

# Methods of measuring the energy consumption of electric mains operated household refrigerators, frozen food storage cabinets, food freezers and their combinations, together with associated characteristics

The European Standard EN 153:2006 has the status of a British Standard

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## National foreword

This British Standard was published by BSI. It is the UK implementation of EN 153:2006. It supersedes BS EN 153:1996 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee RHE/5, Household refrigerators and food freezers.

A list of organizations represented on RHE/5 can be obtained on request to its secretary.

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**Methods of measuring the energy consumption of electric mains operated household refrigerators, frozen food storage cabinets, food freezers and their combinations, together with associated characteristics**

Méthodes de mesure de la consommation d'énergie électrique et des caractéristiques associées des réfrigérateurs, conservateurs de denrées congelées et congélateurs ménagers et de leurs combinaisons

Verfahren zur Messung der Aufnahme elektrischer Energie und damit zusammenhängender Eigenschaften für netzbetriebene Haushalt-Kühlgeräte, Tiefkühlgeräte, Gefriergeräte und deren Kombinationen

This European Standard was approved by CEN on 28 December 2005.

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## **Foreword**

This European Standard (EN 153:2006) has been prepared by Technical Committee CEN/TC 44 "Household refrigerating appliances and commercial refrigeration equipment", 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of an identical text or by endorsement, at the latest by August 2006, and conflicting national standards shall be withdrawn at the latest by August 2006.

This European Standard supersedes EN 153:1995.

The significant changes compared to the document to be revised are the following:

- rated voltage to test the refrigerating appliances is changed from 220 V to 230 V;
- correction formula on the energy consumption measured value within the specified range of test temperature is changed from 24,5 °C to 25,5 °C;
- addition of a normative annex on built-in refrigerating appliances;
- addition of reference to Directives 94/2/EC and 92/75/EEC;
- editorial modifications to be consistent with EN ISO 15502.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, 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 United Kingdom.

## Introduction

Energy saving is the most important parameter in the European plans for the reduction of the greenhouse effect. It is necessary to assess the energy saving by standardised methods of measurement of the energy consumption and of its associated characteristics.

In this context, reference to this European Standard is mentioned in the Commission's Directive 94/2/EC of 21 January 1994 as amended by Commission Directive 2003/66/EC of 3 July 2003[1] implementing Council Directive 92/75/EEC[2] with regard to energy labelling of household electric refrigerators, freezers and their combinations. This European Standard specifies the test method to be applied in accordance with these Directives. It also defines permitted tolerances to values declared by the manufacturer and control procedures for checking these declared values.

For household refrigerators, household frozen food storage cabinets and their combinations these methods are specified in EN ISO 15502. As EN ISO 15502 has a wider field of application, the revision of EN 153:1995 has become necessary to conform its requirements to the European Legislation on rational use of energy.

## **1 Scope**

This European Standard specifies the methods for measuring the energy consumption of electric mains operated household refrigerating appliances, together with associated characteristics.

This European Standard is not concerned with safety.

## **2 Normative references**

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 15502:2005, *Household refrigerating appliances – Characteristics and test methods (ISO 15502:2005)*

## **3 Terms and definitions**

For the purposes of this European Standard, terms and definitions given in EN ISO 15502:2005 apply.

## **4 Classification and symbols**

For the purposes of this European Standard, the classification and symbols given in Clause 4 of EN ISO 15502:2005 apply.

## **5 Design**

For the purposes of this European Standard, 5.1 and 5.6 of EN ISO 15502:2005 shall apply.

## **6 Storage temperatures**

For the purposes of this European Standard, Clause 6 of EN ISO 15502:2005 shall apply.

## **7 Determination of linear dimensions, volumes and areas**

For the purposes of this European Standard, Clause 7 of EN ISO 15502:2005 shall apply.

## **8 General test conditions**

For the purposes of this European Standard, Clause 8 of EN ISO 15502:2005 shall apply except for the following:

8.2 b): to be replaced by the following text:

b) for checking the energy consumption and if any temperature rise time, freezing capacity and ice-making capacity of all refrigerating appliances:

+25 °C for classes SN, class N, class ST and class T refrigerating appliances.

NOTE This is to enable direct comparison between all climate class refrigerating appliances.

8.6.3.1: to be replaced by the following text:



The refrigerating appliance with a rated voltage within the range between 220 V and 240 V shall be tested at 230 V  $\pm 1$  % with a frequency of 50 Hz  $\pm 1$  %.

### 9 Testing the air-tightness of door, lid or drawer seal(s)

For the purpose of this European Standard, Clause 9 of EN ISO 15502:2005 does not apply.

### 10 Testing the opening force of doors or lids

For the purpose of this European Standard, Clause 10 of EN ISO 15502:2005 does not apply.

