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Gas-fired instantaneous water heaters for the production of domestic hot water, fitted with atmospheric burners

Gasbeheizte Durchlauf-Wasserheizer für den sanitären Gebrauch mit atmosphärischen Brennern

Appareils de production instantanée d'eau chaude pour usages sanitaires équipés de bruleurs atmosphériques utilisant les combustibles gazeux

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EUROPEAN STANDARD

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English version

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This amendment A1 modifies the European Standard EN 26:1997; it was approved by CEN on 26 November 1999.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for inclusion of this amendment into the relevant national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This amendment exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 26:1997/A1:2000 E

Foreword

This Amendment EN 26:1997/A1:2000 to EN 26:1997 has been prepared by Technical Committee CEN/TC 48 "Domestic gas-fired water heaters", the secretariat of which is held by AFNOR.

This Amendment to the European Standard EN 26:1997 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2001, and conflicting national standards shall be withdrawn at the latest by April 2001.

This amendment does not change requirements and test methods contained in EN 26:1997. It modifies EN 26:1997 by the addition of requirements and test methods for type testing of type C water heaters with a fan incorporated in the combustion air supply circuit or in the combustion products evacuation circuit.

This Amendment to the European Standard EN 26 :1997 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 standard

To fulfil the Gas Appliance Directive, this Amendment contains normative paragraphs specifying requirements for combustion products evacuation ducts which are part of a water heater. Constructional requirements may arise from the Construction Products Directive.

In respect of potential adverse effects on the quality of water intended for human consumption, caused by the product covered by this standard :

1) this standard provides no information as to whether the product may be used without restriction in any of the Member States of the EU or EFTA.

2) it should be noted that, while awaiting the adoption of verifiable European criteria, existing national regulations concerning the use and/or the characteristics of this product remain in force.

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

1 Scope

2nd paragraph - 1st dash, add :

«C_{12}, C_{13},C_{22}, C_{23}, C_{32}, C_{33}, C_{42}, C_{43}, C_{52}, C_{53}, C_{62}, C_{63}, C_{72}, C_{73}, C_{82} and C_{83}.»

2nd paragraph - add between the 2nd dash and the third :

«- equipped with atmospheric burners assisted by a fan for the supply of combustion air or evacuation of combustion products or fully premixed burners hereafter referred to as «type C water heaters with a fan».

Add after the 2nd paragraph :

«This European standard applies to type C[1)] water heaters as listed in 4.3.3 :

— types C_1, C_3 and C_5 water heaters including their combustion air supply and combustion products evacuation ducts and their terminal(s) ;

— types C_2 and C_4 water heaters including their connection ducts but without the shared duct system ; this shared duct system is part of the building ;

— type C_6 water heaters without any ducts ; the ducts are separately approved and marketed ;

— type C_7 water heaters up to the draught diverter/air inlet but without the secondary flue ;

— type C_8 water heaters with their connecting ducts but without the chimney, which is part of the building.»

4th paragraph - 2nd dash, delete this dash :

«appliances fitted with a fan ;»

2 Normative references

Add the following references :

«EN 1443, *Chimneys - General requirements.*

prEN 1856-1, *Chimneys - Requirements for metal chimneys - Part 1 : System chimney products.*

prEN 1856-2, *Chimneys - Requirements for metal chimneys - Part 2 : Metal liners and connecting flue pipes products.*

EN 1859, *Chimneys - Metal chimneys - Test methods».*

EN 12067-1, *Gas/air ratio controls for gas burners and gas burning appliances – Part 1 : pneumatic types.*

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1) Except for type C_6 water-heaters, type C water-heaters are marketed with ducts. Combustion products evacuation ducts in areas of the building other than the room in which the water-heater is installed or ducts or chimneys which are part of the building are also subject to the Construction Products Directive. National installation regulations may specify further requirements and may limit the modes of installation permitted in the territory of a CEN member state.

3 Definitions

3.4.11 automatic shut-off valve[1)]

Replace note 1) at the foot of the page by :

«1) Automatic shut-off valves are classified in accordance with EN 161 into classes A (not required in the current standard), B and C. Automatic shut-off valves that comply with the safety and operational requirements of this standard and which are integral parts of the water heater are designated as class B' and C', respectively.»

