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ANNEXES 1 to 5

**ANNEXES**

**to the**

**COMMISSION REGULATION**

**laying down ecodesign requirements for refrigerating appliances pursuant to  
Directive 2009/125/EC of the European Parliament and of the Council**

**and repealing Commission Regulation (EC) No 643/2009**

**ANNEX I**  
**Definitions applicable for the Annexes**

The following definitions shall apply:

- (1) 'transparent door' means a door made of a transparent material that allows the user to see items through it, at least 75 % of the internal cabinet height and 75 % if the internal cabinet width shall be transparent, both measured at the front of the cabinet;
- (2) 'fast freeze' means a feature that can be activated by the end-user according to the manufacturer's instructions, which decreases the storage temperature of the freezer or freezer compartment to achieve a faster freezing of unfrozen foodstuffs;
- (3) 'freezer' means a refrigerating appliance with only frozen compartments, at least one of which is a freezer compartment;
- (4) 'frozen compartment' means a compartment type with a target temperature equal to or below 0 °C; that is a 0-star, 1-star, 2-star, 3-star or 4-star compartment, with storage conditions and target temperatures, as set out in Annex III, Table 3;
- (5) '0-star compartment' and 'ice-making compartment' means a frozen compartment with a target temperature and storage conditions of 0 °C, as set out in Annex III, Table 3;
- (6) '1-star compartment' means a frozen compartment with a target temperature and storage conditions of -6 °C, as set out in Annex III, Table 3;
- (7) 'winter switch' means a control feature for a combi appliance with one compressor and one thermostat, consisting of a switching device that guarantees, even if it would not be required for the compartment where the thermostat is located, that the compressor keeps on working to maintain the proper storage temperatures in the other compartments;
- (8) 'chill compartment' means a compartment which is able to control its average temperature within a certain range without adjustments of its control, with a target temperature equal to 2 °C and storage conditions ranging from -3° C to 3 °C, as set out in Annex III, Table 3;
- (9) 'unfrozen compartment' means a compartment type with a target temperature equal to or above 4 °C, that is a pantry, wine storage, cellar or fresh food compartment with storage conditions and target temperatures, as set out in Annex III, Table 3;
- (10) 'pantry compartment' means an unfrozen compartment with a target temperature of 17 °C and storage conditions ranging from 14 °C to 20 °C, as set out in Annex III, Table 3;
- (11) 'wine storage compartment' means an unfrozen compartment with a target temperature of 12 °C and storage conditions ranging from 5 °C to 20 °C, as set out in Annex III, Table 3;
- (12) 'cellar compartment' means an unfrozen compartment with a target temperature of 12 °C and storage conditions ranging from 2 °C to 14 °C, as set out in Annex III, Table 3;
- (13) 'vacuum insulation panel' (VIP) means an insulation panel consisting of a firm, highly-porous material encased in a thin, gas-tight outer envelope, from which the gases are evacuated and which is sealed to prevent outside gases from entering the panel;

