



SLOVENSKI STANDARD
kSIST-TS FprCEN/TS 15502-3-1:2024
01-maj-2024

Plinski kotli za centralno ogrevanje - 3-1. del: Zmesi H2/NG in funkcija prilagodljivega nadzora zgorevanja (ACCF) - Razširitev standarda EN 15502-2-1:2022

Gas-fired central heating boilers - Part 3-1: H2NG and ACCF - Expansion of EN 15502-2-1:2022

Gasbefeuerte Zentralheizkessel - Teil 3-1: Wasserstoffbeimischung und adaptive Verbrennungsregelung - Ergänzung zur DIN EN 15502-2-1:2022

Chaudières de chauffage central utilisant les combustibles gazeux - Partie 3-1: H2/GN et fonction adaptative de contrôle de la combustion - Élargissement de l'EN 15502-2-1:2022

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Ta slovenski standard je istoveten z: EN 15502-3-1:2024

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Gas-fired central heating boilers - Part 3-1: H₂NG and
ACCF - Expansion of EN 15502-2-1:2022

Chaudières de chauffage central utilisant les
combustibles gazeux - Partie 3-1: H₂/GN et fonction
adaptative de contrôle de la combustion -
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Gasbefeuerte Zentralheizkessel - Teil 3-1:
Wasserstoffbeimischung und adaptive
Verbrennungsregelung - Ergänzung zur DIN EN 15502-
2-1:2022

This draft Technical Specification is submitted to CEN members for Vote. It has been drawn up by the Technical Committee CEN/TC 109.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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FprCEN/TS 15502-3-1:2023 (E)**European foreword**

This document (FprEN 15502-3-1:2023) has been prepared by Technical Committee CEN/TC 109 “Central heating boilers using gaseous fuels”, the secretariat of which is held by NEN.

This document is currently submitted to the Vote on TS.

This document contains an expansion of the scope of EN 15502-2-1:2022 and provides requirements needed for this expansion.

The only technical change compared to EN 15502-2-1:2022 is this expansion of the scope compared to EN 15502-2-1:2022.

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

- *Part 1: General requirements and tests;*
- 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.*
- *Part 3-1: H2NG and ACCF — Expansion of EN 15502-2-1:2022.*

Relationship between this document, EN 15502-2-1:2022 and EN 15502-1:2021

The reader needs to be aware of the following information:

- a) This document (CEN/TS 15502-3-1) is to be used in conjunction with EN 15502-2-1:2022, while EN 15502-2-1:2022 is to be used in conjunction with EN 15502-1:2021. This means that this TS is to be used in conjunction with both EN 15502-2-1:2022 and EN 15502-1:2021 and that all information in EN 15502-2-1:2022 and EN 15502-1:2021 applies as well, unless stated otherwise (see under b)).

NOTE 1 To find the actual requirements or information in the (sub)clauses of EN 15502-2-1:2022 referred to in this TS, one might need to check EN 15502-1:2021 (as EN 15502-2-1:2022 is to be used in conjunction with EN 15502-1:2021).

- b) The numbering structure of this TS is using the numbering structure of EN 15502-2-1:2022 and expanding on it. Where this TS states: Shall be according to EN 15502-2-1:2022, [clause number], The numbering, title and text of that clause is to be used (incl. sub clauses, tables, equations, figures, lists and corresponding numbering).

NOTE 2 The TS and its annexes can refer to (sub)clause numbers that are to be found either in this TS, or EN 15502-2-1:2022, or EN 15502-1:2021

- c) The relevant text of EN 15502-2-1:2022 is to be adapted accordingly in all cases where this TS states:
- shall be according to EN 15502-2-1:2022, [clause number] with the following modification;
 - shall be according to EN 15502-2-1:2022, [clause number] with the following modification of [sub clause number(s)];
 - shall be according to EN 15502-2-1:2022, [clause number] with the following addition;

- shall be according to EN 15502-2-1:2022, [clause number] with the addition of [sub clause number(s)] at the end;
 - EN 15502-2-1:2022, [clause number] is replaced by the following;
 - the title of EN 15502-2-1:2022 [clause number] is replaced by the following;
 - EN 15502-2-1:2022, [clause number] is not applicable.
- d) Clauses or subclauses in this TS that are additional to the structure of EN 15502-2-1:2022 are numbered “20x” (e.g. 3.1.201, 8.4.201, Table 201, Formula 201, Figure 201) or designated as Annex “Y” (e.g Annex YA, YB, YC, etc.). These additional (sub)clauses provide requirements and information that is specific for the appliances that are covered in the scope of this TS.

