



BSI Standards Publication

Gas-fired central heating boilers

Part 2-1: Specific standard for type C appliances and type B2, B3 and B5 appliances of a nominal heat input not exceeding 1 000 kW

National foreword

This British Standard is the UK implementation of EN 15502-2-1:2012+A1:2016. It supersedes BS EN 15502-2-1:2012 which is withdrawn. Together with BS EN 15502-1:2012+A1:2015 and BS EN 15502-2-2:2014, it supersedes BS EN 297:1994 (including amendments), BS EN 677:1998, BS EN 15417:2006 and BS EN 625:1996, which will be withdrawn on 31 July 2017.

Annex V gives detailed information on the state of supersessions in the EN 15502 series.

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

The UK participation in its preparation was entrusted to Technical Committee GSE/29, Gas-fired central heating boilers (domestic and non-domestic) and domestic gas-fired water heaters.

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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Amendments/corrigenda issued since publication

Date	Text affected
28 February 2015	Supersession information in National foreword updated and National Annex NA inserted
31 January 2017	Implementation of CEN amendment A1:2016. National Annex NA removed as this has been replaced by Annex V of the standard

English Version

Gas-fired central heating boilers - Part 2-1: Specific
standard for type C appliances and type B2, B3 and B5
appliances of a nominal heat input not exceeding 1 000 kW

Chaudières de chauffage central utilisant les
combustibles gazeux - Partie 2-1 : Norme spécifique
pour les appareils de type C et les appareils de types
B2, B3 et B5 dont le débit calorifique nominal est
inférieur ou égal à 1 000 kW

Heizkessel für gasförmige Brennstoffe - Teil 2-1:
Heizkessel der Bauart C und Heizkessel der Bauarten
B2, B3 und B5 mit einer Nennwärmebelastung nicht
größer als 1 000 kW

This European Standard was approved by CEN on 18 August 2012 and includes Amendment 1 approved by CEN on 18 June 2016.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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

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COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 15502-2-1:2012+A1:2016) has been prepared by Technical Committee CEN/TC 109 “Central heating boilers using gaseous fuels”, the secretariat of which is held by NEN.

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 June 2017, and conflicting national standards shall be withdrawn at the latest by June 2017.

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 includes Amendment 1 approved by CEN on 18 June 2016.

This document supersedes A1 EN 15502-2-1:2012 A1.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

This document has been prepared under A1 Mandates M/535 and M/066 given to CEN A1 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 A1 informative Annexes ZB, ZC and ZD A1, which are integral parts of this document.

It supports essential requirements as meant in Article 3 of EU Directive 2009/142/EC, relating to appliances burning gaseous fuels and the verification methods valid for production and measurements, as meant in Article 5.2 of EU Directive 92/42/EEC, relating to the efficiency requirements for new hot water boilers fired with liquid or gaseous fuels, with an output of (4 – 400) kW.

Changes in this standard:

Many minor changes are introduced due to the harmonisation between the various standards. This includes the definitions that are used. Some definitions are modified as some standards mentioned the same words with a different meaning.

The user is advised to compare the text he is used to (including the definitions) with the current version.

Most aspects were already introduced for some boiler types, but are now valid for a larger group of boilers.

a) Examples of modifications due to harmonisation:

- 1) Requirements for materials used for the flue function (8.101, 8.102, 8.103);
- 2) The soundness of the combustion circuit (8.2.2);

b) New or generally reworded requirements:

- 1) Air proving (5.4.8, 5.4.9, 8.11.101);
- 2) Adjustment of gas air ration controllers (8.11.101);
- 3) Risk assessment (11);
- 4) Auxiliary energy use (10);
- 5) $\boxed{A_1}$ Variation in gas quality (Annex XC) $\boxed{A_1}$;
- 6) The water trap requirements for condensing boilers (5.4.13);
- 7) Requirements for boiler cascades (8.101);
- $\boxed{A_1}$
- 8) The requirements for type $C_{(10)}$ and $C_{(11)}$ boilers with a $\Delta p_{\max, \text{saf}(\min)}$ of 25 Pa which are now added to this standard. $\boxed{A_1}$

EN 15502 is composed of the following parts:

- EN 15502-1, *Gas-fired heating boilers — Part 1: General requirements and tests*;
- EN 15502-2-1, *Gas-fired central heating boilers — Part 2-1: Specific standard for type C appliances and type B2, B3 and B5 appliances of a nominal heat input not exceeding 1 000 kW* (the present document);
- prEN 15502-2-2, *Gas-fired central heating boilers — Part 2-2: Specific standard for type B1 appliances of a nominal heat input not exceeding 70 kW*.

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

Introduction

A gas-fired heating boiler is an appliance using gas as fuel designed to heat water with the purpose of providing heat to a building (or portion of a building) from one point to multiple rooms using heat emitters such as radiators and convectors to transmit the heat from the water to the room. The boiler may also be used to provide domestic hot water via an indirect hot water storage tank.

The basic function of gas-fired heating boiler is to generate heat by direct heat transfer in a heat exchanger, from the combustion gasses to the water.

The boiler may include in one design more than one function. It may include for example:

- a) a sanitary hot water function;
- b) a function to supply the combustion air from the outside of the building;
- c) a function to dispose the combustion products to the outside of the building.

⌈A1⌋ Boilers may be designed to be connected to specific parts of a building, for instance to create a function as described above under b) and c). Especially the connections to building parts to provide the functions mentioned under b) and c) are relevant.

The boiler may be designed to be supplied in more than one part. If the boiler is designed to be supplied in multiple parts, the boiler is the assembly of various parts according to the technical instructions. ⌈A1⌋

This European Standard was established to deal with aspects related to:

- d) safety;
- e) rational use of energy;
- f) fitness for purpose.

Matters related to quality assurance systems, tests during production, and certificates of conformity of auxiliary devices are not dealt with in this series of European Standards.

Relationship between this document and EN 15502-1, Gas-fired heating boilers — Part 1: General requirements and tests:

This European Standard is to be used in conjunction with ⌈A1⌋ EN 15502-1:2012+A1:2015 ⌈A1⌋ and follows the numbering structure of ⌈A1⌋ EN 15502-1:2012+A1:2015 ⌈A1⌋.

