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Refrigerated display cabinets —

Part 1: Vocabulary

Meubles frigorifiques de vente —

Partie 1: Vocabulaire

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 86, *Refrigeration and air-conditioning*, Subcommittee SC 7, *Testing and rating of commercial refrigerated display cabinets*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 44, *Commercial and Professional Refrigerating Appliances and Systems, Performance and Energy Consumption*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 23953-1:2015), which has been technically revised.

The main changes are as follows:

— the following terms have been significantly revised: “semi-vertical refrigerated display cabinet”, “horizontal refrigerated display cabinet”, “combined refrigerated display cabinet with glass-door top”, “combined refrigerated display cabinet with open top”, “multi-temperature refrigerated display cabinet”, “front panel”, “display opening area”, “product temperature”, “product family”, “total revised daily electrical energy consumption”, “published standard rating and standard configuration”;

— the following terms have been added: “multi-use refrigerated display cabinet”, “assisted-service door”, “assisted-service lid”, “self-service door”, “self-service lid”, “door for loading food”, “sneeze guard”, “compartment”, “cabinet with incorporated liquid-cooled condensing unit”, “cabinet with incorporated air-cooled condensing unit”, “full loading”, “half loading”, “sensitive foodstuff loading”, “coefficient of performance for liquid-cooled condensing unit”, “cooling system energy consumption”, “heat extracted condenser”, “revised heat removal energy consumption”, “heat load extracted daily”, “heat removal energy consumption”, “additional heat removal energy consumption”, “refrigeration electrical energy consumption compression-type”, “refrigeration electrical energy consumption indirect”, “additional refrigeration daily electrical energy consumption”, “configuration”, “standard configuration”;

— the following term has been deleted: “visibility of products by arc method”;

— relevant symbols have been added.

A list of all parts in the ISO 23953 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Refrigerated display cabinets —

Part 1:
Vocabulary

1 Scope

This document defines terms related to refrigerated display cabinets used for the sale and display of foodstuffs.

It does not apply to refrigerated vending machines or cabinets intended for use in catering or similar non-retail applications.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 23953-2:2023, *Refrigerated display cabinets — Part 2: Classifications, requirements and test conditions*

3 Terms and definitions

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1 Cabinet families and types

3.1.1
refrigerated display cabinet
cabinet cooled by a refrigerating system which enables chilled and frozen *foodstuffs* (3.7.4) placed therein for a *display* (3.4.4) to be maintained within prescribed temperature limits

3.1.2
vertical refrigerated display cabinet
refrigerated display cabinet (3.1.1) that is semi-vertical multi-deck, roll-in or glass door

3.1.3
semi-vertical refrigerated display cabinet
vertical refrigerated display cabinet (3.1.2) whose overall height does not exceed 1,5 m, with a vertical or inclined display opening, where the total vertical display height ($V_g + V_o$) is greater than 45 % of the total horizontal display depth ($H_g + H_o$)

Note 1 to entry: The meaning of V_g, V_o, H_g and H_o shall be in accordance with ISO 23953-2:2023, Annex A.

3.1.4
horizontal refrigerated display cabinet
counter
refrigerated display cabinet (3.1.1) with a horizontal or slightly inclined display opening on its top and accessible from above, where the total vertical display height (V_g + V_o) is equal to or less than 45 % of the total horizontal display depth (H_g + H_o)

Note 1 to entry: The meaning of V_g, V_o, H_g and H_o shall be in accordance with ISO 23953-2:2023, Annex A.

3.1.5
closed refrigerated display cabinet
refrigerated display cabinet (3.1.1) where access to *foodstuffs* (3.7.4) is gained by opening a door or lid

3.1.6
assisted service refrigerated display cabinet
refrigerated display cabinet (3.1.1) which requires that a person serve the *consumer* (3.7.1) with food

3.1.7
self-service refrigerated display cabinet
refrigerated display cabinet (3.1.1) from which a *consumer* (3.7.1) selects food

3.1.8
serve-over counter with integrated storage
refrigerated display cabinet (3.1.1) for assisted service, including refrigerated storage which is normally placed in its base

