

---

---

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

*Meubles frigorifiques de vente —*

*Partie 2: Classification, exigences et méthodes d'essai*



This document is a preview generated by EBS



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2015, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Ch. de Blandonnet 8 • CP 401  
CH-1214 Vernier, Geneva, Switzerland  
Tel. +41 22 749 01 11  
Fax +41 22 749 09 47  
copyright@iso.org  
www.iso.org

# Contents

Page

|  |           |
|--|-----------|
| <b>Foreword</b>  | <b>v</b>  |
| <b>1 Scope</b>   | <b>1</b>  |
| <b>2 Normative references</b>  | <b>1</b>  |
| <b>3 Terms, definitions, symbols and abbreviated terms</b>                                 | <b>1</b>  |
| 3.1 General  | 1         |
| 3.2 Compression-type refrigeration systems   | 2         |
| 3.3 Indirect refrigeration-type systems  | 3         |
| <b>4 Requirements</b>  | <b>3</b>  |
| 4.1 Construction   | 3         |
| 4.1.1 General  | 3         |
| 4.1.2 Materials  | 5         |
| 4.1.3 Thermal insulation   | 5         |
| 4.1.4 Refrigerating system   | 6         |
| 4.1.5 Electrical components  | 6         |
| 4.1.6 Temperature display  | 6         |
| 4.2 Operating characteristics  | 7         |
| 4.2.1 Absence of odour and taste   | 7         |
| 4.2.2 Classification according to temperature  | 8         |
| 4.2.3 Defrosting   | 8         |
| 4.2.4 Water vapour condensation  | 8         |
| 4.2.5 Energy consumption   | 8         |
| 4.2.6 Specific Energy Consumption  | 9         |
| <b>5 Tests</b>   | <b>9</b>  |
| 5.1 General  | 9         |
| 5.2 Tests outside test room  | 9         |
| 5.2.1 Seal test for doors and lids on low temperature applications                         | 9         |
| 5.2.2 Linear dimensions, areas   | 9         |
| 5.3 Tests inside test room   | 10        |
| 5.3.1 General conditions   | 10        |
| 5.3.2 Preparation of test cabinet and general test procedures                              | 19        |
| 5.3.3 Temperature test   | 45        |
| 5.3.4 Water vapour condensation test   | 50        |
| 5.3.5 Electrical energy consumption test   | 51        |
| 5.3.6 Heat extraction rate measurement when condensing unit is remote from cabinet         | 51        |
| <b>6 Test report</b>   | <b>60</b> |
| 6.1 General  | 60        |
| 6.2 Tests outside test room  | 60        |
| 6.2.1 Seal test of doors and lids  | 60        |
| 6.2.2 Linear dimensions, areas and volumes   | 60        |
| 6.2.3 Test for absence of odour and taste  | 61        |
| 6.3 Tests inside test room   | 61        |
| 6.3.1 General test conditions  | 61        |
| 6.3.2 Cabinet preparation  | 61        |
| 6.3.3 Temperature test   | 62        |
| 6.3.4 Water vapour condensation test   | 62        |
| 6.3.5 Electrical energy consumption test   | 63        |
| 6.3.6 Heat extraction rate measurement when the condensing unit is remote from the cabinet | 63        |
| <b>7 Marking</b>   | <b>65</b> |
| 7.1 Load limit   | 65        |
| 7.2 Marking plate  | 66        |

|                     |   |           |
|---------------------|---|-----------|
| 7.3                 | Information to be supplied by the manufacturer.....   | 66        |
| <b>Annex A</b>      | <b>(normative) Total display area (TDA) .....</b>   | <b>68</b> |
| <b>Annex B</b>      | <b>(informative) Comparison between laboratory and in-store conditions .....</b>                      | <b>76</b> |
| <b>Annex C</b>      | <b>(informative) Test for absence of odour and taste.....</b>   | <b>78</b> |
| <b>Annex D</b>      | <b>(normative) Performance and energy rating of commercial refrigerated<br/>display cabinets.....</b> | <b>80</b> |
| <b>Bibliography</b> | <b>.....</b>  | <b>89</b> |

## 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.

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 documents 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](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is 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 (ISO 23953-2:2005 and ISO 23953-2:2005/Amd 1:2012), 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"

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 and safety classification*

ISO 5149-2:2014, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 2: Design, construction, testing, marking and documentation*

ISO 23953-1:2015, *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*

### 3 Terms, definitions, symbols and abbreviated terms

#### 3.1 General

|                    |   |
|--------------------|---|
| $t_{\text{run}}$   | 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   |
| $t_{\text{stop}}$  | 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     |
| $t_{\text{defst}}$ | 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   |
| $\Delta t$         | time between two consecutive measuring samples, in hours  |