



SLOVENSKI STANDARD
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Measuring method of the energy consumption of gas fired ovens

Bestimmung des Energieverbrauchs von Gasbacköfen

Méthode de mesurage de la consommation d'énergie des fours a gaz

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ICS:

97.040.20	Measuring method of the energy consumption of gas fired ovens	Cooking ranges, working tables, ovens and similar appliances
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EUROPEAN STANDARD
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Measuring method of the energy consumption of gas fired ovens

Méthode de mesurage de la consommation d'énergie des
fours à gaz

Bestimmung des Energieverbrauchs von Gasbacköfen

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 15181:2008) has been prepared by Technical Committee CEN/TC 49 "Gas cooking appliances", the secretariat of which is held by UNI.

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of an identical text or by endorsement, at the latest by April 2009, and conflicting national standards shall be withdrawn at the latest by April 2009.

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 is suitable for direct comparison and is considered sufficiently reproducible within given limits for the purpose of energy labelling according to the European Union Directive 92/75/EEC on "Indication by labelling and standard product information of the consumption of energy and other resources by household appliances".

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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Introduction

The object of this European Standard is to specify, in accordance with the European Union Directive 92/75/EEC on "Indication by labelling and standard product information of the consumption of energy and other resources by household appliances":

- energy consumption using a standardised load during a standardised procedure;
- some performance characteristics (like volume...);
- permitted tolerances to values declared by the manufacturer and control procedures for checking the declared values.

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1 Scope

This standard specifies the method of test for determining the gas energy consumption in gas-fired domestic ovens when they are being used in one or more of the oven cooking modes defined in 3.1. It applies to the gas-fired domestic ovens which are capable of utilising gases of group H or group E, possibly after conversion according to manufacturer's instructions.

It applies to these gas-fired domestic ovens, whether they are separate appliances or component parts of domestic cooking appliances.

It also applies to domestic appliances that can utilise gas and/or electrical energy to provide heat for cooking when the ovens are utilising gas energy to provide heat for cooking, but not when electric energy is used to provide any or all of the heat for cooking in the oven.

It is not applicable to:

- microwave combination ovens;
- small cavity ovens (3.2);
- ovens without adjustable temperature control;
- cooking modes others than defined in 3.1.1 and 3.1.2;
- ovens connected to a chimney in which the gas energy for cooking also, by design, provides space and/or water heating;
- appliances designed for use with gases of the third family only.

This standard is concerned neither with safety nor with performance requirements.

2 Normative references

The following referenced documents are indispensable for the application 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 30-1-1:2008, *Domestic cooking appliances burning gas fuel – Part 1-1: Safety – General*

EN 30-1-2:1999, *Domestic cooking appliances burning gas – Part 1-2: Safety – Appliances having forced-convection ovens and/or grills*

EN 30-1-4:2002, *Domestic cooking appliances burning gas – Part 1-4: Safety – Appliances having one or more burners with an automatic burner control system*

EN 60584-2, *Thermocouples – Part 2: Tolerances (IEC 60584-2:1982)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 30-1-1:2008, EN 30-1-2:1999 or EN 30-1-4:2002 and the following apply.

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NOTE EN 30-1-1:2008, EN 30-1-2:1999 or EN 30-1-4:2002 apply if the appliance falls within the scope of that standard.

3.1 oven cooking modes

3.1.1 conventional oven cooking mode

operation of the oven for cooking roasts, pastry, etc., in which the transmission of heat is achieved by natural convection and radiation

3.1.2 forced-convection oven cooking mode

operation of the oven for cooking roasts, pastry, etc., in which the transmission of heat by convection is assisted by means of a fan

3.2 small cavity ovens

oven with the following dimensions related to the usable volume:

- both width and depth < 250mm
- or height < 120 mm

NOTE The definition of small cavity ovens in this standard is due to the size of the artificial standard load.

3.3 multiple cavity appliances

appliance that has more than one separate oven cavity in which food is cooked and which can be controlled independently, but cannot be installed separately

3.4 auxiliary electrical energy

electrical energy consumption (during the brick test) of any electric components that cannot be switched off from the control panel by the user when using the oven in accordance with the manufacturer's instructions

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4 List of measurements

4.1 Dimensions

Dimensions of the useful oven volume (see Clause 6).

