BS EN 1196:2011

BSI Standards Publication

Domestic and non-domestic gas-fired air heaters — Supplementary requirements for condensing air heaters

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National foreword

This British Standard is the UK implementation of EN 1196:2011. It supersedes BS EN 1196:1998, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GSE/20, Non-domestic space heaters (gas).

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

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

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Domestic and non-domestic gas-fired air heaters - Supplementary requirements for condensing air heaters

Générateurs d'air chaud à usages domestique et non domestique utilisant les combustibles gazeux - Exigences complémentaires pour les générateurs d'air chaud à condensation

Gasbefeuerte Warmluftterzeuger für den häuslichen und den nicht-häuslichen Gebrauch - Zusätzliche Anforderungen an kondensierende Warmlufterzeuger

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Foreword

This document (EN 1196:2011) has been prepared by Technical Committee CEN/TC 180 “Decentralized gas heating”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by February 2012, and conflicting national standards shall be withdrawn at the latest by February 2012.

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

This document supersedes EN 1196:1998.

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(s).

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

Compared to the former edition, attention is drawn to the amendment of Annex A and to the expansion of Annex B which reflects the increase in the number of CEN Member States.

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

1 Scope

This European Standard specifies the additional requirements and test methods for gas-fired air heaters which are designed so that water vapour condenses from combustion products. On this subject, it extends the European Standards EN 778 and EN 1319 for domestic air heaters, and EN 1020 for non-domestic air heaters.

This European Standard applies to gas-fired air heaters with or without a fan in the combustion circuit in one of the following constructional types:

— an integral air heater with at least one condensing heat exchanger;

— a non-condensing air heater with an integrated additional condensing heat exchanger;

— a non-condensing air heater, with an integrated additional condensing heat exchanger for the recovery of heat from combustion products and from ventilation air if appropriate.

This European Standard covers type-testing only.

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 778, *Domestic gas-fired forced convection air heaters for space heating not exceeding a net heat input of 70 kW, without a fan to assist transportation of combustion air and/or combustion products*

EN 1020, *Non-domestic forced convection gas-fired air heaters for space heating not exceeding a net heat input of 300 kW incorporating a fan to assist transportation of combustion air or combustion products*

EN 1319, *Domestic gas-fired forced convection air heaters for space heating, with fan-assisted burners not exceeding a net heat input of 70 kW*

3 Terms and definitions

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

NOTE They supplement the definitions in the aforementioned air heater standards.

3.1
condensing air heater
air heater in which, under normal operating conditions, the water vapour in the combustion products is totally or partially condensed in order to make use of the latent heat in this water vapour for heating purposes

3.2
condensate
liquid formed from the combustion products during the condensation process

3.3
condensate collecting device
part of the appliance designed to collect the condensate in order that it can be drained

4 Constructional and design requirements

4.1 General

All parts of the heat exchanger(s) and other parts of the appliance likely to come into contact with condensate under normal operating conditions at thermal equilibrium, shall be constructed from sufficiently corrosion resistant material or shall be sufficiently protected against corrosion, in order to ensure a reasonable life for an appliance that is installed, used and maintained in accordance with the manufacturer's instructions.

Connections at points where condensation can occur or condensate can be present, shall not give rise to corrosion.

The manufacturer shall provide evidence of evaluation, tests undertaken and/or experience gained to support the claim that the materials used and the construction methods adopted are suitable for the purpose intended.

4.2 Materials

Copper and copper based alloys shall not be used for condensate carrying components.

4.3 Access, assembly and disassembly of condensate carrying parts

A condensate collecting device or other means provided for condensate formed during normal operation to be continuously drained, shall be constructed in such a way that it can be cleaned in accordance with the manufacturer's instructions.

4.4 Condensate discharge

The appliance shall be equipped with one or more condensate drains. Drains within the appliance shall have an internal diameter of at least 13 mm. The main drain for connection to the external drain shall have an internal diameter of at least 18 mm.

Condensate drains shall be so designed and arranged that combustion products do not escape via the drains.

If the appliance is equipped with a sealed combustion chamber, the condensate formed both in the appliance and in the flue system shall be discharged through one or more condensate drains. The drains for the flue system may be the same as the drains for the appliance. Condensate formed in the flue system shall drain to a purposely-designed drain.

Drains for removal of condensate shall be provided with a means, e.g. a water trap or siphon, to prevent leakage of combustion products or combustion air.

If the air heater's condensate outlet is blocked or if a pump for the discharge of condensate fails to operate, the construction shall be such that no hazardous situation can arise when the appliance is operating.

