BRITISH STANDARD

BS EN
12875-1:2005

Mechanical dishwashing resistance of utensils —

Part 1: Reference test method for domestic articles

The European Standard EN 12875-1:2005 has the status of a British Standard

ICS 67.250; 97.040.40; 97.040.60

BSI
British Standards

National foreword

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Spülmaschinenbeständigkeit von Gegenständen - Teil 1: Referenz-Prüfverfahren für Haushaltswaren

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Contents

Foreword

This European Standard (EN 12875-1:2005) has been prepared by Technical Committee CEN/TC 194 “Utensils in contact with food”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by November 2005, and conflicting national standards shall be withdrawn at the latest by November 2005.

This document supersedes ENV 12875-1:1998.

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, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

This European Standard specifies a test method for the determination of the mechanical dishwashing resistance of domestic articles. The results obtained according to this document are intended to serve for comparison purposes for the dishwashing resistance of the different domestic articles and give an indication of resistance only under the standard conditions of this test.

The dishwasher test method described in this document is both time consuming and expensive. However, no single accelerated and inexpensive test is available which gives comparable results to the dishwasher test for the whole variety of utensils made of various materials which are cleaned in dishwashers. The test method described here is to be used as a reference method for dishwashing resistance.

Accelerated test methods may be used instead of the reference test method provided that valid comparison to the dishwasher test is shown.

NOTE Consideration should be given to the normal use of each type of domestic article and its normal frequency of mechanical dishwashing.

Further parts of EN 12875, under the general title *Mechanical dishwashing resistance of utensils*, that have already been published or are in preparation are as follows:

Part 2*: Inspection of non-metallic articles*

Part 4: *Rapid test for domestic ceramic articles*

Part 5*: Rapid test for ceramic catering articles*

1 Scope

This European Standard specifies a method for testing the resistance of domestic articles made from ceramic, glass, glass ceramic, vitreous enamel, metal and plastics under the combined chemical, thermal and mechanical stresses of mechanical dishwashing in domestic dishwashers.

It specifies a reference test method for domestic dishwashing only. It does not define the number of dishwashing cycles which any given product shall withstand.

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 60335-1, Safety of *household and similar electrical appliances - Part 1: General requirements (IEC 60335-1: 2001 Modified)*

EN 60335-2-5, Safety of *household and similar electrical appliances - Part 2-5: Particular requirements for dishwashers (IEC 60335-2-5: 1992, modified)*

IEC 60436, *Electric dishwashers for household use - Methods for measuring the performance*

ISO 6059, *Water quality – Determination of the sum of calcium and magnesium – EDTA titrimetric method*

ISO 8288, *Water quality – Determination of cobalt, nickel, copper, zinc, cadmium and lead – Flame atomic absorption spectrometric methods*

ISO 9297, *Water quality – Determination of chloride – Silver nitrate titration with chromate indicator (Mohr's method)*

3 Terms and definitions

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

3.1
dishwashing resistance
ability of the article to withstand a number of test cycles without significant changes

3.2
test dishwasher
special domestic dishwashing machine, which washes, rinses and dries articles, and which simulates the mean stresses of a domestic dishwashing machine

3.3
test cycle
series of operations for the washing, rinsing and drying of the articles

3.4
basket
rack or partitioned container for placing articles in a test dishwasher

3.5
cleaning agent
mixture of chemicals for use in a dishwasher for improvement of its soil removal capability

3.6
cleaning agent dispenser, automatic
device which dispenses a defined portion of cleaning agent at the appropriate time during the test cycle

3.7
rinse agent
mixture containing reagents which lower the surface tension, normally added to improve the drying effect and reduce the precipitation of salts

3.8
rinse agent dispenser
device from which a defined volume of rinse agent is automatically dispensed at the appropriate time during the test cycle

3.9
water softener
device which reduces the hardness of water by a cation exchange system

3.10
normal corrected vision
naked eye corrected to normal vision if necessary

NOTE This is usually by the wearing of spectacles.