3.1.9
combined refrigerated display cabinet with glass-door top
refrigerated display cabinet (3.1.1) consisting of a horizontal refrigerated bottom (open or with a glass lid) and a vertical, glass-door, refrigerated top with an overall height higher than 1,55 m

3.1.10
combined refrigerated display cabinet with open top
refrigerated display cabinet (3.1.1) consisting of a horizontal refrigerated bottom (open or with a glass lid) and a vertical, open, refrigerated top with an overall height higher than 1,55 m

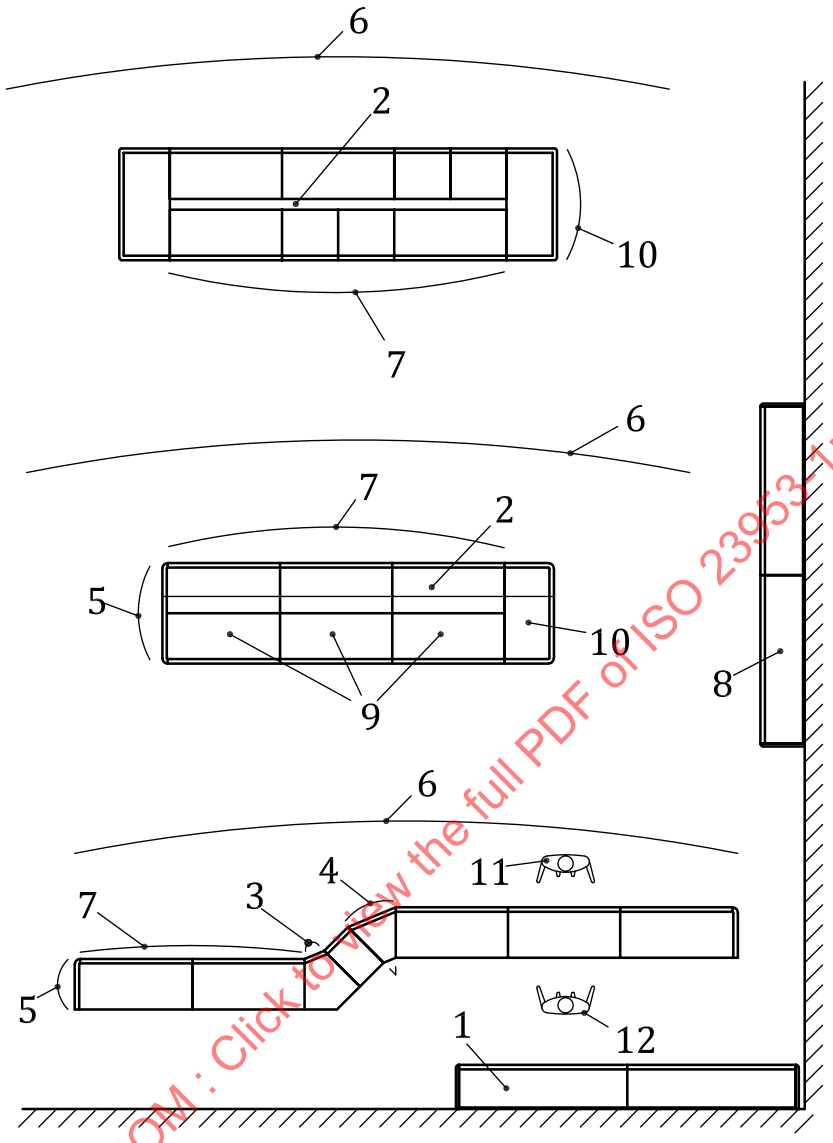
3.1.11
multi-temperature refrigerated display cabinet
refrigerated display cabinet (3.1.1) with *compartments* (3.4.11) working simultaneously at different temperature classes

3.1.12
multi-use refrigerated display cabinet
refrigerated display cabinet (3.1.1) or separate *compartment(s)* (3.4.11) of the same cabinet that can be set at different temperature classes at different times

3.1.13
roll-in cabinet
cabinet that enables *goods* (3.7.3) to be displayed directly on their pallets or rolls, which can be placed inside by lifting, swinging or removing the lower front part, where fitted

3.1.14
back-wall service cabinet
refrigerated cabinet in assisted service, placed behind *serving personnel* (3.7.2), with or without an added back storage

Note 1 to entry: See Figure 1.