- (14) ‘spare part’ means a separate part that can replace a part with the same or similar function in a product;
- (15) ‘door gasket’ means a mechanical seal which fills the space between the door and the cabinet of the refrigerating appliance to prevent leakage from the cabinet to the outdoor air;
- (16) ‘freestanding appliance’ means a refrigerating appliance that is not a built-in appliance;
- (17) ‘built-in appliance’ means a refrigerating appliance that is designed, tested and marketed exclusively:
- (a) to be installed in cabinetry or encased (top, bottom and sides) by panels;
  - (b) to be securely fastened to the sides, top or floor of the cabinetry or panels; and
  - (c) to be equipped with an integral factory-finished face or to be fitted with a custom front panel.
- (18) ‘commercial guarantee’ means any undertaking by the trader or a producer (the guarantor) to the consumer, in addition to any legal obligation on the guarantee of conformity, to:
- (a) reimburse the price paid; or
  - (b) replace, repair or service goods in any way if they do not meet the specifications or any other requirements not related to conformity set out in the guarantee statement or in the relevant advertising available at the time of, or before, the conclusion of the contract.
- (19) ‘climate class’ means the range of ambient temperatures, as set out in point 1(k) of Annex III, in which the refrigerating appliances are intended to be used, and for which the required storage temperatures specified in Table 3 are met;
- (20) ‘product database’ means a collection of data on products, which is arranged in a systematic manner and consists of a consumer-oriented public part, where information on individual product parameters is accessible by electronic means, an online portal for accessibility and a compliance part, with clearly specified accessibility and security requirements, as laid down in Regulation (EU) 2017/1369;
- (21) ‘annual energy consumption’ (*AE*) means the average daily energy consumption multiplied by 365 (days per year) expressed in kilowatt hour (kWh), as calculated in accordance with point 3 of Annex III;
- (22) ‘daily energy consumption’ (*E<sub>daily</sub>*) means the electricity used by a refrigerating appliance over 24 hours at reference conditions expressed in kilowatt hour per 24 hours (kWh/24h), calculated in accordance with point 3 of Annex III.3;
- (23) ‘through-the-door device’ means a device that dispenses chilled or frozen load on demand from a refrigerating appliance, through an opening in its external door and without opening that external door, such as are ice-cube dispensers or chilled water dispensers;
- (24) ‘variable temperature compartment’ means a compartment intended for use as two (or more) alternative compartment types (for example a compartment that can be either a fresh food compartment or freezer compartment) and which is capable of being set by a user to continuously maintain the operating temperature range applicable for each compartment type claimed. A compartment intended for use as a

single compartment type that can also meet storage conditions of other compartment types (for example a chill compartment that may also fulfil 0-star requirements) is not a variable temperature compartment;

- (25) ‘network’ means a communication infrastructure with a topology of links, an architecture, including the physical components, organisational principles, communication procedures and formats (protocols);
- (26) ‘incremental defrost and recovery energy consumption’ ( $\Delta E_{d-f}$ ) means the extra average energy consumption for a defrost and recovery operation expressed in watt hour (Wh);
- (27) ‘auto-defrost’ means a feature by which compartments are defrosted without user intervention to initiate the removal of frost accumulation at all temperature-control settings or to restore normal operation, and the disposal of the defrosted water is automatic;
- (28) ‘defrost interval’ ( $t_{d-f}$ ) means the representative average interval between the time of activation of the defrost heater, or the time of deactivation of the compressor if there is no defrost heater, in two subsequent defrost and recovery cycles, expressed in hour (h);
- (29) ‘steady state power consumption’ ( $P_{ss}$ ) means the average power consumption in steady state conditions, expressed in watt (W);
- (30) ‘average power consumption’ ( $P$ ) means the average rate of energy consumption of a refrigerating appliance for a specific test condition or operation expressed in watt (W);
- (31) ‘defrost and recovery period’ means the period from the initiation of a defrost control cycle until stable operating conditions are re-established;
- (32) ‘defrosting type’ means the method to remove frost accumulation on the evaporator(s) of a refrigerating appliance, i.e. auto-defrost or manual defrost;
- (33) ‘manual defrost’ means not having an auto-defrost function;
- (34) ‘standard annual energy consumption’ ( $SAE$ ) means the reference annual energy consumption of a refrigeration appliance expressed in kilowatt hour (kWh), as calculated in accordance with point 4 of Annex III;
- (35) ‘combi parameter’ ( $C$ ) means a modelling parameter that takes into account the synergy effect when different compartment types are combined in one appliance, with values as set out in Annex III, Table 4;
- (36) ‘door heat loss factor’ ( $D$ ) means a compensation factor for combi appliances according to the number of different temperature compartments or the number of doors, whichever is lower and as set out in Annex III, Table 5. For this factor, ‘compartment’ does not refer to sub-compartment;
- (37) ‘c’ means the index number suffix for a compartment type in an appliance;
- (38) ‘defrost factor’ ( $A_c$ ) means a compensation factor that takes into account whether the refrigerating appliances has an auto-defrost or a manual defrost, with values as set out in Annex III, Table 5;
- (39) ‘built-in factor’ ( $B_c$ ) means a compensation factor that takes into account whether the refrigerating appliance is built-in or freestanding, with values as set out in Annex III, Table 5;

- (40) 'M<sub>c</sub>' and 'N<sub>c</sub>' means modelling parameters that take into account the volume-dependence of the energy use, with values as set out in Annex III, Table 4;
- (41) 'thermodynamic parameter' ( $r_c$ ) means a modelling parameter which corrects the standard annual energy consumption to an ambient temperature of 24 °C, with values as set out in Annex III, Table 4;
- (42) 'load factor' ( $L$ ) means a factor accounting for the extra cooling load from introducing warm foodstuffs beyond what is already anticipated through the higher average ambient temperature for testing with values as in Point 3(a) of Annex III;
- (43) 'equivalent model' means a model with the same relevant technical and performance characteristics but placed on the market under a different model identifier.