4.5 Condensate neutralization system

If the air heater is fitted with a condensate neutralization system, this system shall be designed in such a way that the reagents can be exchanged without dismantling any part of the appliance.

4.6 Limitation of the combustion products temperature

If the combustion products circuit contains materials that are likely to be affected by heat, the appliance shall incorporate a device to prevent the combustion products temperature from exceeding the maximum permissible temperature for the materials as declared by the manufacturer.

The device for limiting the combustion products temperature shall be fail-safe in operation, non-adjustable and shall not be accessible without the use of tools.

5 Operational requirements

5.1 General

The following requirements complete or replace the requirements given in the air heater standards mentioned in Clause 1.

5.2 Draining of condensate

When the appliance is installed in accordance with the test conditions of 6.2, condensate shall only form at the points intended for this purpose and shall be readily drained.

Condensate shall not run into parts of the appliance which are not designed for collection and discharge of condensate, neither shall the condensate interfere with the normal operation of the appliance.

5.3 Soundness of the condensate-carrying parts

Condensate shall not leak from the appliance condensate circuit.

5.4 Composition of the condensate

If the manufacturer states the chemical composition of the condensate, the measured composition shall be in accordance with the manufacturer's declaration.

5.5 Condensate neutralization system

If the air heater is fitted with a condensate neutralization system, the pH value of the neutralized condensate shall not be lower than six.

5.6 Condensate discharge system

5.6.1 Capacity

The dimensions of the condensate discharge system or the capacity of a pump for the discharge of condensate shall be such that the maximum amount of condensate that may be formed under extreme conditions, as simulated in 6.6.1, can be drained.

5.6.2 Behaviour in the event of blockage or pump failure

Blockage of the condensate drain(s) or switching off the pump for the discharge of the condensate shall not lead to concentrations of CO in the combustion products higher than 0,1 %, and spillage of condensate shall not occur before safety shut-down or lock-out occurs.

5.6.3 Soundness of the combustion circuit

Under the conditions of 6.6.3, a water trap or siphon shall have a water seal of at least 25 mm.

5.6.4 Limitation of combustion products temperature

If a device for limiting the combustion products temperature is provided as specified in 4.6, the temperature of the combustion products measured according to 6.7 shall not exceed the maximum allowable working temperature for the materials of the combustion circuit and the flue materials, specified by the appliance manufacturer.

Operation of this device shall cause a non-volatile lock-out.

5.7 Efficiency

Under the test conditions of 6.8, the appliance shall have an efficiency not lower than 90 % (on net calorific value).

6 Test methods

6.1 General

Unless otherwise stated, the tests are carried out under the general conditions of test as described by the appropriate standards for domestic and non-domestic air heaters specified in Clause 1. Special set up conditions required for condensing air heaters are specified below.

The reference conditions for the combustion air apply, with a relative humidity of 50 %.

Unless otherwise stated, the appliance is fitted with the minimum flue length as stated by the manufacturer.

The temperature of both the air to be heated and the combustion air at the inlet of the appliance shall be maintained at (20 ± 5) °C.

6.2 Draining of condensate

The appliance is operated continuously for 4 h in a condensing mode at nominal heat input.

During and after this running condition, it is checked if the requirements of 4.4 and 5.2 are fulfilled.

6.3 Soundness of the condensate-carrying parts

After the test according to 6.2 it is checked whether the requirement of 5.3 is met.

6.4 Composition of the condensate

If required according to 5.4, during the last period of the test according to 6.2, a sufficient quantity of condensate is collected in a suitable (e.g. glass) vessel from the outlet of the appliance, whether or not it is fitted with a neutralization system. The collected condensate is analyzed for the concentrations of the constituents specified by the manufacturer.

It is checked whether the requirement of 5.4 is met.

6.5 Condensate neutralization system

If the air heater is fitted with a condensate neutralization system, during the last period of the test according to 6.2, a sufficient quantity of condensate is collected in a suitable (e.g. glass) vessel from the outlet of the appliance. This may be the condensate collected according to 6.4.

The pH value of this condensate is measured and it is checked that the requirement of 5.5 is met.

6.6 Condensate discharge system

6.6.1 Capacity

The sizing of the condensate draining system or the capacity of a pump is checked by the introduction of the following equivalent rates of water into the draining system:

— for natural gas: 2 l/h water per m^3/h of natural gas;

— for propane: 3 l/h water per m^3/h of propane;

— for butane: 4 l/h water per m^3/h of butane.

The minimum volume of water used for this test is 2 l. If the condensate drain is a combined drain for the combustion circuit and the flue, then the volumes stated above are increased by a factor of 2.

