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Komercialni hladilniki pijač - Razvrstitev, zahteve in preskusni pogoji

Commercial beverage coolers - Classification, requirements and test conditions

Gewerbliche Getränkekühler - Klassifikation, Anforderungen und Prüfbedingungen

Appareils de réfrigération de boissons à usage commercial - Classification, exigences et méthodes d'essai

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Commercial beverage coolers - Classification, requirements and test conditions

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

This document (EN 16902:2016) has been prepared by Technical Committee CEN/TC 44 “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of an identical text or by endorsement, at the latest by June 2017, and conflicting national standards shall be withdrawn at the latest by June 2017.

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1 Scope

The scope of this European Standard is to define the classification for commercial beverage coolers and to specify their requirements and test methods. This European Standard is applicable to integral refrigeration systems. This European Standard is not applicable to remote and secondary system cabinets.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 817, *Refrigerants — Designation and safety classification*

ISO 5149-2, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 2: Design, construction, testing, marking and documentation*

EN 60335-1, *Household and similar electrical appliances — Safety — Part 1: General requirements (IEC 60335-1)*

EN 60335-2-89, *Household and similar electrical appliances - Safety - Part 2-89: Particular requirements for commercial refrigerating appliances with an incorporated or remote refrigerant condensing unit or compressor (IEC 60335-2-89)*

3 Terms and definitions

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

3.1 Types of commercial beverage cooler

3.1.1
commercial beverage cooler
refrigerated cabinets to sell and/or display pre-packaged beverage products that are non-perishable, designed to chill products loaded at ambient temperature to the defined storage temperature class within a specified time and for which the customer is allowed direct access to the products

Note 1 to entry: In the next Annex A there is the designation of the commercial beverage cooler family.

Note 2 to entry: The customer is an organization or person that receives a product; customer can be internal or external to the organization.

EXAMPLE Consumer, client, end-user, retailer, beneficiary and purchaser.

3.1.2
vertical commercial beverage cooler
beverage cooler with overall height greater than 1,5 m

3.1.3
semi-vertical commercial refrigerated beverage cooler
vertical beverage cooler for which the overall height does not exceed 1,5 m and having either a vertical or inclined display opening

3.1.4
horizontal commercial beverage cooler
beverage cooler with horizontal display opening on its top and accessible from above

3.1.5
open commercial beverage cooler
horizontal/vertical/semi-vertical beverage cooler where there are not barriers for the access to the displayed products

3.1.6
closed commercial beverage cooler
horizontal/vertical/semi-vertical beverage cooler where access to the displayed product is gained by opening a door or a lid (transparent or solid)

3.1.7
combined commercial beverage cooler with glass door top
beverage cooler consisting of a refrigerated bottom, open or with transparent/solid lid, and a transparent/solid door refrigerated top

3.1.8
combined commercial beverage cooler with open top
beverage cooler consisting of a refrigerated bottom, open or with transparent/solid lid, and an open refrigerated top

3.2 Parts of commercial beverage cooler

3.2.1
air discharge
opening from which the air curtain emerges

3.2.2
air return
opening at which the air curtain flows back to the evaporator or heat exchanger inside the commercial beverage cooler air ducts

3.2.3
shelf
surface excluding the base deck, on which the goods are displayed

3.2.4
ticket holder
profile fitted along the commercial beverage cooler shelves which enables different types of labels for consumer information to be displayed

3.2.5
kickplate
vertical plate or plinth that covers the gap between the floor and base of the commercial beverage cooler

3.2.6
night cover
cover permanently integrated into the commercial beverage cooler used to reduce the heat ingress (e.g. by infrared radiation or convection)

EXAMPLE Example of cover is night curtain, night blind, night lid.

3.2.7
canopy
upper front part of a vertical/semi-vertical commercial beverage cooler

3.2.8
front panel(s)
group of aesthetic pieces of the commercial beverage cooler front, visible to the customer

3.2.9
front
side of the commercial beverage cooler facing the consumer

3.2.10
front riser
device for retaining the goods within the display surface

3.2.11
condensing unit
combination of one or more compressors, condensers and liquid receivers (when required) and the regularly furnished accessories

3.2.12
base deck
lowest display surface of a commercial beverage cooler

3.2.13
shelf sham
device to limit the loading of a display surface

3.3 Physical aspects and dimensions

3.3.1
refrigerated shelf area
refrigerated display area where the vertical clearance above any shelf or base deck is greater than or equal to 125 mm, measured perpendicularly above the plane of the shelf or base deck and within the bounds of any load limit

3.3.2
depth
horizontal distance, including rear spacers for air circulation channel, between the front and the rear of the commercial beverage cooler

3.3.3
width
horizontal distance between the two external side of the commercial beverage cooler

3.3.4
height
vertical distance from the floor to the top of the commercial beverage cooler; if the commercial beverage cooler has an adjustable feet, the height defined shall be the minimum and the maximum height necessary at installation of the cooler

3.3.5
load limit
boundary surface consisting of a plane or several planes within which all M-cans can be maintained within the limits for the M-cans temperature class declared

3.3.6
load limit line
permanently marked boundary line denoting the edge of the load limit surface

3.3.7
net volume
storage volume inside the appliance which can be used for storage of products

Note 1 to entry: For the calculation method see Annex B.