NOTE 3 The additional (sub)clauses in this TS are not indicated as an addition to EN 15502-2-1:2022.

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FprCEN/TS 15502-3-1:2023 (E)

Introduction

EN 15502-2-1:2022, introduction applies.

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1 Scope

Shall be according to EN 15502-2-1:2022, Clause 1 with the following modifications:

Add at the end of the list, after k), following:

“This document covers gas-fired central heating boilers from the types C₁ up to C₍₁₁₎ and the types B₂, B₃ and B₅”:

l) which are fully premixed appliances equipped with an Adaptive Combustion Control Function (ACCF) 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 including gas grids for natural gases of the second family where up to 20 mol% H₂ is added to the natural gas (H2NG-Y20).

m) which are fully premixed appliances equipped with a Pneumatic Gas/Air Ratio controller (PGAR) that are intended to be connected to gas grids for natural gases of the second family where up to 20 mol% H₂ is added to the natural gas (H2NG-Y20), where the quality of the distributed gas without adding the hydrogen is not likely to vary to a large extent over the lifetime of the appliance.

Replace in the list following

“This document does not cover all the requirements for”:

ab) and ak) and al) by:

ab) 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 AB of EN 15502-1:2021), except for fully premixed appliances with an ACCF, as ACCF appliances are designed to adapt to variations in gas quality.

ak) appliances that are intended to burn natural gases of the second family where hydrogen is added to the natural gas, except for fully premixed appliances with an ACCF or PGAR (which are covered by this document);

al) Partially premixed appliances equipped with an adaptive combustion control function (ACCF).

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.

The normative references of EN 15502-2-1:2022 apply with the following additions:

EN 15502-2-1:2022, *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*

EN 12067-2:2022, *Safety and control devices for burners and appliances burning gaseous or liquid fuels - Control functions in electronic systems - Part 2: Fuel/air ratio control/supervision of the electronic type*

FprCEN/TS 15502-3-1:2023 (E)

3 Terms and definitions

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 15502-2-1:2022 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1.201 definitions introduced in this TS

3.1.201.1

H2NG grid

grid intended to supply gas to H2NG appliances

3.1.201.2

H2NG appliances

appliances that are intended to burn second family gases containing relevant amount of hydrogen

Note 1 to entry: Gas containing less than 0,5 % hydrogen is not considered to contain a relevant amount of hydrogen.

3.1.201.3

appliance category extension Y

appliance category extension for H2NG appliances identifying the maximum hydrogen content of the H2NG gas, expressed as the molar percentage of the hydrogen content of the gas

Note 1 to entry: If the maximum hydrogen percentage of the H2NG is 20 %, this is indicated with an extension "Y20".

Note 2 to entry: An I_{2E} appliance category boiler that is suitable to burn H2NG gases containing up to 20 mol% H₂ shall have the extended appliance category I_{2EY20}.

Note 3 to entry: vol % is equivalent to mol% as the used pressure is almost atmospheric.

3.1.201.4

reduced nominal heat input

Q_{rn}

nominal heat input obtained with the boiler set using the high Wobbe index reference gas at reference conditions and operated using the low Wobbe index reference gas at reference conditions

Note 1 to entry: This is only used for expressing the reduction on the heat input due to the variation of the gas composition supplied by H2NG gas grids.

