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British Standard Specification for

Household refrigerator/freezers: type I

Réfrigérateurs ménagers avec compartiments congélateurs: type I — Spécifications

Haushaltskühl- und -gefriergeräte: Typ I

British Standards Institution

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Foreword

This British Standard has been prepared under the direction of the Refrigeration, Heating and Air Conditioning Standards Committee.

This standard relates to refrigerator/freezers that have a single temperature sensing device for regulating the internal temperatures of the fresh food storage compartment and of the food freezing compartment, i.e. type I. This type of refrigerator/freezer normally has a single compressor or a single absorption system.

It is recognized that refrigerator/freezers of this type may have additional compartments such as chiller compartments; requirements for such special-purpose compartments are not included in this standard pending further consideration, but the requirements are under study.

Larger and more sophisticated refrigerator/freezers have the two compartments separately controllable in regard to temperature, this being achieved by using two separate

compressors or more complex control devices. It is envisaged that these refrigerator/freezers will be covered by a separate standard.

The standard takes account of current work on this subject by technical committee 86 of the International Organization for Standardization (ISO/TC 86/SC 5), and by technical committee 44 of the European Committee for Standardization (CEN/TC 44) (Household refrigerators, European Standard EN 153).

Safety requirements applicable to electrically operated household refrigerating appliances are specified in BS 3456 : Part 3 : Section 3.18.

Safety requirements applicable to gas operated household refrigerating appliances are specified in BS 5258 : Part 6.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

British Standard Specification for

Household refrigerator/freezers: type I

1. Scope

This British Standard specifies the essential characteristics and test methods for household refrigerator/freezers that are wholly factory assembled and have a single temperature sensing device for regulating internal temperatures. These are designated type I refrigerator/freezers and are classified into four classes according to ambient temperature range (see clause 3).

NOTE. The titles of the publications referred to in this standard are listed on the inside back cover.

2. Definitions

For the purposes of this British Standard the following definitions apply.

2.1 household refrigerator/freezer. An insulated cabinet of suitable volume and equipment for household use, cooled by an energy consuming means, and having two or more compartments, of which at least one compartment (the fresh food storage compartment) is suitable for storing unfrozen food, and at least one compartment (the food freezing compartment) is suitable for freezing fresh food and for storing frozen food at -18°C or colder.

2.2 type I refrigerator/freezer. A household refrigerator/freezer having a single temperature sensing device for regulating internal temperatures.

NOTE 1. Type II refrigerator/freezers are those having independent controls for regulating the temperature of the fresh food storage and food freezing compartments.

NOTE 2. The type numbers are those currently being considered for use in international standards in preparation by ISO.

2.3 fresh food storage compartment. A compartment, which may itself be divided into sub-compartments, suitable for the storage of unfrozen food, in which the temperature is maintained at between 0°C and $+7^{\circ}\text{C}$.

2.4 food freezing compartment. A compartment suitable for freezing, from $+25^{\circ}\text{C}$ to -18°C , a quantity of at least 4.5 kg of test packages per 100 L of its storage volume per 24 h, and in no case less than 1.5 kg, and which is also suitable for the storage of frozen food under 'three star' storage conditions (-18°C or colder; see BS 3739).

2.5 overall dimensions (doors or lids closed). The dimensions of the rectangular parallelepiped whose base is horizontal within which the appliance is inscribed, including the fittings but not the handle, the protrusion of which, if any, is separately specified.

2.6 overall space required in use (doors or lids open). The overall dimensions, increased by the space necessary for free circulation of the cooling air when the appliance is in service, plus the space necessary to allow opening of the doors or lids including top-opening lids to the

minimum angle permitting removal of all removable parts (such as containers and shelves) including the drip tray, with water, if this has to be removed and emptied manually (see figure 1).

