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Household refrigerating appliances - Characteristics and test methods - Part 1: General requirements

Haushaltskühlgeräte - Eigenschaften und Prüfverfahren - Teil 1: Allgemeine Anforderungen

Appareils de réfrigération à usage ménager - Caractéristiques et méthodes d'essai - Partie 1: Exigences générales

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English Version

Household refrigerating appliances - Characteristics and test methods - Part 1: General requirements (IEC 62552-1:2015 , modified)

Appareils de réfrigération à usage ménager - Caractéristiques et méthodes d'essai - Partie 1: Exigences générales (IEC 62552-1:2015 , modifiée)

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European foreword

This document (EN 62552-1:2020) consists of the text of IEC 62552-1:2015 prepared by IEC/TC 59 "Performance of household and similar electrical appliances", together with the common modifications prepared by CLC/TC 59X "Performance of household and similar electrical appliances".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2021-02-24
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2023-02-24

This standard in combination with standards EN 62552-2:2020 and EN 62552-3:2020 supersedes EN 62552:2013.

This standard shall be read in combination with standards EN 62552-2:2020 and EN 62552-3:2020.

EN 62552-1:2020 includes the following significant technical changes:

a) Chapter D.2. Location of sensor has been modified completely

b) Annex F Test report has been modified completely

c) New Annex ZA Final test report was added

Clauses, subclauses, notes, tables, figures and annexes which are additional to those in IEC 62552-1:2015 are prefixed “Z”.

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

This document has been prepared under Standardization Request M/459 given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

Endorsement notice

The text of IEC 62552-1:2015 was approved by CENELEC as a European Standard with agreed common modifications.

1 Modifications to the Introduction

Add the following paragraph:

"This standard was developed in relationship with Regulations (EU) 2019/2016 of 11.3.2019 on energy labelling and (EU) 2019/2019 of 1.10.2019 on ecodesign for refrigerating appliances."

2 Modification to Clause 1, "Scope"

Replace the first paragraph with:

"This part of EN 62552 specifies the essential characteristics of household and similar **refrigerating appliances** cooled by internal natural convection or forced air circulation, and establishes test methods for checking these characteristics."

3 Modifications to Clause 3, "Terms, definitions and symbols"

In 3.1, "General terms and definitions" add the following:

"3.1.Z1
low noise refrigerating appliance
refrigerating appliance without vapour compression and with airborne acoustical noise emission lower than A-weighted sound power of 27 dB referred to 1 pW (dB(A) re 1pW)"

In 3.3, "Compartments and sections", add the following note to entry to 3.3.1:

"Note Z1 to entry: A non-enclosed space in the **refrigerating appliance** having one or more external doors, which are only used to access this space, is considered to be a **compartment."**

In 3.3, "Compartments and sections", add the following note to entry to 3.3.4:

Note Z1 to entry: See B.2.5.2 for requirements regarding energy consumption declarations for products with variable temperature compartments.

In 3.3, "Compartments and sections", replace the Note 1 of entry 3.3.5 with the following notes:

"Note 1 to entry**:** **Two-star sections** and/or **sub-compartments** are permitted within the compartment.

Note 2 to entry: A compartment that can meet the three star definition is deemed to be a **three star compartment** and presence of **two-star sections** and/or **sub-compartments** within a compartment does not prevent that compartment from meeting the definition of a **three star compartment**."

In 3.3, "Compartments and sections", add the following notes in entry 3.3.16.3:

"Note Z1 to entry**:** **Two-star sections** and/or **sub-compartments** are permitted within the compartment.

Note Z2 to entry: A compartment that can meet the three star definition is deemed to be a **three star compartment** and presence of **two-star sections** and/or **sub-compartments** within a compartment does not prevent that compartment from meeting the definition of a **three star compartment**."

In 3.3, "Compartments and sections", replace in entry 3.3.16.4 Note 1 of entry with the following notes:

"Note 1 to entry**:** **Two-star sections** and/or **sub-compartments** are permitted within the compartment.

Note Z2 to entry: A compartment that can meet the four star definition is deemed to be a **four star compartment** and presence of **two-star sections** and/or **sub-compartments** within a compartment does not prevent that compartment from meeting the definition of a **four star compartment**."