This European Standard refers to clauses of ⌈A1⌋ EN 15502-1:2012+A1:2015 ⌈A1⌋ or adapts clauses by stating in the corresponding clause:

- shall be according to ⌈A1⌋ EN 15502-1:2012+A1:2015 ⌈A1⌋, (clause number) with the following modification
- shall be according to ⌈A1⌋ EN 15502-1:2012+A1:2015 ⌈A1⌋, (clause number) with the following addition
- ⌈A1⌋ EN 15502-1:2012+A1:2015 ⌈A1⌋, (clause number) is replaced by the following;
- ⌈A1⌋ EN 15502-1:2012+A1:2015 ⌈A1⌋, (clause number) is not applicable.

A1 This European Standard adds clauses or subclauses to the structure of EN 15502-1:2012+A1:2015 which are particular to this standard. It should be noted that these clauses and subclauses are not indicated as an addition. Clauses, subclauses and annexes which are additional to those in EN 15502-1:2012+A1:2015 are numbered starting from 101, or designated as Annex XA, XB, XC, etc.

Annex V lists those existing standards which are replaced by this standard in combination with EN 15502-1.

After the DOW on 2015-10-31 (3 years after the DAV of both EN 15502-1 and EN 15502-2-1) the standards specified in Annex V, for the appliance types covered in EN 15502-2-1, were withdrawn by CEN.

Annex V also lists those existing appliance types for which CEN/TC 109 standards are intended to be replaced by EN 15502-2-2. The standards (that are intended to be replaced by EN 15502-2-2) listed in Annex V will be used until EN 15502-2-2 specifies that the standards are withdrawn for the appliance types indicated. **A1**

1 Scope

This European Standard specifies, the requirements and test methods concerning, in particular, the construction, safety, fitness for purpose, and rational use of energy, as well as the classification and marking of gas-fired central heating boilers that are fitted with atmospheric burners, fan assisted atmospheric burners or fully premixed burners, and are hereafter referred to as “boilers”.

Where the word boiler is used, it needs to be read as the boiler including its connecting ducts, ducts and terminals, if any.

[A1] This European Standard covers gas-fired central heating boilers from the types C₁ up to C₉ and the types B₂, B₃ and B₅:

NOTE For further background information on appliance types see CEN/TR 1749:2014. **[A1]**

- a) that have a nominal heat input (on the basis of net calorific value) not exceeding 1 000 kW;
- b) that use one or more combustible gases of the three gas families at the pressures stated in EN 437;
- c) where the temperature of the heat transfer fluid does not exceed 105 °C during normal operation;
- d) where the maximum operating pressure in the water circuit does not exceed 6 bar;
- e) which may or may not give rise to condensation under certain circumstances;
- f) which are declared in the installation instructions to be either a “condensing” boiler or a “low temperature boiler” or a “standard boiler”; if no declaration is given the boiler is to be considered a “standard boiler”;
- g) which are intended to be installed either indoors or outdoors in a partially protected place;
- h) which may include the facility to produce hot water, either by the instantaneous or storage principle, the whole being marketed as a single unit;
- i) which are designed for either sealed water systems or for open water systems;
- j) which are either modular boilers, or non- modular boilers.

[A1] This European Standard also covers gas-fired condensing central heating boilers from the types C₍₁₀₎ that are equipped with a gas-air ratio control and that have a $\Delta p_{\max, \text{saf}(\min)}$ of 25 Pa, and C₍₁₁₎ boilers that have condensing boiler modules that are equipped with a gas-air ratio control and that have a $\Delta p_{\max, \text{saf}(\min)}$ of 25 Pa. **[A1]**

This European Standard provides requirements for boilers with known constructions. For boilers with any alternative constructions, which might not fully be covered by this standard, the risk associated with this alternative construction needs to be assessed.

An example of an assessment methodology, based upon risk assessment and which covers the essential requirements of the Gas Appliance Directive, is given in Clause 11.

This European Standard does not cover all the requirements for:

Ⓐ

k) Appliances that are intended to be connected to gas grids where the quality of the distributed gas is likely to vary to a large extent over the lifetime of the appliance (see Annex XC); Ⓐ

l) Appliances using flue dampers;

Ⓐ

m) Appliances of the types B₂₁, B₃₁, B₅₁, C₂₁, C₄₁, C₅₁, C₆₁, C₇₁, C₈₁, C₍₁₂₎ and C₍₁₃₎; Ⓐ

n) C₇ appliances that have a nominal heat input (on the basis of net calorific value) exceeding 70 kW;

o) Appliances incorporating flexible plastic flue liners;

Ⓐ

p) C₍₁₀₎ boilers:

- 1) without a gas-air ratio control, or
- 2) which are non-condensing appliances, or
- 3) which have a maximum safety pressure difference at minimum heat input not equal to 25 Pa ($\Delta p_{\max, \text{saf}(\min)}$);

q) C₍₁₁₎ boilers that have boiler modules:

- 1) without a gas-air ratio control, or
- 2) which are non-condensing appliances, or
- 3) which have a maximum safety pressure difference at minimum heat input not equal to 25 Pa ($\Delta p_{\max, \text{saf}(\min)}$); Ⓐ

r) Appliances intended to be connected to a (common) flue having mechanical extraction.

2 Normative references

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

In this standard the normative references of Part 1 are valid. Furthermore the following normative references are valid.

EN 437:2003+A1:2009, *Test gases — Test pressures — Appliance categories*

EN 513:1999, *Unplasticized polyvinylchloride (PVC-U) profiles for the fabrication of windows and doors — Determination of the resistance to artificial weathering*

EN 573-1:2004, *Aluminium and aluminium alloys — Chemical composition and form of wrought products — Part 1: Numerical designation system*

⌈A1⌋ *deleted text* ⌋A1

EN 1856-1:2009, *Chimneys — Requirements for metal chimneys — Part 1: System chimney products*

EN 1856-2:2009, *Chimneys — Requirements for metal chimneys — Part 2: Metal flue liners and connecting flue pipes*

EN 10088-1:2005, *Stainless steels — Part 1: List of stainless steels*

EN 13216-1:2004, *Chimneys — Test methods for system chimneys — Part 1: General test methods*

EN 13501-1:2007, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*

EN 14241-1:2005, *Chimneys — Elastomeric seals and elastomeric sealants — Material requirements and test methods — Part 1: Seals in flue liners*

EN 14471:2005, *Chimneys — System chimneys with plastic flue liners — Requirements and test methods*

⌈A1⌋

EN 14989-1, *Chimneys — Requirements and test methods for metal chimneys and material independent air supply ducts for roomsealed heating applications — Part 1: Vertical air/flue terminals for C6-type appliances* ⌋A1

