the fire has been de-ashed in accordance with A.4.3 at the termination of that test. If the test is started from cold the pre-test period shall be preceded by an initial ignition and pre-test at nominal heat output. In either case the appliance shall then be operated for a further pre-test period or periods before commencing the test period. The duration of the pre-test period shall be sufficient to ensure that stable conditions are established.

When calculating the results of the nominal heat output test in accordance with A.5 then at least two separate test determinations of the necessary test parameters shall be obtained. These two determinations shall be obtained from at least two test periods conducted on separate occasions and preceded by a pre-test period. The test results shall be determined for each test determination.

The mean value for the nominal heat output calculated from at least two separate valid test results shall not be less than the manufacturer's claimed value. For each separate test result to be valid it shall not differ from the mean value by more than ± 10 %.

Observe the static pressure throughout the entire test and if necessary adjust the applied flue draught to keep the static pressure within the appropriate normal flue draught value as detailed in 6.1.

Any primary air inlet control thermostat that cycles the appliance on/off or max/min shall be put out of action, so that the appliance is set to the nominal heat output.

A.4.7.2 Ignition and pre-test period

Start the flue gas extraction and the electrical ignition system if applicable and adjust the applied draught so that the static pressure in the measurement section is set to the normal draught for the appliance as given in 6.1, or such other value as given in the appliance installation instructions.

Load the hopper of the appliance to ensure ignition of the test fuel and a sufficient pre-test period.

Adjust the applied flue draught to give the appropriate static pressure in the measurement section. Set the combustion control devices to the required setting in order to achieve the burning condition necessary to give the claimed nominal heat output. For appliances with boiler set the water flow rate to ensure the requirement for the mean water flow temperature specified in A.2.5 can be met.

Operate the appliance during the pre-test period at a burning rate which gives the manufacturer's claimed nominal heat output.

End the ignition and pre-test period when the stable conditions are obtained for not less than 30 min and the flue gas temperature does not change more than ± 5 K. Record the reading of the platform scale.

A.4.7.3 Test period

If necessary, empty and replace the ashpan. Record the total mass of the test installation as measured by the platform scale. Load the appliance hopper with at least sufficient test fuel for the test period. The test period starts immediately after loading the appliance.

Measure and record the temperature and the composition of flue gas as described in A.4.4. If the appliance is fitted with a boiler, measure and record the inlet and outlet water temperatures and the water flow rate as described in A.4.5.

Measure and record the surface temperature of any operating knobs intended to be operated without the use of a tool, and the temperature in any integral fuel store, if fitted. The temperatures shall be measured at intervals of such duration as to ensure that the maximum temperatures achieved are accurately recorded.

Measure and record the temperatures of the trihedron test hearth and walls, either continuously or at regular intervals of not more than 1 min to ensure that the maximum temperatures achieved are recorded.

End the test period after a period of not less than 3 h or such greater value declared by the manufacturer. At the end of the test period, record the reading of the platform scale.

If, within a tolerance of 15 %, the actual test duration is shorter or longer than that specified in 6.9, then determine by way of a comparative calculation whether, at the manufacturer's declared nominal heat output, the required minimum test duration would theoretically have been reached or whether, at the minimum test duration the manufacturer's declared nominal heat output would theoretically have been achieved.

The actual measured test duration in at least one of the tests shall equal or exceed either the minimum test duration specified in 6.9 or such higher value specified by the manufacturer. Also the actual measured nominal heat output in at least one of the tests shall equal or exceed the manufacturer's declared nominal heat output.

If either the calculated test duration or the calculated nominal heat output do not meet the requirements, the test is invalid (and is designated as a pre-test) and a further test period shall be undertaken.

A.4.8 Reduced heat output test

A.4.8.1 General

The test may start either from cold or shall follow the nominal heat output test detailed in A.4.7. If the test is started from cold, the reduced heat combustion pre-test period shall be preceded by an ignition and pre-test period at nominal heat output in accordance with A.4.7.2. In either case, the appliance shall be operated for a further period at reduced output in accordance with A.4.8.2 before commencing the test period. The duration of the test period shall be 6 h (see 6.7).

Observe the static pressure throughout the entire test and adjust the applied flue draught, if necessary, to keep the static pressure within the appropriate test value as detailed in 6.1.

Set the fuel feed rate, primary air opening and secondary air controls appropriate to the test fuel being used for the reduced heat output combustion test in accordance with the appliance manufacturer's operating instructions.

Any thermostat that cycles the appliance on/off or max/min shall be put out of action, so that the appliance is set to the minimum heat output. For appliances which cycle on/off, the reduced heat output test is not carried out.

A.4.8.2 Ignition and pre-test period

At the end of the initial and pre-test period, de-ash the fire if this was not already done. Load the appliance with enough fuel for the pre-test period and the test period.

Adjust the applied draught so that the static pressure in the measurement section is set to the value required for the reduced heat output test as detailed in 6.1.

Reduce the heat output by reducing the water flow rate (for appliances with boiler only) and/or the combustion settings until the burning rate does not exceed the burning rate level for reduced heat output operation stated in the appliance operating instructions.

If the flow temperature exceeds 85 °C for appliances with boiler then adjust the combustion settings and/or the water flow rate to reduce the flow temperature to below 85 °C.

Begin the test period when the required burning rate is achieved and stable conditions have been maintained for a period of not less than 1 h.

A.4.8.3 Test period

Record the reading on the platform scale. If necessary refuel the appliance with further test fuel so that the amount of fuel calculated in accordance with A.4.2 or such lesser amount of fuel specified by the appliance manufacturer in the operating instructions is present at the start of the test period.

Allow the appliance to operate under the test conditions established at the end of the pre-test period without further attention for the test period duration as detailed in 6.9 or in the manufacturers instructions.

Measure and record the composition of the flue gas as described in A.4.4.

Where a boiler is fitted, measure and record the inlet and outlet water temperature and the water flow rate in accordance with A.4.5.

Record the duration, in minutes, of the test period.

At the end of the test-period, record the reading of the platform scale.

A.4.9 Safety tests

A.4.9.1 Temperature safety test

A.4.9.1.1 General

The following test can be carried out together with the nominal heat output test, if the settings for nominal heat output and those for maximum heat output do not differ.

All controls, except those used only for start-up purposes, shall be in the position allowing the highest temperature in the hopper and on the trihidron to be achieved.

NOTE The maximum fuel consumption being achieved.

Any primary air inlet control thermostat that cycles the appliance on/off or max/min shall be put out of action, so that the appliance is set to the maximum heat output.

A.4.9.1.2 Test period

The test shall be conducted directly after the normal heat output test or start from cold.

Adjust the applied flue draught to obtain a static pressure as for the nominal heat output test specified in 6.1. Set the primary combustion air control settings at the maximum operating position, set the secondary air controls to the normal setting and adjust the fuel consumption to the maximum.

Observe the static pressure at approximately 15 min intervals throughout the entire test and adjust the applied flue draught, if necessary, to keep the static pressure within of the required test flue draught value for nominal heat output.

Maintain the combustion air control settings at their set operating positions allowing the highest heat output to be achieved.

Measure and record the following parameters, either continuously or at regular intervals of no more than 1 min:

— temperatures on the test hearth and the walls of the trihedron;

— temperature in the hopper at the place for pellets.

The test shall be continued until the maximum temperatures are reached.

Record the maximum temperatures achieved.

A.4.9.2 Type pressure test for boilers

Connect the boiler's inlet or outlet water tappings to an hydraulic test rig capable of applying a test pressure of at least twice the maximum operating pressure declared by the manufacturer. Seal any unused boiler water tappings and apply a sustained test pressure of twice the manufacturer's declared maximum water operating pressure for a period of at least 10 min. Record whether or not the boiler shell or its water carrying components either leaked or became permanently deformed as a result of applying the test pressure.

A.4.9.3 Test for operation of thermal discharge control

A.4.9.3.1 General

This test shall be performed only on an appliance, which is fitted with a boiler designed to operate on a sealed system and where a thermal discharge control is fitted as part of the appliance.

This test shall be conducted directly after the normal heat output test or start form cold. When you start from cold, you need an ignition and a sufficient pre-test period.

The boiler shall be connected to a water circuit as specified in A.2.5.

The test shall be carried out with the test fuels used for the nominal heat output test as described in A.4.7.

The cold water used for dissipating the excess heat shall have a temperature between 10 °C and 15 °C and a pressure of (2 ± 0,1) bar.

A.4.9.3.2 Pre-test period

Allow the appliance to continue operating in the same mode as it is described in A.4.7.3 or when started from cold as at the end of the pre-test period.

Adjust the applied flue draught to give the appropriate static pressure in the measurement section. Set the combustion control devices to the required setting in order to achieve the burning condition necessary to give the claimed nominal heat output. Set the water flow rate through the boiler to a minimum flow rate which ensures that the requirement for the mean water flow temperature specified in A.2.5 can be met.

Operate the appliance during the pre-test period at a burning rate which gives the manufacturer's claimed nominal heat output and with both the water temperature thermostat and the thermal discharge control in operation. Ensure that at least the mass of basic firebed remains at the end of this period. The thermal discharge control shall not operate during this pre-test period.

End pre-test period when stable conditions are reached about 30 min.

A.4.9.3.3 Test period

Disable the water temperature thermostat and set all other controls to the position that allows the highest water heating output to be achieved. Maintain the function of the thermal discharge control. Maintain the water flow at the same rate as used during the pre-test period.