After 3.6.4.5, add the following paragraph :

«3.6.4.6 fully premixed burner

A burner in which the gas and a quantity of air at least equal to that theoretically necessary for complete combustion are mixed before the flame ports.»

3.7 combustion circuit

Replace the last dash with the following :

«- the combustion products evacuation ducts and either the duct adapter (if any) or the connection to the terminal for type C water heaters.»

3.7.5 terminal

Replace the clause with the following :

«A device outside of the building, to which is(are) connected :

— the air supply and combustion products evacuation ducts for types C_1 and C_3 water heaters (one or two devices) ;

— the air supply duct and the combustion products evacuation duct for types C_5 water heaters (two devices) ;

— the air supply duct for type C_8 water heaters, (one device).

This device is intended to maintain the quality of combustion in the event of wind.»

After 3.7.5, add the following clauses :

«3.7.6 protected combustion chamber

A combustion chamber which is constructed such that an ignition in the combustion chamber does not ignite an air/gas mixture outside the combustion chamber.

3.7.7 air supply and combustion products evacuation circuits

3.7.7.1 air supply and combustion products evacuation ducts

Means for transporting combustion air to the burner and combustion products to the terminal or duct adapter.

This standard differentiates between :

— completely surrounded ducts : the combustion products evacuation duct is surrounded by combustion air throughout its length ;

— separate ducts : the combustion products evacuation duct and the combustion air supply duct are neither concentric nor the combustion products evacuation duct completely surrounded by the air supply duct.

3.7.7.2 terminal guard

The device that protects the terminal from mechanical damages from outside influences.

3.7.7.3 duct adapter

A device which allows the fitting of :

— the air supply and combustion products evacuation ducts to a single shared duct for type C_2 water heaters ;

— the air supply and combustion products evacuation ducts to two ducts of a shared system for type C_4 water heaters ;

— for type C_6 water heaters to a system for air supply and combustion products evacuation that is approved and marketed independently from the water heater ;

— the combustion products evacuation duct to a chimney that is part of the building for type C_8 water heaters.

The duct adapter may be part of the water heater or of the air supply and/or combustion products evacuation system.

3.7.7.4 roof space

A ventilated part of a building between the uppermost habitable space of the building and the roof.

3.7.7.5 secondary flue

The part of the flue of a type C_7 water heater between the draught diverter located in the roof space and the combustion products outlet above the roof.

After 3.10.9.2, add the following clauses :

«3.10.10 device monitoring the air supply or combustion products evacuation

A device intended to cause safety shutdown in the event of abnormal conditions of air supply or of combustion products evacuation.

3.10.11 gas/air ratio control

A device that automatically adapts the combustion air rate to the gas rate or vice versa.»

4.3 mode of supply of the combustion air and evacuation of the combustion products (appliances types)

Add at the end of the 1st paragraph :

«(see examples in informative annex L).

The classification used in this document is taken from Technical Report CR 1749 "European scheme for the classification of gas appliances according to the method of evacuation of the products of combustion (types)".»

4.3.3 Type C

Replace the clauses by the following :

«Type C water heaters are water heaters in which the combustion circuit is sealed with respect to the habitable areas of the building in which the water heater is installed.

The air supply and the combustion products evacuation ducts and the terminal, including any duct adapter which is used to connect the water heater to a chimney or duct system, are part of the water heater unless otherwise stated. They admit fresh air from outside the habitable areas of the building to the burner as well as discharge the products of combustion to the outside.

Water heaters with sealed combustion circuit with respect to the habitable areas of the building are classified into several types according to the mode of supply of the combustion air and of the evacuation of the combustion products (see examples in annex L).

The types are defined by two subscripts[2)].

The first subscript number is based upon the possible installation of the water heater with respect to the mode of air supply and evacuation of the combustion products.

4.3.3.1 Type C_1

A type C water heater which is connected via its ducts to a horizontally installed terminal at the wall or on the roof. The orifices of the ducts are either concentric or close enough to come under similar wind conditions.

4.3.3.2 Type C_2

A type C water heater which is fitted via its ducts possibly by means of a duct adapter to a shared duct system consisting of a single duct for both supply of the combustion air and discharge of the combustion products.

4.3.3.3 Type C_3

A type C water heater which is connected via its ducts to a vertically installed terminal. The orifices of the ducts are either concentric or close enough to come under similar wind conditions.

