

STN	Vykurovacie kotly na plynné palivá Časť 1: Všeobecné požiadavky a skúšky	STN EN 15502-1+A1 07 0253
------------	---	---

Gas-fired heating boilers - Part 1: General requirements and tests

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 05/24

Obsahuje: EN 15502-1:2021+A1:2023

Oznámením tejto normy sa ruší
STN EN 15502-1 (07 0253) z februára 2022

138659



Úrad pre normalizáciu, metrológiu a skúšobníctvo Slovenskej republiky, 2024
Slovenská technická norma a technická normalizačná informácia je chránená zákonom č. 60/2018 Z. z. o technickej normalizácii v znení neskorších predpisov.

EUROPEAN STANDARD

EN 15502-1:2021+A1

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2023

ICS 27.060.30; 91.140.10

Supersedes EN 15502-1:2021

English Version

Gas-fired heating boilers - Part 1: General requirements and tests

Chaudières de chauffage central utilisant les
combustibles gazeux - Partie 1: Exigences générales et
essais

Heizkessel für gasförmige Brennstoffe - Teil 1:
Allgemeine Anforderungen und Prüfungen

This European Standard was approved by CEN on 25 July 2021 and includes Corrigendum 1 issued by CEN on 7 September 2022 and Amendment approved by CEN on 11 October 2023.

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.

CEN members are the national standards bodies of 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN 15502-1:2021+A1:2023 (E)

Contents	Page
European foreword.....	9
Introduction	11
1 Scope.....	12
2 Normative references.....	13
3 Terms, definitions and symbols.....	15
4 Classification.....	36
4.1 Gases and categories	36
4.2 Mode of air supply and evacuation of the combustion products	36
4.3 Maximum water-side operating pressure.....	36
5 Construction	36
5.1 General	36
5.1.1 General requirements	36
5.1.2 General verification	37
5.2 Conversion to different gases.....	37
5.3 Materials.....	37
5.3.1 General.....	37
5.3.2 Materials and thicknesses of walls or tubes with water side operating pressure for boilers of pressure class-3	38
5.3.3 Domestic water connections	39
5.3.4 Thermal Insulation	39
5.3.5 Materials in contact with water for human consumption	39
5.3.6 Durability against corrosion of metallic combustion product circuits.....	40
5.4 Method of construction	41
5.4.1 Design	41
5.4.2 Checking the state of operation.....	42
5.4.3 Use and servicing.....	42
5.4.4 Connections to the gas and water pipes.....	43
5.4.5 Soundness	43
5.4.6 Supply of combustion air and evacuation of the combustion products	44
5.4.7 Dampers.....	44
5.4.8 Air proving.....	44
5.4.9 Gas/air ratio controls	45
5.4.10 Fan	46

5.4.11 Drainage	46
5.4.12 Operational safety in the event of failure of the auxiliary energy	46
5.4.13 Special provision for Low Temperature Boilers and Condensing Boilers	46
5.5 Burners	47
5.6 Pressure test points	48
5.7 Requirements for the application of control and safety devices	48
5.7.1 General	48
5.7.2 Adjusters and range-rating devices	48
5.7.3 Gas circuit	49
5.7.4 Gas pressure regulator	50
5.7.5 Ignition devices	51
5.7.6 Flame supervision devices	51
5.7.7 Gas/air ratio control tubes	52
5.7.8 Thermostats and water flow temperature limiting devices	52
5.7.9 Remote control	53
5.7.10 Expansion vessel and pressure gauge	54
5.7.11 Protection against frost for boilers intended to be installed in a partially protected place 54	54
5.7.12 Adjusting, control and safety devices for the domestic hot water circuit	55
6 Electrical and electromagnetic safety	55
7 Controls	55
7.1 General	55
7.2 Detailed specifications	56
7.2.1 Control and safety devices	56
7.2.2 Valves used in boilers	56
7.2.3 Not relevant aspects for controls tested in combination with the boiler	56
7.2.4 Relevant aspects for controls tested in combination with the boiler	57
7.3 Thermostats and flow temperature limiting devices	57
7.3.1 General	57
7.3.2 Construction requirements	58
7.3.3 Performance	59
8 Operational requirements	61
8.1 General	61
8.1.1 Characteristics of the reference and limit gases	61
8.1.2 General test conditions	62

