SLOVENSKI STANDARD
oSIST prEN 50733:2023

01-december-2023

Električne pečice s prisilnim kroženjem zraka, parni kuhalniki in kombinirane pečice za profesionalno uporabo - Preskusne metode za merjenje lastnosti

Electric forced convection ovens, steam cookers and combination ovens for professional use - Test methods for measuring the performance

Elektrische Heißumluftöfen, Dampfgeräte und Heißluftdämpfer für den professionellen Gebrauch - Verfahren zur Messung der Gebrauchseigenschaften

Fours électriques à convection forcée, cuiseurs à vapeur et fours combinés à usage professionnel - Méthodes d'essai pour le mesurage de l'aptitude à la fonction

Ta slovenski standard je istoveten z: **prEN 50733**

ICS:

97.040.20	Štedilniki, delovni pulti, pečice in podobni aparati	Cooking ranges, working tables, ovens and similar appliances

oSIST prEN 50733:2023 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 50733

October 2023

ICS 97.040.20 -

English Version

Electric forced convection ovens, steam cookers and combination ovens for professional use - Test methods for measuring the performance

Fours électriques à convection forcée, cuiseurs à vapeur et fours combinés à usage professionnel - Méthodes d'essai pour le mesurage de l'aptitude à la fonction

Elektrische Heißumluftöfen, Dampfgeräte und Heißluftdämpfer für den professionellen Gebrauch - Verfahren zur Messung der Gebrauchseigenschaften

This draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2024-01-19.

It has been drawn up by CLC/TC 59X.

If this draft becomes a European Standard, CENELEC 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.

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

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

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.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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

Contents

Page

European foreword

This document has been prepared by CLC/TC 59X “Performance of household and similar electrical appliances”.

This document is currently submitted to the Enquiry.

The following dates are proposed:

• latest date by which the existence of this document has to be announced at national level	(doa)	dor + 6 months
• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	dor + 12 months
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	dor + 36 months (to be confirmed or modified when voting)

1 Scope

This document applies to electric **forced convection ovens**, **steam cookers** and **combination ovens** for professional use.

These appliances are used in professional kitchens, such as restaurants, canteens, hospitals and in businesses such as butcher shops.

NOTE 1 These appliances are designed for one or more of the following cooking methods: blanching, frying, steaming, proofing, roasting, toasting, au gratin, sous vide cooking, etc

This document does not apply to:

— appliances that exclusively perform rethermalizing processes;

NOTE 2 Rethermalizing process is used for maintaining the temperature of hot food and for the warming of pre-cooked food (e.g. hot cupboard).

— pizza ovens;

— bakery ovens;

— static ovens;

— pressure steam ovens;

— appliances designed exclusively for industrial purposes.

The purpose is to define the principal performance characteristics of electric **forced convection ovens**, **steam cookers** and **combination ovens** for professional use and to describe the standard methods for measuring these characteristics.

This document does not deal with safety, food quality and or minimum performance requirements.

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 631-1, *Materials and articles in contact with foodstuffs - Catering containers - Part 1: Dimensions of containers*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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
forced convection oven
appliance intended for the cooking of food by heated air that is circulated by mechanical means within the **cooking chamber**

3.2
steam cooker
appliance intended for the cooking of food only by means of direct steam contact

Note 1 to entry: The pressure within the **cooking chamber** does not differ significantly from atmospheric pressure.

3.3
combination oven
appliance intended for the cooking of food either by means of direct steam contact or by heated air circulated by mechanical means within the **cooking chamber** or by combination of these two modes

Note 1 to entry: The pressure within the **cooking chamber** does not differ significantly from atmospheric pressure.

3.4
cooking chamber
interior of the appliance in which food products are cooked or processed

3.5
sensible heat
$Q_{sensible}$
heat which results in an increase in temperature and is therefore measurable

3.6
latent heat
Q_{latent}
heat which results in the phase change of the water during the cooking process

3.7
brick
test load not fitted with a temperature measuring sensor

3.8
M-brick
test load fitted with a temperature measuring sensor at its geometric centre

3.9
GN-container
chrome-nickel-steel container according to the dimensions of EN 631-1

3.10
volume fraction of water vapour
ratio between the water vapour partial pressure and atmospheric pressure in %

3.11
oxygen concentration sensor
electronic device that measures the proportion of oxygen

4 List of measurements

The performance and consumption characteristics are determined as follows:

— preheat-time measurement in convection mode in accordance with 8.2.1;

— time, energy and water consumption measurement with an empty appliance in convection mode in accordance with 8.2.2;

— time, energy, water consumption and water loss measurement with a loaded appliance in convection mode in accordance with 8.2.3;

— preheat-time measurement in steam mode in accordance with 8.3.2;

— time, energy and water consumption measurement with an empty appliance in steam mode in accordance with 8.3.4;

— time, energy, water consumption with a loaded appliance in steam mode in accordance with 8.3.5.