### 11 Testing the durability of doors, lids and drawers

For the purpose of this European Standard, Clause 11 of EN ISO 15502:2005 does not apply.

### 12 Testing the mechanical strength of shelves and similar components

For the purpose of this European Standard, Clause 12 of EN ISO 15502:2005 does not apply.

### 13 Testing the storage temperatures

For the purposes of this European Standard, Clause 13 of EN ISO 15502:2005 shall apply.

### 14 Water vapour condensation test

For the purposes of this European Standard, Clause 14 of EN ISO 15502:2005 does not apply.

### 15 Energy consumption test

For the purposes of this European Standard, Clause 15 of EN ISO 15502 shall apply except for the following:

15.1 *Note to 15.1 shall be deleted*

#### 15.2.1 Replacement

The ambient temperature shall be in accordance with 8.2.

When the measured ambient temperature deviates from the nominal (+ 25 °C) ambient temperatures up to  $\pm 0,5$  K, the following first order correction on the measured energy consumption shall be made:

$$P^{corr} = P^{meas} \left[ \sum_{i=1}^n \frac{(25 - t_i) V_i}{(t_{aa} - t_i) V} \right]$$

where

$P$  is the energy consumption [kW/24h];

$t_i$  is the nominal compartment temperature, e.g. 5 °C (see Table 4);

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$V_i$  is the net volume compartment  $i$  [ $\text{dm}^3$ ];

$V$  is the total net volume [ $\text{dm}^3$ ];

$t_{aa}$  is the measured ambient temperature.

### 16 Temperature rise test

For the purposes of this European Standard, Clause 16 of EN ISO 15502:2005 shall apply.

### 17 Freezing test

For the purposes of this European Standard, Clause 17 of EN ISO 15502:2005 shall apply.

### 18 Ice-making test

For the purposes of this European Standard, Clause 18 of EN ISO 15502:2005 shall apply.

### 19 Final test report

For the purposes of this European Standard, Clause 19 of EN ISO 15502:2005 is replaced by the following text:

The final test report shall comprise the measurements and test results of the following:

- a) overall space required in use;
- b) total gross volume(s) (see Clause 7);
- c) storage volume(s) (see Clause 7);
- d) total storage volume (see Clause 7);
- e) defrosting type for each compartment, except for frost free refrigerating appliances;
- f) storage temperature test (see Clause 13);
- g) energy consumption test (see Clause 15);
- h) temperature rise test (see Clause 16);
- i) freezing test (see Clause 17);
- j) ice-making test (see Clause 18).

### 20 Designation

For the purposes of this European Standard, Clause 20 of EN ISO 15502:2005 shall apply.

### 21 Marking

For the purposes of this European Standard, Clause 21 of EN ISO 15502:2005 shall apply.

## **22 Technical and commercial product information**

For the purposes of this European Standard, Clause 22 of EN ISO 15502:2005 shall apply.

## **23 Instructions for users**

For the purposes of this European Standard, Clause 23 of EN ISO 15502:2005 shall apply.

**Annex A**  
(informative)

**Particular conditions for various countries**

For the purpose of this European Standard, Annex A of EN ISO 15502:2005 does not apply.

**Annex B**  
(informative)

**Percentage running time**

For the purpose of this European Standard, Annex B of EN ISO 15502:2005 applies.

**Annex C**  
(informative)

**Test for absence of odour and taste**

For the purpose of this European Standard, Annex C of EN ISO 15502:2005 does not apply.

## **Annex D** **(normative)**

### **Built-in refrigerating appliances**

Refrigerating appliances intended only for building-in or for placing under a counter or under a worktop, or between cabinets (under-counter types), shall be built-in or placed in a test enclosure of dull black painted, approximately 20 mm thick, plywood, with door(s) dimensions in accordance to manufacturer's specifications. If a manufacturer requires a facia door, it shall be fitted.

The inner dimensions of the test enclosure shall comply with the manufacturer's instructions.

If a range of dimensions are given, than the smallest values are used.

If this data is not given, the inner dimensions of the test enclosure are as follows:

The inner depth to exceed by 20 mm to 50 mm the overall depth of the refrigerating appliance, and shall not be more than 550 mm.

The inner width to exceed by 4 mm to 6 mm the overall width of the refrigerating appliance.

The inner height to exceed by 2 mm to 4 mm the overall height of the refrigerating appliance.

If necessary, the test enclosure shall be provided with ventilating openings according to the manufacturer's instructions.

The refrigerating appliance shall be built-in or placed in the test enclosure according to the manufacturer's instructions such that only its door projects beyond the front edges of the enclosure.