**ANNEX II**  
**Ecodesign requirements**

1. Energy efficiency requirements:

- (a) From 1 April 2021, the energy efficiency index (EEI) of refrigerating appliances shall not be above the values as set out in Table 1.

**Table 1**  
**Maximum EEI for refrigerating appliances, expressed in % from 01/04/2021 onwards**

	EEI
refrigerating appliances, except for wine storage appliances	125
wine storage appliances, except for those with transparent doors	155
wine storage appliances with transparent doors	190
low noise refrigerating appliances, except for low noise refrigerating appliances with transparent doors and low noise refrigerator-freezers	300
low noise refrigerating appliances with transparent doors, except for low noise refrigerator-freezers with transparent doors	360

- (b) From 1 April 2024, the EEI of refrigerating appliances shall not be above the values set out in Table 2.

**Table 2**  
**Maximum EEI for refrigerating appliances, expressed in % from 01/04/2024 onwards**

	EEI
refrigerating appliances, except for wine storage appliances	100
wine storage appliances	140
wine storage appliances with transparent doors	172
low noise refrigerating appliances, except for low noise refrigerator-freezers and low noise refrigerating appliances with transparent doors	250
low noise refrigerating appliances with transparent doors, except for low noise refrigerator-freezers with transparent doors	300

2. Functional requirements:

From 1 April 2021, refrigerating appliances shall meet the following requirements:

- (a) the fast freeze facility, or any similar function achieved through modification of the thermostat settings in freezer compartments, shall, once activated by the end-user according to the manufacturer's instructions, automatically revert to the previous normal storage temperature conditions after no more than 72 hours;

- (b) combi appliances which, according to the manufacturer's instructions, can be used in ambient temperatures below + 16 °C and have a winter switch, shall have this winter switch automatically activated or de-activated according to the need to maintain the frozen compartment at the correct temperature;
- (c) each compartment shall be marked with the appropriate identification symbol. For the frozen compartments this shall be the number of stars of the compartment. For the chill and unfrozen compartments, this shall be an indication, chosen by the manufacturer, of the type of food that should be stored in the compartment;
- (d) if the refrigerating appliance contains vacuum insulation panels, the vacuum insulation panels shall be labelled with the letters 'VIP' in a clearly visible and readable way.

Requirements laid down in points 2(a) and (b) shall only apply to combi appliances with one electromechanical thermostat and one compressor from 1 April 2024.

### 3. Additional ecodesign requirements on repair and end-of-life aspects:

From 1 April 2021, refrigerating appliances shall meet the following requirements:

- (a) Requirements for disassembly for the purpose of repair and for material recovery and recycling while avoiding pollution:
  - (1) manufacturers shall ensure that refrigerating appliances are designed so that the components referred to in Annex VII of Directive 2012/19/EU can be removed without the use of any tool which is not readily available for purchase;
  - (2) door gaskets shall be replaceable without special tools and without permanent damage;
  - (3) light sources in refrigerating appliances shall meeting the requirements for containing products set out in Regulation *[OP – please insert Regulation number ecodesign regulation for light sources and separate control gears]*<sup>1</sup>.
- (b) Availability of spare parts:
  - (1) manufacturers shall make available necessary spare parts, including at least thermostats, temperature sensors, printed circuit boards and removable light sources for their refrigerating appliances to professional repairers, for a minimum period of seven years after placing the last unit of the model on the market;
  - (2) manufacturers shall make available door gaskets for their refrigerating appliances to end-users for at least 10 years after placing the last unit of the model on the market;
  - (3) the spare parts, identified in (1) and (2), and the procedure for ordering them shall be publicly available, for example on the manufacturer's website, at the latest two years after the placing on the market of the first unit of a model or of an equivalent model and until the end of the minimum period of availability of these necessary spare parts.