5 General conditions for measurements

5.1 General

The instructions for use regarding installation and use of the professional **combination oven** shall be followed, except if they stand in conflict with the requirements in this document. In this case with the requests of this standard, this document shall prevail.

All testing shall be performed on the same appliance.

Before commencing measurements, the **combination oven** shall be checked to ensure that it is operating properly.

All tests shall be started with the appliances at the ambient conditions in accordance with 5.2.

For all tests, the appliance shall be free-standing in the room without any excess coverage other than originally equipped. All protective surface cover foils shall be removed.

All sides of the **combination oven** shall have a minimum clearance of 0,5 m from any walls.

5.2 Ambient temperature

The following ambient conditions shall be maintained throughout the measurements.

— ambient temperature of the room: (23 ± 2) °C;

— air velocity max: 2 m/s.

The ambient temperature shall be measured and recorded during the test.

5.3 Electrical supply

The appliance is supplied at a voltage of 230 V or 400 V with a tolerance of ±2 % and shall be maintained at the appliance's terminal throughout the test and a frequency of 50 Hz with a tolerance of ±1 %.

It is recommended to use a stabilized power source.

The voltage and frequency shall be reported.

5.4 Water supply

The actual water temperature maintained during the tests shall be measured and recorded.

The temperature of the water supply shall be (15 ± 2) °C.

5.5 Instrumentation and quantities to be measured and calculated

All measurements shall be carried out with instruments that have been calibrated. The following measurement accuracies shall be met:

— thermocouple used for temperature measurement shall be flexible, insulated (no steel tube) and the thermocouple probe on the top of the thermocouple shall have a diameter from 0,5 mm to 3,0 mm. The thermocouple shall be made to an accuracy of ±1,5 K;

NOTE For example, type K class 1 or type T class 1 or 2 can be used.

— ambient temperature of the room: (23 ± 2) °C; temperature measurements, excluding the ones performed with thermocouple, shall be made to an accuracy of ±1 K;

— electrical energy shall be measured to an accuracy of ±1,5 % or ± 10 Wh, whatever is the greater;

— supply voltage shall be measured to an accuracy of ±0,5 %;

— frequency shall be measured to an accuracy of ±0,5 %;

— mass shall be measured to an accuracy of ±3 g;

— time interval measured shall be measured to an accuracy of ±1 s;

— for all continues measurements, the sampling shall be at least one value per 1 s;

— for Formulae (6) and (7) the time sampling shall be 1 s;

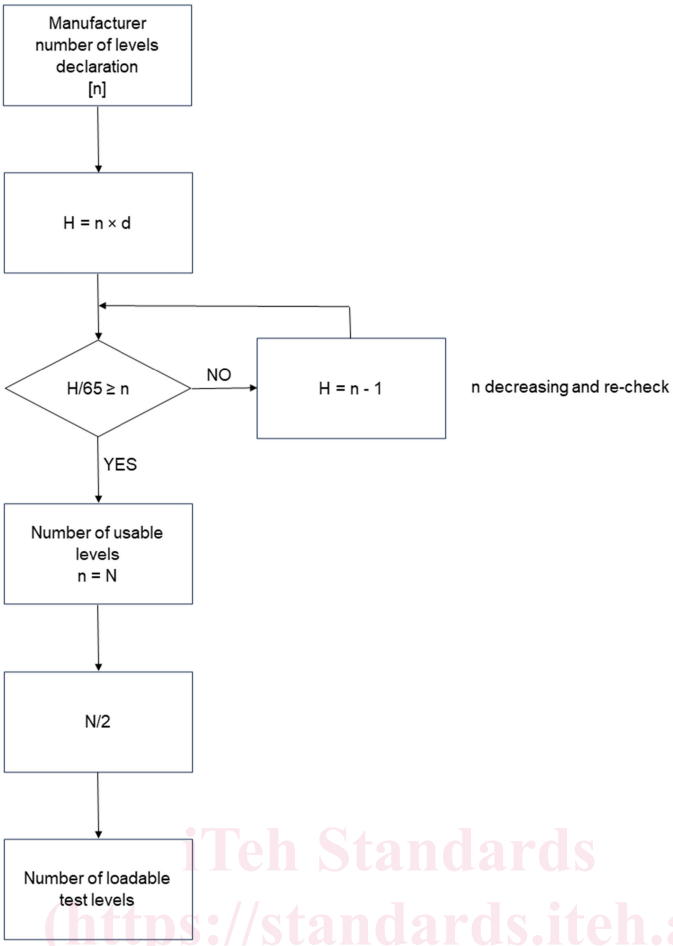
— **oxygen concentration sensor** and control board, for measuring the oxygen concentration inside the cavity to ensure the presence of saturated steam, having a range of oxygen concentration from 0,1 % O_2 to 25 % O_2, an uncertainty of ±0,5 % O_2.