EN 15502-1:2021+A1:2023 (E)

8.2	Soundness	66
8.2.1	Soundness of the gas circuit	66
8.2.2	Soundness of the combustion circuit	67
8.2.3	Soundness of the water circuit	67
8.2.4	Soundness of the domestic water circuit	68
8.3	Hydraulic resistance.....	68
8.3.1	Requirements	68
8.3.2	Test conditions.....	68
8.4	Heat inputs and heat output.....	69
8.4.1	Determination of the nominal heat input or the maximum and minimum heat input	69
8.4.2	Adjustment of the heat input by the downstream gas pressure	71
8.4.3	Ignition rate.....	71
8.4.4	Nominal output	71
8.4.5	Verification of the nominal condensing output.....	71
8.4.6	Nominal domestic hot water heat input.....	72
8.4.7	Water pressure to obtain the nominal heat input for instantaneous combination boilers	72
8.4.8	Obtaining the domestic hot water temperature for instantaneous combination boilers	72
8.4.9	Heating-up time of the domestic hot water	73
8.5	Limiting temperatures.....	73
8.5.1	General.....	73
8.5.2	Limiting temperatures of the adjusting, control and safety devices	73
8.5.3	Limiting temperatures of the side walls, the front and the top	74
8.5.4	Limiting temperature of the test panels and the floor.....	74
8.6	Ignition, cross lighting, flame stability	75
8.6.1	General	75
8.6.2	Limit conditions	75
8.6.3	Special flue conditions.....	76
8.6.4	Reduction of the gas rate of the ignition burner	77
8.7	Reduction of the gas pressure.....	77
8.7.1	Requirements	77
8.7.2	Test conditions	77
8.8	Defective closure of the gas valve immediately upstream of the main burner.....	77
8.8.1	Requirements	77
8.8.2	Test conditions	78

8.9	Pre-purge	78
8.10	Functioning of a permanent ignition burner when the fan stops during the standby time 78	
8.10.1	Requirements	78
8.10.2	Test conditions	78
8.11	Adjustment, control and safety devices	78
8.11.1	Requirement	78
8.11.2	Test method for determining the operating temperature range	78
8.11.3	Combination Boilers	79
8.11.4	Control devices	82
8.11.5	Ignition devices	82
8.11.6	Flame supervision device	84
8.11.7	Gas pressure regulator	87
8.11.8	Thermostats and flow temperature limiting devices	88
8.12	Carbon monoxide	90
8.12.1	General	90
8.12.2	Limit conditions	92
8.12.3	Special conditions	92
8.12.4	Sooting	93
8.12.5	Condensate discharge blockage test	94
8.13	NO_x	94
8.13.1	Requirement	94
8.13.2	Test methods	95
8.13.3	Calculation of emissions of NO_x in mg/kWh based on GCV	97
8.14	Special provisions for boilers intended to be installed in a partially protected place	98
8.14.1	Frost protection system for boilers intended to be installed in a partially protected place 98	
8.14.2	Protection against the ingress of rain	98
8.15	Formation of condensate	98
8.15.1	Requirements	98
8.15.2	Test conditions	98
8.16	Temperature of combustion products	99
8.16.1	Requirements	99
8.16.2	Test conditions	99
8.17	Sound power level L_{WA}	99
9	Useful efficiencies	99

EN 15502-1:2021+A1:2023 (E)