Key

1	back-wall service cabinet	7	*technical line-up* (3.2.6)
2	*island run* (3.2.1)	8	*wall cabinet* (3.2.7)
3	*internal angle cabinet* (3.2.2)	9	*island cabinet* (3.2.8)
4	*external angle cabinet* (3.2.3)	10	*end cabinet* (3.2.10)
5	*end wall* (3.2.4)	11	*consumer* (3.7.1)
6	*line-up* (3.2.5)	12	*serving personnel* (3.7.2)

Figure 1 — Shapes of refrigerated display cabinets

3.1.15
assisted-service door
door opened by *serving personnel* (3.7.2) to serve a *consumer* (3.7.1) with food

3.1.16
assisted-service lid
lid opened by *serving personnel* (3.7.2) to serve a *consumer* (3.7.1) with food

3.1.17
self-service door
door directly opened by a *consumer* (3.7.1) to access food

3.1.18
self-service lid
lid directly opened by a *consumer* (3.7.1) to access food

3.1.19
door for loading food
door to access a cabinet used exclusively to load food into the cabinet or an integrated food-storage compartment

3.1.20
product family
group of cabinets having similar design and functional characteristics

Note 1 to entry: The designation of product families shall be in accordance with Annex A.

3.2 Shapes of refrigerated display cabinets

3.2.1
island run
shop-around line of multiplexed cabinets (horizontal, vertical or combined), possibly provided with an *end cabinet* (3.2.10) so that a *consumer* (3.7.1) has access to all sides

Note 1 to entry: See Figure 1.

3.2.2
internal angle cabinet
cabinet that ensures the geometrical continuity between two cabinets whose extremities form an internal angle of between 0° and 90°

Note 1 to entry: See Figure 1.

3.2.3
external angle cabinet
cabinet that ensures the geometrical continuity between two cabinets whose extremities form an external angle of between 0° and 90°

Note 1 to entry: See Figure 1.

3.2.4
end wall
panel closing a cabinet or a *line-up* (3.2.5) or the side of a line-up

Note 1 to entry: See Figure 1.

3.2.5
line-up
run
line consisting of multiplexed, modular, refrigerated cabinets even if not in a straight segment

Note 1 to entry: See Figure 1.

3.2.6
technical line-up
zone
line made up of multiplexed, modular, refrigerated cabinets even if not in a straight segment but with shared safety and temperature control devices

Note 1 to entry: See Figure 1.

3.2.7
wall cabinet
horizontal, vertical or combined cabinet, intended to be located with its back to a wall or back to back with another cabinet

Note 1 to entry: See Figure 1.

3.2.8
island cabinet
shop-around or other cabinet intended to be multiplexed as a part of an *island run* (3.2.1)

Note 1 to entry: See Figure 1.

3.2.9
island cabinet with air discharge in the middle
island cabinet (3.2.8) with an *air discharge* (3.3.1) positioned in the middle of the cabinet so that the product storage room consists of two separate volumes

Note 1 to entry: Two open *wall cabinets* (3.2.7) mounted back to back are not considered to be an "island cabinet with air discharge in the middle".