⌈A1⌋

EN 15502-1:2012+A1:2015, *Gas-fired heating boilers — Part 1: General requirements and tests* ⌋A1

⌈A1⌋

CEN/TS 16134, *Chimney terminals — General requirements and material independent test methods* ⌋A1

EN ISO 178:2010, *Plastics — Determination of flexural properties (ISO 178:2010)*

EN ISO 179-1:2010, *Plastics — Determination of Charpy impact properties — Part 1: Non-instrumented impact test (ISO 179-1:2010)*

EN ISO 527-1:1996, *Plastics — Determination of tensile properties — Part 1: General principles (ISO 527-1:1993 including Corr 1:1994)*

EN ISO 527-2:1996, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics (ISO 527-2:1993 including Corr 1:1994)*

EN ISO 1183-1:2004, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pyknometer method and titration method (ISO 1183-1:2004)*

EN ISO 1183-2:2004, *Plastics — Methods for determining the density of non-cellular plastics — Part 2: Density gradient column method (ISO 1183-2:2004)*

EN ISO 1183-3:1999, *Plastics — Methods for determining the density of non-cellular plastics — Part 3: Gas pycnometer method (ISO 1183-3:1999)*

EN ISO 9969:2007, *Thermoplastics pipes — Determination of ring stiffness (ISO 9969:2007)*

ISO 37:2005, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 188:2011, *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests*

ISO 815-1:2008, *Rubber, vulcanized or thermoplastic — Determination of compression set — Part 1: At ambient or elevated temperatures*

ISO 815-2:2008, *Rubber, vulcanized or thermoplastic — Determination of compression set — Part 2: At low temperatures*

ISO 1817:2011, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

ISO 2781:2008¹⁾, *Rubber, vulcanized or thermoplastic — Determination of density*

ISO 6914:2008, *Rubber, vulcanized or thermoplastic — Determination of ageing characteristics by measurement of stress relaxation in tension*

ISO 7619-1:2010, *Rubber, vulcanized or thermoplastic — Determination of indentation hardness — Part 1: Durometer method (Shore hardness)*

ISO 7619-2:2010, *Rubber, vulcanized or thermoplastic — Determination of indentation hardness — Part 2: IRHD pocket meter method*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in [\[A1\]](#) EN 15502-1:2012+A1:2015 [\[A1\]](#), EN 437:2003+A1:2009 and the following apply. They are numbered in accordance with the specific groups they belong to.

3.1.3.101

ducts support

accessory used to fix, or transfer the load of, air supply and combustion products evacuation ducts to structural elements (building, etc.)

3.1.3.102

overheat combustion products temperature

maximum temperature of the combustion products in case of overheat, at the exit of the boiler where it is intended to be connected to a duct, flue or chimney

1) This document is impacted by the following amendment: ISO 2781:2008/Amd 1:2010, Precision data.

3.1.3.103

nominal working combustion products temperature

maximum temperature of the combustion products in case of normal functioning, at the exit of the boiler where it is intended to be connected to a duct, flue or chimney

Note 1 to entry: Normal functioning is considered to reflect the situation of running the boiler at inlet/outlet temperatures of 70/90 °C, or just at the point that the control thermostat is switching.

3.1.3.104

condensing operation mode of flue system

operation mode where, under normal operation conditions, condensate is produced in the combustion products circuit

3.1.3.105

terminal

part of the combustion circuit fitted external to the building which has the function of the air supply inlet and/or combustion products outlet of the appliance

3.1.3.106

fitting piece

device which allows the fitting of:



- a) the air supply and combustion products evacuation ducts to a single common duct for type C₂ boilers;
- b) the air supply and combustion products evacuation ducts to two ducts of a common duct system for type C₄, C₁₀ boilers and for type C₁₁ boiler modules;
- c) type C₆ boilers to a system for air supply and combustion products evacuation that is approved and marketed independently from the boiler;
- d) the combustion products evacuation duct to a chimney that is part of the building for type C₈ boilers;
- e) the air supply duct to a chimney that is part of the building for type C₉ boilers;
- f) type B₂ boilers to a system for combustion products evacuation that is approved and marketed independently from the boiler;
- g) the combustion products evacuation duct to a shared duct system for type B₃ boilers

3.1.3.107

terminal guard

device that protects the terminal from mechanical damage from outside influences

3.1.3.108

secondary flue

part of the flue of a type C₇ boiler between the draught diverter/air inlet in the roof space loft and the combustion products outlet above the roof

3.1.3.109

roof space loft

ventilated part of a building between the uppermost inhabitable space of the building and the roof

3.1.3.110

modular boiler

boiler consisting of an assembly of two or more generally identical modules, each of which consists of a heat exchanger, burner, control and safety devices

Note 1 to entry: The assembly has a single flue outlet and a common gas connection, common electricity supply connection and common flow and return water temperature connections. Each module is capable of independent operation.

3.1.3.111

combustion chamber

enclosure inside which combustion of the air-gas mixture takes place

3.1.3.112

completely surrounded combustion circuit

combustion circuit where the air supply circuit completely surrounds the combustion gas carrying part of the combustion circuit

3.1.3.113

separate combustion and air supply circuits

combustion circuit where the air supply circuit does not completely surround the combustion gas carrying part of the combustion circuit

3.1.3.114

flue outlet

part of the boiler through which the combustion products are evacuated to the flue system

3.1.3.115

combustion products circuit

circuit from the combustion chamber to the combustion products outlet of the appliance

3.1.3.116

protected combustion chamber

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



3.1.3.117

common duct

duct to which multiple boilers or boiler modules are connected

3.1.10.101

appliance

appliances' means appliances burning gaseous fuels used for cooking, heating, hot water production, refrigeration, lighting or washing and having, where applicable, a normal water temperature not exceeding 105 °C

Note 1 to entry Forced draught burners and heating bodies to be equipped with such burners also need to be considered as appliances.

Note 2 to entry This is a copy of the definition of appliance given in article (1) of the GAD 2009/142/EC.

