



**SLOVENSKI STANDARD**  
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**Stroji za izdelavo sladoleda - Zahtevane lastnosti in poraba energije**

Artisan Gelato and ice cream machinery - Performance characteristics and energy consumption

Maschinen für handwerklich hergestelltes Eis und Speiseeis - Bestimmung von Leistungsmerkmalen und Energieaufnahme

Machines à glace artisanale et crème glacée - Caractéristiques de performance et consommation d'énergie

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**ICS:**

27.010	Prenos energije in toplote na splošno	Energy and heat transfer engineering in general
67.260	Tovarne in oprema za živilsko industrijo	Plants and equipment for the food industry

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**en,fr,de**

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EUROPEAN STANDARD

EN 16754

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## Artisan Gelato and ice cream machinery - Performance characteristics and energy consumption

Machines à glace artisanale et crème glacée -  
Caractéristiques de performance et consommation  
d'énergie

Maschinen für handwerklich hergestelltes Eis und  
Speiseeis - Bestimmung von Leistungsmerkmalen und  
Energieaufnahme

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<b>Contents</b>	<b>Page</b>
European foreword.....	3
<b>1 Scope</b> .....	<b>4</b>
<b>2 Normative references</b> .....	<b>4</b>
<b>3 Terms and definitions</b> .....	<b>4</b>
<b>4 Performance characteristics</b> .....	<b>6</b>
4.1 Loading of pasteurizer and cream cooker.....	6
4.2 Loading of batch freezer.....	6
4.3 Loading of combined machine.....	6
4.4 Product temperature/Extrusion temperature.....	7
4.5 Overrun.....	7
<b>5 Energy consumption test</b> .....	<b>7</b>
5.1 Test room.....	7
5.1.1 General design, walls, floor and radiant heat.....	7
5.1.2 Thermal characteristics.....	7
5.2 Apparatus.....	8
5.3 Ambient temperature and humidity.....	8
5.4 Installation.....	8
5.5 Test cycle.....	8
5.5.1 Pasteurizing Test Cycle.....	8
5.5.2 Freezing Test Cycle.....	9
5.5.3 Combined machine test cycle.....	9
5.5.4 Ageing Test Cycle.....	9
5.5.5 Product temperature/Extrusion temperature.....	9
5.5.6 Overrun determination.....	10
5.6 Determination of energy consumption.....	10
5.7 Water consumption test.....	10
5.8 Operating time calculation.....	10
<b>6 Reference test mix</b> .....	<b>10</b>
<b>7 Test report</b> .....	<b>11</b>

## European foreword

This document (EN 16754:2016) has been prepared by Technical Committee CEN/TC 44 “Commercial refrigerated cabinets, Commercial and Professional Refrigerating Appliances and Systems, Performance and Energy Consumption”, 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 July 2016, and conflicting national standards shall be withdrawn at the latest by July 2016.

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**EN 16754:2016 (E)****1 Scope**

This European Standard specifies requirements and test conditions of machines for processing Artisan Gelato, ice cream and similar frozen desserts.

It defines machines performance characteristics and energy consumption, measured under specified conditions and test methods, using a reference test mix.

This European Standard applies to professional machines having a maximum capacity of 400 l, for thermal-treatment of Artisan Gelato, ice cream and similar frozen desserts listed as follows:

- pasteurizers;
- ageing vats;
- cream cookers;
- batch freezers;
- combined machines.

The machine can be factory assembled or field connected to a remote condensing unit.

The machine can include separate remote refrigeration systems for the frozen product and fresh mix and can be either air-cooled or water-cooled.

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**2 Normative references**

Not applicable.

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**3 Terms and definitions**

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

**3.1  
compression type machines**  
machines where the cooling is performed by means of a refrigerant liquid at low pressure in a heat exchanger (evaporator), the steam thus formed becomes a liquid by a mechanical compression higher pressure and cooling in another heat exchanger (condenser)

**3.2  
condenser**  
heat exchanger in which after compression, the vaporized refrigerant is liquefied, giving off heat to external cooling system

**3.3  
evaporator**  
heat exchanger in which, after the reduction of pressure, the refrigerant is vaporized by absorbing heat from the medium which is cooled

**3.4****condensing unit**

system assembled in factory to run part of the refrigeration cycle (compression and condensation), including one or more refrigerant compressors, condensers, liquid tanks, piping systems and ancillary equipment assembled on a common basis

**3.5****pasteurization cycle**

cycle during which test mix is heated for a time fixed to different type of pasteurization and then immediately cooled to conservation temperature, to avoid the bacteria's development

**3.6****conservation temperature**

temperature below which the test mixture shall be kept

**3.7****product temperature/extrusion temperature**

temperature of the frozen product immediately after extrusion

**3.8****normal load**

load obtained when the machine is operating at ambient temperature at climate class declared by the manufacturer using the test mixture in the quantity and at the temperature specified by this standard

**3.9****overrun**

percentage increase in volume due to the addition of air to frozen product whose calculation is the ratio between the liquid mix and the drawn frozen product