— water consumption shall be measured with a range of flow rates of 0,1 - 5 l/min with an accuracy of ±3 % momentary value;

— altitude (m) shall be reported to an accuracy of ± 40 m.

6 Calculation of the number of loadable test level

For the identification of the loads to be used in the tests, number of loadable test levels (N) shall be determined as shown in Figure 1.



Key

n	the number of GN-container usable levels declared by the manufacturer
d	the average distance between the levels [mm]. (also the distance between the lowest level and the lower door opening frame is considered in the average calculation)
N	number of usable levels according to number of loadable test level verification
H	height parameter

Figure 1 — Number of loadable test level verification

Height parameter (H) is calculated by the Formula (1):

$$H = n \times d \quad (1)$$

7 Loading scheme

7.1 Number and position of GN-containers

For the test with a loaded appliance, **bricks** according to Annex A shall be used. The dry mass of each **brick** used shall be measured and recorded.

The test is carried out with **bricks** and **GN-containers**, with a depth of 20 mm. The weight of each **GN-container** shall be measured and recorded.

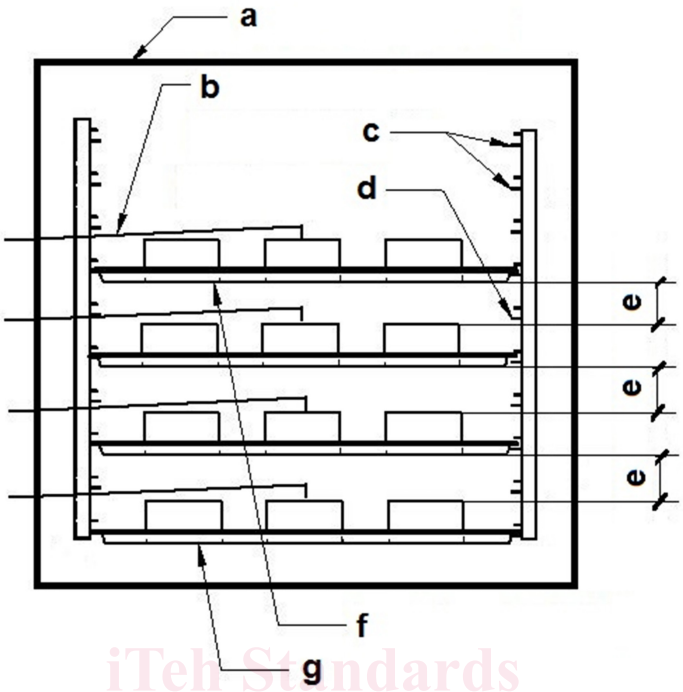
Usable **GN-containers**, shall be selected according to instructions for use:

— appliances intended for 2/3 **GN-containers**, shall be tested with one 2/3 **GN-container** per usable level;

188 — appliances intended for 2/3 **GN-containers**, shall be tested with one 2/3 **GN-container** per usable level;

189 — appliances intended for 2/1 **GN-containers**, shall be tested with one 2/1 **GN-container** per usable level.

190 An example of this loading scheme is given in Figure 2.



191

192 **Key**

- a Cavity opening
- b Thermocouple
- c Free levels
- d Empty level
- e ≥ 30mm
- f Last load
- g First load

193 **Figure 2 — Example of a loading scheme**

194 Starting from the lowest level the **GN-containers** are loaded using each level in order to assure a distance
195 equal or greater than 30 mm between the upper part of the **bricks** and the next **GN-container** to guarantee a
196 good airflow in-between. The **bricks** are arranged according to the layout defined in 7.2.

197 The number of **GN-containers** that shall be loaded is calculated as follow:

198 Number of loadable test levels = N / 2 (the result is rounded to integer removing the decimal part of the number)

199 ## 7.2 Number and position of M-bricks and bricks

200 To determine the core temperature of the **bricks M-bricks** shall be used.

201 **GN-container** GN 1/1 shall be equipped with one **M-brick** according Figure 3.