3.3.8
gross volume
volume within the inside walls of the commercial beverage cooler or compartment, excluding internal fittings, doors or lids, if any, with these being closed, and with the load limit being taken into account if the commercial beverage cooler has no door or lid

3.3.9
equivalent volume
reference volume corrected for compartment classification differences

3.3.10
total display area
TDA
total visible foodstuffs area, including visible area through the glazing, defined by the sum of horizontal and vertical projected surface areas of the net volume

Note 1 to entry: For the calculation method see Annex D.

3.3.11
footprint
surface occupied by the commercial beverage cooler

3.4 Definitions relating to performance characteristics

3.4.1
air curtain
air flow going from the air discharge towards the air return, thereby limiting both heat and mass transfers between the commercial beverage cooler's gross volume and the surrounding environment

3.4.2
normal conditions of use
operating conditions which exist when the commercial beverage cooler, including all permanently located accessories, has been set up and situated in accordance with the recommendations of the manufacturer and is in service

Note 1 to entry: The effects of actions by non-technical personnel for purposes of loading, unloading, cleaning, defrosting, the manipulation of accessible controls and of any removable accessories etc., according to the manufacturer's instructions are within this definition. The effects of actions resulting from interventions by technical personnel for the purposes of maintenance or repair are outside this definition.

3.4.3
energy management device
EMD
electronic device that automatically controls the refrigeration system and/or other key components of the commercial beverage cooler during the stand-by mode

EXAMPLE Lights, fans.

3.4.4
stand-by mode
state in which commercial beverage cooler's lighting, refrigeration and/or other energy-using systems are automatically adjusted such that they consume less energy than they consume in an active mode

Note 1 to entry: In the case of commercial beverage coolers, equipped with an EMD and with night cover built in, or night lid built in, the EMD stand-by mode is activated manually when the night curtain or night lid is down.

Note 2 to entry: In the case of commercial beverage coolers, equipped only with night cover built- in, or night lid built-in for the energy consumption test refer to 6.3.8.

3.4.5
active mode
state in which the commercial beverage coolers are in the average temperature defined for the product class, also lighting and/or other energy-using systems are on

3.4.6
EMD product average temperature
temperature that allows the commercial beverage cooler, that has been in stand-by mode for 12 h, to recover the average product temperature defined for each product temperature class in a recovery time less than 4 h

3.4.7
half reload
capability of the beverage cooler to lower all product temperatures within a specified time after half of the products are removed and reloaded with product at ambient temperature

3.4.8
defrosting
removal of frost, snow and ice from a commercial beverage cooler

3.4.9
automatic defrosting
defrosting where no action is necessary by the user to initiate the removal of frost accumulation and to restore normal operation

Note 1 to entry: It includes automatic removal of defrost water.

3.4.10
semi-automatic defrosting
defrosting where an action is necessary by the user to initiate the removal of frost accumulation and normal operation is restored automatically

Note 1 to entry: It either includes automatic removal of defrost water of entails manual removal of defrost water.

3.4.11
defrost water removal
process through which defrost water is removed from a commercial beverage cooler

3.4.12
automatic removal of defrost water
removal and/or evaporation of defrost water that does not require any action by the user

3.4.13
manual removal of defrost water
removal of defrost water that requires an action by the user

3.4.14
total energy consumption
TEC
total energy consumption in kilowatt hours per 24 h

3.4.15
specific energy consumption
SEC
specific energy consumption for commercial beverage cooler expressed in kilowatt per 24 h per m^3 (TEC/Veq)

3.5 Definition related to test environment

3.5.1
M-cans
test cans used to simulate the product during tests, fitted with a temperature measuring device

3.5.2
climate class
classification of the test room climate according to the dry bulb temperature and relative humidity

3.5.3
M-cans temperature class
classification of test temperature according to temperatures of warmest and coldest M-cans during the temperature test

3.5.4
commercial beverage cooler classification
designation given by the combination of climate class and M-cans temperature class

4 Symbols

t_{run}	running time — time during which compressor is running in normal condition within 24 h
t_{stop}	stopping time — time during which compressor is not running (or solenoid valve is close) within 24 h
t_{deft}	defrost time — time during defrost during which compressor is not running (or solenoid valve is closed) or secondary refrigerant is generally not circulating, within 24 h, but not considered as stopping time
t_{pull}	pull down time – time to pull down the temperature of the beverages from the ambient temperature to the defined temperature class
t_{hr}	half reload time – time to recover the beverage cooler temperature after the half reload with product at ambient temperature
t_{90}	time in which 90 % of a sudden temperature change of 20 °C is indicated, the measurement medium being moderately agitated air (velocity 1 m/s)
Δt	time between two consecutive measuring samples
N_{max}	number of measuring samples in 24 h
n_{deft}	number of defrosts during 24 h
TEC	total energy consumption in kilowatt hours per 24 h
SEC	specific energy consumption for commercial beverage cooler expressed in kilowatt per 24 h per m³ (TEC/Veq)
t_{rr}	relative or percentage running time:

$$t_{rr} = \frac{t_{run}}{t_{run} + t_{stop}} = \frac{t_{run}}{24 - t_{deft}} \quad (1)$$

where

$$t_{run} + t_{stop} + t_{deft} = 24\,h \quad (2)$$

5 Classification and requirements

5.1 Classification according to temperature

The performance of commercial beverage cooler shall comply with one of the classifications defined in Table 1. The performance shall be verified in accordance with the conditions and test methods specified in the following clauses.