SLOVENSKI STANDARD
SIST EN 50465:2015

01-junij-2015

Nadomešča:
SIST EN 50465:2009

Plinske naprave - Kombinirane ogrevalne in pogonske naprave z imensko močjo do vključno 70 kW

Gas appliances - Combined heat and power appliance of nominal heat input inferior or equal to 70 kW

Gasgeräte - Geräte zur Kraft-Wärme-Kopplung mit einer Nennwärmebelastung kleiner oder gleich 70 kW

Appareils fonctionnant au gaz - Appareils produisant de la chaleur et de l'électricité combinées dont le débit calorifique nominal est inférieur ou égal à 70 kW

Ta slovenski standard je istoveten z: **EN 50465:2015**

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27.070	Gorilne celice	Fuel cells
97.100.99	Grelniki, ki uporabljajo druge vire energije	Heaters using other sources of energy

SIST EN 50465:2015 **en**

EUROPEAN STANDARD

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English Version

Gas appliances - Combined heat and power appliance of nominal heat input inferior or equal to 70 kW

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Foreword

This document (EN 50465:2015) has been prepared by CEN/CLC Joint Working Group FCGA, "Fuel cell gas appliances".

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2015-10-29
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2017-10-29

This document supersedes EN 50465:2008.

EN 50465:2015 includes the following significant technical changes with respect to EN 50465:2008:

– inclusion of requirements for „Stirling Engine“ and „Internal Combustion Engine“;

– modification of requirements for fuel cell heating appliances to reflect experience since the first edition;

– partly adaptation to EN 15502-1 and EN 15502-2-1, especially to reflect the new requirements for air proving devices;

– introduction of additional types of combustion air and flue duct systems;

– modification of the total efficiency calculation;

– modifications of NO_X weighting and calculation.

Micro-cogeneration is also known as micro combined heat and power [mCHP]. mCHP is an efficient way to deliver heating, cooling and electricity. It is based on the simultaneous production of electrical and thermal energy, both of which are used. The central and most fundamental principle of mCHP is that in order to maximize the many benefits that arise from it, systems should be based according to the heat demand of the application.

A fuel cell, Stirling engine and internal combustion engine are just some of the significant technologies to be the thermal heart of a mCHP appliance.

mCHP appliances that are already established in the market are used to provide central heating and domestic hot water in residential buildings.

Due to the development of new technology other solutions than those described in this European Standard are possible if these solutions provide at least an equivalent level of safety.

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

Due to the change in scope to include technologies in addition to fuel cells, the title of this European Standard has been changed from “fuel cell gas heating appliance” into “combined heat and power appliance”.

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

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.The essential requirements of EC Directive 2009/142/EC relating to "rational use of energy" is defined by the maximum quantity of energy recovered (thermal and electrical energy output) from the gas energy input.

1 Scope

This European Standard specifies the requirements and test methods for the construction, safety, fitness for purpose, rational use of energy and the marking of a micro combined heat and power appliance; (hereafter referred to as “mCHP appliance”).

This European Standard applies to mCHP appliances of types B_{22}, B_{23}, B_{32}, B_{33}, B_{52}, B_{53}, C_1, C_3, C_{42}, C_{43} C_{52}, C_{53}, C_{62}, C_{63}, C_{82}, C_{83} and C_9 based on the classifications of CEN/TR 1749:

– that use one or more supplied gases of the three gas families at the pressures stated in EN 437,

– where the temperature of the heat transfer fluid of the heating system (heating water circuit) does not exceed 105 ºC during normal operation,

– where the maximum operating pressure in the

  - heating water circuit does not exceed 6 bar,

  - domestic hot water circuit (if installed) does not exceed 10 bar,

– which are either intended to be installed indoors or outdoors in a partially protected place,

– which are intended to produce hot water either by the instantaneous or storage principle,

– which have a maximum heat input (based on net calorific value) not exceeding 70 kW,

– which are designed for sealed or open water systems.