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<sup>1</sup> Regulation (EU) *[OP – please insert Regulation number]* of *[OP-please insert date]* laying down ecodesign requirements for light sources and separate control gears pursuant to Directive 2009/125/EC of the European Parliament and of the Council repealing Commission Regulations (EC) No 244/2009, (EC) No 245/2009, and (EU) No 1194/2012 (*[OP – please insert reference to the OJ]*).

4. Information requirements:
- (a) From 1 April 2021, instruction manuals for installers and end-users, and free access website of manufacturers, their authorised representatives and importers shall include the following information:
- (1) the combination of drawers, baskets and shelves that result in the most efficient use of energy for the refrigerating appliance;
  - (2) clear guidance about where and how to store fresh foodstuffs and beverages in a refrigerating appliance for best preservation over the longest period, to avoid food waste;
  - (3) the recommended setting of temperatures in each compartment for optimum food preservation;
  - (4) an estimation of the impact of temperature settings on food waste;
  - (5) a description of the effects of special modes and features, and in particular how temperatures are affected in each compartment and for how long;
  - (6) for dedicated wine storage appliances: ‘this appliance is intended to be used exclusively for the storage of wine’. This shall not apply to refrigerating appliances that are not specifically designed for wine storage but may be used for this purpose, nor to refrigerating appliances that have a wine storage compartment combined with any other compartment type;
  - (7) instructions for the correct installation and maintenance of the refrigerating appliance;
  - (8) for a freestanding appliance: ‘this refrigerating appliance is not intended to be used as a built-in appliance, the energy consumption will increase significantly if it is used as such’;
  - (9) access to professional repair (internet webpages, addresses, contact details);
  - (10) relevant information for ordering spare parts, directly or through other channels provided by the manufacturer;
  - (11) the minimum period during which spare parts, necessary for the repair of the appliance, are available;
  - (12) the duration of the commercial guarantee of the refrigerating appliance offered by the manufacturer in years;
  - (13) for refrigerating appliances with climate class:
    - extended temperate: ‘this refrigerating appliance is intended to be used at ambient temperatures ranging from 10 °C to 32 °C’;
    - temperate: ‘this refrigerating appliance is intended to be used at ambient temperatures ranging from 16 °C to 32 °C’;
    - subtropical: ‘this refrigerating appliance is intended to be used at ambient temperatures ranging from 16 °C to 38 °C’.
    - tropical: ‘this refrigerating appliance is intended to be used at ambient temperatures ranging from 16 °C to 43 °C’.

- (14) a weblink that links to the model information as stored in the product database, as defined in Regulation (EU) *[OP -Please insert regulation number energy labelling regulation for refrigerating appliances]*<sup>2</sup>.
- (b) The technical documentation for the purposes of conformity assessment pursuant to Article 4 shall include the information in the order and as set out in Annex VI of Regulation *[OP - Please insert here references of the energy labelling regulation for refrigerating appliances]*. For market surveillance purposes, manufacturers may refer to the technical documentation uploaded to the product database which contains the same information laid down in Regulation *[OP - Please insert here references of the energy labelling regulation for refrigerating appliances]*.

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<sup>2</sup> Commission Delegated Regulation (EU) *[OP-please enter regulation number]* of *[OP-please enter date]* supplementing Regulation (EU) 2017/1369 of the European Parliament and of the Council with regard to the energy labelling of refrigerating appliances and repealing Regulation (EU) No 1060/2010 (*[OP-please insert reference to the OJ]*)

### *ANNEX III*

#### **Measurements and calculations**

For the purposes of compliance and verification of compliance with the requirements of this Regulation, measurements and calculations shall be made using harmonised standards, or other reliable, accurate and reproducible methods, which take into account the generally recognised state-of-the-art methods and are in line with the provisions set out below. The reference numbers of these harmonised standards have been published for this purpose in the *Official Journal of the European Union*:

