SLOVENSKI STANDARD
oSIST prEN ISO 23953-2:2014

01-marec-2014

Razstavne hladilne omare - 2. del: Razvrščanje, zahteve in preskusni pogoji (ISO/DIS 23953-2:2013)

Refrigerated display cabinets - Part 2: Classification, requirements and test conditions (ISO/DIS 23953-2:2013)

Verkaufskühlmöbel - Teil 2: Klassifizierung, Anforderungen und Prüfbedingungen (ISO/DIS 23953-2:2013)

Meubles frigorifiques de vente - Partie 2: Classification, exigences et méthodes d'essai (ISO/DIS 23953-2:2013)

Ta slovenski standard je istoveten z: **prEN ISO 23953-2 rev**

ICS:

97.130.20	Hladilne naprave za trgovine	Commercial refrigerating appliances

oSIST prEN ISO 23953-2:2014 **en**

DRAFT INTERNATIONAL STANDARD

ISO/DIS 23953-2

ISO/TC **86**/SC **7**

Secretariat: **ANSI**

Voting begins on:
2013-11-28

Voting terminates on:
2014-04-28

Refrigerated display cabinets —

Part 2:
Classification, requirements and test conditions

Meubles frigorifiques de vente —

Partie 2: Classification, exigences et méthodes d'essai

[Revision of first edition (ISO 23953-2:2005) and the first edition ISO 23953-2:2005/Amd 1:2012]

ICS: 97.130.20

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the European Committee for Standardization (CEN), and processed under the **CEN lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Reference number
ISO/DIS 23953-2:2013(E)

Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 23953-2 was prepared by Technical Committee ISO/TC 86, *Refrigeration and air-conditioning*, Subcommittee SC 7, and by Technical Committee CEN/TC 44, *Commercial refrigerated cabinets, catering refrigerating appliances and industrial refrigeration* in collaboration.

This second edition cancels and replaces the first edition (EN ISO 23953-2:2005), which has been technically revised as follows:

— editorial and technical improvements, corrections and/or clarifications throughout the text to better apply the standard,

— addition of a new Annex D "Performance and energy rating of commercial refrigerated display cabinets",

— addition of a new Annex ZA showing the relationship between this standard and the requirements of Directive 2009/125/EC establishing a framework for the setting of Ecodesign requirements for energy-related products

ISO 23953 consists of the following parts, under the general title *Refrigerated display cabinets*:

— *Part 1: Vocabulary*

— *Part 2: Classification, requirements and test conditions*

Refrigerated display cabinets — Part 2: Classification, requirements and test conditions

1 Scope

This part of ISO 23953 specifies requirements for the construction, characteristics and performance of refrigerated display cabinets used in the sale and display of foodstuffs. It specifies test conditions and methods for checking that the requirements have been satisfied, as well as classification of the cabinets, their marking and the list of their characteristics to be declared by the manufacturer. It is not applicable to refrigerated vending machines. It is also not applicable to cabinets intended for storage or cabinets intended for use for instance in catering or non-retail refrigerated applications nor does it cover the choice of the types of foodstuffs chosen to be displayed in the 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 system*

ISO 23953-1:2005, *Refrigerated display cabinets — Part 1: Vocabulary*

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

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

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

3 Terms, definitions, symbols and abbreviated terms

3.1 General

t_{run} running time — time during which compressor is running (or solenoid valve is open) or secondary refrigerant is circulating (or solenoid valve is open), within 24 h, expressed in hours

t_{stop} stopping time — time during which compressor is not running (or solenoid valve is closed) or secondary refrigerant is not circulating (or solenoid valve is closed), within 24 h and excluding defrost time, expressed in hours

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, expressed in hours

q_m mass flow rate of liquid refrigerant or secondary refrigerant in kilograms per second

Δt time between two consecutive measuring samples, in hours

N_{max} number of measuring samples in 24 hours

n_{deft} number of defrosts during 24 h

DEC direct electrical energy consumption, in kilowatt hours per 24 h period

REC_{RC} refrigeration electrical energy consumption, in kilowatt hours per 24 h period, for remote cabinet for compression-type refrigerating system

REC_{RI} refrigeration electrical energy consumption, in kilowatt hours per 24 h period, for remote cabinet for indirect refrigerating system

TEC total energy consumption in kilowatt hours per 24 h period

TDA total display area, in square meters (see Annex A)

TEC/TDA Specific Energy Consumption (SEC) for Refrigerated Display Cabinet expressed in kilowatt hours per 24h per square meters

t_{rr} relative or percentage running time:

$$t_{rr} = \frac{t_{run}}{t_{run} + t_{stop}} = \frac{t_{run}}{24 - t_{deft}}$$

where $t_{run} + t_{stop} + t_{deft} = 24\text{h}$

Φ_n instant heat extraction rate in kilowatts

3.2 Compression-type refrigeration systems

h_8, h_4 specific enthalpy in kilojoules per kilogram, where state at point 8 corresponds to refrigerant outlet, and state at point 4 to refrigerant inlet, of cabinet