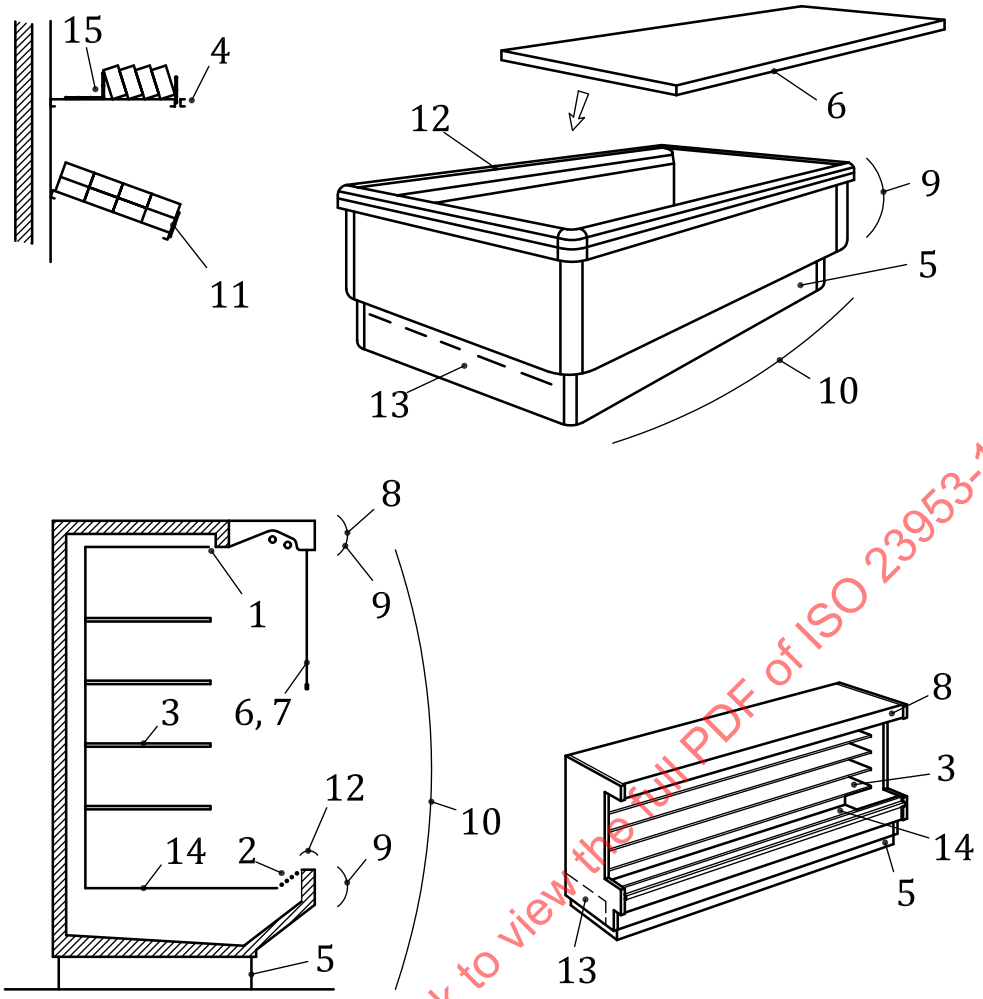
3.2.10
end cabinet
cabinet intended to be located at the end of an *island run* (3.2.1)

Note 1 to entry: See Figure 1.

3.3 Parts of refrigerated display cabinets

3.3.1
air discharge
opening at which an *air curtain* (3.5.1) comes out

Note 1 to entry: See Figure 2.



Key

1 *air discharge* (3.3.1)
2 *air return* (3.3.2)
3 *shelf* (3.3.3)
4 *price marking rail* (3.3.4)
5 *kickplate* (3.3.5)
6 *night cover* (3.3.6)
7 *night blind* (3.3.7)
8 *canopy* (3.3.8)
9 *front panel* (3.3.9)
10 *cabinet front* (3.3.10)
11 *front riser* (3.3.11)
12 *handrail* (3.3.12)
13 possible location of a *condensing unit* (3.3.13)
14 *base deck* (3.3.14)
15 *shelf sham* (3.3.15)

Figure 2 — Parts of refrigerated display cabinets

3.3.2
air return
opening at which an *air curtain* (3.5.1) flows back inside cabinet air ducts

Note 1 to entry: See Figure 2.

3.3.3
shelf
surface, excluding a *base deck* (3.3.14), on which *goods* (3.7.3) are displayed

Note 1 to entry: See Figure 2.

3.3.4
price marking rail
ticket holder
profile fitted along cabinet shelves which enables different types of labels for consumer information to be displayed

Note 1 to entry: See Figure 2.

3.3.5
kickplate
vertical plate or plinth that covers the gap between the floor and base of a cabinet

Note 1 to entry: See Figure 2.

3.3.6
night cover
lid, blind or other cover used to reduce the heat ingress into an open *refrigerated display cabinet* (3.1.1)

Note 1 to entry: See Figure 2.

Note 2 to entry: Examples of heat ingress are infrared radiation or convection.

3.3.7
night blind
night cover (3.3.6) consisting of a curtain to be pulled on a cabinet display opening in order to close it and which can be moved automatically

Note 1 to entry: See Figure 2.