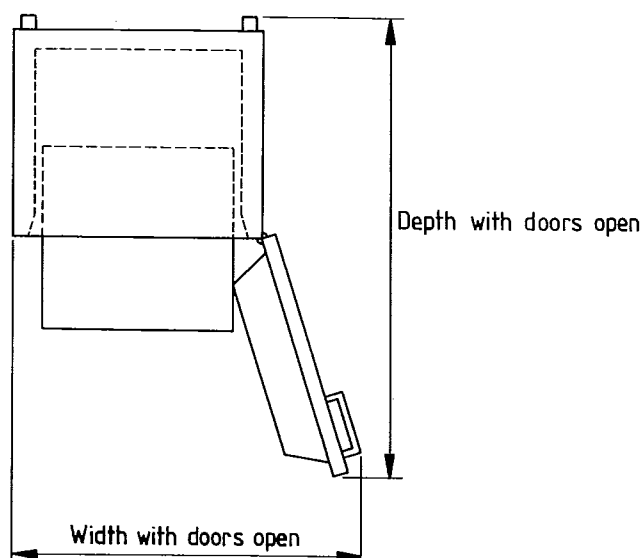


Figure 1. Overall space required in use

2.7 Volumes

2.7.1 gross volume. The total volume of the food compartments within the inside walls of the appliance, without fittings, the doors or lids being closed, except when cooling is provided by forced air, in which case the gross volume is calculated by subtracting from the total volume the volume rendered unusable by cold air ducting, evaporator, fan and other associated accessories.

2.7.2 rated gross volume. The gross volume stated by the manufacturer.

2.7.3 storage volume of a compartment. The part of the volume of any compartment that remains after deduction of the volume of components and of spaces recognized as unusable for the storage of food (see F.2.3).

2.7.4 rated storage volume of a compartment. The storage volume of a compartment stated by the manufacturer.

2.7.5 total storage volume. The sum of the storage volumes of all compartments, such as the fresh food storage compartment, chiller compartment and food freezing compartment.

2.7.6 rated total storage volume. The total storage volume stated by the manufacturer.

2.8 Storage areas

2.8.1 shelf. Any horizontal surface (shelf, partition, etc.) on which food can be placed being formed by one component or by components fitted side by side, which may be fixed or removable.

2.8.2 storage shelf area. The sum of the horizontal projections of the storage surfaces within the storage volume, including door shelves and the bottom of each compartment.

2.8.3 rated storage shelf area. The storage shelf area stated by the manufacturer.

2.9 load limit. The surface enveloping the storage volume of the food freezing compartment.

2.10 load limit line(s). Permanent marks indicating the limits of the frozen food storage volume in the food freezing compartment.

2.11 Performance characteristics

2.11.1 control cycle. The period between two successive starts, or two successive stops, of the refrigerating system controlled by a temperature control device under stable operating conditions.

2.11.2 storage temperature of the fresh food storage compartment (t_m). The mean of the three internal temperatures t_1 , t_2 and t_3 , which are the averages of the extreme values read at given points T_1 , T_2 and T_3 (see figure 2) during a complete control cycle under the specified test conditions.

NOTE 1. The storage temperature of the fresh food storage compartment (t_m) is calculated from the equation:

$$t_m = (t_1 + t_2 + t_3) / 3$$

NOTE 2. For the test of storage temperatures, see appendix G.

2.11.3 storage temperature of the food freezing compartment. The maximum temperature of the warmest 'M' package of a load placed in storage in the food freezing compartment in the specified test conditions.

NOTE. For the test of storage temperatures, see appendix G.

2.11.4 'M' package. A test package of dimensions 50 mm x 100 mm x 100 mm, fitted with a temperature sensor at its geometric centre.

NOTE. See A.3.

2.11.5 freezing capacity. The mass of test packages whose temperature (the instantaneous arithmetic mean temperature of all the 'M' packages) can be lowered from the loading temperature of +25 °C to -18 °C in 24 h under the specified test conditions.

NOTE 1. The freezing capacity is expressed in kilograms.