Allow the appliance to continue operating in this mode whilst recording the temperature of the water flow from the boiler.

End the test when either the thermal discharge control operates or if the thermal discharge control does not operate when the flow temperature exceeds 110 °C. Record whether or not the thermal discharge control operated. If the control operated record the temperature of the flow water from the boiler when the thermal discharge control operated.

A.5 Test results

Record, for the test fuel used, the results of the analysis parameters specified in B.2.2.

From at least two valid separate test results calculate and record, in accordance with A.6, the following mean parameters at both nominal and reduced heat output:

— total heat output;

— total efficiency;

— heat to water (if a boiler is fitted);

— heat to space;

— CO emission at 13 % O_2;

— flue gas temperature.

The mean values for the nominal heat output and reduced heat output calculated from at least two separate valid test results shall be not less than the manufacturer's claimed value. For each separate test result to be valid it shall not differ from the mean value by more than ± 10 %.

Record also the test values of the individual measurements used in the calculations and the flue draught used for each test.

Record the total heat output and reduced heat output, and the actual test duration measured during the test at nominal heat output and reduced heat output. If, within a tolerance of ± 15 %, the test duration was shorter or longer than that specified in 6.5, determine by way of a comparative calculation whether, at the manufacturer's declared heat output, the required minimum test duration would theoretically have been reached or whether, at the required minimum test duration the manufacturer’s declared heat output would theoretically have been achieved. Record either the revised test duration or the recalculated heat output.

Record the maximum surface temperature achieved on every operating knob intended to be operated without the use of a tool. Record the maximum temperatures of the trihedron walls and test hearth. Also record the maximum temperature achieved in any integral flue store, if fitted.

Record whether it was possible to maintain reduced heat combustion for the minimum periods specified in 6.7.

Record whether or not the boiler shell or its water carrying components either leaked or became permanently deformed during the type pressure test and the nominal heat output test.

Record whether or not the thermal discharge control, if fitted, met the requirements specified in 5.7.

Record whether the materials, design and constructional requirements specified in Clause 4 were met. Record whether the manufacturer's instructions for the appliance met the requirements specified in Clause 7 and whether the marking of the appliance met the requirements specified in Clause 8.

NOTE Actual measured values of dimensions, thicknesses, etc. together with supporting certificates should also be recorded.

A.6 Calculation methods

A.6.1 Notations and units used

The notations and units used in the calculations are given in Table A.2.

Table A.2 — Notations and units used in calculations

Notation	Definition	Unit
A	Stoichiometric oxygen demand for the fuel	mol O_2/mol fuel
B	Mass of the test fuel fired hourly (as fired basis)	kg/h
b	Combustible constituents in material passing through the grate and in residue referred to mass of residue material	% of mass
C	Carbon content of test fuel (as fired basis)	% of mass
c	Carbon content of the fuel (on dry ash free basis)	kg/kg
CO	Carbon monoxide content of the dry flue gases	% of volume
CO_2	Carbon dioxide content of the dry flue gases	% of volume
C_p	Specific heat of water	kJ/kgK
Cr	Carbon content of the residue passing through the grate, referred to the quantity of test fuel fired. (Approximation : Cr = $R \times b$ / 100)	% of mass
C_{pmd}	Specific heat of dry flue gases in standard conditions, depending on temperature and composition of the gases	kJ/K.m³
C_{pmH2O}	Specific heat of water vapour in standard conditions, depending on temperature	kJ/K.m³
H	Hydrogen content of the test fuel (as fired basis)	% of mass
h	Hydrogen content of the fuel (on dry ash free basis)	kg/kg
H_u	Lower calorific value of the test fuel (as fired basis)	kJ/kg
M_w	Water flow rate	kg/h
m	Flue gas mass flow	g/s
m_h	Molar content of hydrogen	
m_o	Molar content of oxygen	
m_s	Molar content of sulfur	
N	Boiler water temperature rise	K
η	Efficiency	%
o	Oxygen content of the fuel (on dry ash free basis)	kg/kg
P	Total heat output, reduced heat output	kW
P_{SH}	Space heat output	kW
P_w	Water heat output	kW

Table A.2 — Notations and units used in calculations (*concluded*)

Notation	Definition	Unit
Q_a	Thermal losses in the flue gases, referred to the unit of mass of the test fuel	kJ/kg
Q_b	Chemical heat losses in the flue gases, referred to the unit of mass of the test fuel	kJ/kg
Q_r	Heat losses through combustible constituents in the residue passing through the grate, referred to the unit of mass of the test fuel (as fired basis)	kJ/kg
q_a	Proportion of losses through specific heat in the flue gases Q_a, referred to the calorific value in the test fuel (as fired basis)	%
q_b	Proportion of losses through latent heat in the flue gases Q_b, referred to the calorific value in the test fuel (as fired basis)	%
q_r	Proportion of heat losses through combustible constituents in the residue passing through the grate Q_r, referred to the calorific value of the test fuel (as fired basis)	%
R	Residue passing through the grate, referred to the mass of the fired test fuel	% of mass
s	Sulfur content of the fuel (on dry ash free basis)	kg/kg
T_b	Minimum refuelling interval or manufacturer's declared duration	h
t_a	Flue gas temperature	°C
t_r	Room temperature	°C
W	Moisture content of the test fuel	% of mass

A.6.2 Formulae

A.6.2.1 Heat losses and efficiency

The heat losses are determined from the mean values of flue gas and room temperatures, the flue gas composition and the combustible constituents in the residue.

The efficiency is determined from these losses with the equation:

$$\eta = 100 - (q_a + q_b + q_r) \quad (3)$$

A.6.2.1.1 Thermal losses in the flue gas

$$Q_a = (t_a - t_r) \times [[(C_{pmd} \times (C - C_r) / (0{,}536 \times (CO + CO_2))] + [C_{pmH2O} \times 1{,}92 \times (9H + W) / 100]] \quad (4)$$

$$q_a = 100 \times Q_a / H_u \quad (5)$$

A.6.2.1.2 Chemical losses in the flue gas

$$Q_b = 12\,644 \times CO \times (C - C_r) / [\, 0{,}536 \times (CO_2 + CO) \times 100 \,] \quad (6)$$

$$q_b = 100 \times (Q_b / H_u) \quad (7)$$

A.6.2.1.3 Heat losses due to combustible constituents in the residue passing through the grate

$$Q_r = 335 \times b \times R / 100 \quad (8)$$

$$q_r = 100 \times Q_r / H_u \quad (9)$$

Where the heat loss in the residue for wood pellets is taken as 0,2 % points of efficiency then the value of C_r shall be calculated using the following equation:

$$C_r = (0{,}2 \times H_u) / 33\,500 \quad (10)$$

A.6.2.2 Total heat output and reduced heat output

These heat outputs are calculated from the mass of fuel burned per hour, the calorific value of the test fuel and the efficiency, using the following equation:

$$P = (\eta \times B \times H_u) / (100 \times 3\,600) \quad (11)$$

A.6.2.3 Water heating output

The water heating output is calculated from the water flow rate, the water temperature rise and the specific heat of water, using the following equation:

$$P_w = (C_p \times M_w \times N) / 3\,600 \quad (12)$$

A.6.2.4 Space heating output

The space heating output is calculated as the difference between the total heat output and the water heating output, using the following equation:

$$P_{SH} = P - P_w \quad (13)$$

A.6.2.5 Flue gas mass flow

The flue gas mass flow is determined as an approximate value from the CO_2 content of the flue gases and the fuel-specific data, using the following equation:

$$m = [\, B \times (1{,}3) \times (C\text{-}C_r) / (0{,}536) \times (CO_2 + CO) + (\, 9\, H + W\,) / 100\,] / 3{,}6 \quad (14)$$

A.6.2.6 CO content at 13 % oxygen

The mean values of the flue gas components such as oxygen (O_2), carbon dioxide (CO_2) and carbon monoxide (CO) over the test period are calculated as an allowable approximation of the data received from the instrument readings.

With this calculation method though, the mean values of the components are not weighted for possible fluctuations in mass flow over the test period, as the flue gas flow is assumed to be constant and the calculation errors are deemed to be small.

The CO content shall be calculated as follows:

1. The mean carbon monoxide value (CO_{avg}) shall be calculated as the mean value of all CO data acquired from the instrument readings over the test period.

2. The CO_{avg} value shall be converted to a CO content value based on a standardized oxygen content ($O_{2\ standardized}$) in the flue gas according one of the following equations:

CO content = $$CO_{\mathrm{avg}} \times \frac{21 - O_{2\mathrm{standardized}}}{21\text{-}\mathrm{O}_{2\mathrm{avg}}} \quad (15)$$

CO content = $$CO_{\mathrm{avg}} \times \frac{CO_{2\,\max}}{CO_{2avg}} \times \frac{21 - O_{2\mathrm{standardized}}}{21} \quad (16)$$

For this European Standard the standardized oxygen content ($O_{2\ standardized}$) in the flue gas shall be taken as 13 %. The value of CO_{2max} shall be calculated as detailed in A.6.2.8.