In 3.4, "Physical aspects and dimensions" add the following entry:

"3.4.Z1

h-line

vertical line through a **compartment** used to measure the effective height and to define the height positions of sensors in a **compartment"**

In 3.5, "Terms and definitions relating to performance characteristics" add the following note in 3.5.5.1:

"Note Z1 to entry: **Automatic defrost** may be achieved by active heating of the evaporator (typically using a resistive heater), or by other means, such as e.g. stopping the cooling function of the evaporator without active heating, reverse cycle defrost or hot gas bypass defrosting."

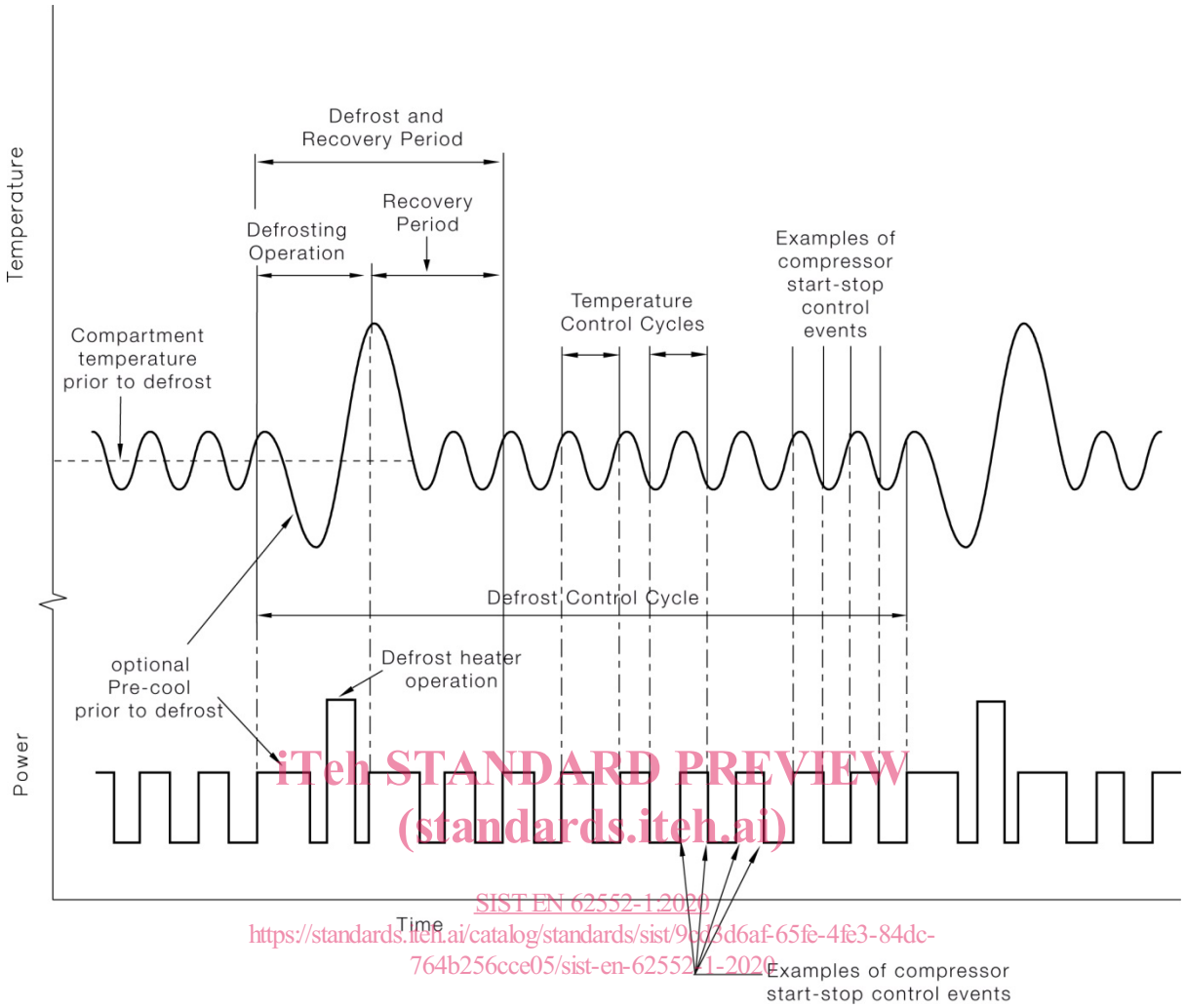
In 3.5, "Terms and definitions relating to performance characteristics", replace the term in entry 3.5.22 with:

"load processing efficiency test"

In 3.5, "Terms and definitions relating to performance characteristics", delete entry 3.5.25.