NOTE 2. For the freezing test, see appendix H.

2.11.6 rated freezing capacity. The freezing capacity stated by the manufacturer.

2.11.7 energy consumption. The consumption of a refrigerator/freezer over a period of 24 h, running under stable operating conditions at an ambient temperature of +25 °C (in the case of class SN, class N and class ST refrigerator/freezers) or 32 °C (in the case of class T refrigerator/freezers) and measured under the specified test conditions.

NOTE. For the energy consumption test, see appendix J.

2.11.8 rated energy consumption. The energy consumption stated by the manufacturer.

2.11.9 automatic defrosting. A method of defrosting that will maintain the specified storage conditions (see 5.2.1 and appendix G) without the intervention of the user to remove frost accumulation.

2.11.10 semi-automatic defrosting. A method of defrosting whereby the action necessary to remove frost accumulation is initiated by the user and normal operation is restored automatically.

NOTE. Semi-automatic defrosting may be accelerated by the application of heat.

2.11.11 manual defrosting. A method of defrosting whereby the actions necessary to remove frost accumulation and to restore normal operation are both initiated by the user.

3. Classification

This standard provides for the following four classes:

- (a) class SN: appliances intended for use in ambient temperatures from +10 °C to +32 °C;
- (b) class N: appliances intended for use in ambient temperatures from +16 °C to +32 °C;
- (c) class ST: appliances intended for use in ambient temperatures from +18 °C to +38 °C;
- (d) class T: appliances intended for use in ambient temperatures from +18 °C to +43 °C.

4. Design, type testing, materials and manufacture

4.1 General. Refrigerator/freezers shall be constructed in such a manner as to give adequate performance and durability in use. Before routine production to this British Standard commences, under the test conditions specified in appendix A, type tests in accordance with appendices B to K shall be carried out. The test report shall include the information listed in appendix L.

Appliances intended for direct connection to the UK mains supply shall be suitable for use at 240 V and 50 Hz.

4.2 Materials and finishes. None of the materials used inside refrigerator/freezers shall cause odours.

None of the materials used inside refrigerator/freezers shall contaminate food placed in contact with them or transmit poisonous substances to food. They shall be resistant to the action of moisture and food acids.

All surface finishes shall, in normal conditions of use and for the purpose intended, be sufficiently resistant to impact, hard, colour fast, smooth and easily washable.

4.3 Air tightness and thermal insulation. The air tightness of the seal shall be such that, when tested in accordance with appendix B, the strip of paper shall not slide freely when the door or lid is closed.

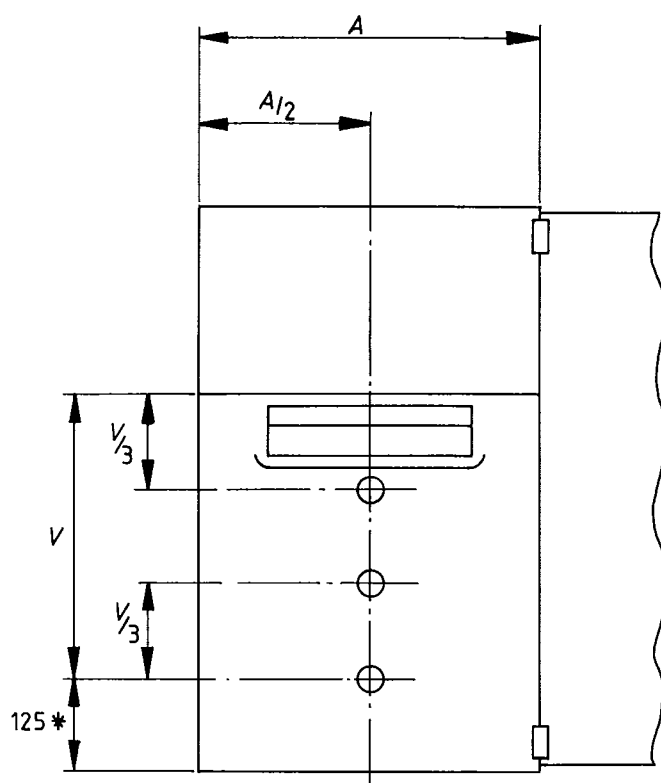
NOTE. The thermal insulation of the refrigerator/freezers should be efficient and permanently maintained. In particular, the insulating material should not be subject to shrinkage and should not allow under normal working conditions an excessive accumulation of ice or moisture.