4.2 Energy consumption and heating time

Heating of the load (see Subclause 7.2).

5 General conditions for measurements

5.1 General

According to good laboratory practice, before installation, it shall be checked that the appliance is free from damage and complies with 6.1.1: leakage, of EN 30-1-1:2008, EN 30-1-2:1999 or EN 30-1-4:2002, as applicable.

The manufacturer's instructions regarding installation of the oven shall be followed.

Prior to every test the whole appliance (this includes the material and the insulation) shall be at ambient temperature. In multiple cavity appliances each oven cavity has to be measured separately. Only the cavity measured shall be switched on.

In case an oven has several cooking modes as described in Clause 3, the manufacturer can choose the variant to be tested. This has to be reported (see Clause 8).

Unless otherwise specified, measurements are conducted under the following conditions:

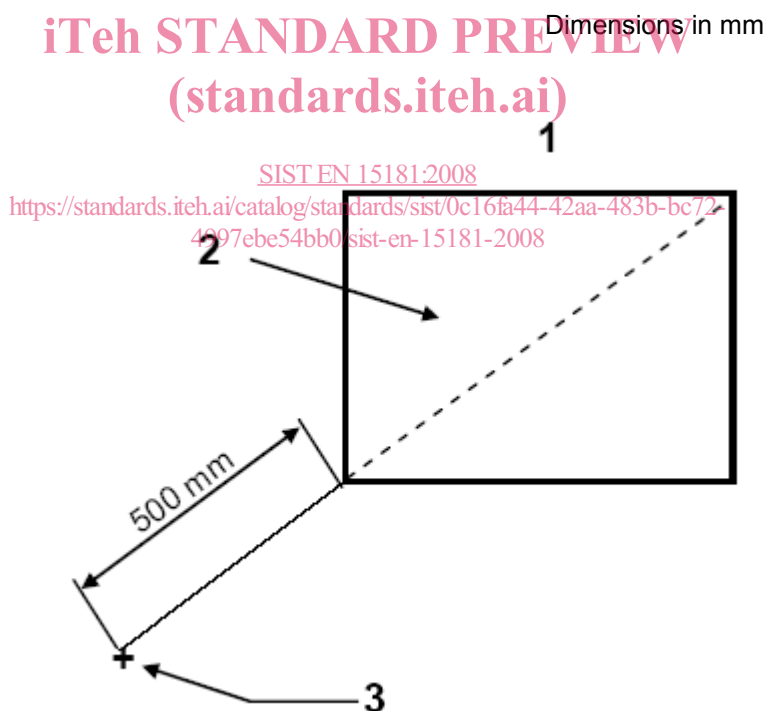
5.2 Ambient temperature

The tests are carried out in a substantially draught-free room in which the ambient temperature is maintained at (23 ± 2) °C during the complete test.

NOTE A change in the ambient temperature of the room during the test could affect the results. Care should be taken during the test to ensure that the ambient temperature is as steady as possible.

This ambient temperature is measured at a point that is at the same height as the centre of the useful oven volume of the oven cavity and at a distance of 0,5 m diagonally from one of the front edges of the appliance, see Figure 1.

The measurement of the ambient temperature shall not be influenced by the oven itself or by any other appliance.



Key

- 1 top view
- 2 oven
- 3 thermocouple

Figure 1 - Position of the thermocouple

EN 15181:2008 (E)**5.3 Test gases and test pressures**

The appliance is fitted with the appropriate injector(s) for utilisation of gas group H or gas group E. The primary air adjuster, if any, shall be adjusted according to the technical instructions.

The appliance is then supplied with G 20, with a composition of at least 95 % methane, at a pressure of 20 mbar.

5.4 Electrical supply

The supply voltage shall be maintained at 230 V \pm 1%. The supply frequency shall be at 50Hz \pm 1%.

5.5 Load

The load for test 7.2 shall be a brick with two holes for temperature measurements as shown in Annex A.