NOTE 1 For applications where the maximum allowable water temperature exceeds 110 ºC or where volume multiplied by maximum allowable pressure exceeds 50 bar litres, further requirements may be necessary to comply with the essential requirements of Directive 97/23/EC (Pressure Equipment Directive (PED)).

NOTE 2 For mCHP appliances with constructions that might not be fully covered by this European Standard or by another specific standard, the risk associated with the alternative construction will be assessed.

NOTE 3 prEN 13203-4 will specify the assessment of energy consumption for domestic hot water production of gas combined heat and power appliances (mCHP).

This European Standard does not contain the requirements necessary for appliance capable of producing electrical energy without using the thermal energy.

This European Standard does not cover all the requirements for mCHP 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 DD).

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.

EN 88-1, *Pressure regulators and associated safety devices for gas appliances – Part 1: Pressure regulators for inlet pressures up to and including 500 kPa*

EN 125, *Flame supervision devices for gas burning appliances – Thermoelectric flame supervision devices*

EN 126, *Multifunctional controls for gas burning appliances*

EN 161, *Automatic shut-off valves for gas burners and gas appliances*

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

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

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

EN 549, *Rubber materials for seals and diaphragms for gas appliances and gas equipment*

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

EN 1057, *Copper and copper alloys – Seamless, round copper tubes for water and gas in sanitary and heating applications*

EN 1092 (all parts), *Flanges and their joints – Circular flanges for pipes, valves, fittings and accessories, PN designated*

CR 1404, *Determination of emissions from appliances burning gaseous fuels during type-testing*

EN 1561, *Founding – Grey cast irons*

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

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

EN 10226-1, *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, *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, *Gas/air ratio controls for gas burners and gas burning appliances – Part 2: Electronic types*

EN 13203-1, *Gas-fired domestic appliances producing hot water – Appliances not exceeding 70 kW heat input and 300 l water storage capacity – Part 1: Assessment of performance of hot water deliveries*

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

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

EN 13611, *Safety and control devices for gas burners and gas burning appliances – General requirements*

EN 14459, *Control functions in electronic systems for gas burners and gas burning appliances – Methods for classification and assessment*

EN 14471:2013, *Chimneys – System chimneys with plastic flue liners – Requirements and test methods*

EN 50090 (all parts), *Home and Building Electronic Systems (HBES)*

EN 50438, *Requirements for micro-generating plants to be connected in parallel with public low-voltage distribution networks*

CLC/TS 50549-1, *Requirements for the connection of generators above 16 A per phase – Part 1: Connection of the LV distribution system*

EN 55014-1, *Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission (CISPR 14-1)*

EN 55014-2, *Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 2: Immunity – Product family standard (CISPR 14-2)*

EN 60335-1, *Household and similar electric appliances – Safety – Part 1: General requirements (IEC 60335-1)*

EN 60335-2-102, *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)*

EN 60529:1991, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)*

EN 60730-2-9, *Automatic electrical controls for household and similar use – Part 2-9: Particular requirements for temperature sensing controls (IEC 60730-2-9)*

EN 61000-3-2, *Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current up to and including 16 A per phase) (IEC 61000-3-2)*

EN 61000-3-3, *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection (IEC 61000-3-3)*

EN 61000-3-11, *Electromagnetic compatibility (EMC) – Part 3-11: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems – Equipment with rated current ≤ 75 A and subject to conditional connection (IEC 61000-3-11)*

EN 61000-3-12, *Electromagnetic compatibility (EMC) – Part 3-12: Limits – Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16 A and ≤ 75 A per phase (IEC 61000-3-12)*

EN 61000-6-1, *Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Immunity for residential, commercial and light-industrial environments (IEC 61000-6-1)*

EN 61000-6-3, *Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments (IEC 61000-6-3)*

EN 62282-3-100:2012, *Fuel cell technologies – Part 3-100: Stationary fuel cell power systems – Safety (IEC 62282-3-100:2012)*