4.4 Doors, lids and fittings

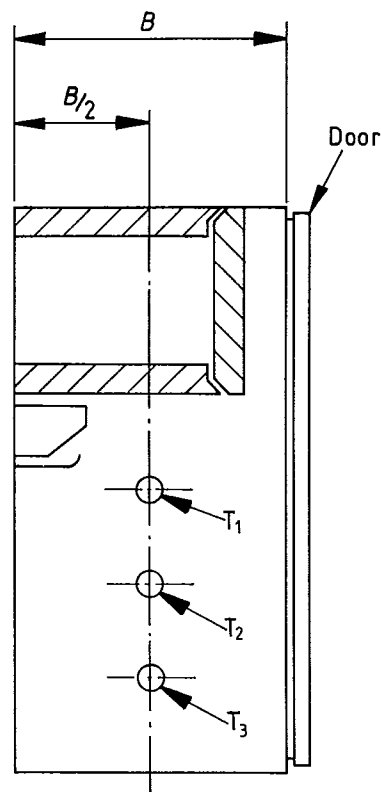
4.4.1 The fastening system shall be such as to enable the door to be easily closed and opened. It shall be efficient and capable of maintaining its proper function.

For refrigerator/freezers having any compartment with a volume equal to or greater than 60 L determined after removal of all detachable shelves, it shall be possible to open the door or lid of that compartment from the

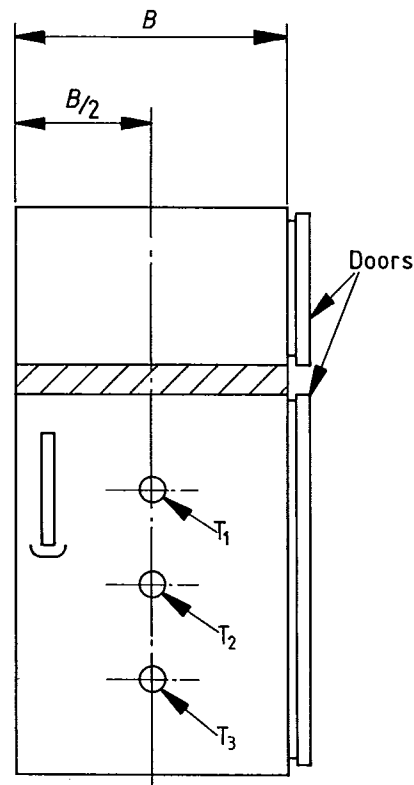
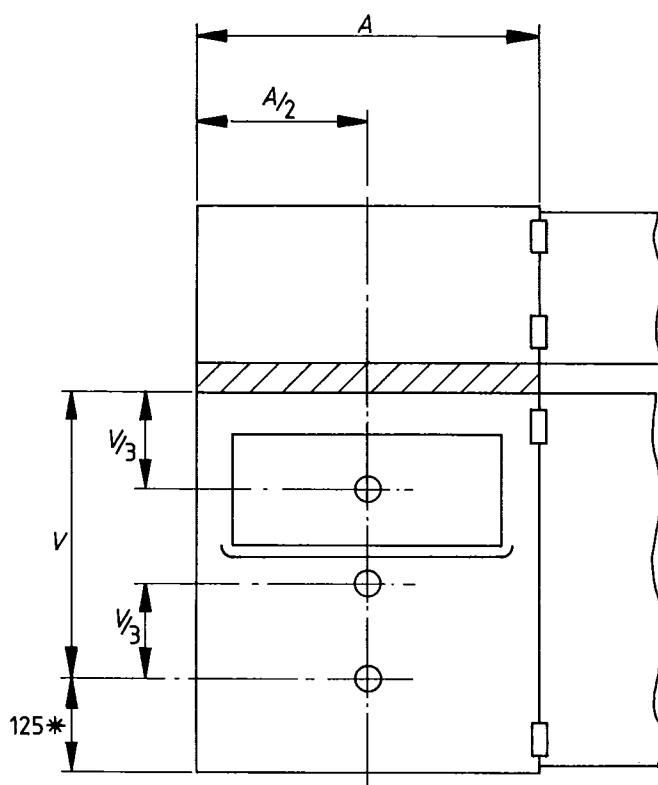
Front view