9.1	General	99
9.1.1	Correction of measured efficiency to reference conditions	99
9.1.2	Use of the general test conditions	100
9.2	Useful efficiency at the nominal heat input	100
9.2.1	Requirements	100
9.2.2	Tests	100
9.3	Useful efficiency at part load	102
9.3.1	Requirements	102
9.3.2	Tests	102
9.4	Heat output, Seasonal energy efficiency and energy consumption	109
9.4.1	Rated heat output (P_{rated} and P_4)	109
9.4.2	Useful heat output at 30% of rated heat output and low-temperature regime (P_1)	109
9.4.3	Useful efficiency (GCV) at rated heat output and high-temperature regime (η_4)	109
9.4.4	Useful efficiency (GCV) at 30% of rated heat output and low-temperature regime (η_1)	110
9.4.5	Ignition burner power consumption (GCV) (P_{ign})	110
9.4.6	Calculation of the seasonal space heating energy efficiency (η_s)	110
9.4.7	Calculation of the annual energy consumption for space heating (Q_{HE}) (GCV)	112
9.4.8	Water heating energy efficiency and energy consumption of combination boilers for water heating mode	112
10	Electric auxiliary energy	113
10.1	Auxiliary energy consumption	113
10.1.1	General	113
10.1.2	System boundaries	113
10.1.3	Auxiliary energy at nominal heat input	113
10.1.4	Auxiliary energy at part load	114
10.1.5	Auxiliary energy at stand-by	114
10.2	Auxiliary electricity consumption measurements required for eco-design and labelling regulations	114
10.2.1	General	114
10.2.2	System boundaries	114
10.2.3	Auxiliary electricity consumption [kW] at nominal heat input	115
10.2.4	Auxiliary electricity consumption at part load [kW]	115
10.2.5	Auxiliary electricity consumption at stand by [kW]	115
11	Risk assessment	115
12	Marking and instructions	116

12.1 Boiler marking	116
12.1.1 Data plate	116
12.1.2 Markings related to the state of adjustment	117
12.1.3 Packaging	117
12.1.4 Warnings notices on the boiler and the packaging	117
12.1.5 Other information	118
12.2 Instructions	119
12.2.1 Instructions for installation	119
12.2.2 Instructions for use and servicing	124
12.2.3 Conversion instructions	124
12.3 Presentation	125
Annex A (normative) Properties of carbon and stainless steels	133
Annex B (normative) Minimum requirements for cast iron	134
Annex C (normative) Parts in aluminium and aluminium alloys	135
Annex D (normative) Parts in copper or copper alloys	136
Annex E (normative) Minimum thicknesses for rolled parts	137
Annex F (normative) Nominal minimum thicknesses of boiler sections of cast materials under water pressure	138
Annex G (normative) Parameters for welded joints and welding processes	139
Annex H (informative) Examples of the composition of the gas circuit according to 5.7.3.2	144
Annex I (informative) Compilation of the test conditions for the various gas families ..	153
Annex J (normative) Calculation of conversions of NO_x	155
Annex K (informative) Example of calculation of the weighting factors NO_x	157
Annex L (informative) Practical method of calibrating the test rig to enable the heat loss D_p to be determined	159
Annex M (informative) Means of determining the ignition time at full rate	160
Annex N (informative) Determination of the heat losses from the test rig of the indirect method and the contributions of the circulating pump of the test rig	161
Annex O (informative) Example of a risk assessment method	162
Annex P (informative) Examples of risk assessment with a method described in Annex O	165
Annex Q (informative) Realisation of a protective measure	170
Annex R (informative) Overall classification of a basic risk	172
Annex S (informative) Not exhaustive list of classification examples	175
Annex T (normative) Correction for the determined efficiency in the low water temperature test of low temperature boilers (LTB) and condensing boilers (CB)	178
Annex U (normative) Use of test gases	180
Annex V (informative) Alternative method for heat output as enthalpy difference	181

EN 15502-1:2021+A1:2023 (E)

Annex AA (informative) Product Information related to Eco-design Regulation and Labelling Regulation.....	184
Annex AB (informative) Variations in gas quality.....	188
Annex AC (normative) Non-exhaustive list of materials used in contact with drinking water	193
Annex ZA (informative) Left empty on purpose.....	195
Annex ZB (informative) Clauses of this European Standard addressing the methods for the verification of the efficiency of the EU Directive 92/42/EEC, relating to the efficiency of new hot boilers with an output of 4 - 400 kW	196
Annex ZC (informative) Relationship between this European Standard and the ecodesign requirements of Commission Regulation (EU) No 813/2013 L 239/136 aimed to be covered	197
Annex ZD (informative) Relationship between this European Standard and the energy labelling requirements of Commission Delegated Regulation (EU) No 811/2013 L 239/1 aimed to be covered.....	200
Annex ZE (informative) Relationship between this European Standard and the essential requirements of Regulation (EU) 2016/426 of the European Parliament and of the Council of 9 March 2016 on appliances burning gaseous fuels and repealing Directive 2009/142/EC aimed to be covered.....	203
Bibliography.....	213

European foreword

This document (EN 15502-1:2021+A1:2023) 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 2024, and conflicting national standards shall be withdrawn at the latest by June 2024.