EN ISO 178, *Plastics – Determination of flexural properties (ISO 178)*

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

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

EN ISO 527-1, *Plastics – Determination of tensile properties – Part 1: General principles (ISO 527-1)*

EN ISO 527-2, *Plastics – Determination of tensile properties – Part 2: Test conditions for moulding and extrusion plastics (ISO 527-2)*

EN ISO 1183 (all parts), *Plastics – Methods for determining the density of non-cellular plastics (ISO 1183)*

EN ISO 2553, *Welding and allied processes – Symbolic representation on drawings - Welded joints (ISO 2553)*

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

EN ISO 4063, *Welding and allied processes – Nomenclature of processes and reference numbers (ISO 4063)*

EN ISO 8256, *Plastics – Determination of tensile-impact strength (ISO 8256)*

EN ISO 9969, *Thermoplastics pipes – Determination of ring stiffness (ISO 9969)*

EN ISO 16852, *Flame arresters – Performance requirements, test methods and limits for use (ISO 16852)*

ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads – Part 1: Dimensions, tolerances and designation*

ISO 37, *Rubber, vulcanized or thermoplastic – Determination of tensile stress-strain properties*

ISO 188, *Rubber, vulcanized or thermoplastic – Accelerated ageing and heat resistance tests*

ISO 262, *ISO general purpose metric screw threads – Selected sizes for screws, bolts and nuts*

ISO 815 (all parts), *Rubber, vulcanized or thermoplastic – Determination of compression set*

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

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

ISO 1817, *Rubber, vulcanized or thermoplastic – Determination of the effect of liquids*

ISO 2781, *Rubber, vulcanized or thermoplastic – Determination of density*

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

ISO 7619 (all parts), *Rubber, vulcanized or thermoplastic – Determination of indentation hardness*

3 Terms and definitions

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

NOTE Table F.1 summarizes the main symbols and abbreviations used in this European Standard.

3.1
reference conditions
these correspond to 15 ºC and 1 013,25 mbar, unless otherwise specified

Note 1 to entry: mbar = 10^2 Pa.

[SOURCE: EN 437: 2003+A1:2009, 3.9]

3.2
combustible gases

3.2.1
test gases
gases intended for the verification of the operational characteristics of gas appliances. They consist of reference gases and limit gases

[SOURCE: EN 437:2003+A1:2009, 3.2]

3.2.2
reference gases
test gases with which appliances operate under nominal conditions when they are supplied at the corresponding normal pressure

[SOURCE: EN 437:2003+A1:2009, 3.3]

3.2.3
limit gases
test gases representative of the extreme variations in the characteristics of the gases for which appliances have been designed

[SOURCE: EN 437:2003+A1:2009, 3.4]

3.2.4
calorific value
quantity of heat produced by the complete combustion, at a constant pressure equal to 1 013,25 mbar, of a unit volume or mass of gas, the constituents of the combustible mixture being taken at reference conditions and the products of combustion being brought back to the same conditions

A distinction is made between:

– the gross calorific value H_s: the water produced by combustion is assumed to be condensed;

– the net calorific value H_i: the water produced by combustion is assumed to be in the vapour state

Note 1 to entry: The calorific value is expressed:

– either in megajoules per cubic metre (MJ/m³) of dry gas under the reference conditions;

– or in megajoules per kilogram (MJ/kg) of dry gas.

[SOURCE: EN 437:2003+A1:2009, 3.11]

3.2.5
relative density
d
ratio of the masses of equal volumes of dry gas and dry air under the same conditions of temperature and pressure: 15 °C or 0 °C and 1 013,25 mbar

[SOURCE: EN 437:2003+A1:2009, 3.10]

3.2.6
Wobbe index
gross Wobbe index: W_s**; net Wobbe index:** W_i
ratio of the calorific value of a gas per unit volume to the square root of its relative density under the same reference conditions. The Wobbe index is said to be gross or net according to whether the calorific value used is the gross or net calorific value

Note 1 to entry: The Wobbe indices are expressed:

– either in megajoules per cubic metre (MJ/m³) of dry gas under reference conditions,

– or in megajoules per kilogram (MJ/kg) of dry gas.