**3.10****reference test mix**

mix specifically prepared for testing

**3.11****frozen product**

product obtained after freezing test cycle of the reference test mix

**3.12****climate class**

range of ambient temperature in which the machines are intended to be used

**3.13****time of cycle**

time required by the machine to complete the foreseen cycle

**3.14****artisan gelato**

self-made frozen dessert

**3.15****pasteurizer**

machine used for mixing, heating, cooling ingredients in order to produce and store the mix for artisan gelato

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## EN 16754:2016 (E)

## 3.16

**ageing vat**

machine used for the storage and ageing the mix for artisan gelato

## 3.17

**cream cooker**

pasteurizer intended for use with liquid and thick products

## 3.18

**batch freezer**

non continuous operating machine used to freeze the mix incorporating air to produce artisan gelato

## 3.19

**combined machine**

machine combining two or more functions of pasteurizer, ageing vat, cream cooker, batch freezer

## 4 Performance characteristics

### 4.1 Loading of pasteurizer and cream cooker

The machines shall operate at ambient temperature (see 5.3). The pasteurization tank of the machines shall be loaded with the maximum amount, expressed in kilogramme, indicated by the manufacturer with the reference test mix (see Clause 6) at  $20\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ . The machines shall be operated as long as necessary so that the reference test mix reaches the heating temperature expected (5.5.1) and shall then proceed to the cooling cycle to the storage temperature  $\leq 5\text{ }^{\circ}\text{C}$ .

### 4.2 Loading of batch freezer

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The machine shall operate at ambient temperature (see 5.3). The machine shall be loaded with the 75 % of the maximum amount, expressed in kilogramme, indicated by the manufacturer or with the average of the values min and max declared by the manufacturer with the reference test mix at a temperature of  $5\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ . The machine shall work the time required for the reference test mix reaches the temperature  $< -9\text{ }^{\circ}\text{C}$ .

The product obtained is discharged and the machine is turned off.

The final product characteristics shall be the following:

- temperature  $< -9\text{ }^{\circ}\text{C}$
- overrun  $> 20\text{ }%$
- discharged Quantity  $> 80\text{ }%$  of the Total Load

### 4.3 Loading of combined machine

The machine shall operate at ambient temperature (see 5.3). The machine shall be loaded with the 75 % of the maximum amount, expressed in kilogramme, indicated by the manufacturer of the reference test mix (see Clause 6) at  $20\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ . The machines shall be operated as long as necessary so that the reference test mix reaches the heating temperature expected (5.5.4). The machine shall work the time required for the reference test mix reaches the temperature  $< -9\text{ }^{\circ}\text{C}$ .

The product obtained is discharged and the machine is turned off.



The final product characteristics shall be the following:

- temperature < -9 °C
- overrun > 20 %
- discharged Quantity > 80 % of the Total Load

#### 4.4 Product temperature/Extrusion temperature

The extrusion temperature of the reference frozen mix (Clause 6) depends on the adjusting and setting of the freezing equipment and is directly related to the characteristics of the final product.

The extrusion temperature of the reference frozen mix (Clause 6) affects the energy consumption of the batch freezer and combined machines.

#### 4.5 Overrun

Generally, during the freezing, the test product (Clause 6) and air enter in the freezing chamber, where a beater assemblies scrapes ice crystals from the chamber walls and blends the air into the test mix.

The overrun of the reference frozen mix (Clause 6) depends on the adjusting and setting of the freezing equipment and is directly related to the characteristics of the final product. The overrun of the product obtained with the reference mix (Clause 6) affects the energy consumption of the batch freezer and combined machines.

## 5 Energy consumption test

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### 5.1 Test room

#### 5.1.1 General design, walls, floor and radiant heat

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The test room shall be a parallelepiped space in which two of the opposite side walls, referred to as the *discharge technical side wall* and the *return technical side wall*, are designed to create an even, horizontal air flow within the test room. By convention, the distance separating these two technical side walls is referred to as the “length” of the test room.

The minimum useful dimensions (length, width, height) of the test room shall be dependent on the overall dimensions (length, depth, height) of the machine to be tested.

The ceiling and the two non-technical side walls of the room shall be thermally insulated and shall be equipped with an inner metal skin.

A minimum insulation level equivalent to 60 mm of rigid polyurethane foam  $\lambda = 0,03 \text{ W/(m K)}$  should be used for the building of a new test room.

The floor shall be made of concrete or of thermally equivalent material and/or shall be sufficiently insulated to ensure that external climatic conditions do not affect the floor temperature.

#### 5.1.2 Thermal characteristics

An experimental evaluation of the test-room performances shall be carried out minimum once per year.

Air temperature measured at different points shall not deviate from the rated temperature of the test-room by more than  $\pm 2 \text{ K}$ .

The test room shall be capable of maintaining values of humidity within  $\pm 5$  units of the relative humidity percentage figures of the rated humidity of the test room temperature class at the specified measuring points.