NOTE The volumes above take into account the possibility of the penetration of rain or snow into the flue system as designed by some manufacturers.

It is checked if the requirement of 5.6.1 is met.

6.6.2 Behaviour in the event of blockage or pump failure

The appliance is operated continuously in a condensing mode at nominal heat input. With the condensate drain blocked or with a pump for the discharge of condensate put out of operation, it is checked if the requirement of 5.6.2 is met.

In order to accelerate the test, water may be added to the condensation circuit.

6.6.3 Soundness of the combustion circuit

The appliance is installed with the maximum flue length specified by the manufacturer, and operated with the maximum pressure in the combustion chamber. It is checked that the requirement of 5.6.3 is met.

6.7 Limitation of combustion products temperature

The appliance is installed as given in 6.1 and according to the manufacturer's instructions and operated at nominal heat input. The appliance is supplied with one of the corresponding reference gases for the appliance category.

After reaching thermal equilibrium, the appliance overheat cut-off device or air temperature limiter is rendered inoperative and the air delivery fan is put out of action. The temperature of the combustion products is measured until the appliance is switched off by the device for limiting the combustion products temperature.

It is checked that the requirement of 5.7 is met.

6.8 Efficiency

6.8.1 General

The appliance is installed according to the manufacturer's instructions. The air heater is supplied with one of the corresponding reference gases for the appliance category.

The efficiency (on net calorific value), η_i, expressed as a percentage, of the appliance is determined at each heat input specified by the manufacturer, using the indirect method based on the following equation:

$$\eta_i = \frac{H_i - (q_1 + q_2) + S}{H_i} - 100 \quad (1)$$

where

H_i is the net calorific value in megajoules per cubic metre (MJ/m^3) at 15 °C, 1 013,25 mbar, dry;

S is the condensing correction (MJ/m^3 gas); this factor S is determined according to the procedure given in Annex A;

q_1 is the heat of the dry products of combustion divided by the heat input based on the net calorific value in per cent (%);

q_2 is the heat of the water vapour contained in the products of combustion divided by the heat input based on the net calorific value in per cent (%).

6.8.2 Efficiency at nominal heat input

The appliance is operated at nominal heat input. The flow rate of the air to be heated is controlled so as to be equal to the minimum stated by the manufacturer.

Under these conditions it is checked if the requirement of 5.7 is met.

6.8.3 Efficiency at minimum heat input

The appliance is operated at minimum heat input. The flow rate of the air to be heated is controlled so as to be equal to the minimum stated by the manufacturer.

Under these conditions it is checked if the requirement of 5.7 is met.

7 Marking and instructions

7.1 Marking

In addition to the marking as required in the associated appliance standard, i.e. EN 778, EN 1020 or EN 1319, the following applies:

— on the appliance and also the packaging it shall be clearly stated that it is a condensing appliance and that local regulations may apply with respect to the discharge of condensate as effluent;

— type C_6 appliances shall carry a firmly attached label indicating limitations of materials suitable for use with the appliance including the maximum operating temperature that the flue shall be capable of withstanding during use. The label shall draw the attention to the installation instructions on this subject, and shall be located near the flue gas outlet.

7.2 Installation instructions

7.2.1 General

In addition to the instructions as required in the associated appliance standard, i.e. EN 778, EN 1020 or EN 1319, the installation instructions shall contain the following information:

a) precise specifications for the flue, combustion air ducts and condensate discharge systems, including the amounts of condensate produced by the appliance and/or its flue system; in particular, attention shall be drawn to the necessity of avoiding horizontal runs in flues and drains;

b) a list of appropriate materials suitable for use on flue systems and any temperature limits that apply;

c) if appropriate, instructions for dismantling of the heat exchanger in which condensate is formed;

d) instructions for the installation of the appliance in situations where a condensate neutralization system is to be installed;

e) reference to the national and/or local regulations that may apply for the discharge of condensate;

f) drawing the installer's attention to the possibility of condensate freezing in the condensate drain system and external flue components;

g) any special instructions for commissioning and servicing.

7.2.2 User's instructions

In addition to the instructions as required in the associated appliance standard, i.e. EN 778, EN 1020 or EN 1319, the user's instructions shall contain a brief description of the operation of the air heater. The following points shall be covered:

a) the appliance is equipped with a heat exchanger in which condensate is formed;

b) the measures taken to ensure that condensate is drained from the appliance and the flue system;

c) the condensate drains shall not be modified nor plugged;

d) measures to be taken in case of freezing danger of condensate, with respect to the draining system and to the external flue components;

e) if appropriate, the action necessary and frequency to clean condensate drain traps, siphons, etc. between appliance service intervals;

f) where applicable, description of the procedures and time intervals for the exchange of the reagents in a condensate neutralization system.