[SOURCE: EN 437:2003+A1:2009, 3.12]

3.2.7
gas pressure

3.2.7.1
general
all the pressures are static pressures of the moving gas, relative to the atmospheric pressure, measured at right angles to the direction of the flow of the gas

Note 1 to entry: Symbol: p. The gas pressures used are expressed in millibars (mbar) 1 mbar = 10^2 Pa.

3.2.7.2
test pressures
gas pressures used to verify the operational characteristics of gas appliances, consisting of normal and limit pressures

[SOURCE: EN 437:2003+A1:2009, 3.5, modified]

3.2.7.3
normal pressure
p_n
pressure under which the appliances operate in nominal conditions when they are supplied with the corresponding reference gas

[SOURCE: EN 437:2003 + A1:2009, 3.6]

3.2.7.4
limit pressures
maximum pressure: p_{max}**; minimum pressure:** p_{min}
pressures representative of the extreme variations in the appliance supply conditions

[SOURCE: EN 437:2003+A1:2009, 3.7]

3.2.7.5
pressure couple
combination of two distinct gas distribution pressures applied by reason of the significant difference existing between the Wobbe indices within a single gas family or group in which

– the higher pressure corresponds only to gases of low Wobbe index;

– the lower pressure corresponds to gases of high Wobbe index

[SOURCE: EN 437:2003+A1:2009, 3.8]

3.3
Cogeneration
CHP
simultaneous generation of thermal and electrical energy in one process

Note 1 to entry: CHP= combined heat and power

3.3.1
mCHP

condensing or non-condensing CHP appliance with a maximum electrical output power below 50 kW

Note 1 to entry: As defined by Directive 2012/27/EC.

Note 2 to entry: mCHP= microCHP.

3.3.2
mCHP appliance
appliance which is either delivered as a complete package or specified as the complete package to deliver safely and effectively the heating, electrical power and where applicable the domestic hot water service claimed, comprising as relevant:

– primary heat & power generator (PH&PG);
– supplementary heat generator;
– flue ducts;
– thermal store

3.3.3
mCHP appliance technologies and its sub functions

3.3.3.1
fuel cell mCHP appliance
appliance that includes a fuel cell which produces simultaneous thermal energy and electrical energy (electrochemical reaction), consisting typically of distinct parts

Note 1 to entry: See Figure 1.

3.3.3.2
Stirling engine mCHP appliance
appliance that includes a Stirling engine module which thermodynamically converts a proportion of absorbed thermal energy to electrical energy, the remaining energy being transferred to the thermal management system; consisting typically of distinct parts

Note 1 to entry: See Figure 2.

3.3.3.3
internal combustion engine mCHP appliance
appliance that includes an internal combustion engine module which generates mechanical and thermal energy and a generator to convert mechanical energy into electrical energy, the remaining energy being transferred to the thermal management system; consisting typically of distinct parts

Note 1 to entry: See Figure 3.

3.3.3.4
Sub functions
3.3.3.4.1
primary heat & power generator
preferential heat generator producing thermal and electrical energy comprising

- for fuel cell mCHP appliances: fuel processing system, fuel cell module and power conditioning and chp-control system, see Figure 1
- for Stirling Engine mCHP appliances: Engine burner, Stirling Engine module, power conditioning and chp-control system, see Figure 2
- for internal combustion engine mCHP appliances: internal combustion engine, power generator and power conditioning and chp-control system, see Figure 3

3.3.3.4.2
fuel processing system
chemical processing equipment including any associated heat exchangers and controls required to convert input fuel to a composition suitable for the fuel cell stacks