NOTE Where the CO is measured on a volume basis (vol % or parts per million) and COavg' should be changed as follows:

a) if CO is measured as parts per million (ppm):

CO_{avg} (mg/m³$_n$) = CO_{avg} (ppm) x d_{co} (17)

b) if CO is measured as percentage (vol %):

CO_{avg} (mg/m^3_n) = CO_{avg} (*vol%)* x d_{co} x 10 000 (18)

where d_{co} is the density of carbon monoxide at standard condition [d_{CO} = 1,25 kg/m^3_n]

A.6.2.7 Specific heat value of the combustion products

A.6.2.7.1 Specific heat of dry flue gases in standard conditions (C_{pmd})

The specific heat of the dry flue gases in standard conditions (C_{pmd}) is calculated according to the following equation:

$$C_{\mathrm{pmd}} = 3{,}6\ \mathrm{x}\left(0{,}361 + 0{,}008\ \mathrm{x}\left(\frac{t_a}{1000}\right) + 0{,}034\ \mathrm{x}\left(\frac{t_a}{1000}\right)^2 \right.$$

$$+ \left(0{,}085 + 0{,}19 \times \left(\frac{t_a}{1000}\right) - 0{,}14 \times \left(\frac{t_a}{1000}\right)^2 \right) \times \left(\frac{CO_2}{100}\right) \quad (19)$$

$$\left. + \left(0{,}3\ \mathrm{x}\left(\frac{t_a}{1000}\right) - 0{,}2 \times \left(\frac{t_a}{1000}\right)^2 \right) \times \left(\frac{CO_2}{100}\right)^2 \right)$$

A.6.2.7.2 Specific heat of water vapour (C_{pmH2O})

The specific heat of water vapour (C_{pmH2O}) in the combustion products is calculated according to the following equation:

$$C_{\mathrm{pmH2O}} = 3{,}6 \times \left(0{,}414 + 0{,}038 \times \left(\frac{t_a}{1000}\right) + 0{,}034 \times \left(\frac{t_a}{1000}\right)^2 \right) \quad (20)$$

A.6.2.8 Calculation of CO_{2max}

The value of CO_{2max} used in Equation 15 is calculated as follows:

$$CO_{2max} = \frac{1}{[1 + m_s + A \times (79/21)]} \times 100 \quad (21)$$

The values of A and m_s used in Equation 21 are calculated as follows:

$$A = 1 + (m_h/4) - (m_o/2) + m_s \quad (22)$$

$$m_s = (12/32) \times (s/c) \quad (23)$$

where

$$m_h = 12 \times (h/c) \quad (24)$$

$$m_o = (12/16) \times (o/c) \quad (25)$$

NOTE Ultimate analysis of the fuel is necessary for these calculations so that the content of carbon, hydrogen, sulfur and oxygen on a dry, ash free basis are known.

A.7 Test report

The test report, each page of which shall be numbered consecutively, shall specify the results of the testwork and any other additional information and shall contain at least the following details concerning the testwork undertaken on the appliance:

a) name and address of the appliance manufacturer;

b) name, serial number and description of the appliance;

c) statement describing whether the materials, design and construction requirements specified in Clause 4 are met or failed, supported by actual measured values of dimensions, thicknesses etc. together with certificates as appropriate;

d) statement describing whether the safety requirements specified in Clause 5 and performance requirements specified in Clause 6 are met or failed, supported by detailed test results as specified in A.5;

e) statement describing whether the installation and operating instructions comply with the requirements specified in Clause 7;

f) copy of the marking information given on the appliance, and a statement whether the marking information conforms with the requirements specified in Clause 8;

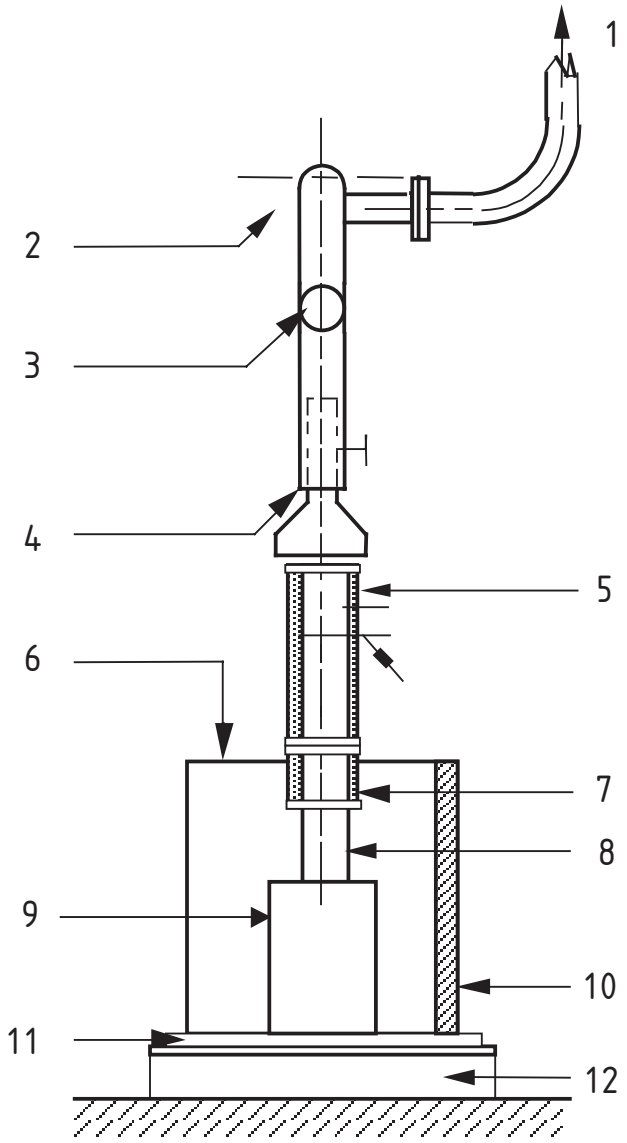
g) name and address of the test laboratory;

h) unique serial number for the report;

i) date of issue of the report;

j) signature and legible name of the person taking responsibility for the content of the report;

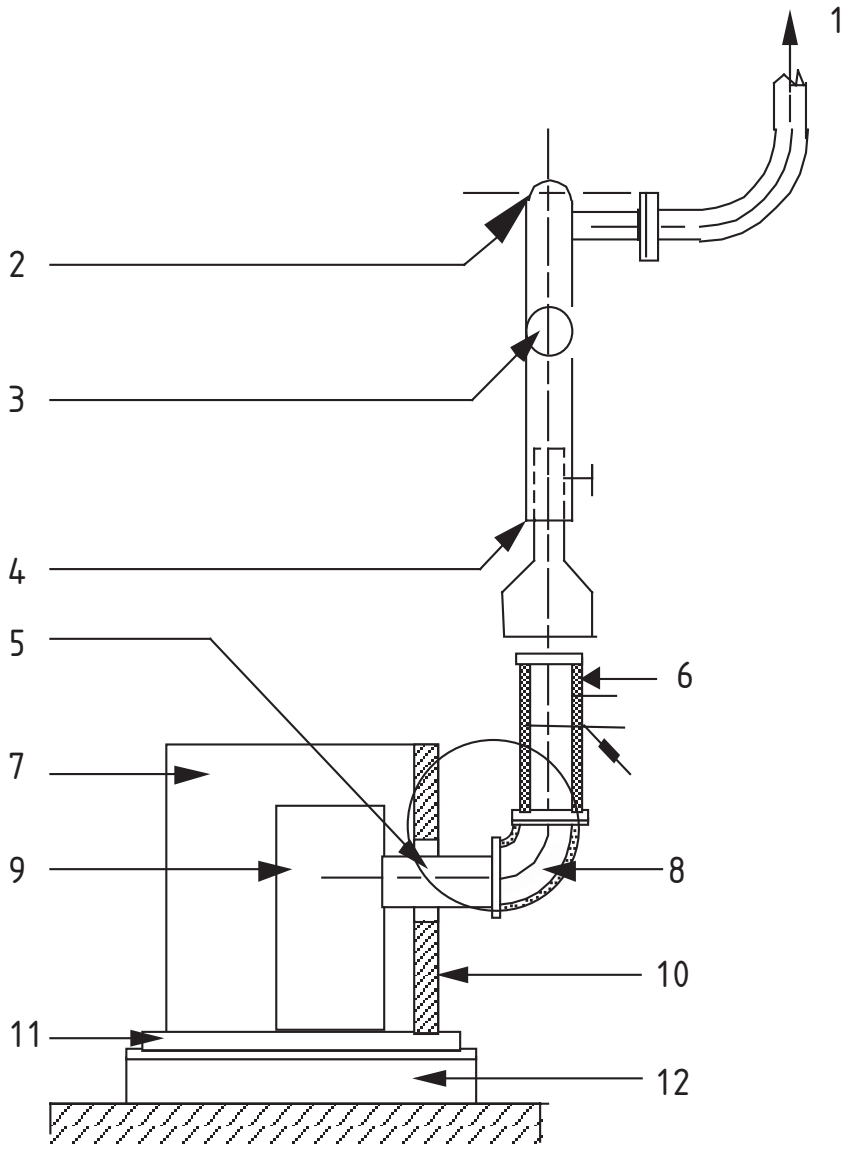
k) analyses and specifications of the test fuel used during the testwork.