Sectional side view



(a) Appliance with one external door



(b) Appliance with two external doors

*125 mm above the bottom of cabinet or 25 mm above the cover of a closed container.
All dimensions are in millimetres.

Figure 2. Positions of temperature measuring points (T) in fresh food storage compartment

outside with a force not exceeding 70 N when tested in accordance with appendix C, except when the latch is locked on the door or lid of an appliance having all the following characteristics.

- (a) The latch on the door or lid is of a mechanical type that can be locked by a removable key.
- (b) The door or lid cannot be closed with the key turned to the locked position.
- (c) The refrigerator/freezer is accompanied by an instruction that the key be kept out of children's reach and away from the vicinity of the appliance.

4.4.2 Hinges and handles shall be sufficiently strong and resistant to corrosion to withstand normal conditions of use.

When tested in accordance with appendix D, the hinges, handles and seals of external doors and lids, other than a separate external access door or lid of a food freezing compartment, shall withstand 100 000 opening and closing cycles without deterioration. The hinges, handles and seals of a separate external access door or lid of a food freezing compartment, when tested in accordance with appendix D, shall withstand 10 000 opening and closing cycles without deterioration. Deterioration prejudicial to the requirements of 4.3 and 4.4.1 shall be ascertained by retesting in accordance with appendices B and C.

4.5 Shelves and containers. Shelves, containers and similar components shall have adequate mechanical strength. Those used for storing food shall, when tested in accordance with appendix E, not show such distortion that they can no longer fulfil their intended function. In particular, sliding components shall be capable of their full movement when loaded.

NOTE. Shelves, containers and similar components that are intended to be removable should be easily removable.

4.6 Disposal of defrost water. Means shall be provided for completely collecting the defrost water, either in a removable internal drip tray, or in an external receptacle wherein the defrost water is evaporated, or by other means.

NOTE. The drip tray or other defrost water receptacle should have adequate volume and, additionally, external drip trays should have adequate evaporating means.

The volume of drip trays (either internal or external) of evaporators that are semi-automatically or manually defrosted shall be at least equal to the volume obtained by multiplying by 1 mm the total external and internal area of the related evaporator(s).

Any drainage system shall be designed to ensure its proper function. It shall be easily accessible for the clearing of any blockage, and shall be designed so as to prevent any undue ingress of air into the food storage compartment(s).

4.7 Refrigerating system

NOTE 1. The mechanical operation of the refrigerator/freezer should not give rise to undue noise or vibration.

NOTE 2. The design of the condenser should be such as to minimize the accumulation of dust.

NOTE 3. Pipes and connections to moving or resiliently mounted parts should be so arranged as not to generate noise, nor to touch or to transmit vibrations to other parts, and should be so designed as to prevent failure due to fatigue. All other pipes and connections should be securely anchored. Where necessary, pipes and valves should be properly insulated.

NOTE 4. Suitable means should be provided to prevent water condensed on cold parts from affecting the operation of the unit

or its controls, or from causing any other damage to the refrigerator/freezer and its surroundings.