4 Principle

Unused articles are repeatedly exposed to a standardized test cycle in a test dishwasher which simulates usual household dishwashing machines. The test dishwasher is a machine in which a washing cycle consists of several partial steps: pre-wash, a cleaning step using alkaline cleaner, an intermediate rinse step, and the final rinse during which a rinse aid is added. The washing cycle is followed by a drying step.

The test dishwasher is fully loaded.

After testing the articles are inspected for deviations from the original according to the conditions specified in the relevant standards for various groups of products.

5 Reagents

5.1 Water

The used water shall be drinking water and shall have a temperature of (15 ± 5) °C. It shall be softened by the cation exchanger as specified in 6.1.

NOTE 1 Attention is drawn to EU directive 80/778/EEC and any national legislation relating to drinking water.

For testing metal articles, the chloride ion content shall not exceed 150 mg l^{-1} when determined in accordance with ISO 9297.

For testing plastics articles, the copper content shall not exceed 0,03 mg l^{-1} when determined in accordance with ISO 8288.

NOTE 2 A higher copper content results in a noticeable yellowing of plastics.

5.2 Cleaning and rinse agents

For the purpose of this test, cleaning detergent A containing phosphate, and the acidic rinse agent formula II, as given in IEC 60436, shall be used.

6 Features of the test dishwasher

6.1 Water softener (cation exchanger), which shall be controlled to give a water hardness $c(Ca^{2+} + Mg^{2+})$ of between 0,3 mmol/l[1)] and 0,6 mmol/l[2)] , when tested in accordance with ISO 6059.

6.2 Heat supply sufficient to provide the heating rate specified in 8.3.c).

6.3 Constant water quantity for each washing cycle of (6,0 ± 0,5) l, with a water pressure of between 5 N/cm^2 and 100 N/cm^2.

6.4 Automatic proportioning devices to deliver the required amount of cleaning and rinse agents in each test cycle.

6.5 Automatic fully opening door or means of reducing temperature and humidity at an equivalent rate following completion of the washing cycle.

6.6 Thermostat with an accuracy of ± 1 °C.

6.7 Automation to the effect that the complete washing cycle specified in 8.3 is performed and repeated automatically.

6.8 Counter which records the number of washing cycles.

6.9 For safety the dishwasher shall comply with EN 60335-1 and EN 60335-2-5.

7 Test specimens

For each article a sufficient number of unused specimens of identical shape, size and surface finish shall be tested and further specimens shall be retained for reference.

NOTE It is recommended that at least three test specimens are tested in order to obtain representative results.

The specimens shall be free of surface contamination, e.g. by washing by hand in a mild liquid detergent at about 45 °C. The specimens shall be examined for any quality defects, and these shall be noted.

8 Procedure

8.1 Preparation of test dishwasher

When testing metal articles, after each regeneration of the ion exchanger with sodium chloride, run one test cycle (see 8.3) with no test specimens.

8.2 Loading the test dishwasher

The test dishwasher shall be fully loaded, using dummy articles to fill excess capacity if necessary. Each specimen shall be placed in the appropriate basket making sure that the specimens will not come into contact with each other during testing. All surfaces shall be equally exposed to the water spray, and the specimens shall be positioned in a way that avoids the formation of water pools. It is permissible to simultaneously wash several different types of domestic articles of ceramic, glass, metal or plastics.

NOTE The risk of interaction between different materials should be considered. Where there is such a risk, such specimens should not be tested together.

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1) 1 mmol/l = 5,6 °DH or 1 °DH = 0,1786 mmol/l.

2) 1 mmol/l = 5,6 °DH or 1 °DH = 0,1786 mmol/l.

If it is necessary to withdraw a test specimen during the test, it shall be replaced by a similar article.