3.3.8
canopy
upper front part of a vertical cabinet

Note 1 to entry: See Figure 2.

3.3.9
front panel
sectional piece of a *cabinet front* (3.3.10), visible to a *consumer* (3.7.1)

Note 1 to entry: See Figure 2.

3.3.10
cabinet front
side of the cabinet facing a *consumer* (3.7.1) or, in the case of an *island cabinet* (3.2.8), the side on which the manufacturer affixes his or her identification plate

Note 1 to entry: See Figure 2.

3.3.11
front riser
device for retaining *goods* (3.7.3) within a display surface

Note 1 to entry: See Figure 2.

3.3.12
handrail
upper front profile covering the edge that is normally touched by a *consumer* (3.7.1)

Note 1 to entry: See Figure 2.

3.3.13
condensing unit
combination of one or more compressors, condensers and liquid receivers (when required), and regularly furnished accessories

Note 1 to entry: See Figure 2.

3.3.14
base deck
lowest display surface of a cabinet

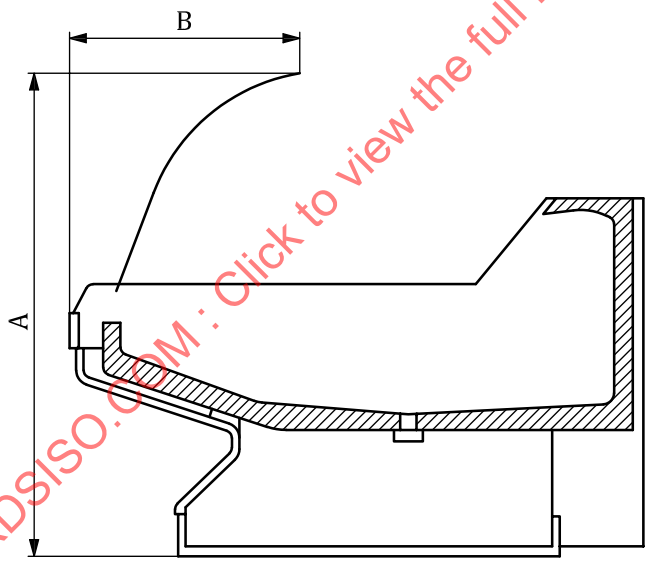
Note 1 to entry: See Figure 2.

3.3.15
shelf sham
device intended to limit the loading of a display surface

Note 1 to entry: See Figure 2.

3.3.16
sneeze guard
display and sale of unpacked foodstuffs guard against the risk of contamination coming from *consumers* (3.7.1) through handling, coughing, etc., which has a vertical dimension and a horizontal dimension

Note 1 to entry: See Figure 3.



Key
A vertical dimension
B horizontal dimension

Figure 3 — Dimensions for sneeze guard

3.4 Dimensional characteristics

3.4.1
refrigerated shelf area
refrigerated display area where the vertical clearance above any *shelf* (3.3.3) or *base deck* (3.3.14) is greater than or equal to 100 mm, measured perpendicularly above the plane of the shelf or base deck and within the bounds of any *load limit* (3.4.6)

3.4.2
overall external dimensions at installation
dimensions of the right parallelepiped bounded by the length, depth and height of the cabinet, including its projecting accessories

3.4.3
overall external dimensions in service
dimensions necessary for the installation as well as for the space to allow circulation of the air cooling the condenser, the opening and closing of doors and other devices for access to *foodstuffs* (3.7.4) or which allow foodstuffs to be loaded, evacuation of defrost water, etc.

3.4.4
display
space in which a *consumer* (3.7.1) can see the *goods* (3.7.3) contained in a cabinet

3.4.5
display opening area
opening area obtained by multiplying the smallest length and width for a horizontal cabinet, or length and height for a vertical cabinet

3.4.6
load limit
boundary surface consisting of a plane or several planes within which all *test packages* (3.6.2) can be maintained within the limits for the *M-package temperature class* (3.6.4) declared

3.4.7
load limit line
permanently marked boundary line denoting the edge of a *load limit* (3.4.6)

3.4.8
net volume
volume containing *foodstuffs* (3.7.4) within a *load limit* (3.4.6)