Annex A
(normative)

Determination of the condensing correction factor (*S* in the efficiency equation)

The correction is based on the condensate collected in kg of condensate per m^3 gas used.

For dry appliances, $S = 0$.

For condensing appliances, S is calculated with the following equation:

$$S = S_A + S_B - S_C \quad \text{(A1)}$$

where

S_A is the heat of condensation recovered by the condensate collected (in MJ/m^3 gas) at the reference temperature (15 °C);

= condensate collected (kg/m^3 gas) × heat of condensation at 15 °C (2,466 MJ/kg);

S_B is the sensible heat in (MJ/m^3 gas) between the reference temperature (15 °C) and the flue gas temperature of that water vapour which has been condensed.

NOTE 1 This amount of sensible heat has, therefore, not been lost to the flue and so the sensible heat loss is reduced by the amount, therefore:

S_B = condensate collected (kg/m^3 gas) × 1,294 × enthalpy (water vapour) × ΔT_1.

NOTE 2 The figure 1,294 is the ratio of water vapour in m^3 per kg of condensate at 15 °C. This figure may be rounded to 1,3 to take account of vapour losses in the condensate circuit.

NOTE 3 The enthalpy of water vapour is taken as 0,001 42 MJ/(m^3·K)

S_C is the sensible heat loss of the condensate liquid above the reference value (15 °C) in MJ/m^3 gas;

= condensate collected (kg/m^3 gas) × specific heat (0,004 18 MJ/kg·K) × ΔT_2.

NOTE 4 ΔT_2 is the temperature difference between the reference value (15 °C) and the temperature of the condensate at the appliance drain outlet, as compared with ΔT_1 which is the temperature rise of the combustion products above the reference value.

Annex B
(informative)

Special categories marketed nationally or locally

B.1 Special categories marketed nationally or locally

B.1.1 General

The national or local conditions of gas distribution (gas composition and supply pressures) lead to the definition of special categories, which are marketed nationally or locally in certain countries, as shown in Table B.1.

Table B.1 — Test gases corresponding to categories marketed nationally or locally

Category	Reference gas	Incomplete combustion limit gas	Light back limit gas	Lift limit gas	Sooting limit gas	Country [a]
I_{2Esi}, I_{2Er}	G 20, G 25	G 21	G 222	G 231	G 21	FR
$I_{2E(S)B}$	G 20, G 25	G 21	G 222	G 231	G 21	BE
$I_{2E(R)B}$	G 20, G 25	G 21	G 222	G 231	G 21	BE
I_{2ELL}	G 20, G 25	G 21	G 222	G 231, G 271	G 21	DE
I_{2S}	G 25.1	G 26.1	G 222	G 27.1	G 26.1	HU [b]
I_{2HS}	G 20, G 25.1	G 21, G 26.1	G 222	G 27.1	G 21, G 26.1	HU [b]
I_{2ELw}	G 20, G 27	G 21	G 222	G 2.412	G 21	PL
I_{2ELs}	G 20, G 2.350	G 21	G 222	G 2.352	G 21	PL
I_{2ELn}	G 20, G 2.300	G 21	G 222	G 2.302	G 21	PL
I_{2ELwLs}	G 20, G 27, G 2.350	G 21	G 222	G 2.352	G 21	PL
$I_{2ELwLsLn}$	G 20, G27, G2.350, G 2.300	G 21	G 222	G 2.302		PL
$I_{3B/P}$ [c]	G 30	G 30	G 32	G 31	G 30	PL
$I_{3P(B/P)}$ [c]	G 31, G 30	G 31, G 30	G 32	G 31	G 30	PL
II_{1c2H}	G 130, G 20	G 21	G 132, G 222	G 23	G 21	CH
II_{2Esi3+} II_{2Er3+}	G 20, G 25 G 30	G 21	G 222 G 32	G 231 G 31	G 30	FR
II_{2Esi3P} II_{2Er3P}	G 20, G 25 G 31	G 21	G 222 G 32	G 231 G 271	G 31 G 32	FR
$II_{2ELL3B/P}$	G 20, G 25, G 30	G 21, G 30	G 222, G 32	G 231 G 271	G 30	DE
$II_{2S3B/P}$	G 25.1, G 30	G 26.1, G 30	G 32	G 27.1 G 31	G 26.1, G 30	HU [b]
II_{2S3P}	G25.1, G 31	G 26.1, G 30	G 32	G 27.1, G 31	G 26.1, G 31, G 32	HU [b]
II_{2S3B}	G 25.1, G 30	G 26.1, G 30	G 32	G 27.1, G 31	G 26.1, G 30	HU [b]
$II_{2HS3B/P}$	G 20, G 25.1 G 30	G 21, G 26.1, G 30	G 222 G 32	G 23, G 27.1, G 31	G 21, G 26.1, G 30	HU [b]
II_{2HS3P}	G 20, G 25.1 G 31	G 21, G 26.1, G 30	G 222 G 32	G 23, G 271, G 31	G 21, G 26.1, G 31, G 32	HU [b]
II_{2HS3B}	G 20, G 25.1 G 30	G 21,G 26.1, G 30	G 222 G 32	G 23, G 271, G 31	G 21, G 26.1, G 30	HU [b]
II_{1Lm2E}	G1.250, G 20	G 21	G 1,252, G 222	G 1,252	G 21	PL
$II_{1Lm2ELwLsLn}$	G.1250, G 20, G 27, G 2.350, G 2.300	G 21	G 1,252, G 222	G 1,252	G 21	PL
$II_{2E3B/P}$	G 20, G 30	G 21	G 222, G 32	G 231, G31	G 30	PL
II_{2E3P}	G 20, G 31	G 21	G 222, G 32	G 231, G31	-	PL