Key

1	exhaust to atmosphere	7	flue gas adaptor - straight
2	fan	8	flue gas connector
3	adjustable damper	9	appliance
4	adjustable gather	10	trihedron side wall(s)
5	measurement section	11	trihedron test hearth
6	trihedron side wall(s)	12	platform scale

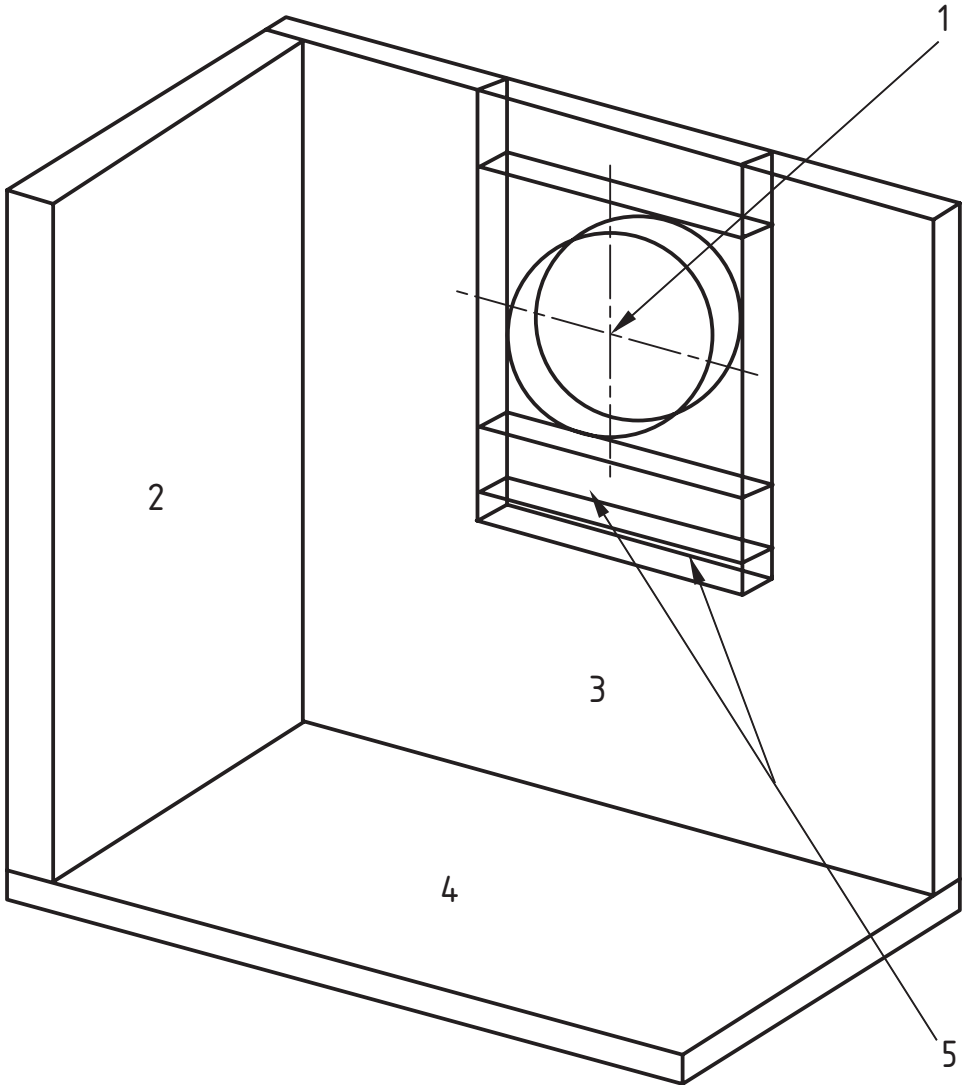
Figure A.1 — Example of installation of an appliance with vertical flue outlet in the test assembly



Key

1	exhaust to atmosphere	7	trihedron side wall
2	fan	8	flue gas adaptor - bend
3	adjustable damper	9	appliance
4	adjustable gather	10	trihedron side wall
5	flue gas connector	11	trihedron test hearth
6	measurement section	12	platform scale

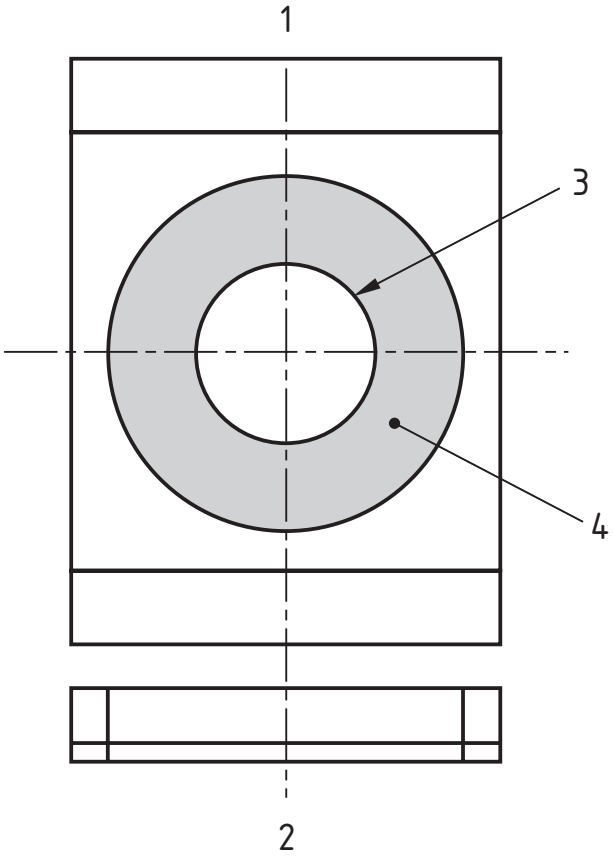
Figure A.2 — Example of installation of an appliance with horizontal flue outlet in the test assembly



Key

1 centre line of flue gas connector
2 side
3 rear wall
4 test hearth
5 filler pieces

Figure A.3 — View of trihedron showing general arrangement of side walls and test hearth

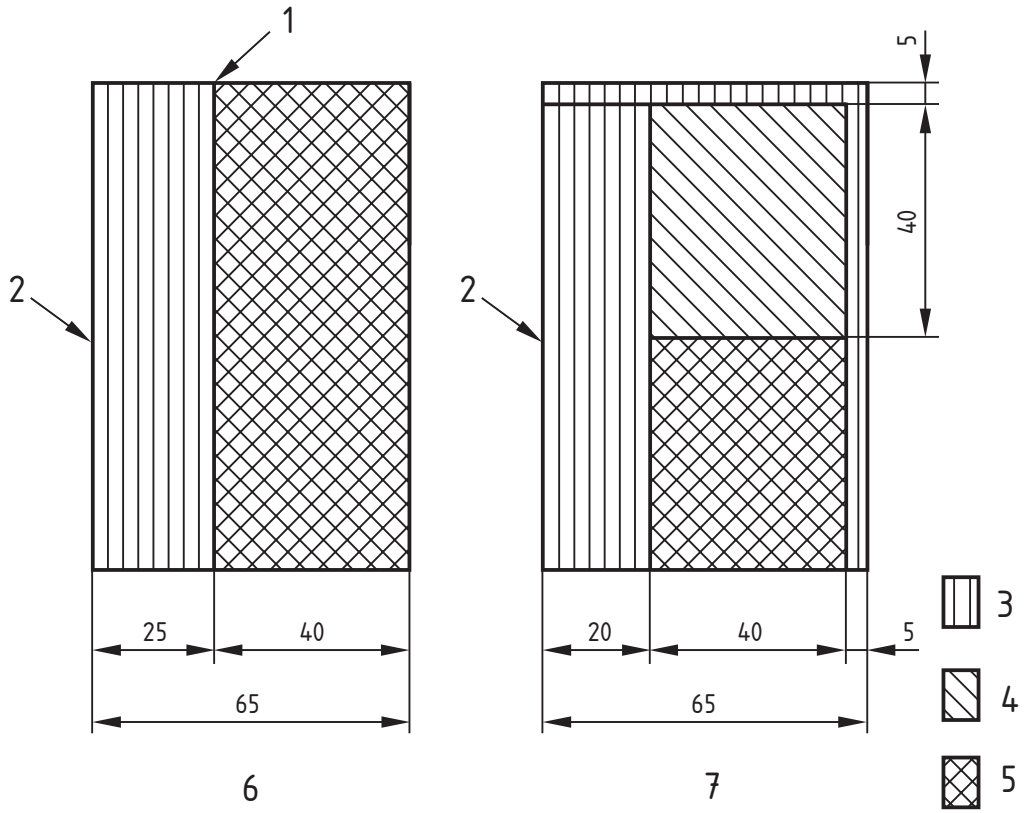


Key

1 elevation
2 plan view
3 flue gas connector
4 clearance of (100 ± 5) mm around flue gas connector filled with insulation

Figure A.4 — Details of filler pieces for trihedron rear wall (same construction as Figure A.3)