In 3.6, "Operating state as shown in Figure 1", replace Figure 1 with the following figure:

"



NOTE Components of refrigerator operation depicted in this figure are illustrative only and are intended to be representative of common products. Not all products will exhibit all features and some products may operate in a different manner. Written definitions have precedence over depictions in this figure.

Figure 1 — Illustration of selected typical refrigerator operations

"

4 Modifications to Annex A, “Test room and instrumentation”

In A.3.2.3, "Temperature values", replace item a) with:

"a) For assessing the **storage temperatures**:

+10 °C and +32 °C for class SN **refrigerating appliances**;

+16 °C and +32 °C for class N **refrigerating appliances**;

+16 °C and +38 °C for class ST **refrigerating appliances**;

+16 °C and +43 °C for class T **refrigerating appliances**.

For products **rated** for multiple climate classes, tests only need to be performed at the extreme **ambient temperatures** of all the relevant **rated** classes. Testing details are specified in Clause 6 of EN 62552-2.

EXAMPLE For **refrigerating appliances rated** from SN to T, tests are performed at +10 °C and at +43 °C

In addition, verification tests may be carried out at any ambient temperature between the minimum and maximum temperature defined by the climate class, in order to confirm compliance with the storage temperatures requirements at any ambient temperature."

In A.3.2.3, "Temperature values", add the following to b):

"for **low noise refrigerating appliance** energy consumption test shall be done at 25 °C"

Delete subclause A.3.4 and renumber the following subclauses.

5 Modifications to Annex B, “Preparation of an appliance for testing and general measurement procedure”

In B.2.3.3, "Built-in appliances", replace the sixth paragraph with:

"The depth of niche used for test shall be an integer multiple of 20 mm and the smallest value that equals or exceeds the minimum dimension specified by the manufacturer. If a single specific dimension is given, this dimension shall be used for testing.

NOTE Z1 The most common depth of niche for furniture is 560mm. If the manufacturer declare the range from 550 mm to 570 mm, the dimension for the testing is 560 mm. If the manufacturer declare the range from 560 mm to 580 mm, the dimension for the testing is 560 mm.

If these dimensions are not given **or is declared only the maximum value of range**, the inner dimensions of the test enclosure shall be as follows:

- the inner depth shall exceed by 0 mm to 2 mm the overall depth of the **refrigerating appliance;**
- the inner width shall exceed by 4 mm to 6 mm the overall width of the **refrigerating appliance**;
- the inner height shall exceed by 2 mm to 4 mm the overall height of the **refrigerating appliance**."

Replace the entire subclause B.2.5.2, "Variable temperature compartments" with the following:

"Where the **compartment** is a **variable temperature compartment** type (that spans the operating range of several **compartment** types), it shall be classified.

a) For the storage test (EN 62552-2): Each **variable temperature compartment** shall be capable of maintaining specified internal temperatures for each claimed **compartment** type at **ambient temperatures** across the rated **range**.

b) For the **cooling capacity** test (EN 62552-2): If the **variable temperature compartment** can be used as a fresh food compartment, it shall be operated as **fresh food compartment** type where this test is performed.

c) For the **freezing capacity** and **temperature rise time** test (EN 62552-2): if the **variable temperature compartment** can be used as a **three-star** or **four-star compartment**, it shall be operated as a **three-star** or **four-star compartment** type where this test is performed.

d) For the **energy consumption**, water vapour condensation and **ice-making capacity** test (EN 62552-2 and EN 62552-3), as applicable.

The **variable temperature compartment** shall operate as the compartment type which has the highest **energy consumption** for the energy test.

Additional requirements regarding each compartment type are specified in EN 62552-3, Table 1 during the **energy consumption** test. In the **energy consumption** test, where a **refrigerating appliance** has **variable temperature compartments** that can operate as more than one **compartment** type, additional **compartment** classifications may be tested, if required, in addition to the primary classification specified above."

6 Modifications to Annex C, “Test Packages”

In C.1, "Dimensions and tolerances", add the following note:

"Note Z1 In EN 62552:2007, 1 kg packs were defined (200 mm x 100 mm x 50 mm) which can be reused under this standard by combining 2 packages vertically to form stacks with a footprint of 100 mm x 100 mm."