Table B.1 *(continued)*

Category	Reference gas	Incomplete combustion limit gas	Light back limit gas	Lift limit gas	Sooting limit gas	Country
$II_{2E3P(B/P)}$ [c]	G 20, G30, G 31	G 21	G 222, G 32	G 231, G31	G 30	PL
$II_{2Els3B/P}$	G 20, G 2.350, G 30	G 21	G 222, G 32	G 2.352 G 31	G 30	PL
II_{2Els3P}	G 20, G 2.350, G 31	G 21	G 222, G 32	G 2.352 G 31	-	PL
$II_{2ELwLs3B/P}$	G 20, G 27, G 2.350, G 30	G 21	G 222, G 32	G 2.352 G 31	G 30	PL
$II_{2ELwLs3P}$	G 20, G 27, G 2.350, G 31	G 21	G 222, G 32	G 2.352 G 31	-	PL
$II_{2ELwLs3P(B/P)}$ [c]	G 20, G 27, G 2.350, G 31, G 30	G 21	G 222, G 32	G 2.352 G 31	G 30	PL
$II_{2ELwLsLn3P(B/P)}$ [c]	G 20, G 27, G 2.350, G 2.300 G 31, G 30	G 21	G 222, G 32	G 2.302 G 31	G 30	PL
$III_{1a2H3B/P}$	G 110, G 20 G 30	G 21	G 112 G 222, G 32	G 23 G 31	G 30	DK, IT
$III_{1c2H3B/P}$	G 130, G 20 G 30	G 21	G 132 G 222, G 32	G 23 G 31	G 30	CH
III_{1c2H3+}	G 130, G 20 G 30	G 21	G 132 G 222, G 32	G 23 G 31	G 30	CH
III_{1c2H3P}	G 130, G 20, G 30	G 21	G 132 G 222, G 32	G 23 G 31	G 31 G 32	CH
$III_{1c2E+3+}$	G 130, G 20, G 30	G 21	G 132 G 222, G 32	G 231 G 31	G 30	FR
III1c2E+3P	G 130, G 20 G 31	G 21	G 132 G 222, G 32	G 231 G 31	G 32	FR
III1c2Esi3+ III1c2Er3+	G 130, G 20 G 25, G 30	G 21	G 132 G 222, G 32	G 231 G 31	G 30	FR
III1c2Esi3P III1c2Er3P	G 130, G 20 G 25, G 31	G 21	G 132 G 222, G 32	G 231 G 31	G 32	FR
III1ab2H3B/P	G 110, G 120 G 20, G 30	G 21	G 112 G 222, G 32	G 23 G 31	G 30	SE
$III_{1c2E3B/P}$	G 130, G 20, G 30	G 21	G 132, G 222, G 32	G 31	G 30	PL
$III_{1Lm2ELwLsLn3B/P}$	G 1.250, G20, G 27, G 2.350, G 2.300, G 30	G 21	G 1.252, G 222, G 32	G 1.252 G 31	G 30	PL

[a] Member states to confirm selection of appliance categories.
[b] Hungary to confirm selection.
[b] Only used on appliances less than 12 kW and at normal pressure of 37 mbar for both butane and propane.

B.1.2 Definition of special categories

B.1.2.1.1 Appliances designed for the use of gases linked to the first family

Category I_{1b}: appliances using only gases of Group b linked to the first family, at a fixed supply pressure (this category is not used).