θ_7 refrigerant temperature at evaporator outlet, in degrees Celsius

θ_8 refrigerant temperature at cabinet outlet, in degrees Celsius

θ_4 refrigerant temperature at cabinet inlet, in degrees Celsius

θ_5 refrigerant temperature at evaporator inlet , in degrees Celsius

p_8 refrigerant pressure at cabinet outlet, in Pascals

θ_{mrun} arithmetic average of evaporator-saturated temperature obtained from pressure p_8 by referring to table of saturation properties for refrigerant in use, during t_{run}, in degrees Celsius

θ_{min} arithmetic average of evaporator-saturated temperature obtained from pressure p_8 by referring to table of saturation properties for refrigerant in use, during the last 10 % of all running periods, in degrees Celsius

T_{mrun} = θ_{mrun} + 273,15 in Kelvin

3.3 Indirect refrigeration-type systems

θ_i	secondary refrigerant temperature at cabinet inlet, in degrees Celsius
θ_o	secondary refrigerant temperature at cabinet outlet, in degrees Celsius
θ	secondary refrigerant median temperature, in degrees Celsius $(\theta_i + \theta_o)/2$
θ_{mrun}	arithmetic average of the secondary refrigerant median temperature (θ) during t_{run}, in degrees Celsius
θ_{min}	arithmetic average of the secondary refrigerant median temperature (θ) during last 10 % of all running periods, in degrees Celsius
q_{mrun}	arithmetic average of the secondary refrigerant mass flow during t_{run}, in kilograms per second
c_i	specific heat of secondary refrigerant, in kilojoules per kilogram per degree Celsius at cabinet inlet
c_o	specific heat of the secondary refrigerant, in kilojoules per kilogram per degree Celsius, at cabinet outlet
$p_{irun} - p_{orun}$	pressure drop between inlet and outlet of cabinet during t_{run}, in kilo Pascals
CPEC	pumping electrical energy consumption expressed in kilowatt hours per 24 h period
v	specific volume of secondary refrigerant, in cubic metres per kilogram (simplification: v = const. = 0,001 m^3/kg)

4 Requirements

4.1 Construction

4.1.1 General

4.1.1.1 Strength and rigidity

The cabinet and its parts shall be constructed with adequate strength and rigidity for normal conditions of handling, transport and use and attention shall be given to the following:

a) interior fittings, including shelves, baskets, rails, etc. and their supports, shall be sufficiently strong for the duty required;

b) where sliding shelves, baskets, trays or drawers are fitted they shall retain their shape and ease of movement when fully loaded;

c) any fitments which are provided with stops to prevent accidental removal shall be self-supporting when fully loaded and withdrawn to the limit of the stops;

d) stops.

4.1.1.2 Pipes and connections

Pipes and connections to moving or resiliently mounted parts shall be arranged so as not to foul or transmit harmful vibrations to other parts. All other pipes and connections shall be securely anchored and sufficient

free length and/or vibration eliminators shall be provided to prevent failure due to fatigue. Where necessary, pipes and valves shall be adequately thermally insulated.

4.1.1.3 Condensate drainage

Where drains, drip trays or evaporation receptacles are fitted, they shall have ample capacity and shall be easily accessible and cleanable.

Any condensate or defrost water receptacle, or group of receptacles, requiring to be emptied manually shall have a capacity equivalent to at least 48 h of normal operation in the appropriate climate class for which the cabinet is intended.

4.1.1.4 Closed refrigerated cabinets (self-service type)

Closed refrigerated cabinets shall meet certain special requirements as follows.

Hinged lids and doors shall be opened by different angles up to and including 60°.

Transparent doors and lids shall be condensate-free at the climate class specified by the manufacturer.

Door fasteners and hinges under normal conditions of use shall be smooth and positive in action and designed to function properly without undue wear.

When any doors or lids provided to ensure an air seal to the refrigerated space are closed, there shall be no undue leakage of ambient air into the interior.

The doors or lids shall not open of their own accord.

The gasket shall be made from a material whose characteristics are compatible with the operating conditions (especially temperatures). If the fastening device is mechanical, a stop or other means shall be provided to prevent the gasket from being excessively deformed.