In C.2, "Composition", replace the second paragraph in c) with:

"Where test packages are required, packages of type a) or b) can be used except:

1) For **unfrozen compartments**, only packages b) shall be used, for example:

   a. during the **freezing capacity** test;

   b. for a **chill compartment** during the storage temperature test;

   c. for a **fresh food compartment** during the **cooling capacity** test;

2) For the **light load** during the **freezing capacity** test, only packages a) shall be used;

3) For **one-star compartments**, only packages a) shall be used;

4) For the **temperature rise time** test, only packages a) shall be used."

Replace the entire subclause of C.3, "M-packages" with:

"Some of the 500 g packages (50 mm × 100 mm × 100 mm) shall be equipped for temperature measurement and shall be known as M-packages. These shall be fitted with thermocouples or other temperature-measuring

transducers which shall be inserted in the geometrical centre of the packages in direct contact with the filling material. All precautions shall be taken to minimize extraneous conduction of heat. All M-packages located close to the compartment door gasket, shall be oriented such that the sensor enters the package from the side furthest away from the door gasket. The composition and the limitations of their use shall be in accordance with Clauses C.1 and C.2."

7 Modifications to Annex D, “Determination of compartment average air temperatures”

Replace the entire subclause D.2 "Location sensors" with:

"D.2.1 Location of sensors

The positions specified for a temperature sensor is the geometric centre of the sensor (metal mass) except where minimum clearances are specified, in which case, clearance is to the outer surface of the metal mass.

Temperature sensor positions are specified in the following paragraphs. Clearances or heights specified are determined from the surface of the **compartment** at the specified positions. The surface may be the **compartment** liner or the surface of a convenience feature or a **sub-compartment**. Any fixed feature shall be treated as a surface.

The full height of a **compartment** (h_{T}) is defined as the height at the front of the **compartment** or **sub-compartment** according D.2.4.2. When the liner at the door seal is curved, the inner radius shall be taken as reference (see Figure D.6). The full height is used to define the number of sensors and to classify compartments as small or low height compartments.

The effective height of a **compartment** (h), which is used to define the height of sensors in a **compartment**, is defined as the height along a vertical line through temperature measurement point TMP3 for unfrozen compartments (D.2.2) and TMP14 for frozen compartments (D.2.3). This vertical line is defined as the **h-line**. The measurement is taken from the point where the **h-line** reaches the bottom surface of the compartment to the point where the **h-line** reaches the top surface of the compartment. Partitions or shelves are ignored when calculating the effective height. Where the surface of the **compartment** has a step change (edge) exactly at the **h-line**, the surface that is furthest away from the door is used to determine measurements.

NOTE Z1 Where the position of TMP3 or TMP14 is shifted to meet clearance requirements the h-line passes through the new position.

For **frozen compartments** having a partial width **convenience feature** where the side gap to the liner is 100 mm or greater and where the **h-line** is limited by this **convenience feature**, the **convenience feature** shall be considered not in place for the determination of the **h-line**.

NOTE Z2 This case applies to e.g. ice makers placed inside a **frozen compartment,** which can be placed on the left or right top side. As TMP14 is defined on the right side, this would result in different sensor positions in height whether the ice maker is placed on the left or the right. Using mirrored positions as mentioned in Clause D.2.4.1 does not resolve this inconsistency.

Items such as controls and vent housings shall be ignored as shall other features or protrusions with a **volume** of less than 2 l.

D.2.2 Unfrozen compartments

Except as set out in D.2.4, three air temperature sensors in **unfrozen compartments** shall be located at the following vertical positions defined by the **h-line** (from the bottom)**:**

- at 3/4 h (TMP1);
- at 1/2 h (TMP2);
- 50 mm (TMP3).

These positions are illustrated in Figure D.1, Figure D.2, and Figure D.3 and Figure D.8 part 1 and with reference to D.2.4 as applicable.

A box evaporator of any shape within an **unfrozen compartment** where the evaporator is not configured to provide a separate storage space (i.e. not a **sub-compartment**) shall be treated as if it is a **convenience feature** (see Figure D.2.Part 3).

D.2.3 Frozen Compartments

Except as set out in D.2.4, either five or seven air temperature sensors in **frozen compartments** shall be located in vertical positions as follows:

- two at 50 mm from the top surface of the **compartment** (TMP12 front and TMP13 rear);

- at 3/4 *h* from the bottom defined by the **h-line** if h_1 exceeds 1000 mm (TMP16);
- at 1/2 *h* from the bottom defined by the **h-line** (TMP11);
- at 1/4 *h* from the bottom defined by the **h-line** if h_1 exceeds 1000 mm (TMP17);
- two at 50 mm from the bottom surface of the **compartment** (TMP14 front and TMP15 rear).