Category I_{1c}: appliances using only gases of Group c linked to the first family, at a fixed supply pressure (this category is not used).

Adjustment of the gas rate is optional for the replacement of a gas of one group to a gas of another group within the first family and of the gases which are linked to it.

Category I_{1Lm}: appliances using only of Group Lm gases linked to the first family at the prescribed supply pressure (this category is not used).

B.1.2.1.2 Appliances designed for the use of gases of the second family and the gases linked to it

Category I_{2Esi}: appliances capable of using only gases of Group E of the second family, and operating under the appropriate pressure of a pressure couple. The replacement of a gas in the range Es of Group E (Wobbe index between 44,8 MJ/m^3 and 54,7 MJ/m^3) by a gas in the range Ei of Group E (Wobbe index in the range 40,9 MJ/m^3 and 44,8 MJ/m^3) or vice versa necessitates a modification to the burner setting and possibly a change of injectors, of calibrated orifices and of the atmosphere control device.

Category I_{2Er}: appliances capable of using only gases of Group E of the second family and being able to operate with a pressure couple without adjustment on the appliance. However, specific adjustment of the burner gas rate is optional for the replacement of a gas of the range Es of Group E (Wobbe index between 44,8 MJ/m^3 and 54,7 MJ/m^3) by a gas of the range Ei of Group E (Wobbe index between 40,9 MJ/m^3 and 44,8 MJ/m^3). If this adjustment has been carried out, a re-adjustment to the previous setting is then necessary in order to return to the use of a gas in the range Es of Group E.

Category I_{2LL}: appliances using only gases of Group LL linked to the second family, at a fixed supply pressure. On condition that the Wobbe index of the second family gas distributed does not exceed the upper limit of 43,7 MJ/m^3, the appliance may be adjusted according to a lower nominal value (this category is not used).

Category I_{2ELL}: appliances capable of using gases of Group E of the second family, and gases of Group LL linked to the second family. The gases of Group E of the second family are used under the same conditions as for Category I_{2E}. The gases of Group LL of the second family are used under the same conditions as for Category I_{2LL}.

Category I_{2S}: appliances using only gases of Group S linked to the second family, at the defined supply pressure.

Category I_{2HS}: appliances using only gases of Group H of the second family and gases of Group S linked to the second family. The Group H second family gases are used under the same conditions as for Category I_{2H}. The Group S second family gases are used under the same conditions as for Category $I_{2S.}$

Category I_{2Lw}: appliances using only of Group Lw gases linked to the second family at the prescribed supply pressure (this category is not used).

Category I_{2Ls}: appliances using only of Group Ls gases linked to the second family at the prescribed supply pressure (this category is not used).

Category I_{2Ln}: appliances using only of Group Ln gases linked to the second family at the prescribed supply pressure (this category is not used).

Category I_{2ELwLs}: appliances capable of using gases of Group E second family and gases Group Lw and Ls linked to the second family. The gases of Group E are used under the same conditions as for Category I_{2E}. The gases Group Lw and Ls are used accordingly under the same conditions as for Category I_{2Lw} and Category I_{2Ls}.

Category $I_{2ELwLsLn}$: appliances capable of using gases of Group E second family and gases Group Lw, Ls and Ln linked to the second family. The gases of Group E are used under the same conditions as for Category I_{2E}. The gases Group Lw, Ls and Ln are used accordingly under the same conditions as for Category I_{2Lw}, Category I_{2Ls} and Category I_{2Ln}.

B.1.2.1.3 Appliances designed for the use of gases of the third family and the gases linked to it

Category $I_{3P(B/P)}$: appliances capable of using gases of Group P and B/P third family. The gases of Group P are used under the same conditions as for Category I_{3P}. The gases group B/P are used under the same conditions as for Category $I_{3B/P}$.

B.1.2.2 Category II

B.1.2.2.1 Appliances designed to use gases of the first family or that are linked to it and gases of the second family or that are linked to it

Category $II_{1Lm2ELwLsLn}$: appliances capable of using of Group Lm gases linked to the first family and gases of Group E, Lw, Ls, Ln of the second family or linked to the second family. The gases linked to the first family are used under the same conditions as for category I_{1Lm}. The second family gases are used under the same conditions as for category $I_{2ELwLsLn}$.

B.1.2.2.2 Appliances designed to use of gases of the second family or that are linked to it and gases of the third family

Category II_{2Esi3+}: appliances capable of using gases of Group E of the second family and gases of the third family. The second family gases are used under the same conditions as for Category I_{2Esi}. The third family gases are used under the same conditions as for Category I_{3+}.