3.1.201.5

reduced nominal heat output

P_{rn}

nominal heat output obtained with the boiler set using the high Wobbe index reference gas at reference conditions and operated using the low Wobbe index reference gas at reference conditions

Note 1 to entry: This is only used for expressing the reduction on the heat output due to the variation of the gas composition supplied by H2NG gas grids

3.1.201.6 distributed gas

gaseous fuel used on the territory of the CEN members and affiliated members

Note 1 to entry: Corresponds to the one given in the Regulation (EU) 2016/426 on gas appliances (article 2.2).

[SOURCE: EN 437:2021, 3.2, modified]

3.1.201.7 distribution limit gas DLG

distribution gases that will most likely result in an undesired combustion phenomenon

Note 1 to entry: The DLG depends on the distributed gas and the combustion and mixing technology used in the appliance and the undesired combustion phenomenon.

Note 2 to entry: The DLG is specifying the normal operating range of gases for which the appliance is suitable for, as declared in the instructions for installation.

3.1.201.8 test gas

gas intended for the verification of the operational characteristics of gas appliances

Note 1 to entry: Test gases include reference gases and limit gases

[SOURCE: EN 437:2021, 3.3]

3.1.201.9 reference gas

test gas with which appliances operate under nominal conditions when they are supplied at the corresponding normal pressure

[SOURCE: EN 437:2021, 3.4]

Note 1 to entry: In this TS some new appliance categories are used that have two reference gases, as this TS covers appliances that are intended to be connected to H2NG gas grids.

Note 2 to entry: where in this TS reference gas is mentioned without specifying high or low Wobbe index, always the high Wobbe index reference gas is intended.

3.1.201.10 low Wobbe index reference gas

reference gas containing the maximum amount of hydrogen with which appliances operate under nominal low Wobbe Index conditions when they are supplied at the corresponding normal pressure

Note 1 to entry: As an example, for a 2_{EY20} appliance with the reference gas G20, the low Wobbe index reference gas has the following composition in volume: $CH_4 = 80\%$; $H_2 = 20\%$ (also called G20Y20 in this document).

3.1.201.11 high Wobbe index reference gas

reference gas not containing hydrogen with which appliances operate under nominal high Wobbe index conditions when they are supplied at the corresponding normal pressure

Note 1 to entry: As an example, for a 2_{EY20} appliance with reference gas G20, the high Wobbe index reference gas is G20.

FprCEN/TS 15502-3-1:2023 (E)**3.1.201.12****limit gas**

test gas representative of the extreme variations in the characteristics of the gases for which appliances have been designed

[SOURCE: EN 437:2021, 3.5]

Note 1 to entry: a limit gas that is intended to be used as a test gas where the test conditions, other than the test pressures, are not required to be at the extremes of the normal operating conditions of the appliance, is referred to in this document as Extreme Limit Gas (ELG).

Note 2 to entry: a limit gas that is intended to be used as a test gas where the test conditions, including the test pressures, are required to be at the extremes of the normal operating conditions of the appliance, is referred to in this document as Distribution Limit Gas (DLG, see 3.1.201.7).

Note 3 to entry: Annex YC.2 explains why the limit gases indicated in EN 437 are not suitable for ACCF appliances.

3.1.201.13**test pressure**

gas pressure used to verify the operational characteristics of gas appliances, consisting of normal and limit pressures

Note 1 to entry: Gas pressure is expressed in millibars (mbar) 1 mbar = 100 Pa.

[SOURCE: EN 437:2021, 3.6]

3.1.201.14**normal pressure**

p_n

pressure under which the appliances operate in nominal conditions when they are supplied with the corresponding reference gas

[SOURCE: EN 437:2021, 3.7]

3.1.201.15**limit pressure**

p_{max} , p_{min}

pressures representative of the extreme variations in the appliance supply conditions

Note 1 to entry: Limit pressures comprise a maximum pressure p_{max} and a minimum pressure p_{min} .

[SOURCE: EN 437:2021, 3.8]

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3.1.201.16

propane equivalent PE

hydrocarbons in the gas being conveyed, other than methane and propane, are expressed as an equivalent amount of methane and propane which has the same ideal volume and the same average number of hydrogen and carbon atoms per molecule as the said hydrocarbons

Note 1 to the entry: The PE can be calculated based on the composition of the gas. A gas containing 93 % methane, 4 % ethane, 2 % propane and 1 % butane has a PE of $(0,5 \times 4 \%) + (1 \times 2 \%) + (1,5 \times 1 \%) = 5,5 \%$.