4.3.3.4 Type C_4

A type C water heater which is fitted via its ducts possibly by means of a duct adapter to a shared duct system consisting of a duct for supply of the combustion air and a duct for the discharge of the combustion products. The orifices of this shared ducts system are either concentric or close enough to come under similar wind conditions.

4.3.3.5 Type C_5

A type C water heater which is connected via its separate ducts to two terminals in zones of difference pressure.

4.3.3.6 Type C_6

A type C water heater which is intended to be connected to a separately approved and marketed system for the supply of combustion air and discharge of the combustion products.

4.3.3.7 Type C_7

A type C water heater which is connected via its vertical ducts, and a draught diverter located in the roof space, to a secondary flue. The combustion air is taken from the roof space.

4.3.3.8 Type C_8

A type C water heater which is fitted via its ducts possibly by means of a duct adapter to an air supply terminal and to an individual or shared chimney.

4.3.3.9 Presence and position of a fan

The second subscript number is based upon the presence and position of an integral fan in the water heater :

— a type C water heater that does not incorporate a fan is identified by the second subscript number «1» (e.g. C_{11}) ;

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2) Water- heaters in which the combustion products circuit is under positive pressure and is surrounded by the combustion air circuit may require identification by an additional subscript, in accordance with national regulations, if they are intended to be installed in non-ventilated areas.

— a type C water heater that does incorporate a fan downstream of the combustion chamber/heat exchanger is identified by the second subscript number «2» (e.g. C_{12}) ;

— a type C water heater that does incorporate a fan upstream of the combustion chamber/heat exchanger is identified by the second subscript number «3» (e.g. C_{13}).»

5.2.1 Technical instructions

5.2.1.4 For installation of the evacuation combustion products circuit

d) for type C_{11} and C_{21} appliances

Add the following clause :

«e) for type C appliances with a fan

— information about the type of installation for which the water heater is approved ;

— give the instruction that the water heater has to be installed with the necessary accessories (e.g. ducts, terminal, duct adapter) supplied with the water heater or give the specification of the necessary accessories that must be applied ;

— give the instructions for the installation of parts intended to be fitted to the water heater ;

— state the maximum number of bends to be used and the maximum length and, if necessary, the minimum length of the air supply and combustion products evacuation ducts ;

— give the particular characteristics of the terminal guard, where provision for this is made, and information on its installation relative to the terminal ;

— in case of separated air supply and combustion products evacuation ducts, and if their tightness characteristics are different, indicate the way of identifying the ducts ;

— for type C_1 water heaters, the installation instructions shall state :

  — if the terminal can be installed on the wall and/or on the roof ;

  — that the terminal outlets from separate ducts must fit inside a square of 50 cm ;

— for type C_2 water heaters, the installation instructions shall state :

  — the characteristics of the shared duct systems to which the water heater can be connected ;

— for type C_3 water heaters, the installation instructions shall state :

  — that the terminal outlets from separate ducts must fit inside a square of 50 cm ;

— for type C_4 water heaters, the installation instructions shall state :

  — the minimum and maximum pressure losses permitted in the air supply and combustion products evacuation ducts, or the minimum and maximum lengths of these ducts ;

  — the combustion products temperature and mass rate at the maximum and minimum heat input with the maximum length of ducts, if necessary ;

  — the characteristics of the shared duct systems to which the water heater can be connected ;

— for type C_5 water heaters, the installation instructions shall state :

  — if the terminals for the supply of combustion air and for the evacuation of combustion products are to be installed on opposite or adjacent walls of the building ; this can be only on the condition that the

ignition, cross-lighting, flame stability have been tested with an overpressure on the combustion products evacuation duct (see 7.7.7.2) ;

— for type C_6 water heaters, the installation instructions shall state :

  — the minimum and maximum pressure losses permitted in the air supply and combustion products evacuation ducts, or the minimum and maximum lengths of these ducts ;

  — the combustion products temperature and mass rate at the maximum and minimum heat inputs ;

  — that the water heater is to be installed with terminals that comply with the requirements of prEN 1856 and EN 1859, and whose openings are in zones of similar pressure ;

  — the method of calculating the pressure loss in the air supply and combustion products evacuation ducts, starting from the values of the temperature and the mass rate of the combustion products in relation to the CO_2 content ;

— for type C_7 water heaters, the installation instructions shall state :

  — that the draught diverter and the air intake have to be installed in the roof space of the building ;

  — that the water heater is not intended to be installed in cases where the roof space is in use, or to be used, as living accommodation ;

— for type C_8 water heaters, the installation instructions shall state :

  — the characteristics of the chimney to which the water heater is to be connected.»