Dimensions in millimetres
Tolerance on dimensions ± 1 mm

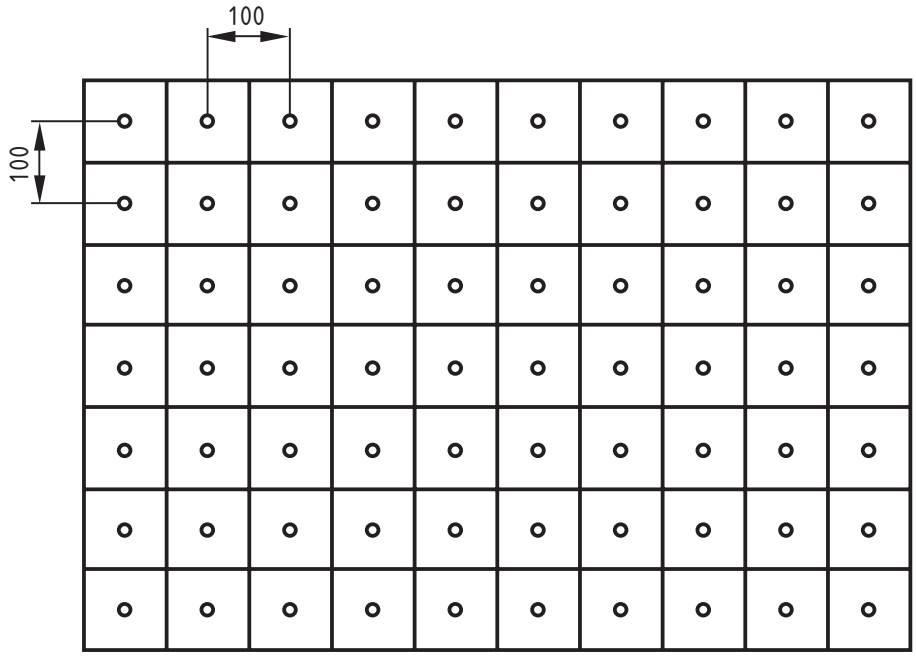


Key

1 adhesive
2 black cover
3 plywood board
4 squared timber
5 insulation (fibre or plates) thermal conductivity 0,04 W/m·K
6 example 1
7 example 2

Figure A.5 — Cross section showing trihedron construction

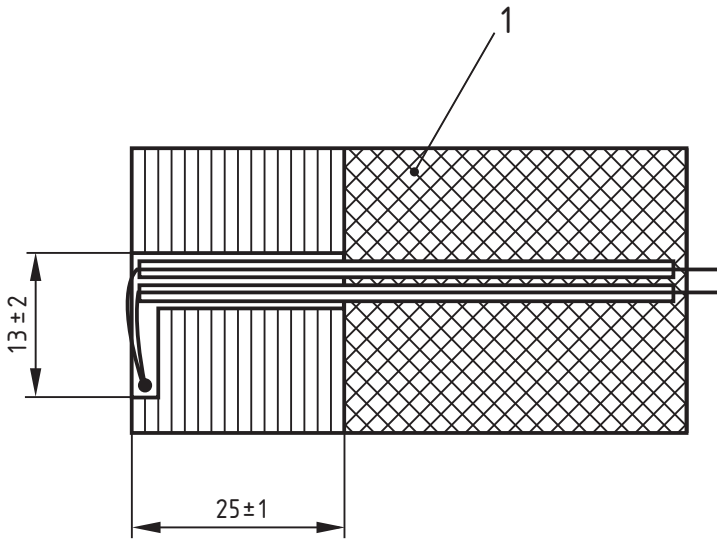
Dimensions in millimetres
Tolerance on dimensions ± 1 mm



NOTE Other similar arrangements can be used so that the highest temperature is found.

Figure A.6 — Plan view of trihedron hearth and walls showing position of measurement points

Dimensions in millimetres

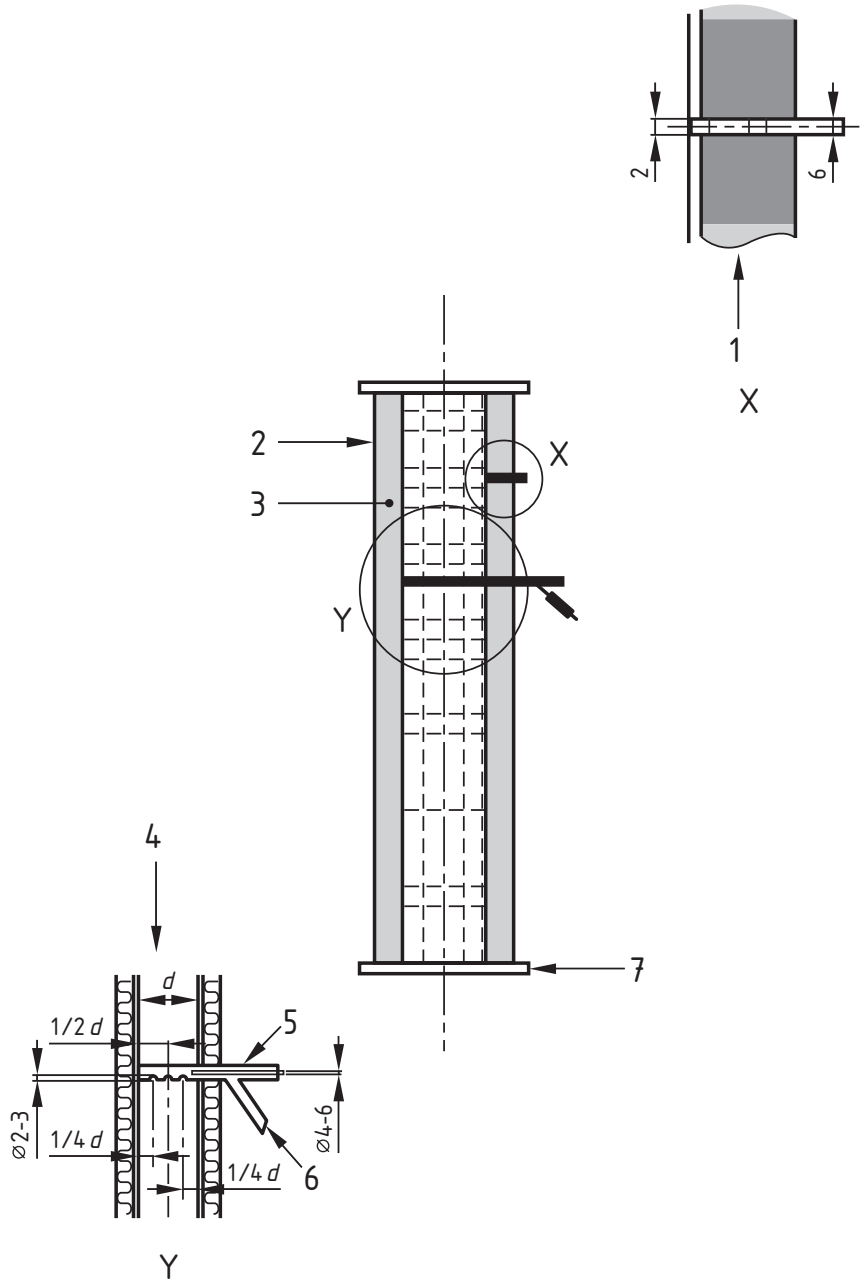


Key

1 trihedron wall

Figure A.7 — Details of thermocouples in trihedron wall (example)

Dimensions in millimetres

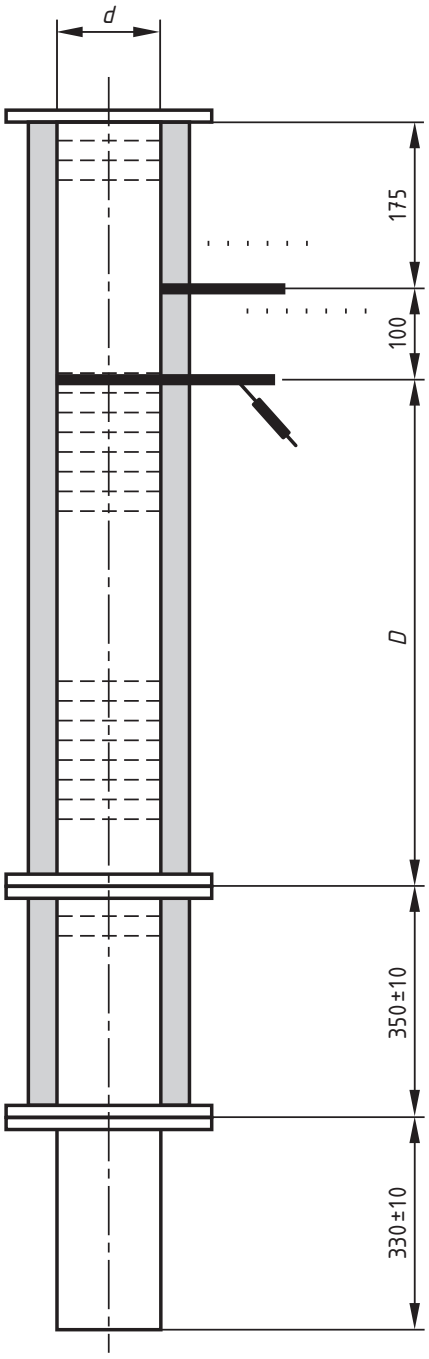


Key

1 static pressure measurement
2 measurement section
3 insulation
4 measurement of flue gas temperature and constituents
5 outlet for sensing alarm
6 outlet for flue gas sampling
7 flange

Figure A.8 — Construction and general arrangement of measurement section

Dimensions in millimetres
Tolerance on dimensions ± 1 mm except where shown otherwise