3.1.10.102

boiler

appliance using gaseous fuel designed to heat water with the purpose of providing heat to a building (or portion of a building) from one point to multiple rooms using heat emitters such as radiators and convectors to transmit the heat from the water to the room

3.1.10.103

type C₍₁₀₎ boiler

type C appliance connected via its two ducts to a common duct system²⁾ which is designed for more than one appliance and which consists of two ducts connected to a terminal, which at the same time admits fresh air to the burner and discharges the products of combustion to the outside through orifices that are either concentric or close enough to come under similar wind conditions

Note 1 to entry: The C₍₁₀₎ appliance is designed to become connected to a common duct system that is designed to operate under the conditions where the static pressure in the common flue duct might exceed the static pressure in the common air duct.

3.1.10.104

type C₍₁₁₎ boiler

assembly of two or more generally identical boiler modules, connecting ducts, a common flue duct, a common air duct, where the static pressure in the flue ducts might exceed the static pressure in the air ducts and where the orifices of air duct and the flue duct to the outside are either concentric, or close enough to come under similar wind conditions

Note 1 to entry: A C₍₁₁₎ boiler is designed to be assembled by connecting its boiler modules via its connecting ducts to its common ducts. These common ducts consist of two ducts connected to their terminals, which at the same time admit fresh air to the burner of each boiler module, and discharges the products of combustion of each boiler module to the outside through orifices that are either concentric or close enough to come under similar wind conditions. The assembly has a single air inlet and a single flue outlet.

Note 2 to entry: The C₍₁₁₎ boiler is designed as a single appliance. The technical instructions specify how the various parts need to be assembled. The C₍₁₁₎ boiler is evaluated and certified under the GAD (in analogy with the types C₁, C₃, C₅).

Note 3 to entry: Each C₍₁₁₎ boiler module consists of a heat exchanger, burner, control and safety devices. Each C₍₁₁₎ boiler module has an independent gas connection, electricity supply connection and flow and return water connections. Each module is capable of independent operation.

Note 4 to entry: This definition is a modification of the definition of C₍₁₁₎ given in CEN/TR 1749:2014.

2) This common duct system is part of the building and not a part of the appliance.

3.1.12.101

nominal heat input for central heating

value of the heat input for the central heating function as declared in the technical instructions

Symbol: Q_{nh}

Unit: kilowatt (kW)

3.1.12.102

maximum nominal heat input

highest value of the maximum nominal heat input for central heating (Q_{nh}) and the nominal domestic hot water heat input (Q_{nw})

Symbol: $Q_{n,max}$

Unit: kilowatt (kW)

3.1.12.103

minimum adjustable heat input

minimum value to which the nominal heat input can be adjusted according to the technical instructions for boilers or boiler modules fitted with a range-rating device

Symbol: $Q_{min,a}$

Unit: kilowatt (kW)

3.1.12.104

minimum controlled heat input

minimum value of the heat input which is allowed by the control system for modulating boilers or boiler modules

Symbol: $Q_{min,c}$

Unit: kilowatt (kW)

3.1.12.105

minimum heat input allowed by the controls

lowest value of the minimum adjustable heat input $Q_{min,a}$ and the minimum controlled heat input $Q_{min,c}$

Symbol: Q_{min}

Unit: kilowatt (kW)

3.1.12.106

maximum safety pressure difference at maximum heat input

maximum pressure difference between combustion products outlet and air inlet for safety aspects, when all boilers or boiler modules (n) are running at maximum nominal heat input ($Q_{n,max}$), at a flue gas temperature of 25 °C

Symbol: $\Delta p_{max, saf(max)}$

Unit: Pascal (Pa)

3.1.12.107

maximum safety pressure difference at minimum heat input

maximum pressure difference between combustion products outlet and air inlet for safety aspects, when all boilers or boiler modules except one (n-1) are running at maximum nominal heat input ($Q_{n,max}$) and 1 appliance at the minimum heat input allowed by the controls (Q_{min}), at a flue gas temperature of 25 °C

Symbol: $\Delta p_{max, saf(min)}$

Unit: Pascal (Pa)

3.1.12.108

maximum safety pressure difference at start

maximum pressure difference between combustion products outlet and air inlet for safety aspects, when all boilers or boiler modules except one (n-1) are running at maximum nominal heat input ($Q_{n,max}$) and 1 appliance off, at a flue gas temperature of 25 °C

Symbol: $\Delta p_{max, saf(start)}$

Unit: Pascal (Pa)

3.1.12.109

maximum functional pressure difference at maximum heat input

maximum pressure difference between combustion products outlet and air inlet for functional aspects, when all boilers or boiler modules (n) are running at a mix of inputs created by heating function (Q_{nh}) and hot water function (Q_{nw}), at a flue gas temperature of 25 °C

Symbol: $\Delta p_{max, func(max)}$

Unit: Pascal (Pa)

3.1.12.110

minimum safety pressure difference

minimum (most negative) pressure difference between combustion products outlet and air inlet for safety aspects, at maximum flue gas temperature under most severe wind conditions

Symbol: $\Delta p_{min, saf}$

Unit: Pascal (Pa)

3.1.12.111

number of boilers or boiler modules connected to the common flue duct

total number of boilers or boiler modules connected to the common flue duct

Symbol: n

Unit: [-]



3.2 Symbols

Shall be according to EN 15502-1:2012+A1:2015 , 3.2.

4 Classification

Shall be according to EN 15502-1:2012+A1:2015 , Clause 4.

5 Construction

5.1 General

Shall be according to **EN 15502-1:2012+A1:2015**, 5.1 with the following addition:

Where the word boiler is used, it shall be read as the boiler including its connecting ducts, ducts and terminals, if any.

5.2 Conversion to different gases

Shall be according to **EN 15502-1:2012+A1:2015**, 5.2.

5.3 Materials

5.3.1 General

Shall be according to **EN 15502-1:2012+A1:2015**, 5.3.1 with the following addition:

If there is a risk of condensation in the combustion products circuit it shall comprise materials which comply with the requirements of **EN 15502-1:2012+A1:2015**, 5.4.13.1. Other materials may be used when evidence is provided of their suitability for conditions in which condensation can occur.

5.3.2 Materials and thicknesses of walls or tubes with water side operating pressure for boilers of pressure class-3

Shall be according to **EN 15502-1:2012+A1:2015**, 5.3.2.

5.3.3 Domestic water connections

Shall be according to **EN 15502-1:2012+A1:2015**, 5.3.3.

5.3.4 Thermal insulation

Shall be according to **EN 15502-1:2012+A1:2015**, 5.3.4.

5.3.101 Durability against corrosion of metallic combustion product circuits

The durability against corrosion of the combustion product circuit is demonstrated by fulfilling either:

- a) the requirements in Table 101, or
- b) a corrosion test method from normative Annex A of EN 1856-1:2009.