Category II_{2Esi3P}: appliances capable of using gases of Group E of the second family and gases of Group P of the third family. The second family gases are used under the same conditions as for Category I_{2Esi}. The gases of the third family are used under the same conditions as for Category I_{3P}.

Category II_{2Er3+}: appliances capable of using gases of Group E of the second family and gases of the third family. The second family gases are used under the same conditions as for Category I_{2Er}. The gases of the third family are used under the same conditions as for Category I_{3+}.

Category II_{2Er3P}: appliances capable of using gases of Group E of the second family and gases of Group P of the third family. The second family gases are used under the same conditions as for Category I_{2Er}. The gases of the third family are used under the same conditions as for Category I_{3P}.

Category $II_{2ELL3B/P}$: appliances capable of using gases of Group E of the second family, gases of Group LL linked to the second family and gases of the third family. The second family gases or the gases that are linked to it are used under the same conditions as for Category I_{2ELL}. Gases of the third family are used under the same conditions as for Category $I_{3B/P}$.

Category $II_{2S3B/P}$: appliances capable of using gases of Group S linked to the second family and gases of the third family. The gases linked to the second family are used under the same conditions as for Category I_{2S}. The third family gases are used under the same conditions as for Category $I_{3B/P}$.

Category II_{2S3P}: appliances capable of using gases of Group S linked to the second family and gases of Group P of the third family. The gases linked to the second family are used under the same conditions as for Category I_{2S}. The third family gases are used under the same conditions as for Category I_{3P}.

Category II_{2S3B}: appliances capable of using gases of Group S linked to the second family and gases of Group B of the third family. The gases linked to the second family are used under the same conditions as for Category I_{2S}. The third family gases are used under the same conditions as for Category I_{3B}.

Category $II_{2HS3B/P}$: appliances capable of using gases of Group H of the second family, gases of Group S linked to the second family and gases of the third family. Gases of the second family or gases linked to it are used under the same conditions as for Category I_{2HS}. The third family gases are used under the same conditions as for Category $I_{3B/P}$.

Category II_{2HS3P}: appliances capable of using gases of Group H of the second family, gases of Group S linked to the second family and gases of Group P of the third family. Gases of the second family or gases linked to it are used under the same conditions as for Category I_{2HS}. The third family gases are used under the same conditions as for Category I_{3P}.

Category II_{2HS3B}: appliances capable of using gases of Group H of the second family, gases of Group S linked to the second family and gases of Group B of the third family. Gases of the second family or gases linked to it are used under the same conditions as for Category I_{2HS}. The third family gases are used under the same conditions as for Category I_{3B}.

Category $II_{2E3P(B/P)}$: appliances capable of using gases of Group E of the second family and gases of groups P and B/P of the third family. The second family gases are used under the same conditions as for Category I_{2E}. The gases of the third family are used under the same conditions as for Category $I_{3P(B/P)}$.

Category $II_{2ELwLsLn3B/P}$: appliances capable of using gases of Group E of the second family, gases Groups Lw, Ls, Ln linked to the second family and gases of Group B/P of the third family. The second family gases are used under the same conditions as for Category $I_{2ELwLsLn}$. The gases of the third family are used under the same conditions as for Category $I_{3B/P}$.

Category $II_{2ELwLsLn3P}$: appliances capable of using gases of Group E of the second family, gases Groups Lw, Ls, Ln linked to the second family and gases of Group P of the third family. The second family gases are used under the same conditions as for Category $I_{2ELwLsLn}$. The gases of the third family are used under the same conditions as for Category I_{3P}.

Category $II_{2ELwLsLn3P(B/P)}$: appliances capable of using gases of Group E of the second family, gases Groups Lw, Ls, Ln linked to the second family and gases of Group P and B/P of the third family. The second family gases are used under the same conditions as for Category $I_{2ELwLsLn}$. The gases of the third family are used under the same conditions as for Category $I_{3P(B/P)}$.

B.1.2.3 Category III

Category $III_{1a2H3B/P}$: appliances capable of using gases of Group a of the first family, gases of Group H of the second family and gases of the third family. The first family gases are used under the same conditions as for Category I_{1a}. The second family gases are used under the same conditions as for Category I_{2H}. The third family gases are used under the same conditions as for Category $I_{3B/P}$.

Category $III_{1c2E+3+}$: appliances capable of using gases of Group c linked to the first family, gases of Group E of the second family and gases of the third family. The gases linked to the first family are used under the same conditions as for Category I_{1c}. The second family gases are used under the same conditions as for Category I_{2E+}. The third family gases are used under the same conditions as for Category I_{3+}.