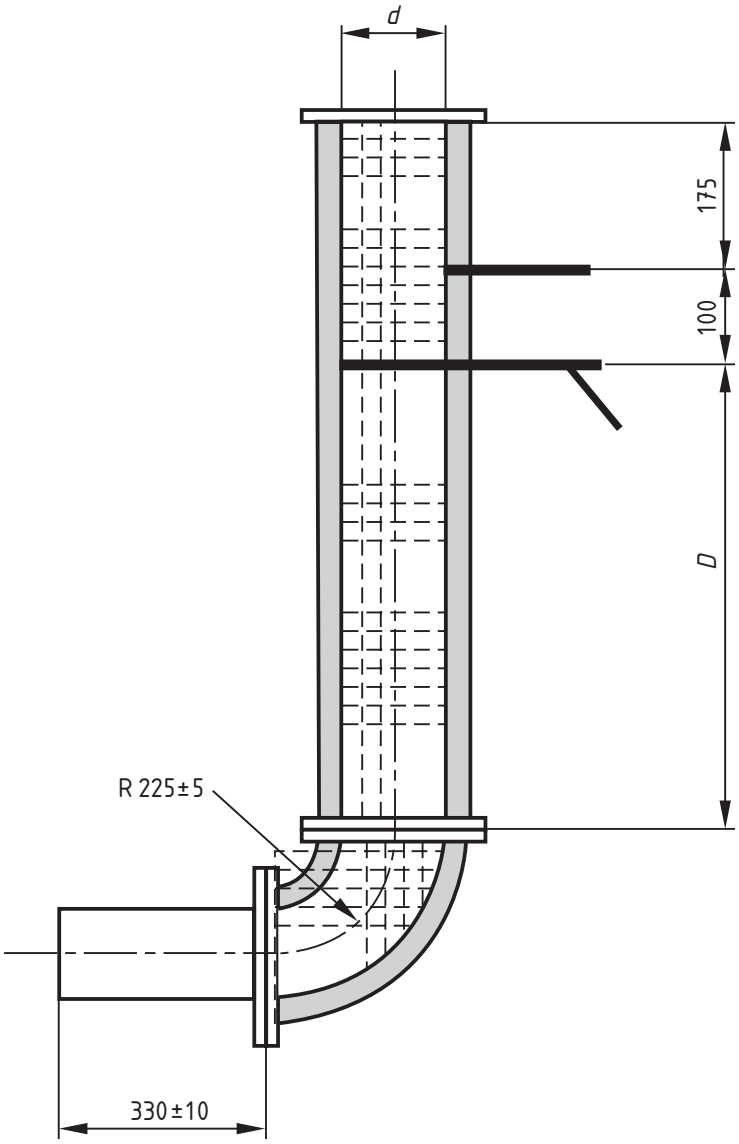


DIMENSIONS OF MEASUREMENT SECTIONS

Flue spigot/socket diameter ∅	*d*	*D*
≤ 110	100	500
100 < ∅ ≤ 180	150	750
180 < ∅ ≤ 250	200	1 000
> 250	300	1 500

Figure A.9 — Details and dimensions of measurement section for vertical flue outlet

Dimensions in millimetres
Tolerance on dimensions ± 1 mm except where shown otherwise

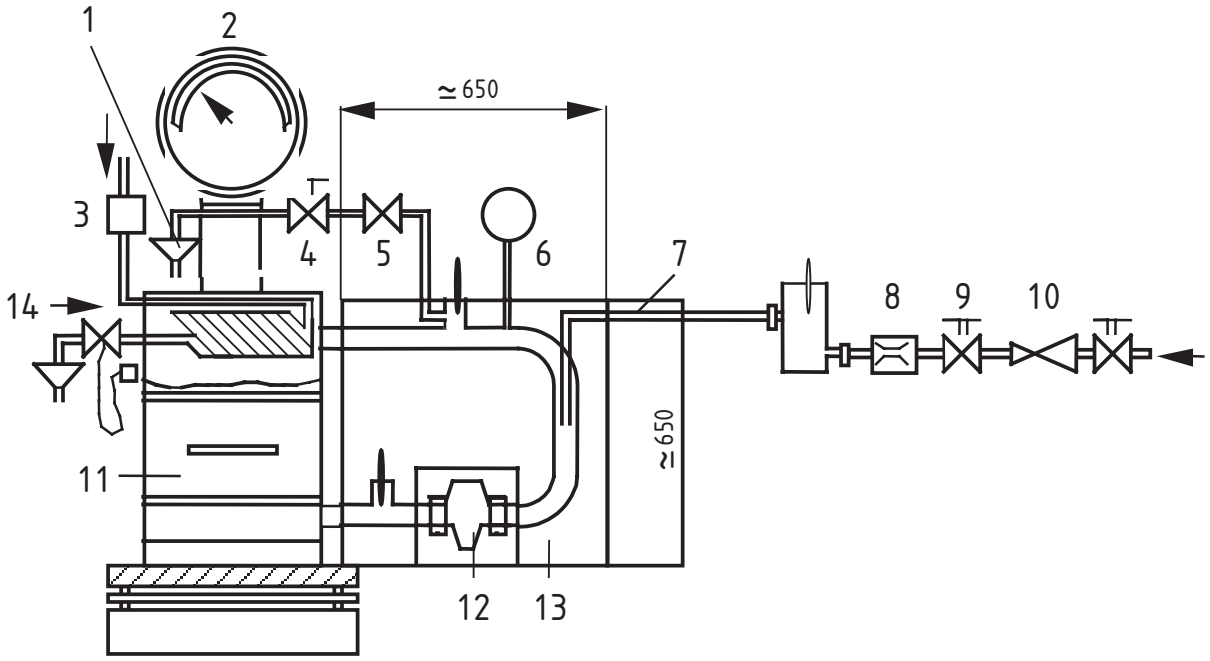


DIMENSIONS OF MEASUREMENT SECTIONS

Flue spigot/socket diameter ∅	*d*	*D*
≤ 110	100	500
100 < ∅ ≤ 180	150	750
180 < ∅ ≤ 250	200	1 000
> 250	300	1 500

Figure A.10 — Details and dimensions of measurement section for horizontal flue outlet

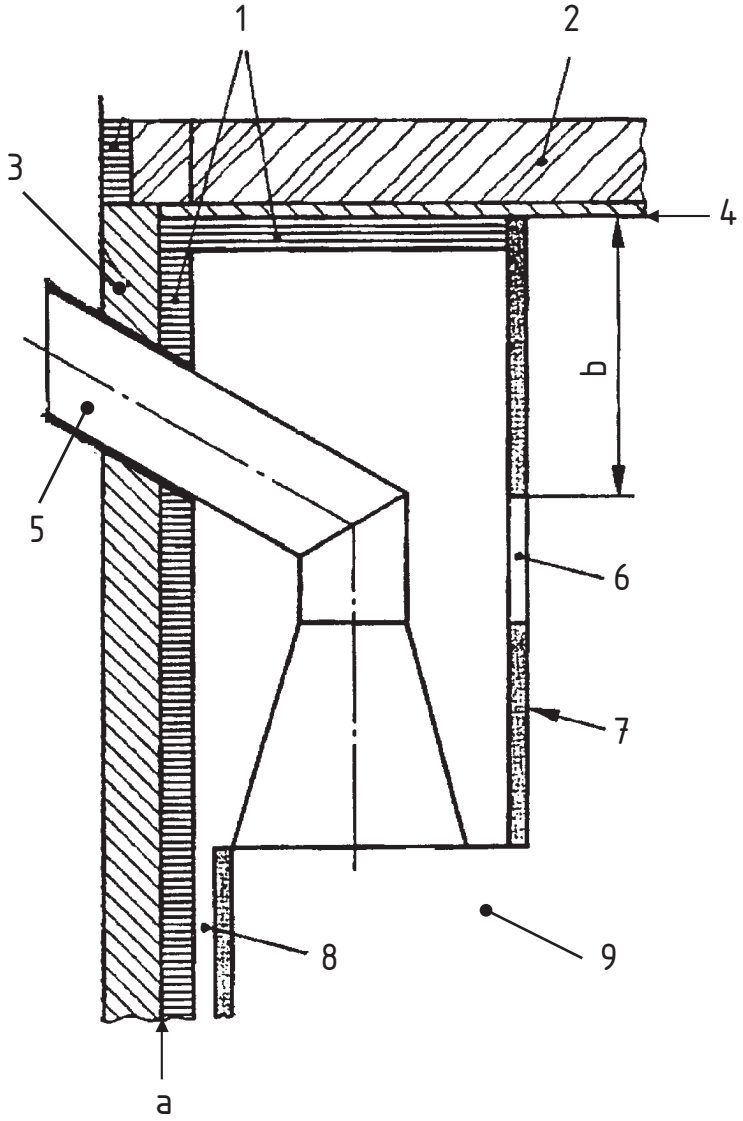
Dimensions in millimetres



Key

1 drain (for pressurised systems)
2 platform scale
3 safety equipment
4 valve (cut off)
5 safety valve (for pressurised systems)
6 pressure extension vessel (for pressurised systems)
7 flexible connection (for pressurised systems)
8 flowmeter
9 regulating valve
10 pressure reduction vessel
11 appliance with boiler
12 circulation pump
13 steel-box insulated with 120 mm mineral wool or filled with scraps of cork
14 thermal discharge control (for pressurised systems)

Figure A.11 — Example of test installation for appliances with water circuit



Key

a	temperature measurement position
b	distance from combustible material specified by manufacture
1	insulation
2	ceiling
3	thrihedron wall
4	temperature measurement position
5	connection to measurement section
6	air grilles
7	surround
8	convection air space around appliance
9	appliance

Figure A.12 — Example of installation with trihedron test wall and ceiling

Annex B
(normative)

Test fuels and recommended fuels

B.1 General

The standardized test fuels with their various specifications as detailed in Table B.1, representing each of the various types of commercially available fuels, shall be used as the respective test fuel when undertaking the thermal testing of an appliance against the performance requirements of this European Standard.

Selection, preparation and analysis of the test fuel shall be in accordance with the methods described in B.2.