A new brick shall be dried before using it for the first time in forced air circulation in an oven of about 50 l volume at ≥ 175 °C for three hours. No more than two bricks shall be dried at the same time in the same oven.

The mass m_d of the completely dry brick without thermocouples shall be measured within 5 min after removal from the oven and shall be noted in grams. The dry mass m_d shall be in accordance with the dry mass specified in Annex A. The brick shall be identified with a reference number for accurate calculation of the water absorption according to 7.2.2.

Place markings 32 mm from the measuring point of the two thermocouples with steel tube and insert the thermocouples into the holes until the marking matches with the surface of the brick. The thermocouples shall be fixed to ensure that the measuring points remain at a depth of 32 mm during the whole test procedure.

NOTE 1 The weighing machine should be protected from the effects of the hot brick.

NOTE 2 The thermocouples may be fixed by means of a droplet of silicon glue at the surface of the brick or by other suitable means.

NOTE 3 Care should be taken that the measuring point is the first contact point of the two thermowires.

NOTE 4 Between test series the brick should be stored in a refrigerator, preferably not soaked with water. The brick soaking water should be kept (to reduce dissolving processes); i.e. re-use of the brick storage water. A brick that has already been soaked in water needs at least eight hours to dry out as described above.

NOTE 5 Due to the porosity of the brick care should be taken that the holes of the brick are not enlarged if the thermocouples are removed and reinserted.

NOTE 6 A brick can be used for about 20 tests when handled with normal care.

5.6 Instrumentation

Air temperature measurements in the empty oven are made with a thermocouple with a welded point (not with a black copper plate), class 1, type K.

Room temperature measurements are made with a thermocouple, class 1, type T.

NOTE 1 Other types of thermocouple may be used for the measurement of room temperatures provided they are known to provide equivalent or better accuracy and reproducibility than a type T.

Temperature measurements in the load are made with two thermocouples with 1 mm steel tube diameter, class 1, according to EN 60584-2. The thermocouple shall be accurate to $\pm 1,5$ K.

NOTE 2 The steel tube of the thermocouple eases the insertion of the thermocouple into the brick. See also NOTE 2 in 5.5.

The temperature measurement system excluding the thermocouple shall be accurate to $\pm 1,0$ K.

The determination of the heat input and the consumption shall be made at an accuracy as defined in EN 30-1-1:2008, Subclause 7.3.1.2.1.1.

The equipment used shall be capable of measuring the following parameters with the specified accuracies:

- Auxiliary electrical energy within $\pm 1,5$ % or ± 10 Wh of the measured value, whichever is the greater;
- Voltage within $\pm 0,5$ %;
- Frequency within $\pm 0,5$ %;
- Mass within ± 3 g;
- Time within ± 5 s.

5.7 Positioning of the appliance

The appliance shall be installed according to the manufacturer's instructions and in accordance with 7.1.3.2 of EN 30-1-1:2008, EN 30-1-2:1999 and EN 30-1-4:2002, as applicable.

5.8 Auxiliary electrical energy

The auxiliary electrical energy as defined in Subclause 3.4 is measured during the brick test (Subclause 7.2.3). The measurement is taken over the same period of time as the gas consumption measurement at the temperature $\Delta T_2^{i\dots}$ of Table 1.

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6 Useful oven volume

The useful oven volume is measured in accordance with 3.4.3.12 of EN 30-1-1:2008.

The useful volume is rounded to the nearest whole litre.

7 Energy consumption and time

7.1 Measurement of oven temperature

The oven temperature of each cooking mode as appropriate (see Clause 3) shall be measured separately. During the test only one cooking mode (see Clause 3) shall be used.

The air temperature in the empty oven is measured with a thermocouple according to 5.6 fixed to the grid which is delivered with the oven and placed in the oven in a way that the welded point of the thermocouple is located at the centre of the useful volume of the oven with a distance of at least 30 mm from the grid.

7.2 Energy consumption and time for heating a load

7.2.1 Purpose

The purpose of this test is to measure the energy consumption and the time for heating a load. The load is a water saturated brick as defined in 7.2.2 which simulates both the thermal properties and the water content of food (e.g. meat).