4.1.1.5 Joints and seams

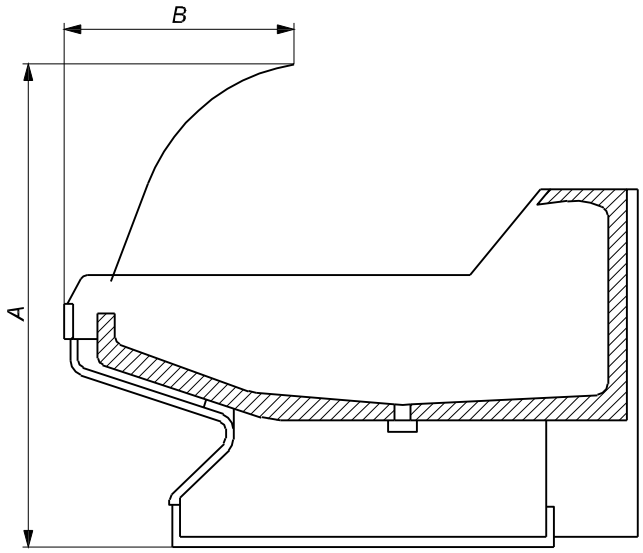
All construction joints and seams within the net volume shall prevent the accumulation of potentially contaminating substances.

All construction joints and seams within the net volume shall permit the easy removal of any deposits of potentially contaminating substances.

4.1.1.6 Sneeze guard

The front façade constitutes a guard against risks of contamination emanating from consumers through handling, coughing, etc. in case of display and sale of unpacked foodstuffs.

For this, the sum of vertical dimension A and horizontal dimension B as shown in Figure 1 shall be not less than 1 500 mm.



Key

A vertical dimension
B horizontal dimension

Figure 1 — Dimensions for sneeze guard

4.1.2 Materials

4.1.2.1 General

The materials shall be durable and shall not favour the development of mould or emit odours.

Under normal conditions of use, materials in contact with foodstuffs shall be resistant to moisture and shall neither be toxic nor contaminate them.

4.1.2.2 Wear resistance

Internal and external finishes shall be resistant to wear and capable of being cleaned effectively and hygienically. Finishes shall not crack, chip, flake, rub off or soften under normal conditions of use or during cleaning.

4.1.2.3 Corrosion resistance

Metal parts, used in the construction of cabinets, shall have resistance to corrosion appropriate to their location and function.

4.1.3 Thermal insulation

4.1.3.1 Efficiency

The thermal insulation shall be efficient and permanently fixed. In particular, the insulating material shall not be subject to shrinkage and shall not allow under normal working conditions an accumulation of moisture (see 4.2.4).

4.1.3.2 Vapour barrier

Suitable means shall be used to prevent deterioration of the thermal insulation by the ingress of moisture.

4.1.3.3 Containment of insulation material

Where the insulation space is vented to the inside, it shall be ensured that particles of the insulation material cannot escape into the foodstuff display compartment.

For fibrous insulation materials, it shall not be possible to insert a rigid probe of 1 mm diameter through any aperture which allows access to the insulating material, the probe being applied with negligible force.

4.1.4 Refrigerating system

4.1.4.1 Design and construction

The design and construction of all parts of the refrigerating system subject to internal pressure shall take into account the maximum working pressure to which they are subjected when the cabinet is in operation or at rest.

For refrigerated display cabinets with integral condensing unit or components thereof which are charged with refrigerant prior to transportation, the maximum ambient temperature during transit shall be taken into account. All refrigerant containing components shall be in accordance with ISO/FDIS 5149-2.

4.1.4.2 Condensation

There shall be suitable means to prevent water condensed on cold surfaces of the cabinet and its parts from harmfully affecting the operation of the refrigerating system or its controls.

4.1.4.3 System protection

For cabinets fitted with doors or lids, the refrigerating system shall suffer no damage if any door or lid in the cabinet is left open while the cabinet is operating in an ambient temperature corresponding to the climate class (see Table 3) for which the cabinet is intended.

When the door or lid is kept open under normal operating conditions (for example, during product loading) or is left open accidentally, any automatic motor overload protective device may come into operation.

4.1.4.4 Refrigerant

When deciding on the refrigerant for the system, attention shall be given to the possible hazards associated with the use of certain refrigerants and heat-transfer media or secondary refrigerant, due to their toxicity, flammability etc. Guidance on this point is available in ISO/FDIS 5149-2.

4.1.5 Electrical components

Electrical components shall be in accordance with IEC 60335-2-89 and IEC 60335-1.

4.1.6 Temperature display

The cabinets shall incorporate a temperature display instrument showing the air temperature in the refrigerated display cabinets to provide an indication of the operation and functioning of refrigerating equipment and information on its operating state.

NOTE As a rule, measured air temperature is not identical with foodstuff temperature in refrigerated display cabinets.

4.1.6.1 Temperature-measuring instrument

Suitable temperature-measuring instruments shall be used, i.e. those that fulfil the following requirements:

— the unit symbol (°C) shall be inscribed or displayed on the temperature-measuring instrument;