3.4.9
gross volume
volume within the inside walls of a cabinet or *compartment* (3.4.11), excluding internal fittings, doors, *night blinds* (3.3.7) or lids, if any, with these being closed and with the *load limit* (3.4.6) being taken into account if the cabinet has no door or lid

3.4.10
total display area
S_{TDA}
total visible foodstuffs area, including visible area through the glazing, defined by the sum of the horizontal and vertical projected surface areas of the *net volume* (3.4.8)

3.4.11
compartment
section in a refrigerated appliance included between the base plate or *shelf* (3.3.3) in which a *foodstuff* (3.7.4) is displayed and/or stored and the *load limit line* (3.4.7) where the access can be open or through one or more doors/lids

Note 1 to entry: All products within a compartment are maintained at the same temperature level.

Note 2 to entry: If there is more than one load limit line for different product temperature classes this means that there are several loading areas for the same refrigerated cabinet compartment, and a test is carried out for both loading levels considering different (if any) resulting *total display areas* (3.4.10).

3.5 Operating characteristics

3.5.1
air curtain
air flow going from the *air discharge* (3.3.1) towards the *air return* (3.3.2), thereby limiting both heat and mass transfers between a cabinet's *gross volume* (3.4.9) and the surrounding environment

3.5.2
normal conditions of use
operating conditions which exist when a cabinet, 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* (3.5.3), 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.

3.5.3
defrosting
removal of frost, snow and ice from a *refrigerated display cabinet* (3.1.1)

3.5.3.1
automatic defrosting
defrosting (3.5.3) 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* (3.5.7).

3.5.3.2
semi-automatic defrosting
defrosting (3.5.3) 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* (3.5.7) or entails *manual removal of defrost water* (3.5.8).

3.5.3.3
manual defrosting
defrosting (3.5.3) where an action is necessary by the user to initiate the removal of frost accumulation and restoration to normal operation requires a further action by the user

Note 1 to entry: It either includes *automatic removal of defrost water* (3.5.7) or entails *manual removal of defrost water* (3.5.8).

3.5.3.4
hot-gas defrosting
defrosting (3.5.3) with a partial flow of hot gas through an evaporator

3.5.4
compression-type refrigerating system
system in which refrigeration is affected by the vaporization of a liquid refrigerant at low pressure in a heat exchanger or evaporator

Note 1 to entry: The vapour thus formed being restored to a liquid state by mechanical compression to a higher pressure and subsequent cooling in another heat exchanger or condenser.

3.5.5
indirect-type refrigerating system
system in which a secondary refrigerant circulating system is installed between a central refrigerating system and a refrigerated cabinet

3.5.6
defrost water removal
process by which defrost water is taken out of a *refrigerated display cabinet* (3.1.1)

3.5.7
automatic removal of defrost water
removal and/or evaporation of defrost water that does not require any action by the user

3.5.8
manual removal of defrost water
removal of defrost water that requires an action by the user

3.5.9
secondary refrigerant
liquid or liquid-solid or gas-liquid fluid used in an *indirect-type refrigerating system* (3.5.5) to transfer heat

3.5.10
suction superheat
difference between the temperature of the suction vapour at a given point and the saturation temperature derived from the pressure at this point by the use of the thermodynamic data for the refrigerant specified

3.5.11
cabinet with incorporated liquid-cooled condensing unit
semi-plug-in cabinet
water-loop cabinet
refrigerated display cabinet (3.1.1) that is designed to work with a condenser partially or fully cooled by a closed liquid circuit

Note 1 to entry: Phase change fluids (e.g. slurries) are not part of this definition.

Note 2 to entry: An example of a closed liquid circuit is a water/glycol loop.

3.5.12
cabinet with incorporated air-cooled condensing unit
plug-in cabinet
integral cabinet
self-contained cabinet
refrigerated display cabinet (3.1.1) that is designed to work with a condenser fully cooled by ambient air

3.5.13
full loading
loading of a cabinet using *test packages* (3.6.2) and *M-packages* (3.6.1) in order to fill the full available space between the *base deck* (3.3.14) and the *shelf* (3.3.3) above, two vertically aligned shelves and from a shelf to the ceiling of the cabinet, unless a *load limit line* (3.4.7) indicates otherwise

Note 1 to entry: It refers to the loading methods and particularly to the loading height to be used during tests, as specified in ISO 23953-2:2023, 5.3.3.3.2 a), b) and d) ii).