4.7.1 All parts of compressor-type refrigerating systems and absorption-type refrigerating systems that are subjected to internal pressure shall be designed to withstand, without leakage, the pressures that may occur in normal service and transit.

4.7.2 The heat exchange surfaces of the evaporator shall either be made of corrosion-resistant material or finished with a corrosion-proof non-poisonous coating resistant to temperature changes and alternating frosting and defrosting.

NOTE. The evaporator should be so designed or protected that it will not suffer any damage during the normal use of the appliance.

4.7.3 If temperature control devices are intended to be adjusted by the user, the means of adjustment shall be readily accessible.

5. Characteristics of complete appliances

5.1 Dimensional characteristics

5.1.1 Rated gross volume. The rated gross volume shall be not greater than the gross volume, measured in accordance with appendix F, by more than 3 % of the latter or 1 L whichever is the greater.

5.1.2 Rated total storage volume. The rated total storage volume shall be not greater than the total storage volume, measured in accordance with appendix F, by more than 3 % of the latter or 1 L, whichever is the greater.

5.1.3 Rated storage shelf area. The rated storage shelf area shall be not greater than the storage shelf area, measured in accordance with appendix F, by more than 3 % of the latter.

5.2 Performance characteristics

5.2.1 Storage temperatures. When tested in accordance with appendix G, the appliance shall be capable of maintaining simultaneously the storage temperatures for the fresh food storage compartment and food freezing compartment given in table 1.

5.2.2 Rated freezing capacity of the food freezing compartment. The rated freezing capacity of the food freezing compartment shall be not less than 1.5 kg, or 4.5 kg/100 L of total frozen food storage volume, whichever is the greater.

When measured in accordance with appendix H, either the freezing capacity of the first appliance tested shall be equal to or greater than the rated value minus 15 % or, failing this, a further three appliances shall be tested and the arithmetic mean of the freezing capacities of these three appliances shall be equal to or greater than the rated value minus 10 %.

5.2.3 Energy consumption. When measured in accordance with appendix J, either the energy consumption of the first appliance tested shall be not greater than the energy consumption stated by the manufacturer by more than 15 % of the latter or, failing this, a further three appliances shall be tested and the arithmetic mean of the energy consumptions of these three appliances shall be not greater than the energy consumption stated by the manufacturer by more than 10 % of the latter.

5.2.4 Water vapour condensation. When tested in accordance with appendix K, no running water shall appear.

Table 1. Storage compartment temperatures

Climate class (and ambient temperature range)	Fresh food storage compartment		Food freezing compartment
	t_1, t_2, t_3 are all to lie between:	t_m max.	
SN (+10 °C to +32 °C)	-1 °C and +10 °C	+7 °C	Equal to or colder than -18 °C
N (+16 °C to +32 °C)	0 °C and +10 °C	+7 °C*	
ST (+18 °C to +38 °C)	0 °C and +12 °C	+7 °C	
T (+18 °C to +43 °C)	0 °C and +12 °C	+7 °C	

*Certain countries may require t_m max. = +5 °C.

6. Designation

Refrigerator/freezers covered by this standard shall be designated according to the following:

- (a) the description and type, i.e. refrigerator/freezer, type I;
- (b) the operating principle (compression or absorption) and:
 - (1) if compression, the type of refrigerating unit (hermetically sealed, accessible or open);
 - (2) if absorption, the energy source (e.g. electricity, gas or liquid fuel);
- (c) the class (SN, N, ST or T);
- (d) the rated gross volume, expressed either in cubic decimetres or in litres;
- (e) the rated total storage volume, expressed either in cubic decimetres or in litres;
- (f) the rated storage volume of the food freezing compartment, expressed either in cubic decimetres or in litres;
- (g) the rated freezing capacity, expressed in kilograms (per 24 h).

For example: Refrigerator/freezer, type I, hermetically sealed compressor unit, class SN, gross volume 200 litres, total storage volume 180 litres, storage volume of food freezing compartment 40 litres, rated freezing capacity 5 kg (per 24 h).