If the refrigerating appliance is provided with spacers, strips or other special means of solid or resilient material for closing the gap between the contours of the refrigerating appliance and the cabinet or enclosure, these means shall be used accordingly. If such means are not provided, the gaps between the test enclosure and the refrigerating appliance are left open.

The back partition shall be in close contact with the side of the test enclosure in such a way to prevent unintended airflow.

NOTE This may require adhesive tape or sealing compound.

## **Annex E** (normative)<sup>1)</sup>

### **Rated characteristics and control procedure**

#### **E.1 Volumes and areas**

##### **E.1.1 Rated gross volume**

The measured value according to Clause 7 of EN ISO 15502:2005 shall not be less than the rated value by more than 3 % or 1 l, whichever is the greater value.

##### **E.1.2 Rated storage volume**

The measured value according to Clause 7 of EN ISO 15502:2005 shall not be less than the rated value by more than 3% or 1 l, whichever is the greater value. Where the volumes of the cellar compartment and fresh food storage compartment are adjustable relative to one another by the user, this requirement applies when the cellar compartment is adjusted to its minimum volume.

##### **E.1.3 Rated storage shelf area**

The measured storage shelf area according to Clause 7 of EN ISO 15502:2005, including that of any cellar and chill compartment, shall not be less than the rated storage shelf area by more than 3 %.

##### **E.1.4 Control procedure**

If the requirements of E.1.1, E.1.2 or E.1.3 are not met on a single refrigerating appliance the measurements shall be made on a further three randomly selected refrigerating appliances.

The arithmetical mean of the measured values of these three refrigerating appliances shall be in accordance with the requirements of E.1.1, E.1.2 or E.1.3.

#### **E.2 Performance characteristics**

NOTE The editing committee realise that there was no control procedure as is the case for the other performance characteristics in Annex C and therefore have added the following text of C.2.1.

##### **E.2.1 Storage temperatures**

The values measured in accordance with Clause 13 of EN ISO 15502:2005 on the first refrigerating appliance tested shall comply with requirements in Table 2 of EN ISO 15502:2005.

If any result of the test carried out on the first refrigerating appliance is outside the specified values, the test shall be carried out on a further three randomly selected refrigerating appliances.

All the values on these three refrigerating appliances tested shall comply with requirements in Table 2 of EN ISO 15502:2005.

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1) Annex E (informative) "Rated characteristics and control temperature" of EN ISO 15502 has become normative.



### **E.2.2 Freezing capacity**

The value measured in accordance with Clause 17 of EN ISO 15502:2005 on the first refrigerating appliance tested shall not be less than the rated value by more than 15 %.

If the result of the test carried out on the first refrigerating appliance is less than the rated value minus 15 %, the test shall be carried out on a further three randomly selected refrigerating appliances.

The arithmetical mean of the values of these three refrigerating appliances shall be equal to or greater than the rated value minus 10 %.

The value obtained either on the first refrigerating appliance tested or the arithmetical mean value obtained on a further three refrigerating appliances shall be in accordance with the minimum values stated in Clause 17 of EN ISO 15502:2005.

### **E.2.3 Energy consumption**

The value measured shall not be greater than the rated value by more than 15 %.

If the result of the test carried out on the first refrigerating appliance is greater than the rated value plus 15 %, the test shall be carried out on a further three randomly selected refrigerating appliances.

The arithmetical mean of the values of these three refrigerating appliances shall be equal to or less than the rated value plus 10 %.

### **E.2.4 Ice making**

The measured value shall not be less than the rated value by more than 15 %.

If the value obtained from the first test is less than the rated value minus 15%, the test shall be carried out on a further three randomly selected refrigerating appliances.

The arithmetical mean of the values of these three refrigerating appliances shall be equal to or greater than the rated value minus 10 %.

### **E.2.5 Temperature rise time**

The measured value in accordance with Clause 16 of EN ISO 15502:2005 shall not be shorter than the rated value by more than 15 %.

If the result of the test on the first refrigerating appliance is less than the rated value minus 15 %, the test shall be carried out on a further three randomly selected refrigerating appliances. The arithmetical mean of the values of these three refrigerating appliances shall be equal to or greater than the rated value minus 10 %.

## Bibliography

- [1] Commission Directive 2003/66/EC of 3 July 2003 amending Directive 94/2/EC implementing Council Directive 92/75/EEC with regard to energy labelling of household electric refrigerators, freezers and their combinations – Official Journal L 170, 09/07/2003 P. 0010-0014
- [2] Commission Directive 94/2/EC of 21 January 1994 implementing Council Directive 92/75/EEC with regard to energy labelling of household electric refrigerators, freezers and their combinations – Official Journal L 045, 17/02/1994 P. 0001-0002



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