Table 101 — Metallic combustion products circuit material specifications

Material	Symbol	Minimum Nominal Thickness non- condensing ^b mm	Minimum nominal Thickness condensing ^b mm
EN 573-1 Aluminium designation			
EN AW – 4047A	EN AW Al Si 12 (A), and CU <0,1 %, Zn<0,15 % (cast aluminium)	0,5	1,5
EN AW – 1200A	EN AW-AL 99,0 (A)	0,5	1,5
EN AW-6060	EN AW-Al MgSi	0,5	1,5
EN 10088-1 Steel number	EN 10088-1 Steel name		
1.4401	X5CrNiMo 17-12-2	0,4	0,4
1.4404 ^a	X2CrNiMo 17-12-2	0,4	0,4
1.4432	X2CrNiMo 17-12-3	0,4	0,4
1.4539	X1NiCrMoCu 25-20-5	0,4	0,4
1.4401	X5CrNiMo 17-12-2	0,11 ^c	0,11 ^c
1.4404 ^a	X2CrNiMo 17-12-2	0,11 ^c	0,11 ^c
1.4432	X2CrNiMo 17-12-3	0,11 ^c	0,11 ^c
1.4539	X1NiCrMoCu 25-20-5	0,11 ^c	0,11 ^c
^a Equivalent for material N° 1.4404 = 1.4571 (symbol X6CrNiMoTi 17-12-2). ^b The condensing column shall be used if, under normal operation conditions, condensate is produced in the combustion products circuit (according to 3.1.3.8). ^c Flexible liners (when installed in an existing chimney).			

The actual minimum thickness of the materials shall always be greater than 90 % of the minimum nominal thicknesses.

5.4 Method of construction

5.4.1 Design

Shall be according to [A1] EN 15502-1:2012+A1:2015 [A1], 5.4.1.

5.4.2 Checking the state of operation

Shall be according to [A1] EN 15502-1:2012+A1:2015 [A1], 5.4.2.

5.4.3 Use and servicing

Shall be according to **A1** EN 15502-1:2012+A1:2015 **A1**, 5.4.3.

5.4.4 Connections to the gas and water pipes

Shall be according to **A1** EN 15502-1:2012+A1:2015 **A1**, 5.4.4.

5.4.5 Soundness

Shall be according to **A1** EN 15502-1:2012+A1:2015 **A1**, 5.4.5.

5.4.6 Supply of combustion air and evacuation of the combustion products

A1 EN 15502-1:2012+A1:2015 **A1**, 5.4.6 is replaced by the following:

5.4.6.101 General

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

Fan assisted boilers may be fitted with a means of adjustment in the combustion circuit intended to adapt the boiler to the pressure losses in the installed ducts either by restrictors or by setting the means of adjustment to predetermined positions in accordance with the installation instruction.

A1 The technical instructions specify the parts needed to assemble the appliance type, and how to assemble these parts. The boiler is the assembly of the parts needed (such as: ducts, terminal, terminal guard, fitting piece, etc). according to the technical instructions. **A1**

5.4.6.102 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 boiler.

It shall be possible to connect the boiler, the air supply and combustion products evacuation ducts and the terminal or fitting piece using ordinary tools if necessary. **A1** deleted text **A1**

The terminal inlets/outlets from separate combustion and air supply circuits for the supply of combustion air and the evacuation of combustion products:

- a) shall fit inside a square of 50 x 50 cm for type C₁ and C₃ boilers, for boilers up to 70 kW;
- b) shall fit inside a square of 100 x 100 cm for type C₁ and C₃ boilers, for boilers above 70 kW;
- c) may terminate in zones of different pressure for type C₅ boilers, but not on different walls of the building.

5.4.6.103 Terminal

Terminals on appliances without a fan should prevent the intrusion of external objects by having no opening in the external surfaces of the terminal which shall permit the entry of a 16 mm diameter ball when applied with a force of 5 N.

Any horizontal terminal for non-condensing boilers shall be designed in such a way that any condensate which may form is discharged away from the surface of the wall to which the terminal is fitted.

Any horizontal terminal for condensing boilers shall be designed in such a way that condensate is directed towards the appliance.

5.4.6.104 Terminal guard

ⓘ If the technical instructions prescribe a protective guard for the terminal for use when the outlet for evacuation of the combustion products open on to a walkway, this device shall be used during testing. ⓘ

The dimensions of the terminal guard, when installed in accordance with the installation 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.

5.4.6.105 Fitting piece

For boilers of types C₂, C₄ and C₈, the fitting piece shall be so designed that it is possible to connect the appliance to the common duct.

5.4.7 Dampers

ⓘ EN 15502-1:2012+A1:2015 ⓘ, 5.4.7 is not applicable.

5.4.8 Air proving

ⓘ EN 15502-1:2012+A1:2015 ⓘ, 5.4.8 is replaced by the following:

Boilers with fans shall be fitted with a system for air proving.

Except for boilers with gas/air ratio controls, before each fan start it shall be checked that there is no simulation of air flow in the absence of air flow.

The system for supervision of the combustion air rate or combustion products rate is activated directly by the flow of combustion air or combustion products. This is also valid for boilers with more than one fan speed in which the flows associated with each fan speed are monitored.

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

- a) gas /air ratio controls;
- b) continuous supervision of the combustion air rate or combustion products rate;
- c) start up supervision of the combustion air rate or combustion products rate provided that:
 - 1) The combustion products circuit is completely surrounded by the air supply circuit, or the leakage rate of the combustion products circuit meets the requirements of 8.2.2.102.2 and
 - 2) There is a shutdown at least every 24 h³⁾ and
 - 3) There is an indirect system for air proving (e.g. fan speed supervision) during operation.

3) Some boilers will be used in a way that it is very likely they will shut down at least once per 24 h without having a specific function to ensure this.

5.4.9 Gas/air ratio controls

Shall be according to [A1] EN 15502-1:2012+A1:2015 [A1], 5.4.9 with the following addition: If the installation instructions state (see 12.2.1.2) that the gas/air ratio control settings are not intended to be adjustable by a gas operative during installation, appliance service or when the gas valve is replaced then the appliance shall incorporate additional provisions to discourage unauthorised interference with the gas/air ratio control settings.