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

This document supersedes A1 EN 15502-1:2021 A1.

This document includes Amendment 1, approved by CEN on 2023-10-11.

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

A1 *deleted paragraphs* A1

EN 15502 consists of the following parts under the general title “Gas-fired heating boilers”:

- *Part 1: General requirements and tests (this standard);*
- *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;*
- *Part 2-2: Specific standard for type B1 appliances.*

This document is to be used in conjunction with the specific Parts 2.

This document has been prepared under mandates M89/6 and M066, given to CEN by the European Commission and the European Free Trade Association, and 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.

This document has been prepared under the mandates M/534 and M/535, given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to:

- requirements of Commission Regulation (EC) No 813/2013 of 2 August 2013 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for space heaters and combination heaters;
- requirements of Commission Delegated Regulation (EC) No 811/2013 of 18 February 2013 supplementing Directive 2010/30/EC of the European Parliament and of the Council with regard to energy labelling of space heaters, combination heaters, packages of space heater, temperature control and solar device and packages of combination heater, temperature control and solar device.

For relationship with EU Directive(s) and Commission Regulations, see informative Annexes ZB, ZC and ZD, ZE which are integral parts of this document.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

EN 15502-1:2021+A1:2023 (E)

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

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 can include in one design more than one function. It can include for example:

- a sanitary hot water function;
- a function to supply the combustion air from the outside/open air;
- a function to dispose the combustion products to the outside/open air.

The boiler design can be supplied to the market in more than one part. If the boiler is supplied to the market in multiple parts, the boiler is the assembly of various parts according to the instructions for installation.

Boilers can be designed to be connected to specific parts of a building. Connection to a chimney and the means of combustion air supply is particularly relevant.

This document is a first part of a series of standards that will describe the special requirements for specific appliance types of the boiler. This European Standard contains the common requirements that are applicable for the majority of the appliance types of the boiler.

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.

EN 15502-1:2021+A1:2023 (E)

1 Scope

This document specifies the common requirements and test methods, as well as the classification, marking and energy labelling 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".

This document is to be used in conjunction with the specific Parts 2 (Part 2-1, Part 2-2 and following ones).

This document applies to boilers of types B and C:

NOTE For further background information on appliance types see EN 1749:2020.

- a) that use one or more combustible gases of the three gas families at the pressures stated in EN 437:2021;
- b) where the temperature of the water does not exceed 105 °C during normal operation;
- c) where the maximum operating pressure in the water circuit does not exceed 6 bar;
- d) which can give rise to condensation under certain circumstances;
- e) which are declared in the instructions for installation to be either a "condensing" boiler or a "low temperature boiler" or a "standard boiler" or an "other boiler". If no declaration is given the boiler is to be considered both a "standard boiler" and an "other boiler";
- f) which are intended to be installed inside a building or in a partially protected place;
- g) which are intended to produce also hot water either by the instantaneous or storage principle as a single unit.

This document applies to boilers designed for sealed water systems or for open water systems.

NOTE This general standard and the specific standards (see Part 2) provide requirements for boilers with known constructions. For boilers with any alternative constructions, which might not fully be covered by this standard or a specific standard, the risk associated with this alternative construction will need to be assessed.

An example of an assessment methodology, based upon risk assessment, is given in Clause 11.

This document is not intended to cover appliances intended for connection 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 AB).