As specified in 7.3 it is the responsibility of the appliance manufacturer to declare in the appliance operating instructions the types of commercially available fuels he recommends for use on the appliance. For reference purposes Table B.2 gives a list of the types of currently available commercial fuels against each test fuel type as well as detailing their typical characteristics. The tests for suitability of a recommended fuel are described in B.3.

B.2 Test fuel

B.2.1 Selection of test fuel

Based upon the number of types of commercial fuels recommended by the appliance manufacturer in the operating instructions, the test laboratory shall select from Table B.1 the appropriate test fuel corresponding to each of those recommended commercial fuel types. The size grading of the test fuel shall be in accordance with that specified by the appliance manufacturer in his operating instructions.

B.2.2 Storage, preparation and analysis

Each batch of test fuel shall be stored under cover and prior to use solid mineral fuels shall be sieved to ensure that the proportions of oversize and undersize material present are each no greater than 5 % by mass.

When sampled and analysed in accordance with the appropriate ISO test method specified in Tables B.1 and B.2, each batch of test fuel shall conform to the appropriate specification given in Table B.1.

Where the measured moisture content exceeds the specification given in Table B.1, the test fuel shall be air dried until the moisture content meets the specification.

It is the responsibility of the test laboratory to ensure that the properties of the test fuel used meet the appropriate test fuel specifications as given in Table B.1.

NOTE The analysis may be guaranteed by a supplier’s certificate of analysis.

The analysis and specification for the test fuel(s) used shall be given in the test report on the appliance performance.

B.3 Tests for recommended fuels

B.3.1 Basis of testing

The testing of a recommended fuel shall be carried out using a standard appliance previously type tested and chosen by the test laboratory to be representative of its appliance class and type. The chosen appliance shall be installed in accordance with the installation methods given in A.4 as appropriate to its class and type and using the test and measuring equipment described in A.1 to A.3.

The degree of testing to be undertaken depends on whether or not the fuel lies within the test fuel specification of Table B.1. The process of selecting the tests to be carried out shall be as shown diagramatically in Figure B.1 and the methods and criteria for the tests shall be as described in B.3.2.

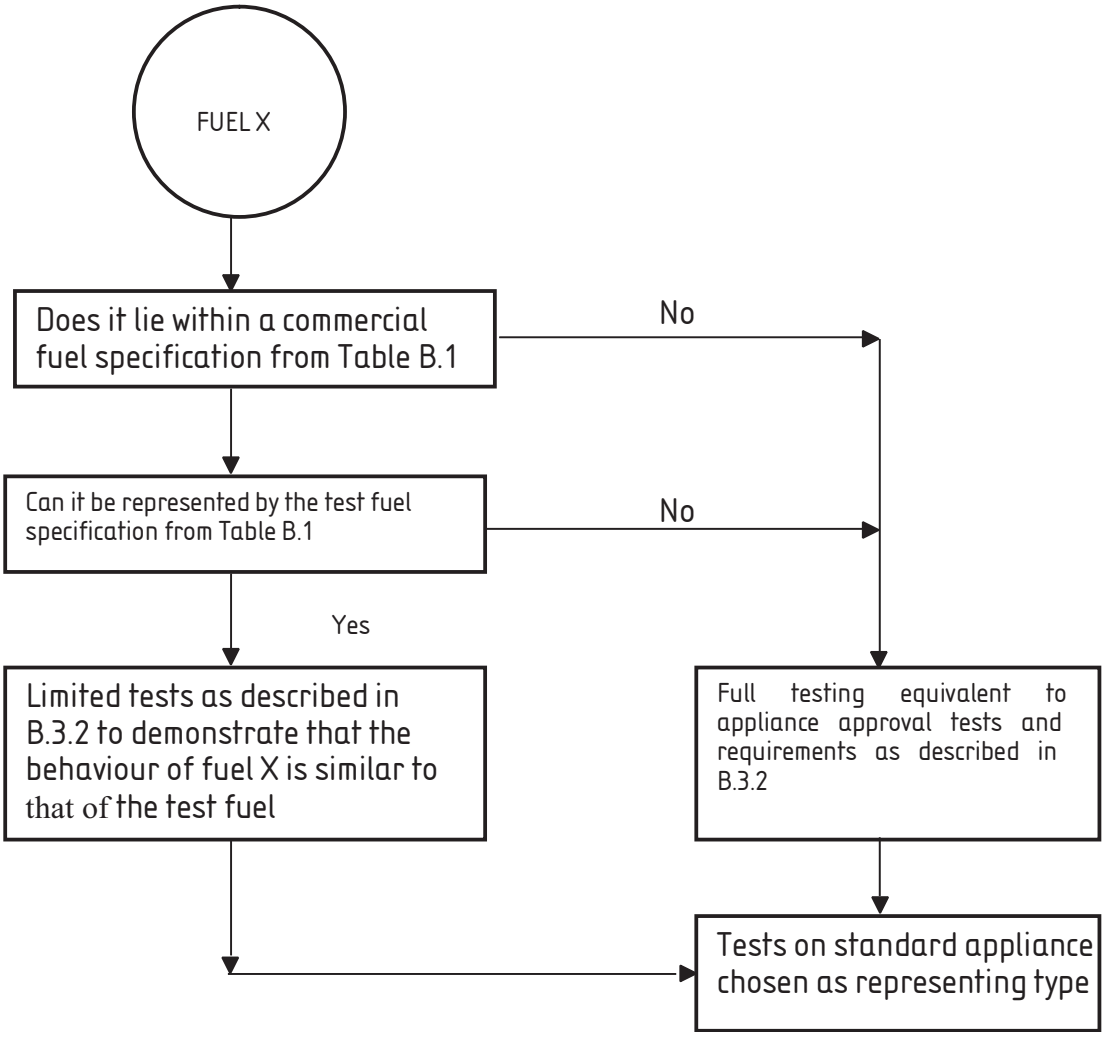


Figure B.1 — Flow chart showing selection process for tests on recommended fuels

B.3.2 Test methods and criteria

Where a recommended commercial fuel is technically represented by a test fuel in Table B.1 and its analysis lies within the analysis range of the commercial fuel types given in Table B.2 then it shall be subjected to limited testing in accordance with the test methods for nominal heat output and slow combustion given in A.4.7 and A.4.8 respectively of this European Standard as appropriate for that appliance class and type. The limited tests to be performed and the criteria to be met shall be as follows:

1) nominal heat output test in accordance with A.4.7:

— nominal heat output to be not less than 95 % of that claimed by the appliance manufacturer and confirmed in the test using the test fuel(s);

— total efficiency to be not less than the minimum efficiency claimed by the appliance manufacturer for the test fuel as detailed in 6.4.2;

— test duration to be not less than 95 % of the duration given in 6.9;

— CO emission not to exceed the value declared by the appliance manufacturer for the test fuel as detailed in 6.3;

— temperature requirements concerning clearances from combustible materials detailed in 5.2 shall be satisfied.

2) reduced heat output test in accordance with A.4.8:

— test duration to be not less than the minimum duration given in 6.9 or that greater duration declared by the appliance manufacturer.

Where a new commercially available fuel is not technically represented by the test fuel type listed in Table B.1 or its nature and characteristics are such that its performance cannot be predicted from the information or analyses provided then the fuel shall be fully tested. The fuel shall be tested on a standard previously type tested appliance (or appliances) chosen to be representative of the class and/or type of appliance on which the fuel will be burned to ensure the safety requirements detailed in 5.2, to 5.6, and the performance requirements detailed in 6.2 to 6.9 are met.

NOTE Where appropriate, the performance testing of a recommended fuel as being suitable for use on a particular appliance type may be undertaken by the appliance manufacturer, the fuel producer or by an independent testing laboratory.

Table B.1 — Test fuel specifications

The test fuel shall be chosen from the following commercial fuel type:

Wood pellets: compressed untreated wood with and without bark, without or with pressing aids (e.g. molasses, paraffin wax, glucose)

Moisture content (as fired basis) CEN/TS 14774-1 and ISO 687	≤ 12 %
Ash content (as fired basis) ISO 1171	≤ 0,7 % without bark ≤ 2,0 % with bark
Volatile matter (dry, ash-free basis) ISO 562	80 % to 88 %
Hydrogen content (as fired basis) ISO 609	5,0 % to 6,5 %
Carbon content (as fired basis) ISO 609	40 % to 50 %
Sulfur content (as fired basis) ISO 351 and ISO 334	≤ 0,1 %
Net (lower) calorific value (as fired basis) ISO 1928	16 900 kJ/kg to 19 500 kJ/kg
Diameter	4 mm to 10 mm
Swelling index ISO 501	-
Length	≤ 50 mm

NOTE Some countries have national regulations on the type and quality (e.g. sulfur content) of fuels which have to be complied with in those countries.

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Directive

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under Mandate M/129 Space Heating Appliances given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard shown in this annex meet the requirements of the mandate given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of the residential space heating appliances fired by wood pellets covered by this annex for the intended uses indicated herein; reference shall be made to the information accompanying the CE marking.

WARNING: Other requirements and other EU Directives, not affecting the fitness for intended uses, can be applicable to the residential space heating appliances fired by wood pellets falling within the scope of this European Standard.

NOTE 1 In addition to any specific clauses relating to dangerous substances contained in this standard, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

NOTE 2 An informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA (accessed through http://europa.eu.int/comm/enterprise/construction/internal/dangsub/dangmain.htm).

This annex establishes the conditions for the CE marking of the residential space heating appliances fired by wood pellets intended for the uses indicated in Table ZA.1 and shows the relevant clauses applicable:

This annex has the same scope as Clause 1 of this standard and is defined by Table ZA.1.