7. Marking

7.1 Rating plate(s). Each refrigerator/freezer shall have, on one or several securely fastened durable rating plates, the following information marked in a permanent and legible manner:

- (a) the number and date of this British Standard* (i.e. BS 6291 : 1983);
- (b) the indication 'Refrigerator/freezer, type I';
- (c) the symbol of the class (SN, N, ST or T);
- (d) the trade mark or name of the manufacturer or responsible vendor;

- (e) the manufacturer's type/model reference;
- (f) the serial number and/or date of manufacture, which may be coded;
- (g) the rated gross volume, expressed either in cubic decimetres or in litres;
- (h) the rated storage volume of the fresh food storage compartment, expressed either in cubic decimetres or in litres;
- (i) the rated storage volume of the food freezing compartment, expressed either in cubic decimetres or in litres;
- (j) the rated freezing capacity, expressed in kilograms (per 24 h);
- (k) the number designation of the refrigerant (see BS 4580), and its mass, expressed in grams;
- (l) appropriate indications relating to the energy source, including those needed to fulfil safety requirements.

NOTE 1. The manufacturer is free to show any other information he considers desirable.

The rating plate shall be either:

- (a) readily visible in normal use; or
- (b) readily visible either when the refrigerator/freezer is away from a wall or after the removal, without any tool, of a flap or grille.

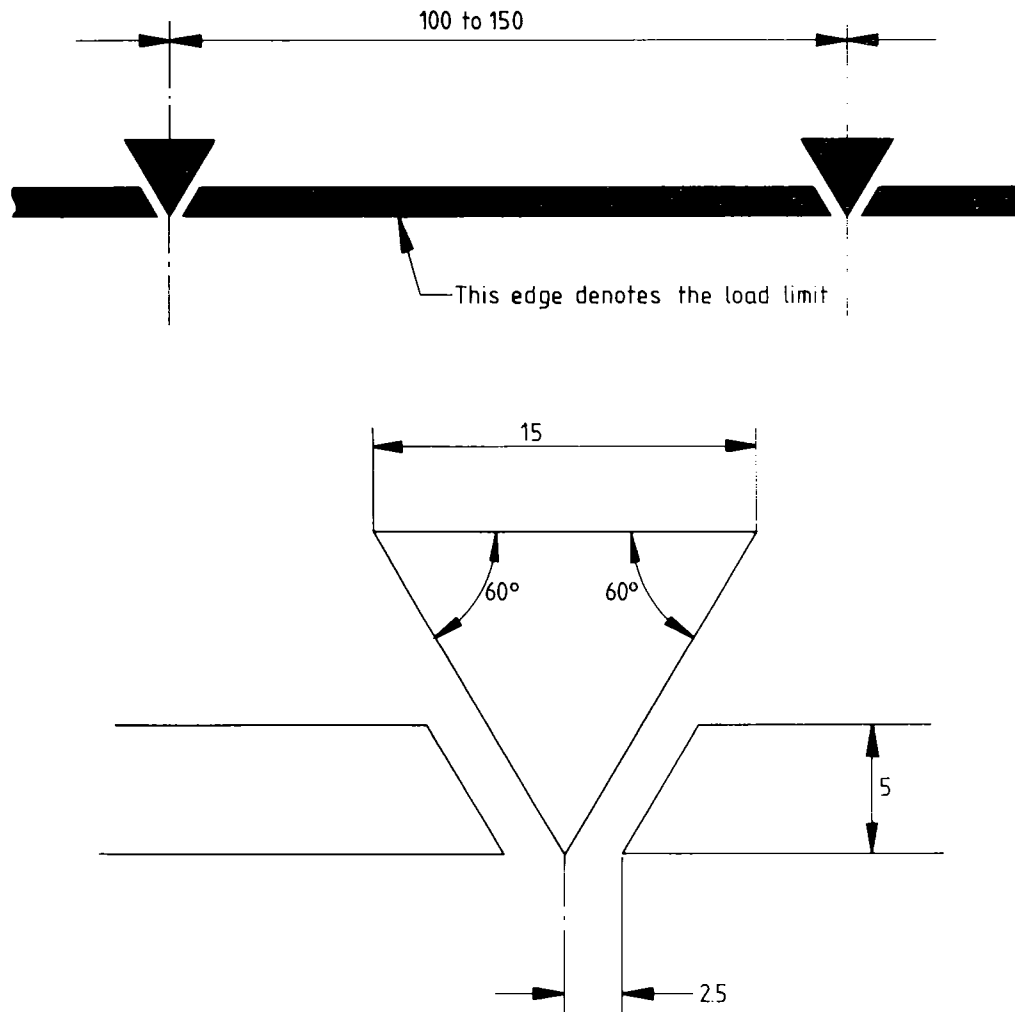
NOTE 2. Option (1) is preferred.