This document does not cover all the requirements for :

- aa) appliances above 1000 kW;
- ab) appliances designed and constructed to burn gas containing carbon monoxide or other toxic components;
- ac) appliance having a supplementary heater.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 88-1:2011+A1:2016, *Pressure regulators and associated safety devices for gas appliances - Part 1: Pressure regulators for inlet pressures up to and including 50 kPa*

EN 125:2010+A1:2015, *Flame supervision devices for gas burning appliances - Thermoelectric flame supervision devices*

EN 126:2012, *Multifunctional controls for gas burning appliances*

EN 161:2011+A3:2013, *Automatic shut-off valves for gas burners and gas appliances*

EN 298:2012, *Automatic burner control systems for burners and appliances burning gaseous or liquid fuels*

EN 437:2021, *Test gases - Test pressures - Appliance categories*

EN 573-1:2004, *Aluminium and aluminium alloys - Chemical composition and form of wrought products - Part 1: Numerical designation system* EN 1057:2006+A1:2010, *Copper and copper alloys - Seamless, round copper tubes for water and gas in sanitary and heating applications*

EN 1092-1:2018, *Flanges and their joints — Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 1: Steel flanges*

EN 1092-2:1997, *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 2: Cast iron flanges*

EN 1092-3:2003, *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 3: Copper alloy flanges*

EN 1092-4:2002, *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 4: Aluminium alloy flanges*

EN 1561:2011, *Founding - Grey cast irons*

EN 1749:2020, *Classification of gas appliances according to the method of supplying combustion air and of evacuation of the combustion products*

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

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

EN 10088-1:2014, *Stainless steels - Part 1: List of stainless steels* EN 10226-1:2004, *Pipe threads where pressure tight joints are made on the threads - Part 1: Taper external threads and parallel internal threads - Dimensions, tolerances and designation*

EN 10226-2:2005, *Pipe threads where pressure tight joints are made on the threads - Part 2: Taper external threads and taper internal threads - Dimensions, tolerances and designation*

EN 12067-2:2004, *Gas/air ratio controls for gas burners and gas burning appliances - Part 2: Electronic types*

EN 15502-1:2021+A1:2023 (E)

EN 13203-1:2015, Gas fired domestic appliances producing hot water - Part 1: Assessment of performance of hot water deliveries

EN 13203-2:2018, *Gas-fired domestic appliances producing hot water — Part 2: Assessment of energy consumption*

EN 13611:2019, *Safety and control devices for gas burners and gas burning appliances - General requirements*

EN 15036-1:2006, *Heating boilers — Test regulations for airborne noise emissions from heat generators - Part 1: Airborne noise emissions from heat generators*

EN 15456:2008, *Heating boilers - Electrical power consumption for heat generators - System boundaries - Measurements*

EN 16830:2017, *Safety and control devices for burners and appliances burning gaseous or liquid fuels - Control functions in electronic systems - Temperature Control function*

EN 60335-1:2012+AC:2014+A1:2019+A2:2019+A11:2014+A13:2017+A14:2019, *Household and similar electrical appliances - Safety - Part 1: General requirements*

EN 60335-2-102:2016, *Household and similar electrical appliances - Safety - Part 2-102: Particular requirements for gas, oil and solid-fuel burning appliances having electrical connections (IEC 60335-2-102:2004,MOD; IEC 60335-2-102:2004/A1:2008,MOD; IEC 60335-2-102:2004/A2:2012,MOD)*

EN 60529:1991+A2:2013+AC1:2019, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989+A1:2001+A2:2013/C2:2015, IDT)*

EN IEC 60730-2-9:2019+A1:2019+A2:2020, *Automatic electrical controls — Part 2-9: Particular requirements for temperature sensing controls*

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

EN ISO 2553:2019, *Welding and allied processes — Symbolic representation on drawings — Welded joints (ISO 2553:2019, IDT)*

EN ISO 3166-1:2014, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes (ISO 3166-1:2013, IDT)*

EN ISO 4063:2010, *Welding and allied processes — Nomenclature of processes and reference numbers (ISO 4063:2009, Corrected version 2010-03-01)*

ISO 857-1:1998, *Welding and allied processes — Vocabulary — Part 1: Metal welding processes*

ISO 857-2:2005, *Welding and allied processes — Vocabulary — Part 2: Soldering and brazing processes and related terms*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN