
**Blast chiller and freezer cabinets for
professional use — Classification,
requirements and test conditions**

*Cellules de refroidissement et de surgélation rapide pour usage
professionnel — Classification, exigences et conditions d'essai*

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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).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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).

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.

Blast chiller and freezer cabinets for professional use — Classification, requirements and test conditions

1 Scope

This document specifies the requirements for the verification of performance and energy consumption of blast cabinets for professional use in commercial kitchens, hospitals, canteens, institutional catering and similar professional areas.

The appliances covered by this document are intended to rapidly cool down hot foodstuffs up to a load capacity of 300 kg.

This document applies to:

- blast chillers;
- blast freezers;
- multi-use blast chillers/freezers.

The following appliances are not covered:

- roll-in cabinet;
- pass-through cabinet;
- cabinets with remote condensing unit;
- cabinets with water cooled condenser;
- blast chilling and freezing tunnels;
- continuous blast-chilling and blast-freezing equipment;
- bakery combined freezing and storage units.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

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

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

blast cabinet

insulated refrigerating appliance primarily intended to rapidly cool down hot foodstuff

3.1.1

blast chiller

blast cabinet intended to rapidly cool down hot foodstuff to below +10 °C

3.1.2

blast freezer

blast cabinet intended to rapidly cool down hot foodstuff to below -18 °C

Note 1 to entry: Blast freezers are also able to operate as blast chillers.

Note 2 to entry: Different full load capacity is claimed depending on the mode of operation for chilling or freezing considered.

3.2

test food

reference food used for the tests

3.3

full load capacity

weight of the test food, in kg, as declared by the manufacturer, that can be processed in the appliance for testing its performance

3.4

reference temperature cycle

cycle from which temperature in °C down to which temperature in °C test food is intended to be cooled and in how many minutes

3.5

energy consumption

ratio of total energy measured in kWh per kg of test food per reference temperature cycle, rounded to four digits after the comma

3.6

test pan

container made by solid stainless steel

3.7

M-pan

test pans equipped for temperature measurement, fitted with a temperature probe placed at the geometrical centre of the test food volume

3.8

operating conditions

conditions which exist when the cabinet, including all permanently located accessories, has been set up to the program specified by the manufacturer in order to achieve final reference temperature cycle

3.9

operational ambient temperature

ambient temperature at which the appliance has been designed to be operated

Note 1 to entry: The operational ambient temperatures are 25 °C $\begin{smallmatrix} -1 \\ +5 \end{smallmatrix}$ or 30 °C $\begin{smallmatrix} -1 \\ +5 \end{smallmatrix}$ or 40 °C $\begin{smallmatrix} -1 \\ +5 \end{smallmatrix}$.

4 Requirements

4.1 Reference temperature and time of test food

Blast chillers shall bring the test food from an initial reference temperature of +65 °C to a final temperature of +10 °C within a test time of 120 min.

Blast freezers shall bring the test food from an initial reference temperature of +65 °C to a final temperature of –18 °C within a test time of 270 min.

For blast chillers at the end of the test, the temperature of the coldest M-pan shall be higher than –1 °C.

NOTE In some countries specific hygiene requirements apply.

4.2 Test time

The test time is the time between:

- T_0 , time when the average temperature of the test food in the M-pans is equal to the initial reference temperature; and
- T_f time when the temperature of the test food in all M-pans reaches the final reference temperature.

The measured time is rounded to the next full minute.

5 Test conditions

5.1 Test room

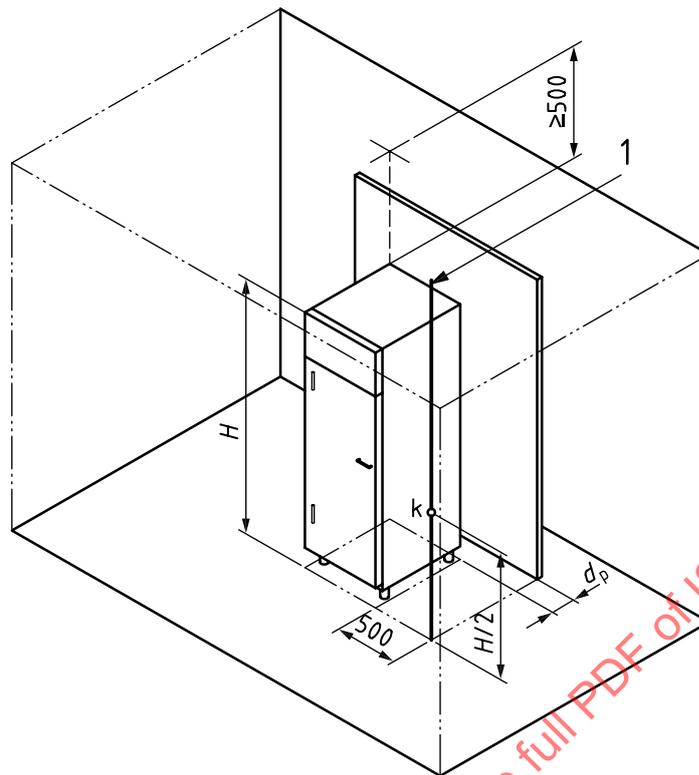
Tests shall be carried out in a test room at a temperature in accordance with the operational ambient temperature. Temperature measurement shall be at one decimal place.

The measuring point (k) shall be located opposite to the hinges of the door of the blast cabinet, 500 mm upstream of the blast cabinet, in line with the front of the cabinet at a vertical height that is half the blast cabinet height (including cabinet feet and fixings).

No specific requirement on relative humidity is applicable.

5.2 Blast cabinet selection, installation and positioning within the test room

The blast cabinet, including all components required for normal operation, shall be assembled, set up and sited as it would be installed in service as far as practicable and in accordance with the manufacturer's instructions. All permanently located accessories required for normal use shall be in their respective places. Blast cabinets shall be placed against a wall of the test room or a vertical partition having a length of at least 1 m on the side of the test room temperature measuring point, 0,5 m on the opposite side and an height of at least 0,5 m more than the cabinet under testing at a distance from the rear as specified in the instructions for use (see [Figure 1](#)).



Key

- 1 climate measuring line
- H overall height of the cabinet including feet
- k climate measuring point detecting temperature
- d_p clearance between rear wall of test room and vertical position specified by the manufacturer (if used)

Figure 1 — Test room temperature measuring point and positioning of the cabinet

5.3 Blast cabinet operation

The blast cabinet shall be operated at normal operating conditions.

5.4 Power supply

The blast cabinet shall be supplied at the voltage and frequency marked on the rating plate. In case a range of voltage or frequency are indicated, the cabinet is supplied at the conditions giving the highest energy consumption. The tolerance on power supply shall be $\pm 2\%$ for voltage and $\pm 1\%$ for frequency, in relation to the nominal values given on the marking plate or otherwise stated.

5.5 Instruments, measuring equipment and measuring accuracy

All measurements shall be carried out with instruments that are subjected to a due calibration program.

The following measurement accuracies shall be met:

- temperature shall be measured to an accuracy of $\pm 0,8\text{ }^\circ\text{C}$;
- total energy shall be measured to an accuracy of $\pm 2\%$;
- weight shall be measured to an accuracy of $\pm 2\text{ g}$;

- time interval measurements shall be made to an accuracy of at least 1 %;
- time measurements shall be made to an accuracy of at least ± 1 s;
- dimensions shall be measured to an accuracy of ± 2 mm.

5.6 Test load

5.6.1 Test food

The test food shall be reconstituted mashed potatoes. Composition for a kg of reconstituted mashed potatoes shall be:

- 115 g of instant mashed potatoes (flakes);
- 877 g of water;
- 8 g of common salt.

The test food shall be prepared in the following way:

- heat the water and the salt in a cooking pan covered with a lid (to minimize water evaporation) to a temperature between 75 °C and 80 °C;
- when the above temperature is reached, pour the flakes into the water and mix vigorously with a whisk to an even consistency, leave to rise 2 min to 3 min in the cooking pan covered with a lid;
- place the mashed potatoes into the test pans in layers of uniform thickness.

It is recommended to prepare a quantity of test food exceeding the needed quantity by approximately 20 %.

The test food shall only be used once.

5.6.2 Test pan loading

The test pans, having the maximum surface that can be allowed by the shelf and with a height of 40 mm, shall be loaded by test food load evenly distributed up to a height of 35 mm.

In case a blast cabinet cannot fit the test pans, a pan made by a rectangular stainless-steel container with the height of 40 mm shall be loaded with test food load evenly distributed up to a height of 35 mm.

In case of blast cabinets loaded with only 1 test pan and in case reference temperature and time of test food specified in 4.1 with an amount of food corresponding to one test pan as in Nomenclature 1/1 in Table 1 cannot be reached, a rectangular stainless steel container with the height of 40 mm shall be loaded with test food load evenly distributed up to a height of 35 mm.