7.2 Load limit line(s). The limits of storage volume of the food freezing compartment shall be indicated in a conspicuous and indelible fashion by a load limit line or lines in the form shown in figure 3, except if, within the gross volume of the food freezing compartment, either:

- (a) the whole of the space is stated by the manufacturer as being suitable for food storage; or
- (b) the load limits are determined by the particular construction (e.g. baskets, flaps, etc.); or
- (c) the load limits are determined naturally (see figure 4) and the loading conditions are specifically described in the instructions for use.

NOTE. It is recommended that the manufacturer should avoid, as far as possible, the provision of storage space outside the load limits.

*Marking BS 6291 on or in relation to a product is a claim by the manufacturer that the product has been manufactured to the requirements of the standard. The accuracy of such a claim is therefore solely the manufacturer's responsibility. Inquiries as to the availability of third party certification to support such claims should be addressed to the Director, Quality Assurance Division, BSI, Maylands Avenue, Hemel Hempstead, Herts HP2 4SQ for certification marks administered by BSI or to the appropriate authority for other certification marks.



All dimensions are in millimetres.

Figure 3. Marking of load limit

7.3 Identification of food freezing compartments.

Food freezing compartments shall be identified by a food freezer symbol of form and proportions as shown in figure 5(a) and of such a size that the three-star symbol height is not less than 5 mm.

NOTE. In figure 5(a) the three-star symbol height is shown as 12.5.

The food freezer symbol shall be placed on the access door or lid of the compartment.

The symbol shall not make use of more than two colours or exhibit more than two contrasting surface finishes. The colour (or the surface finish) of the large star shall be different from that of the three other stars (see figure 5(b)).

NOTE. For the purposes of this clause, white and black are considered as colours.

There shall be no other marking or decoration on the appliance that can be confused with the food freezer symbol.

8. Technical information

The manufacturer shall provide at least the following technical information:

- (a) the designation of the appliance (see clause 6);

NOTE. The rated storage volume (see clause 6(f)) may in addition be shown as the mass of food calculated at 320 g/L.

- (b) the name of the manufacturer or responsible vendor;

- (c) type/model reference;

- (d) the minimum and maximum ambient temperatures for the class (SN, N, ST or T) for which the refrigerator/freezer is designed (see clause 3);

NOTE. It is important that the prospective user is made aware that, for general use in the United Kingdom, class SN appliances are appropriate. If the expected minimum ambient room temperature is likely to be below 10 °C, the attention of the prospective user should be drawn to the advisability of choosing an appliance of type II having independent controls for regulating the temperatures of the fresh food storage and food freezing compartments.

- (e) overall dimensions (doors or lids closed) (see 2.5);

- (f) overall space required in use (doors or lids open) (see 2.6);

- (g) direction of opening of the door(s), and whether reversible;

- (h) for appliances that are suitable for building in, the recess dimensions, together with any additional ventilation requirements.

The above information shall be available to prospective users on request.