Table ZA.1 — Relevant clauses for Residential space heating appliances fired by wood pellets

Product:	Residential Space Heating Appliance fired by wood pellets as covered under the scope of this standard		
Intended use:	Space heating in residential buildings with possible supply of hot water		
Essential Characteristics	**Requirement clauses in this European Standard**	**Levels and/or classes**	**Notes**
Fire safety	4.2, 4.3, 4.7, 4.8, 4.10, 4.11, 5.1, 5.3, 5.4, 5.5, 5.8,	-	
Emission of combustion products	4.2, 4.3, 4.7, 4.8, 4.9, 4.14, 5.3, 5.4, 6.3	-	Test result for CO emission with threshold value < 0,04 % at nominal heat output and < 0,06 % at reduced heat output
Release of dangerous substance	ZA.1	-	
Surface temperature	4.2, 4.13, 5.1, 5.2, 5.4, 5.5	-	
Electrical safety	5.9	-	
Cleanability	4.5, 4.6, 4.10, 4.12,	-	
Maximum operating pressure (applicable only where the appliance is fitted with a boiler)	4.2, 5.6, 5.7	- -	
Flue gas temperature	6.2	-	
Mechanical resistance (to carry a chimney/flue)	4.2, 4.3	-	
Thermal output/Energy efficiency	6.1, 6.4 to 6.10	-	Test result for efficiency with threshold value of ≥ 75 % at nominal heat output and ≥ 70 % at reduced heat output
Durability	4.2		

The requirement on a certain characteristic is not applicable in those Member States (MSs) where there are no regulatory requirements on that characteristic for the intended use of the product. In this case, manufacturers placing their products on the market of these MSs are not obliged to determine nor declare the performance of their products with regard to this characteristic and the option “No performance determined” (NPD) in the information accompanying the CE marking (see ZA.3) may be used. The NPD option may not be used, however, where the characteristic is subject to a threshold level.

ZA.2 Procedure for attestation of conformity of residential space heating appliances fired by wood pellets

ZA.2.1 System of attestation of conformity

The system of attestation of conformity of residential space heating appliances fired by wood pellets indicated in Table ZA.1, in accordance with the Decision of the Commission 1999/471/EC of 1999-06-29 as given in Annex III of the mandate for "Space heating appliances", is shown in Table ZA.2 for the indicated intended use and relevant level(s) or class(es):

Table ZA.2 — System of attestation of conformity

Product(s)	Intended use	Level(s) or class(es)	Attestation of conformity system
Residential space heating appliances fired by wood pellets	Space heating in residential buildings with possible supply of hot water	-	3
System 3: See Directive 89/106/EEC (CPD) Annex III.2.(ii), Second possibility.			

The attestation of conformity of the residential space heating appliances fired by wood pellets in Table ZA.1 shall be based on the evaluation of conformity procedures indicated in Table ZA.3 resulting from application of the clauses of this or other European Standard indicated therein.

Table ZA.3 — Assignment of evaluation of conformity tasks for Space heating in residential buildings with possible supply of hot water under system 3

Tasks		Content of the task	Evaluation of conformity clauses to apply
Tasks for the manufacturer	Factory production control (F.P.C)	Parameters related to all relevant characteristics of Table ZA.1	9.3
	Initial type testing	All relevant characteristics of Table ZA.1 not tested by the notified body	9.2
Tasks for the notified test laboratory	Initial type testing	Fire safety Emission of combustion products Surface temperature Thermal output/Energy efficiency Release of dangerous substances Cleanability Flue gas temperature Durability	9.2

ZA.2.2 EC Certificate and Declaration of conformity

When compliance with the conditions of this annex is achieved, the manufacturer or his agent established in the EEA shall prepare and retain a declaration of conformity (EC Declaration of conformity), which entitles the manufacturer to affix the CE marking. This declaration shall include:

— name and address of the manufacturer, or his authorised representative established in the EEA, and place of production;

NOTE 1 The manufacturer may also be the person responsible for placing the product onto the EEA market, if he takes responsibility for CE marking.

— description of the product (type, identification, use,...), and a copy of the information accompanying the CE marking;

NOTE 2 Where some of the information required for the Declaration is already given in the CE marking information, it does not need to be repeated.

— provisions to which the product conforms (i.e. Annex ZA of this EN);

— particular conditions applicable to the use of the product, (e.g. provisions for use under certain conditions);

— name and address of the notified laboratory(ies);

— name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or his authorised representative.

The above mentioned declaration and certificate shall be presented in the official language or languages of the Member State in which the product is to be used.

ZA.3 CE marking and labelling

The manufacturer or his authorised representative established within the EEA is responsible for the affixing of the CE marking. The CE marking symbol to affix shall be in accordance with Directive 93/68/EC and shall be shown on the residential space heating appliances fired by wood pellets (or when not possible it may be on the accompanying label, the packaging or on the accompanying commercial documents e.g. a delivery note). The following information shall accompany the CE marking symbol:

— name or identifying mark and registered address of the producer;

— last two digits of the year in which the marking is affixed;

— number of the EC Certificate of conformity or factory production control certificate (if relevant);

— reference to this European Standard;

— description of the product: generic name, material, dimensions, … and intended use;

— information on those relevant essential characteristics listed in Table ZA.1 which are to be declared presented as:

— declared values and, where relevant, level or class (including “pass” for pass/fail requirements, where necessary) to declare for each essential characteristic as indicated in "Notes" in Table ZA.1;

— “No performance determined” for characteristics where this is relevant;

— as an alternative, a standard designation which shows some or all of the relevant characteristics (where the designation covers only some characteristics, it will need to be supplemented with declared values for other characteristics as above.

In particular the following information shall be given:

— recommended fuel type (or types)

— distance to adjacent combustible materials

— emission of CO in combustion products (Test result value but < 0,04 % at nominal heat and < 0,06 % at reduced heat output)

— maximum operating pressure (where relevant)

— flue gas temperature

— thermal output

— energy efficiency (Test result value but ≥ 75 % at nominal heat output and ≥ 70 % at reduced heat output)

The “No performance determined” (NPD) option may not be used where the characteristic is subject to a threshold level. Otherwise, the NPD option may be used when and where the characteristic, for a given intended use, is not subject to regulatory requirements in the Member State of destination.

Figure ZA.1 gives an example of the information to be given on the product, label, packaging and/or commercial documents.

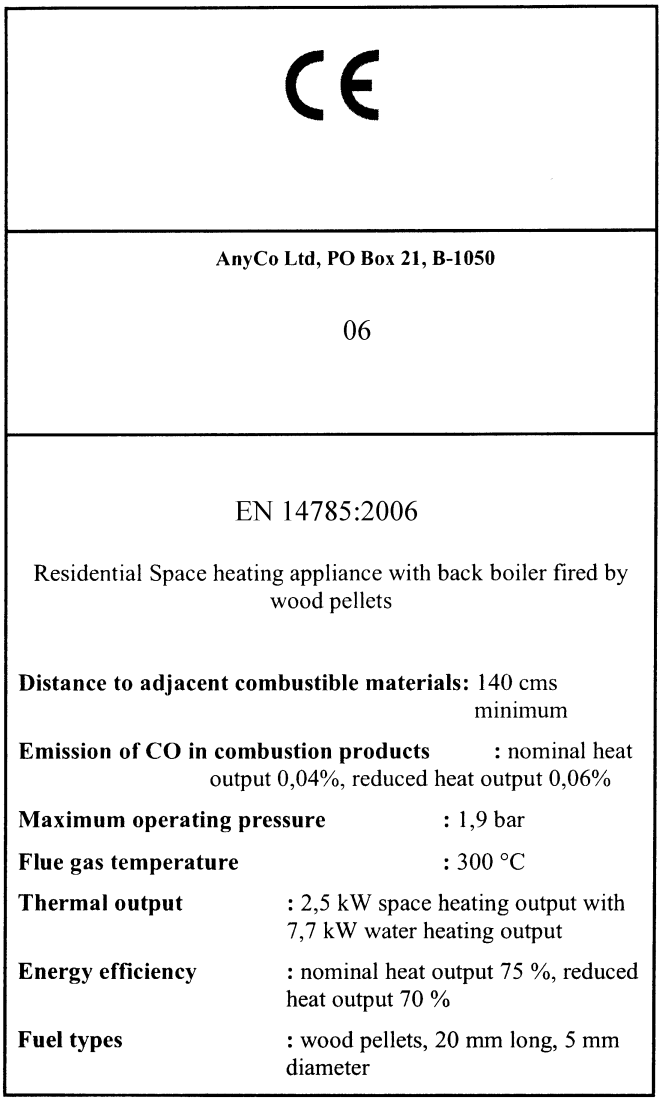


Figure ZA.1 — Example CE marking information

In addition to any specific information relating to dangerous substances shown above, the product should also be accompanied, when and where required and in the appropriate form, by documentation listing any other legislation on dangerous substances for which compliance is claimed, together with any information required by that legislation.

NOTE 1 European legislation without national derogations need not be mentioned.

NOTE 2 Affixing the CE marking symbol means, if a product is subject to more than one directive, that it complies with all applicable directives.

Bibliography

[1] EN 13229, *Inset appliances including open fires fired by solid fuels — Requirements and test methods*

[2] EN 13240, *Room heaters fired by solid fuel — Requirements and test methods*

[3] EN ISO 9001, *Quality management systems — Requirements (ISO 9001:2000)*

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