The following examples are considered to be suitable additional provisions:

- a) physical removal of the adjustment screws (or other method of rendering these inoperative);
- b) physically preventing access to the adjustment screws (e.g. filling access holes);
- c) addition of a suitably worded warning label affixed to the gas valve and/or in close proximity to the adjuster screws; this label shall be clearly visible to any gas operative whilst gaining access to the adjuster screws.

NOTE 1 Gas/air ratio controls typically have two adjustments ("throttle" and "offset") and the requirements of this clause apply to both.

If the appliance installation instructions indicate that the valve can be adjusted, by a suitably qualified gas operative using appropriate instruments, a provision shall be made to indicate that the valve setting has been changed.

NOTE 2 An example of a suitable provision is to use a paint spot on the adjusting device.

The appliance installations shall include instructions on how the settings shall be checked if, at the time of installation or service, there is an indication that the gas/air ratio control settings have been altered. The appliance installation instructions shall indicate the action to be taken if the settings are found to be incorrect.

If the appliance installation instructions allow the gas/air ratio controls to be adjusted then the method for adjustment shall be described.

5.4.10 Fan

Shall be according to [A1] EN 15502-1:2012+A1:2015 [A1], 5.4.10.

5.4.11 Drainage

Shall be according to [A1] EN 15502-1:2012+A1:2015 [A1], 5.4.11.

5.4.12 Operational safety in the event of failure of the auxiliary energy

Shall be according to [A1] EN 15502-1:2012+A1:2015 [A1], 5.4.12.

5.4.13 Special provision for Low Temperature Boilers and Condensing Boilers

This subclause of Part 1 applies but with the following changes:

5.4.13.1 Materials in contact with condensate

Shall be according to [A1] EN 15502-1:2012+A1:2015 [A1], 5.4.13.1

5.4.13.2 Discharge of condensate

[A1] EN 15502-1:2012+A1:2015 [A1], 5.4.13.2 is replaced by the following:

Requirements

Condensing boilers shall be fitted with a condensate discharge system of corrosion-resistant material or covered by a durable protection against corrosion.

Ⓐ Where disposal of condensate from the boiler is by gravity the internal diameter of the condensate discharge connection shall be at least 13 mm. If the boiler incorporates some form of pump assisted condensate disposal the size of the discharge from the boiler and connection to any point of gravity discharge shall be specified in the technical instructions. The disposal system, forming part of the boiler or supplied with the boiler, shall be such that:

- a) it can be easily inspected and cleaned in accordance with the technical instructions; and Ⓐ
- b) it cannot transmit combustion products into the room where the boiler is installed; this requirement is met if the disposal system incorporates a water trap.

The water trap shall meet 2 requirements:

- 1) The water trap should have a seal of at least 25 mm water column.
- 2) The functional operation of the water trap will be tested under the blockage tests b) of 8.11.101.2 or 8.11.101.3.2. In that condition there shall be no leakage of combustion products into the room where the boiler is installed.

Surfaces in contact with condensates (except purpose provided drains, water traps and siphons) shall be designed to prevent condensate retention.

It shall be possible to service and clean the system easily. There may be a common condensate drain for flue gas exhaust and the condensing boiler.

Test conditions

By measurements, visual inspection or manual tests it is checked whether the requirements for the condensate discharge are fulfilled.

5.4.13.3 Control of the combustion products temperature

Shall be according to Ⓐ EN 15502-1:2012+A1:2015 Ⓐ, 5.4.13.3.

5.4.13.4 Chemical composition of the condensate

Shall be according to Ⓐ EN 15502-1:2012+A1:2015 Ⓐ, 5.4.13.4.

5.5 Burners

Shall be according to Ⓐ EN 15502-1:2012+A1:2015 Ⓐ, 5.5.

5.6 Pressure test points

Shall be according to Ⓐ EN 15502-1:2012+A1:2015 Ⓐ, 5.6.

5.7 Requirements for the application of control and safety devices

5.7.1 General

Shall be according to Ⓐ EN 15502-1:2012+A1:2015 Ⓐ, 5.7.1

5.7.2 Adjusters and range-rating devices

Shall be according to Ⓐ EN 15502-1:2012+A1:2015 Ⓐ, 5.7.2.

5.7.3 Gas circuit

Shall be according to  EN 15502-1:2012+A1:2015 , 5.7.3.

5.7.4 Gas pressure regulator

Shall be according to  EN 15502-1:2012+A1:2015 , 5.7.4.

5.7.5 Ignition devices

Shall be according to  EN 15502-1:2012+A1:2015 , 5.7.5.

5.7.6 Flame supervision devices

5.7.6.1 General

Shall be according to  EN 15502-1:2012+A1:2015 , 5.7.6.1.

5.7.6.2 Thermoelectric flame supervision device

Shall be according to  EN 15502-1:2012+A1:2015 , 5.7.6.2 with the following addition:

It is permitted to use a burner ≤ 150 kW using a thermoelectric flame supervision device provided that the additional heat input is supervised by an automatic burner control system (see 8.11.6.2).

5.7.6.3 Automatic burner control system

Shall be according to  EN 15502-1:2012+A1:2015 , 5.7.6.3.

5.7.7 Gas/air ratio controls

Shall be according to  EN 15502-1:2012+A1:2015 , 5.7.7.

5.7.8 Thermostats and water temperature limiting devices

Shall be according to  EN 15502-1:2012+A1:2015 , 5.7.8.

5.7.9 Remote control

Shall be according to  EN 15502-1:2012+A1:2015 , 5.7.9.

5.7.10 Expansion vessel and pressure gauge

Shall be according to  EN 15502-1:2012+A1:2015 , 5.7.10.

5.7.11 Protection against frost for boilers intended to be installed in a partially protected place

Shall be according to  EN 15502-1:2012+A1:2015 , 5.7.11.

5.7.12 Adjusting, control and safety devices for the domestic hot water circuit

Shall be according to  EN 15502-1:2012+A1:2015 , 5.7.12.

5.101 Additional requirements for modular boilers

Each module shall be fitted with its own control system and automatic valves, including flame safeguard equipment, control thermostat and safety temperature limiter. The requirements in relation to control and safety devices depend on the nominal heat input (Q_n) of the module.

Where it is possible to close off the water flow to individual modules, it shall not be possible to operate the isolated module(s) if this could result in a hazardous condition.

5.102 **[A1]** Additional requirements for non-return valves in type C₍₁₀₎ boilers and C₍₁₁₎ boiler modules

Requirements:

- 1) A non-return valve shall be applied;
- 2) Each C₍₁₀₎ boiler shall contain a non-return valve.