Note 2 to the entry: The propane equivalent is defined as a parameter to express the amount of higher hydrocarbons in natural gas.

Note 3 to the entry: In some specifications the relative density of gas is used as an indication of the amount of higher hydrocarbons in gas. The density is only a good indicator for that, provided the gas only contains saturated hydrocarbons and no inert gases, hydrogen or unsaturated hydrocarbons.

3.1.201.17

manual calibration of an ACCF appliance

calibration of an ACCF appliance that is started by the installer

Note 1 to entry: The instruction for installation may indicate instructions for performing a manual calibration. These instructions may specify that the manual calibration shall only be performed while burning a gas of known composition, or that a verification of combustion parameters after manual calibration shall be performed.

3.1.201.18

λ adjustment of a PGAR appliance

calibration and adjustment of the air factor λ in the flue of a PGAR appliance that is performed in the field by the installer, according to the instructions for installation

Note 1 to entry: A calibration and adjustment can be initiated to detect, and if necessary compensate, for drift and ageing etc and/or change in gas quality.

Note 2 to entry: In practice the λ adjustment for H2NG appliances is based on the measured O₂ concentration in the flue (see 12.2.1.2).

Note 3 to entry: The instruction for installation may indicate that the λ adjustment shall only be performed while burning a gas of known composition (see 12.2.1.2).

Note 4 to entry: A λ adjustment is also indicated as “throttle” adjustment in the EN 15502 series.

3.1.201.19

ΔP adjustment of a PGAR appliance

calibration and adjustment of the pressure difference between the gas and air of a PGAR appliance, that is performed in the field by the installer, according to the instructions for installation

Note 1 to entry: A calibration and adjustment can be initiated to detect, and if necessary compensate, for drift and ageing of the pressure regulating function of the PGAR.

Note 2 to entry: A ΔP adjustment is also indicated as “offset” adjustment in the EN 15502 series.

FprCEN/TS 15502-3-1:2023 (E)**3.1.201.20****self-calibration of an ACCF appliance**

automatically started calibration of an ACCF appliance

Note 1 to entry: A calibration can be initiated to detect and if necessary compensate for drift and ageing etc and change in gas quality.

3.1.201.21**pneumatic gas supply control****PGS**

device where the gas supply rate is pneumatically driven by the external gas supply pressure or an internal appliance pressure regulator

Note 1 to entry: Pneumatically driven means that the product of the density and square of the volume rate of the gas is proportional to the pressure difference.

Note 2 to entry: The most common PGS controls consist of a nozzle or injector having a turbulent flow.

Note 3 to entry: The Wobbe index, as a key gas quality parameter, was defined having pneumatically driven gas supply in mind, as this was the only technology used in the past.

Note 4 to entry: An appliance with an injector burner or an atmospheric appliance is called a PGS appliance.

3.1.201.22**pneumatic gas/air ratio control****PGAR**

device where the gas supply rate is pneumatically driven by the air supply rate or vice versa

Note 1 to entry: Pneumatically driven means that the product of the density and the square of the volume rate of the gas is proportional to the product of the density and the square of the volume rate of the air.

Note 2 to entry: The most common PGAR controls consist of a nozzle with a turbulent flow for the gas rate where the pressure difference over this nozzle is driven by a pressure difference resulting from a restriction in the combustion air flow having a turbulent flow.

3.1.201.23**adaptive combustion control function****ACCF**

control function, intended to maintain λ constant in a range $\Delta\lambda$ by adapting the flow of gaseous fuel and/or the flow of air and/or other physical quantities to compensate changes in input parameters relevant for the combustion process

Note 1 to entry: Changes in input parameters could be for example the composition of the fuel or the combustion air temperature.

[Source: EN 12067-2:2022, 3.117]