3.5.14
half loading
loading of a cabinet using *test packages* (3.6.2) and *M-packages* (3.6.1) in order to half fill the full available space between the *base deck* (3.3.14) and the *shelf* (3.3.3) above, two vertically aligned shelves and from a shelf to the ceiling of the cabinet, unless a *load limit line* (3.4.7) indicates otherwise

Note 1 to entry: It refers to the loading methods and particularly to the loading height to be used during tests as specified in ISO 23953-2:2023, 5.3.3.3.2 d) i).

3.5.15
sensitive foodstuff loading
loading of a cabinet using *test packages* (3.6.2) and *M-packages* (3.6.1) in order to fill 100 mm of the available space between the *base deck* (3.3.14) and the *shelf* (3.3.3) above, two vertically aligned shelves and from a shelf to the ceiling of the cabinet, unless a *load limit line* (3.4.7) indicates otherwise

Note 1 to entry: It refers to the loading methods and particularly to the loading height to be used during tests, as specified in ISO 23953-2:2023, 5.3.3.3.2 c).

3.6 Test environment

3.6.1
M-package
package fitted with a temperature measuring device

3.6.2
test package
package without a temperature measuring device

Note 1 to entry: This package may be a box of plastic material in which the content shall be water soaked into a porous material such as natural, plastics or cellulose sponge.

3.6.3
climate class
classification of a test room climate according to the dry bulb temperature and relative humidity

3.6.4
M-package temperature class
classification of an M-package temperature according to the temperatures of the warmest and coldest *M-packages* (3.6.1) during a temperature test

3.6.5
cabinet classification
designation given by the combination of *climate class* (3.6.3) and *M-package temperature class* (3.6.4)

EXAMPLE A cabinet tested in a test room climate class 3 with an M1 class is designated as 3M1.

3.6.6
product temperature
M-package temperature

Note 1 to entry: The M-package temperature establishes the performance level of the *refrigerated display cabinet* (3.1.1).

3.7 General

3.7.1
consumer
purchaser or end user of *goods* (3.7.3)

Note 1 to entry: See Figure 1.

3.7.2
serving personnel
store personnel who prepare and/or serve *goods* (3.7.3) for *consumers* (3.7.1)

Note 1 to entry: See Figure 1.

3.7.3
goods
items to be sold

3.7.4
foodstuff
goods (3.7.3) for consumption

3.8 Energy and coefficient

3.8.1
incorporated compressor coefficient of performance
C_{ic}
ratio between the cooling capacity and the electric power input values at any given set of *rating conditions* (3.9.3) for an incorporated compressor

Note 1 to entry: Both cooling capacity and electric power input values are expressed in W.

3.8.2
coefficient of performance for liquid-cooled condensing unit
C_{LC}
coefficient of performance for *cabinets with incorporated liquid-cooled condensing unit* (3.5.11)

3.8.3
anti-condensate energy consumption
$E_{ACE,24h}$
total daily energy consumption used in condensate removal on the outside of a commercial refrigerated display cabinet, which typically includes fan and condensate heater energy

3.8.4
additional refrigeration energy consumption
E_{add}
additional indirect effect of alternate electric component(s) on the *refrigeration electrical energy consumption* (3.8.18) for a cabinet intended for a remote *compression-type refrigerating system* (3.5.4) or *indirect-type refrigerating system* (3.5.5)

3.8.5
compressor energy consumption
E_{CEC}
energy consumed by the compressor of a *condensing unit* (3.3.13) incorporated in a *refrigerated display cabinet* (3.1.1)

3.8.6
pumping electrical energy consumption
$E_{CPEC,24h}$
daily energy consumption of a conventional pumping system for the *secondary refrigerant* (3.5.9) necessary to operate a cabinet

3.8.7
cooling system energy consumption
E_{CSEC}
energy consumption for cooling the liquid of a closed circuit that provides the condensation for a unit integrated in a refrigerated cabinet

EXAMPLE Dry cooler fan.

3.8.8
direct daily electrical energy consumption
$E_{DEC,24h}$
daily energy consumption of the electrical components of a cabinet