8.3 Test cycle

The test cycle shall comprise the following stages.

a) Draining the dishwasher by pump.

b) Pre washing the test specimens in the dishwasher by:

   1) filling the dishwasher with water (see 5.1);

   2) circulating the water for (5 ± 0,5) min;

   3) draining the dishwasher by pump.

c) Washing the test specimens in the dishwasher by:

   1) filling the dishwasher with water and (24 ± 3) g cleaning agent (see 5.2) per (6,0 ± 0,5) litres of water;

   2) heating to (60 ± 2) °C while circulating the water and cleaning agent for (20 ± 1) min;

   3) circulating the water and cleaning agent for a further (10 ± 1) min without heating;

   4) draining the dishwasher by pump.

d) Intermediate rinsing the test specimens in the dishwasher by:

   1) filling the dishwasher with water;

   2) circulating the water for (3 ± 0,5) min;

   3) draining the dishwasher by pump.

e) Final rinsing the test specimens in the dishwasher by:

   1) filling the dishwasher with water;

   2) heating to (65 ± 2) °C while circulating the water;

   3) measuring when a temperature of between 40 °C and 45 °C has been reached, and adding between 2,5 g and 3,0 g of rinse agent (see 5.2) per (6,0 ± 0,5) litres of water.

   4) measuring when a temperature of (65 ± 2) °C has been reached and draining the dishwasher by pump.

f) Drying the test specimens in the dishwasher by retaining them in the dishwasher for:

   1) (10 ± 1) min with the door closed;

   2) (30 ± 1) min with the door open.

8.4 Parameter control

The parameters of the test cycle listed below shall be verified before starting the first test cycle and after every 50th test cycle.

a) Heating rates and maximum temperatures as defined in [8.3 c) 2)] and [8.3 e) 2)].

b) Water hardness before and after the water softener (cation exchanger) (see 6.1) by determination of the sum of calcium and magnesium using the procedure outlined in ISO 6059.

c) Proper function of the automatic feeding devices for the cleaning agent and the rinse agent, making sure that no cleaning agent is carried over;

d) Proper function of the other parts of the equipment.

e) Absence of deposits on the test specimens. If deposits are present on the whole charge, the operation of the test dishwasher shall be examined.

If a deposit is visible on the test specimens or on the interior surface of the test dishwasher, which gives an indication of irregularities in the process, the specimens shall be dipped - outside the dishwasher - for a period of one minute in a 10 % citric acid solution at about 50 °C. To clean the dishwasher, a test cycle as described in 8.3, using a citric acid solution instead of the cleaning agent, shall be carried out.

NOTE It is recommended that a set of items of known performance is provided for use as reference for checking the consistency of test conditions.

8.5 Number of test cycles

Subject specimens to at least 125 test cycles, and then multiples of 250 cycles.

9 Expression of results

9.1 General

After the number of test cycles have been completed (see 8.5) and the elimination of minor deposits (see 9.2), the specimens are inspected. For inspection conditions and inspection criteria, see 9.3 and 9.4 respectively.

9.2 Elimination of minor deposits

Before inspection, easily removable deposits shall be eliminated by suitable means.

EXAMPLE Wiping with a cloth and/or a one minute dip in 10 % citric acid at about 50 °C.

9.3 Inspection conditions

The inspection site shall:

a) be protected from external light, and illuminated vertically by a diffuse daylight (3 500 to 4 500) K lamp yielding (1 000 to 1 500) lx near the specimens;

b) show grey colour and a dull surface finish on all surfaces exposed to the artificial light;

c) have sufficient table area to accommodate all of the specimens of one type simultaneously.

The inspection shall be carried out with normal corrected vision from a distance of (30 ± 10) cm, while the viewing angle is changed.

9.4 Inspection criteria

The results shall be expressed according to the requirements specified for the various groups of products.

10 Test report

The test report shall contain:

a) reference to this document, i.e. EN 12875-1:2005;

b) identification of the articles tested (description), e.g. type, origin and designation of the manufacturer or supplier of the specimens;

c) place and date of sampling;

d) date of receipt and date of testing of the specimens;

e) number of each type of test specimen;

f) water hardness;

g) number of test cycles;

h) test results and number of test cycles at which failure occurred;

i) any unusual features noted during the determination;

j) any other observations relevant to the test results.

Bibliography

EU Directive

80/778/EEC, *Council Directive of 15 July 1980 relating to the quality of water intended for human consumption*

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