Each C₍₁₁₎ boiler module shall contain a non-return valve. **[A1]**

6 Electrical safety

Shall be according to **[A1]** EN 15502-1:2012+A1:2015 **[A1]**, Clause 6.

7 Controls

Shall be according to **[A1]** EN 15502-1:2012+A1:2015 **[A1]**, Clause 7.

8 Operational requirements

8.1 General

Shall be according to **[A1]** EN 15502-1:2012+A1:2015 **[A1]**, 8.1.

8.1.1 Characteristics of the reference and limit gases

Shall be according to **[A1]** EN 15502-1:2012+A1:2015 **[A1]**, 8.1.1.

8.1.2 General test conditions

8.1.2.1 Installation of the boiler

Shall be according to **[A1]** EN 15502-1:2012+A1:2015 **[A1]**, 8.1.2.1 with the following addition:

Sampling probes are positioned so as to obtain a representative sample of the combustion products.

The sample of the combustion products is taken in the plane perpendicular to the direction of flow of the combustion products, and at a distance L from the extreme end of the combustion products duct (see probe examples in Figures 101, 102, 103 or 104):

- a) for circular ducts: $L = D_i$
- b) for rectangular ducts: $L = 4 S / C$

where:

D_i is the internal diameter of the combustion products evacuation duct, in mm;

S is the cross-sectional area of this duct, in mm²;

C is the circumference of this duct, in mm.

Except where otherwise stated, the requirements are checked under the following test conditions.

— Installation of type C boilers and type B boilers with a fan

Ⓐ Except where otherwise stated, the boiler is connected to the shortest ducts with the smallest pressure loss stated in the technical instructions. Ⓐ If necessary, an external duct may be sealed in accordance with the installation instructions. The terminal guard is not fitted.

Type C₁, C₃, and C₅ boilers are tested with their terminals fitted. Type C₁ boilers are tested with a duct suitable for a wall with a thickness of 300 mm.

Ⓐ Type C₂, C₄, C₈, and C₍₁₀₎ boilers are tested with their fitting pieces fitted but not connected to a test duct. Ⓐ

Type C₆ boilers are fitted with restrictors enabling the minimum and maximum duct pressure losses specified by the installation instructions to be simulated.

Type C₇ boilers are tested with 1 m of vertical secondary flue.

Type C₉ boilers are tested with the minimum diameter / cross section area of the vertical duct supplying the combustion air as specified by the installation instructions.

— Installation of type B boilers

For all the tests, except where otherwise stated in the particular clauses, the boiler is installed and used under the conditions specified in the installation instructions.

Ⓐ Except where otherwise stated, type B₅ boilers are connected to the shortest ducts with the smallest pressure loss stated in the technical instructions. Ⓐ Ⓐ The internal diameter of the test flue shall be equal to the smallest diameter stated the technical instructions. Ⓐ The thickness of the flue is less than 1 mm.

If the diameter of the boiler flue outlet does not correspond to the external diameter in local use, a linking piece of thickness 1 mm is used to adapt the flue outlet diameter to the diameter of the test flue.

The height of the flue is measured:

- c) for a boiler having a flue outlet with a horizontal axis, from this axis;
- d) for a boiler having a flue outlet with a vertical axis, from the plane of the flue outlet.

The combustion products are sampled at a point in the flue 0,2 m from the top, using the probe shown in Figures 103 or 104.

Type B₅ boilers are fitted with their ducts and terminals. The terminal guard is not fitted. Except where otherwise stated, type B₅ boilers are connected to the shortest ducts with the smallest pressure loss stated by the manufacturer in the installation instructions. If necessary, an external duct may be sealed in accordance with the installation instructions.

8.1.2.2 Gas circuit

Shall be according to Ⓐ EN 15502-1:2012+A1:2015 Ⓐ, 8.1.2.2.

8.1.2.3 Conduct of the test to obtain a heat input

Shall be according to Ⓐ EN 15502-1:2012+A1:2015 Ⓐ, 8.1.2.3.

8.1.2.4 Water circuit

Shall be according to Ⓐ EN 15502-1:2012+A1:2015 Ⓐ, 8.1.2.4.

8.1.2.5 Thermal equilibrium

Shall be according to $\langle A_1 \rangle$ EN 15502-1:2012+A1:2015 $\langle A_1 \rangle$, 8.1.2.5.

8.1.2.6 General test conditions for combination boilers

Shall be according to $\langle A_1 \rangle$ EN 15502-1:2012+A1:2015 $\langle A_1 \rangle$, 8.1.2.6.

8.1.2.7 Electrical supply

Shall be according to $\langle A_1 \rangle$ EN 15502-1:2012+A1:2015 $\langle A_1 \rangle$, 8.1.2.7.

8.1.2.8 Tolerances of measurements

Shall be according to $\langle A_1 \rangle$ EN 15502-1:2012+A1:2015 $\langle A_1 \rangle$, 8.1.2.8.

$\langle A_1 \rangle$

8.1.2.101 Maximum pressure differences at different operational situations for type C₍₁₀₎ boilers

For safety aspects the maximum nominal heat input ($Q_{n,max}$) is taken into account unless otherwise stated.

The design documentation shall declare:

- a) the maximum safety pressure difference at minimum heat input is ($\Delta p_{max, saf(min)}$) 25 Pa;
- b) the maximum safety pressure difference at maximum heat is $\Delta p_{max, saf(max)} = (2/(1+m))^{2,2} * (\Delta p_{max, saf(min)})$ with $m=Q_{min}/Q_{n,max}$;
- c) The maximum safety pressure difference at start : $\Delta p_{max, saf(start)} = \Delta p_{max, saf(min)}$;
- d) The maximum functional pressure difference at maximum heat input is considered equal the maximum safety pressure difference ($\Delta p_{max, func(max)} = \Delta p_{max, saf(max)}$), and
- e) The minimum safety pressure difference ($\Delta p_{min, saf}$) is stated as -200 Pa.

The stated maximum pressure difference is the maximum value of the pressure differences between the combustion products outlet and air inlet at the end of the fitting pieces where these are connected to the common duct system.

8.1.2.102 Maximum pressure differences at different operational situations for type C₍₁₁₎ boilers

8.1.2.102.1 General

For safety aspects the maximum nominal heat input ($Q_{n,max}$) of each individual boiler module is taken into account unless otherwise stated.