Table 1 — Nomenclature and nominal dimensions of test pans

Dimensions in millimetres

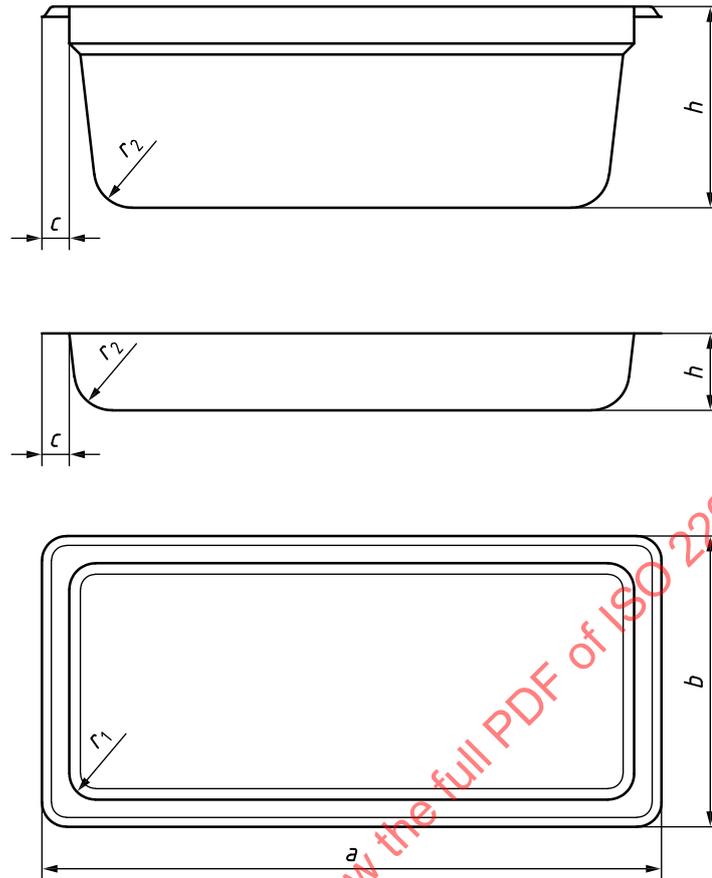
Nomenclature	Dimension ^a												
	<i>a</i>	<i>b</i>	<i>h^b</i>						<i>c^c</i>	<i>r₁</i>		<i>r₂</i>	
										min.	max.	min.	max.
2/1	650	530	20	40	65	100	150	200	13	30	80	3	40
1/1	530	325	20	40	65	100	150	200	13	30	80	3	40
1/2	325	265	20	40	65	100	150	200	13	30	80	3	40
2/3	354	325	20		65	100	150	200	13	30	80	3	40
1/3	325	176	20		65	100	150	200	13	30	60	3	20
1/6	176	162			65	100	150	200	13	30	50	3	20
1/9	176	108			65	100			13	30	50	3	20
1/4	265	162	20		65	100	150	200	13	30	50	3	20
2/8	325	132			65	100	150		13	30	50	3	20
2/4	530	162		40	65	100	150		13	30	50	3	20

^a See [Figure 2](#).

^b Commonly available height.

^c This dimension may be larger to allow for drop-down handles or other features. Where such features are incorporated the *c* dimension shall be measured to the feature.

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**Key**

- a length
- b width
- c length, including retractable handles or other accessories
- h depth
- r_1 external radius
- r_2 internal radius

Figure 2 — Basic module, derived dimensions and nomenclature

No lids shall be placed on the containers.

The thickness of the test pan shall be $0,8 \text{ mm} \pm 0,05 \text{ mm}$, measured at the centre of the bottom of the test pan.

For the correct performance of the tests the following information shall be provided by the manufacturer or the person applying for the tests:

- position of the pan on the support,
- in case no test pans are used, description and dimensions of the pan made by a rectangular stainless-steel container.

5.6.3 M-pans

The probe supports shall be fixed, made of non-thermal conductive and non-deformable material.

5.6.4 Blast cabinet loading

Blast cabinets shall be filled with the number of test pans corresponding to the full load capacity. Each loaded level shall be filled with the maximum number of test pans.

In appliances which contain less than 10 test pans, all test pans shall be M-pans.

In case of supports that can receive test pans as in nomenclature 2/1 in [Table 1](#), two test pans as in Nomenclature 1/1 in [Table 1](#) shall be used if this is possible by the construction of the blast cabinet.

Each level shall include at least one M-pan placed alternatively at the front and at the back starting from the upper at the front.

During the loading process, the temperature inside the appliance shall be in equilibrium with the test room temperature (no pre-cooling).

The top-level test pan support and the bottom level test pan support shall be loaded with test pans. In case the manufacturer has foreseen specific vertical loading configuration for these pans and for a given product, the instruction for use shall specify in detail the loading scheme to be used for the test.

The remaining test pans supports shall be evenly distributed and loaded with test pans. In case of uneven distribution, the remaining test pans are placed on the first available level close to the top.

In case of one level, test pan shall be loaded, and it shall be placed so that the centre of the test food is as much as possible close to the vertical centre of the blast cabinet.

In case the test pan can slide on the support, it is placed in accordance with manufacturer's instruction. If not, it is placed at the geometrical centre of the support.

The door of the appliance shall be left open until to the start of the test.

The weight of the test food for each test pan shall be measured.

The appliance shall be loaded as quickly as possible.

The test food temperature in all the pans forming the full load shall be between +65 °C and +80 °C.

Immediately after the loading of the last test pan the door is closed, the appliance is switched-on at normal operating conditions and the test is started. The door shall be kept closed for the full duration of the test.

5.7 Temperature recording

The test room temperature and the M-pan temperatures shall be recorded at a rate of a measurement of at least every 5 min.

To define T_0 at the beginning of the test and T_f at the end of the test, temperatures shall be recorded at least every 30 s.

6 Test procedure for total energy measurement

Measure the total energy according to the procedure defined in [4.1](#) with all fitted electrical power using components switched on. The total energy is expressed in kWh, given to two decimal places.

Measurement shall be made at least every 10 s and the relevant average or integrated values shall be recorded every 30 s.

For blast freezers two tests shall be conducted with the respective full load capacity, one for the blast chilling cycle and one for the blast freezing cycle and two values of total energy shall be measured, one for the blast chiller function and one for the blast freezer function.