For TMP12, TMP13, TMP14 and TMP15, the vertical distance is measured at the local position of the sensor in the horizontal plane.

These positions are illustrated in Figure D.4, Figure D.5, Figure D.6, Figure D.7 and Figure D.8 and with reference to D.2.4 as applicable.

D.2.4 Equivalent positions and other requirements for all compartment types

D.2.4.1 General

The equivalent sensor locations for special configurations (or features) and other requirements for all **compartment** types are set out below.

If it is not possible to place sensors in the positions shown in Figures D.1 to D.8, the first option is to use a mirror image of the positions as applicable as illustrated in Figure D.9.

Where it is not possible to place the temperature sensors in either of these positions, they shall be positioned as near as practicable to the specified locations in a position which will provide an equivalent result taking note of the intent above. The position of such locations shall be recorded in the test report.

D.2.4.2 Compartment full height

The full height of a **compartment** (h_1) is defined as the height at the front of the **compartment** or **sub-compartment** adjacent to the door seals from the bottom to the top. When the liner at the door seal is curved, the inner radius shall be taken as reference (see Figure D.6). For top opening **compartments** the full height is taken from the lowest bottom surface to the gasket sealing surface.

D.2.4.3 Compartment depth

TMP1, TMP2 and TMP3 for **unfrozen compartments**, except for small or low height **compartments**, and TMP11, TMP16 and TMP17 for **frozen compartments**, shall be located at the midpoint between the front and back of the **compartment** at the given vertical position. For all front opening **compartments**, the front of the **compartment** is the gasket sealing surface. The back of the compartment is defined as the rear surface at the vertical position of the sensor.

D.2.4.4 Compartment width

TMP1, TMP2 and TMP3 for **unfrozen compartments**, except for small or low height **compartments**, and TMP11, TMP16 and TMP17 for **frozen compartments**, shall be located at the midpoint between the left and right surface of the **compartment** at the given vertical position.

D.2.4.5 Small compartments/small sub-compartments

For a **compartment/sub-compartment** or **convenience feature** where the full height (h_1) of the **compartment/sub-compartment** is not more than 150 mm or the **volume** is not more than 25 l and where temperature measurements are required, two temperature sensors shall be used. Each shall be located 50 mm from the lower surface of the **sub-compartment**, one at the front left and the other at the right rear at *d*/4 and *w*/4. (Refer to Figure D.3a).)

D.2.4.6 Low height compartments

For **unfrozen compartments**, **sub-compartments** or **convenience features** where the full height (h_1) is 300 mm or less and this is less than 0,7 of either the width (measured at the door sealing surface) or the maximum depth (between the door sealing surface and back wall), the temperature sensors shall be located in positions as shown in Figure D.3 b). In cases where the width or depth is greater than 700 mm, the positions shown in Figure D.3 b) shall also be used if the ratio of full height (h_1) to either depth or width is less than 0,6.

For **frozen compartments** where the full height (h_1) is 200 mm or less and the **volume** is 40 l or less, the temperature sensors shall be located in positions as shown in Figure D.3 b).

D.2.4.7. Clearance from internal fittings (other than shelves)

Except where otherwise specified, the clearance of temperature sensors shall be at least 25 mm from any internal fittings, walls or features. Clearance in this context means the distance from the surface of the internal fitting, wall or feature to the closest external surface of the temperature sensor (metal mass).

Where a temperature sensor would have less than 25 mm clearance from a fixed **sub-compartment**/feature that is not full width, the sensor shall be moved so that the specified height is maintained while a clearance of 25 mm is maintained from the surface of the **sub-compartment**/feature. Where a temperature sensor shall be placed next to a **convenience feature** that has a gap on each side, the sensor shall be placed in the gap that is the larger. Where the gap sizes are equal, the sensor shall be placed in the left gap for sensor positions that are above the centre of the effective height and on the right gap for sensor positions that are at or below the centre of the effective height. Also refer to Figure D.1 and Figure D.2.

D.2.4.8 Shelf and temperature sensor placement

The following rules regarding shelf placement shall be applied:

1. Shelves shall be installed in accordance with manufacturer instructions (where available)

2. Where no positions are specified in manufacturer instructions, where possible, one shelf in the largest **unfrozen compartment** type (where applicable) shall be located below temperature sensor position TMP1 (while maintaining a minimum clearance of 25 mm) and above TMP2 and one shelf shall be located below temperature sensor position TMP2 (while maintaining a minimum clearance of 25 mm) and above TMP3. As far as possible, any remaining **shelves** shall be evenly spaced through the **compartment**.