5.2.2.4 For type C appliances

Add at the end of the article :

«Mention that a water heater of type C_7 is not intended to be installed in cases where the roof space is in use, or to be used, as living accomodation.»

6.1.2 Materials

Add at the end of the article :

«for separated air supply and combustion products evacuation ducts connected to a type C water heater, the requirements given in 6.1.7.4, in accordance with EN 1443, shall additionally apply.»

6.1.6.2 Soundness of the combustion circuit

6.1.6.2.2 Type C_{11} et C_{21} appliances

Replace the title by «**Type C appliances**».

1st paragraph - Replace the sentence by :

« The sealing of the combustion circuit up to the connection with the terminal (type C_{11}, C_{12}, C_{13}, C_{32}, C_{33}, C_{52}, C_{53}, (if necessary C_{62}, C_{63}), C_{82} and C_{83}), or to the common duct or to the duct adapter (type C_{21},C_{22}, C_{23}, C_{42}, C_{43}, (if necessary C_{62}, C_{63}), C_{82} and C_{83}), except for parts permanently fixed to the common duct (type C_{21},C_{22}, C_{23}, C_{42}, C_{43}, (if necessary C_{62}, C_{63}), C_{82} and C_{83}), shall be achieved only by mechanical means, excluding mastics and pastes ».

6.1.7 Supply of combustion air and evacuation of the combustion products

Delete clauses 6.1.7.4 Type C_{11} appliances and 6.1.7.5 Type C_{21} appliances.

After 6.1.7.3, add the following clauses :

«6.1.7.4 Separate combustion products evacuation duct

6.1.7.4.1 Stability under mechanical loading

The combustion products evacuation duct shall be capable of withstanding horizontal and vertical loads. The following requirements shall be considered :

— compressive strength ;

— tensile strength ;

— where applicable, resistance to lateral load which corresponds to a reference wind velocity pressure of 1,5 kN/m^2.

6.1.7.4.2 Stability under exposure to heat

The stability of the walls of the evacuation duct shall be ensured during and after exposure to heat occurring under all operating conditions of the water heater.

6.1.7.4.3 Corrosion resistance

The evacuation duct shall keep its essential characteristics in the presence of the corrosion load corresponding to all operating conditions of the water heater.

6.1.7.4.4 Resistance to condensates and moisture under normal operating conditions

The evacuation duct shall keep its essential characteristics in the presence of condensate and moisture under normal operating conditions.

6.1.7.5 Type C apppliances

6.1.7.5.1 General

All water heaters shall be designed so that there is an adequate supply of combustion air during ignition and over the whole range of possible heat inputs stated by the manufacturer. A gas/air ratio control is permitted.

Unless otherwise stated, water heaters with a fan may be fitted with a means of adjustment in the combustion circuit intended to adapt the water heater to the installation conditions. This adjustment is effected either by restrictors or by setting a means of adjustment to predetermined positions in accordance with detailed instructions from the manufacturer.

According to the water heater type, the manufacturer shall supply any terminal and/or duct adapter, with the water heater for test.

6.1.7.5.2 Air supply and combustion products evacuation ducts

The assembly of the various parts during installation shall be such that no work is necessary other than adjusting the length of the air supply and combustion products evacuation ducts (possibly by cutting them). Such adaptation shall not impair the correct operation of the water heater.

It shall be possible to connect the water heater, the air supply and combustion products evacuation ducts and the terminal or the duct adapter using ordinary tools if necessary. All necessary accessories and the fitting instructions shall be supplied by the manufacturer.

The terminal outlets from separate ducts for the supply of combustion air and the evacuation of combustion products :

— shall fit inside a square of 50 cm for types C_1 and C_3 water heaters ;

— may terminate in zones of different pressure for type C_5 water heaters.

Separate air supply and combustion products evacuation ducts, whose tightness characteristics are different, have to be markedso as to be clearly identifiable.

6.1.7.5.3 Terminal

No opening in the external surfaces of the terminal shall permit the entry in the ducts of a 16 mm diameter ball applied with a force of 5 N.