The design documentation shall declare:

- a) the maximum safety pressure difference at maximum heat (input ($\Delta p_{max, saf(max)}$));
- b) the maximum safety pressure difference at minimum heat input is ($\Delta p_{max, saf(min)}$) 25 Pa;
- c) the maximum safety pressure difference at start : $\Delta p_{max, saf(start)}$;
- d) the maximum functional pressure difference at maximum heat input $\Delta p_{max, func(max)}$, and

e) the minimum safety pressure difference ($\Delta p_{\min, \text{saf}}$) equal or less to the suction.

The to be declared maximum pressure difference is the maximum value of the pressure differences between the combustion products outlet and air inlet at the end of the fitting pieces where these are connected to the common duct system.

8.1.2.102.2 Conditions for determination of the maximum safety pressure

For safety aspects the maximum applicable maximum nominal heat inputs ($Q_{n, \max}$) of each individual boiler module is taken into account.

When n-1 boiler modules are running, all applicable operational circumstances shall be taken into account.

For example: n=4 and $\Delta p_{\max, \text{saf}(\text{start})}$ shall be declared.

In this situation there are 4 operational circumstances, namely or the boiler module at the stock, or the first floor, or the second floor or third floor is off or on minimum input.

The pressure differences between the combustion products inlet to and air outlet from the common duct system shall be determined for the boiler module which is in minimum input or not running for all four operational circumstances. The maximum of the four determined pressure differences is applicable.

When a boiler contains more than 5 boiler modules a simple approach can be the following. Make a calculation with n boiler modules running on maximal load. Determine the boiler module with the maximal pressure ($\Delta p_{\max, \text{saf}(\max)}$). Do the calculation again with this boiler module on minimum heat input at 25 Pa ($\Delta p_{\max, \text{saf}(\min)}$). Do the calculation again with this boiler module shut down ($\Delta p_{\max, \text{saf}(\text{start})}$).

8.1.2.102.3 Conditions for determination of the maximum functional pressure

The functional operation is defined as the situation in which:

For combination boiler modules the maximum fraction of nominal heat input for domestic hot water production (Q_{nw}) for the number of n boiler modules connected to the common duct system is:

$$f(DHW) = \frac{\sqrt{2,5 \times n}}{n}; \text{ with a maximum of } 1,0.$$

- The number of boiler modules running and producing domestic hot water based on n boiler modules connected to the common duct system are:

$$n(DHW) = f(DHW) \times n \text{ round off upwards.}$$

- The number of boiler modules running and producing hot water for central heating based on n boiler modules connected to the common duct system are:

$$n(CH) = n - n(DHW)$$

For central heating boiler modules without domestic hot water production no fraction is used.

For combination boiler modules, the boiler modules running in central heating mode and boiler modules running in domestic hot water mode are proportional divided. The lowest positioned boiler module is always in domestic hot water mode.

8.1.2.102.4 Example for calculation of heat inputs

For both 8.1.2.102.2 and 8.1.2.102.3 an example for calculating the heat inputs at which the pressure differences between the combustion products inlet to and air outlet from the common duct system is given in Annex XD.



8.2 Soundness

8.2.1 Soundness of the gas circuit

Shall be according to EN 15502-1:2012+A1:2015 , 8.2.1.

8.2.2 Soundness of the combustion circuit

No requirements in EN 15502-1:2012+A1:2015 , 8.2.2.

8.2.2.101 General

Requirements

Boilers and/or their ducts shall be sound in accordance with 8.2.2.102 or 8.2.2.103. Ducts that are part of the boiler shall be sound in accordance with 8.2.2.102.3, 8.2.2.102.4 and 8.2.2.102.5.

Soundness is verified before and after all the tests of this standard, except the tests specified in the mechanical tests.

All the joints identified in the installation instructions shall be checked, for example between:

- a) the boiler and its ducts;
- b) interconnecting ducts;
- c) the ducts and any bends and;
- d) the ducts and any fitting piece or terminal.

In the case where leakage can also occur along the length of the ducts, the tests are also carried out with the maximum length of ducts as specified in the technical instructions.

In accordance with the installation instructions, the wall connections, the joint with the terminal or the joint with the fitting piece with another system of combustion products evacuation may be made sound.

8.2.2.102 Soundness of the air supply and combustion product circuit type C boilers

8.2.2.102.1 Air supply and combustion product circuit

Requirements

Soundness with respect to the room where the boiler is installed is ensured if, under the specified test conditions, the leakage rates do not exceed the values in Table 102.

Table 102 — Maximum admissible leakage rates

Test object	Surrounding of the combustion products circuit by the combustion air circuit	Maximum leakage rate for $Q_n \leq 40$ kW m ³ /h	Maximum leakage rate for $Q_n > 40$ kW m ³ /h
Boiler with its air supply and combustion products evacuation ducts and all their joints	Completely not completely	5 1	$5Q_n/40$ $Q_n/40$
Boiler and the joints to the air supply and combustion products evacuation ducts	Completely not completely	3 0,6	$3 Q_n/40$ $0,6 Q_n/40$
combustion products evacuation ducts, not completely surrounded by combustion air, with all its joints excluding the joints tested above		0,4	$0,4 Q_n/40$
Air supply duct with all its joints excluding the joints tested above		2	$2 Q_n/40$

Test Methods

The test can be carried out either separately on the boiler body and on the ducts, or on the boiler assembled with its ducts.

The combustion circuit of the test object in accordance with Table 102 is connected to a pressure source on one side and blocked on the other side.

The test pressure (difference) is 0,5 mbar unless otherwise stated.

For boilers with a fan where the combustion products circuit is not completely surrounded by the combustion air circuit, the test is also carried out on the part of the combustion circuit downstream of the fan, with a test pressure which is increased by the highest pressure between the combustion circuit, in the envelope of the boiler or the ducts, and the atmosphere, measured with the boiler in thermal equilibrium at nominal heat input and fitted with the longest ducts specified in the installation instructions.

ⓘ For boilers with non-return valves like C₍₁₀₎ and C₍₁₁₎ the non-return valve shall be open during the test. ⓘ

8.2.2.102.2 Requirements for combustion products evacuation duct for appliances with indirect air proving

Requirements

The soundness of the combustion products evacuation duct for installation both inside and outside the room where the boiler is installed, permitted for alternative control systems, is ensured if, under the test conditions, the leakage rate per surface area of the duct does not exceed 0,006 dm³/s·m².