The following rules regarding temperature sensor placement shall be applied:

1. Where shelves positions are specified or where there is limited adjustability, temperature sensors that have less than 25 mm clearance from the shelf shall be relocated to a position above the shelf with a clearance of 25 mm.

2. Where a temperature sensor would have less than 50 mm clearance above or below a refrigerated **shelf** surface, or any evaporator surface (such as plate or box evaporator) that temperature sensor shall be relocated to a position with 50 mm clearance above the relevant refrigerated shelf, where possible, and shall maintain 50 mm clearance in all horizontal directions.

Door **shelves**, drawers, bins, sliding baskets or items with dedicated but interchangeable positions shall all be kept in place but organized to minimize their interference with temperature sensors.

Items which are not intended to be in place during **normal use**, as specified in the instructions, are removed.

D.2.4.9 Convenience feature and temperature sensor placement

Where a **convenience feature** interferes with the position of a temperature sensor, the same rules as for part width **compartments** in D.2.4.7 and for **shelves**, D.2.4.8 apply. If the sensor in the **compartment** lies in the **convenience feature**, it shall be moved to the nearest position outside it.

D.2.4.10 Frozen compartment sensors and door shelves

Where a deep door **shelf** interferes with or encloses the location for sensor positions TMP12 or TMP14, (refer to Figure D.5 and Figure D.6) or the air space clearance is less than 25 mm, then the centre line of the sensor shall be moved by up to 50 mm further into the **compartment** (i.e. a maximum depth of 150 mm from the door

gasket) in order to satisfy the clearance. If this does not satisfy the requirements, the sensor shall be located inside the door **shelf** as close as possible to the original position while maintaining a clearance of 30 mm from the centre of the sensor to the wall and 50 mm from the centre of the sensor to the floor of the door **shelf**.

Where a **two-star section** only comprises of door **shelves,** three sensors shall be positioned diagonally, similar to the low height **compartments** (see Figure D.3b). The **h-line** is to be determined from the bottom surface of the **two-star section** to the top surface using TMP23 as reference. In the absence of top and/or bottom surfaces, the door or volume borders (see EN 62552:3 Amendment 1 Annex H.4) shall be taken as the limit for the **h-line** and sensor positions. The sensor positions shall be:

- TMP21 at 50 mm from the top surface;
- TMP22 at 1/2 *h* defined by the **h-line**;
- TMP23 at 50 mm from the bottom surface.

The sensor positions shall be in width direction (if these positions are not available, the sensors shall be shifted to the nearest position at the given height level that maintains minimum clearances):

- TMP21 at 50 mm from the section border closest to the hinge;
- TMP22 at the midpoint measured at the height level 1/2 *h*;
- TMP23 at 50 mm from the section border at the opposite side from TMP21.

In depth direction, the three sensors shall be placed at the midpoint where the depth is measured from the door surface to the volume border, this for each sensor at its corresponding height level.

If a **three-star** of **four-star compartment** has multiple doors a **two-star section** contained in it shall not cover multiple doors. If required, a **two-star section** can be defined in each door.

D.2.4.11 Placement of temperature sensors within drawers and bins

Where a drawer or bin is located at the top of the compartment, the effective height (h) shall be taken from the lowest fixed point above the drawer or bin as it slides in and out (effectively equal to the top of the tallest object that could be placed into the drawer or bin without catching).

Where a temperature sensor is required within or in the vicinity of a drawer or bin, the sensor shall be located inside the drawer or bin and the drawer or bin shall be treated as the inside of the liner (Figure D.8). Effectively this means that the effective height (*h*) shall be taken from the bottom of the lowest drawer or bin.

When drawers and/or bins wholly or predominantly occupy the space within a **compartment**, sensors shall be placed within these drawers or bins in positions specified in D.2.2 or D.2.3, as applicable. In the case of solid drawers or bins, temperature sensors shall lie inside the relevant drawer or bin (refer D.2.4) while maintaining all clearances (see D.2.4.7) and treating the base of the bin as a **shelf** (see D.2.4.8).

Where the available space is so small that the clearances specified cannot be achieved, the clearance from the temperature sensor to the bin bottom (25 mm) shall be maintained as far as possible while reducing the clearance to the **compartment** top.