Any horizontal terminal shall be designed in such a way that any condensate is discharged outwards from the wall.

6.1.7.5.4 Terminal guard

If the manufacturer describes, in the installation instructions, a protective guard for the terminal for use when the outlets for evacuation of the combustion products open on to a walkway, this device shall be supplied to the laboratory for test. The dimensions of the terminal guard, when installed in accordance with the manufacturer's instructions, shall be such that the distance between any part of the guard and the terminal, except the wall plate, exceeds 50 mm. The guard shall not have any sharp edges likely to cause injury.

6.1.7.5.5 Duct adapter

For types C_2, C_4 and C_8 water heaters, the duct adapter shall be designed so that it is possible to obtain the distances specified by the manufacturer for the projection of the ends of the combustion air supply and combustion products discharge ducts into the shared duct, whatever the total thickness (flue and cladding) of the shared duct.

6.1.7.6 Special requirements for certain components of water heaters with a fan

6.1.7.6.1 Fan

Direct access to the rotating parts of a fan shall be prevented. The parts of a fan in contact with combustion products shall be effectively protected against corrosion unless they are of corrosion resistant material ; furthermore they shall withstand the temperature of the combustion products.

6.1.7.6.2 Air proving device

Before each fan start or at the end of a delivery, it shall be checked that there is no simulation of air flow in the absence of air flow. If there is an isolated demand then this proving shall occur either at the start, or not more than one minute after the end of that demand. If there is a series of demands each separated by less than one minute then the proving shall occur either at the start or not less than one minute after the end of that series of demands. This requirement does not apply to water heaters fitted with gas/air ratio controls.

The air proving device shall detect the presence of a sufficient air supply within 10 s.

The supply of combustion air shall be checked by one of the following :

a) supervision of the combustion air pressure or the combustion products pressure

This supervision of pressure is only allowed for water heaters fitted with a constant speed fan during the operation of the main burner and where the combustion products duct is completely surrounded by combustion air throughout its length which shall not exceed 3 m. In addition the following requirements shall be fulfilled :

— the ducts shall not have adjustable or removable restrictions ; and

— the pressure loss of the heat exchanger shall not exceed 0,05 mbar ;

b) continuous supervision of the combustion air rate or the combustion products rate

In this system, the supervision device is activated directly by the flow of combustion air or combustion products.

This is also valid for water heaters with more than one fan speed, in which the flows associated with each fan speed are monitored by separate supervision devices.

c) gas/air ratio control

The following proving systems are only allowed for water heaters where the combustion products circuit is completely surrounded by the air supply circuit or for separate ducts when the leakage rate of the combustion products evacuation ducts meets the requirements of 7.2.2.3.4 both inside and outside the room where the water heater is installed :

d) indirect supervision (e.g. fan speed supervision) when there is an air proving device which proves the supply of combustion air at least once at each start

e) supervision of the minimum and maximum air or combustion products rates with two rate supervision devices.

6.1.7.6.3 Gas/air ratio control

Gas/air ratio control shall be designed and constructed so that reasonably foreseeable damage does not give rise to a change capable of affecting safety.

Control tubes may be made of metal with suitable mechanical connections or of other materials with at least equivalent properties. In this case, they are considered immune to breakage, accidental disconnection and leakage after initial soundness checks. As such they are not subject to the tests in 7.7.12.4.2.2.

When such control tubes are made of materials with less than equivalent properties, their disconnection, breakage or leakage shall not lead to an unsafe situation. This implies either locking out or safe operation with no leakage of gas outside the water heater.

Control tubes for air or combustion products shall have a minimum internal cross-sectional area of 12 mm^2 with a minimum internal dimension of 1 mm. They shall be located and fixed so that any retention of condensate is avoided and positioned such that creasing, leakage or breakage is prevented. Where more than one control tube is used the relevant connection position for each shall be obvious. Provided that evidence is given and precautions are taken to avoid condensation in the control tubes, the minimum cross sectional area of air control tubes shall be 5 mm^2.

Gas/air ratio controls comply with the relevant requirements of EN 12067-1. The operational tests will be achieved in accordance with this standard. »

6.2.8.3 Flame supervision device of an appliance with an intermittent safety ignition burner

Delete the 1st paragraph :

«This device is only permitted for types B_{11} and B_{11BS} appliances.»