Category $III_{1c2E+3P}$: appliances capable of using gases of Group c linked to the first family, gases of Group E of the second family and gases of Group P of the third family. The gases linked to the first family are used under the same conditions as for Category I_{1c}. The second family gases are used under the same conditions as for Category I_{2E+}. The third family gases are used under the same conditions as for Category I_{3P}.

Category $III_{1c2Esi3+}$: appliances capable of using gases of Group c linked to the first family, gases of Group E of the second family and gases of the third family. The gases linked to the first family are used under the same conditions as for Category I_{1c}. The second family gases are used under the same conditions as for Category I_{2Esi}. The third family gases are used under the same conditions as for Category I_{3+}.

Category $III_{1c2Esi3P}$: appliances capable of using gases of Group c linked to the first family, gases of Group E of the second family and gases of the third family. The gases linked to the first family are used under the same conditions as for Category I_{1c}. The second family gases are used under the same conditions as for Category I_{2Esi}. The third family gases are used under the same conditions as for Category I_{3P}.

Category $III_{1c2Er3+}$: appliances capable of using gases of Group c linked to the first family, gases of Group E of the second family and gases of the third family. The gases linked to the first family are used under the same conditions as for Category I_{1c}. The second family gases are used under the same conditions as for Category I_{2Er}. The third family gases are used under the same conditions as for Category I_{3+}.

Category $III_{1c2Er3P}$: appliances capable of using gases of Group c linked to the first family, gases of Group E of the second family and gases of Group P of the third family. The gases linked to the first family are used under the same conditions as for Category I_{1c}. The second family gases are used under the same conditions as for Category I_{2Er}. The third family gases are used under the same conditions as for Category I_{3P}.

Category $III_{1ab2H3B/P}$: appliances capable of using gases of Group a of the first family, gases of Group b linked to the first family, gases of Group H of the second family and gases of the third family. The first family gases or the gases linked to it are used under the same conditions as for categories I_{1a} and I_{1b}. The second family gases are used under the same conditions as for Category I_{2H}. The third family gases are used under the same conditions as for Category $I_{3B/P}$.

Category $III_{1Lm2ELwLsLn3B/P}$: appliances capable of using gases of group Lm linked to the first family, gases of Group E of the second family, gases Groups Lw, Ls, Ln linked to the second family and gases of Group B/P of the third family. The first family gases are used under the same conditions as for category I_{1Lm}. The second family gases are used under the same conditions as for Category $I_{2ELwLsLn}$. The third family gases are used under the same conditions as for Category $I_{3B/P.}$.

Annex C
(informative)

A-deviations

A-deviation: National deviation due to regulations, the alteration of which is for the time being outside the competence of the CEN/CENELEC member.

This European Standard falls under Directive 2009/142/EC on the approximation of the laws of Member States concerning gas appliances.

A-deviations in an EFTA country are valid instead of the relevant provisions of the European Standard in that country until they have been removed.

Switzerland

The Swiss law (Luftreinhalte-Verordnung, LRV) of 1985-12-16 (state on 2010-07-15) is applicable instead of the requirements of 5.7 and the associated appliance standard, i.e. EN 778, EN 1020 or EN 1319, regarding energy efficiency (chimney losses, standby losses) and emissions of CO and NO_x.

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directives

This European Standard 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 2009/142/EC on the approximation of the laws of Member States concerning gas appliances.

WARNING: Other requirements and other EU Directives may be applicable to the products falling within the scope of this standard.

The following clauses of this standard are likely to support requirements of EU Directive 2009/142/EC. Only relevant essential requirements are included in the table below. All other requirements are already covered in the air heater standards EN 778, EN 1020 and EN 1319.

Compliance with this standard provides one means of conforming with the specific essential requirements of the Directive concerned and associated EFTA regulations.

Table ZA.1

Essential requirement	Subject	Relevant clauses in EN 1196
1	**Annex I of the Directive 2009/142/EC** **General conditions**	
1.1	Safe design and construction	Whole standard
1.2	Instructions -installer -user Warning notices -appliance -packaging	 7.2 7.3 7.1 7.1
1.2.2	User instructions contain: -all instructions -restrictions on use	 7.3 Not applicable
2	**Materials**	
2.1	Fitness for purpose	4.1
3	**Design and construction**	
3.1.2	Condensation	4.1, 4.2, 4.3, 4.4, 4.5, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6
3.1.9	Safety/control device failure -flue gas temperature cut-off device	 4.6
3.5	Rational use of energy	5.8

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