1. General conditions for testing:
  - (a) for refrigerating appliances with anti-condensation heaters that can be switched on and off by the end-user, the anti-condensation heaters shall be switched on and — if adjustable — set at maximum heating and included in the annual energy consumption ( $AE$ ) as daily energy consumption ( $E_{daily}$ );
  - (b) for refrigerating appliances with ambient controlled anti-condensation heaters, the ambient controlled electric anti-condensation heaters shall be switched off or otherwise disabled, where possible, during the measurement of energy consumption. The energy consumption of these heaters shall be determined from their power consumption declared by the manufacturer for a set of ambient temperature and humidity conditions and added to the auxiliary energy;
  - (c) for refrigerating appliances with through-the-door devices that can be switched on and off by the end-user, the through-the-door devices shall be switched on during the energy consumption measurement but not operating;
  - (d) for the measurement of energy consumption, variable temperature compartments shall operate at the lowest temperature that can be set by the user to continuously maintain the temperature range, as set out in Table 3, of the compartment type which has the lowest temperature;
  - (e) for refrigerating appliances that can be digitally connected to a network, the communication module shall be activated but there is no need to have a specific type of communication or data exchange or both during the energy consumption test. During the energy consumption test it has to be ensured that the unit is connected to a network;
  - (f) for the performance of chill compartments:
    - (1) for a variable temperature compartment rated as a fresh food and/or chill compartment, the EEI shall be determined for each temperature condition and the highest value shall be applied;
    - (2) a chill compartment shall be able to control its average temperature within a certain range without user-adjustments of its control, this can be verified during the energy consumption tests at 16 °C and 32 °C ambient temperature.
  - (g) for adjustable volume compartments, when the volumes of two compartments are adjustable relative to one another by the user, the energy consumption and the volume shall be tested when the volume of the compartment with the higher target temperature is adjusted to its minimum volume;

- (h) for 2-star compartments or sections:
  - (1) a 2-star compartment or section is separated from the 3-star or 4-star volume by a partition, container, or similar construction;
  - (2) the rated volume does not exceed 20 % of the total volume of the compartment.
- (i) the specific freezing capacity is calculated as 12 times the light load weight, divided by the freezing time to bring the temperature of the light load from +25 to –18 °C at an ambient temperature of 25 °C expressed in kg/12h; the light load weight is 3,5 kg per 100 litre of freezer volume, and should be at least 2,0 kg;
- (j) for 4-star compartments, the freezing time to bring the temperature of the light load from +25 to –18 °C at all ambient temperatures, an ambient temperature of 25 °C, is smaller than or equal to 24 h;
- (k) for the determination of the climate classes, the acronym for the ambient temperature range, that is SN, N, ST or T:
  - (1) the extended temperate (SN) has a temperature range from 10 °C to +32 °C;
  - (2) the temperate (N) has a temperature range from 16 °C to 32 °C;
  - (3) the subtropical (ST) with a temperature range from 16 °C to 38 °C; and
  - (4) the tropical (T) has temperature range from 16 °C to 43 °C.

2. Storage conditions and target temperatures per compartment type:

Table 3 sets out the storage conditions and target temperature per compartment type.

3. Determination of the annual energy consumption (*AE*):

- (a) For all refrigerating appliances, except for low noise refrigerating appliances:

The energy consumption shall be determined by testing at an ambient temperature of 16 °C and 32 °C.

To determine the energy consumption, the average air temperatures in each compartment shall be equal to or below the target temperatures specified in Table 3 for each compartment type claimed by the supplier. Values above and below target temperatures may be used to estimate the energy consumption at the target temperature for each relevant compartment by interpolation, as appropriate.

The main components of energy consumption to be determined are:

- a set of steady-state power consumption values ( $P_{SS}$ ) in W, each at a specific ambient temperature and at a set of compartment temperatures, which may be above or below target temperatures;
- the representative incremental defrost and recovery energy consumption ( $\Delta E_{d-f}$ ), in W, for products with one or more auto-defrost systems (each with its own defrost control cycle) measured at an ambient temperature of 16 °C ( $\Delta E_{d-f16}$ ) and 32 °C ( $\Delta E_{d-f32}$ );
- defrost interval ( $t_{d-f}$ ), in h, for products with one or more defrost systems (each with its own defrost control cycle) measured at an ambient temperature of 16 °C ( $t_{d-f16}$ ) and 32 °C ( $t_{d-f32}$ ). The defrost interval  $t_{d-f}$  shall be determined for each system under a range of conditions;

- for each test performed the steady state power consumption and defrost and recovery energy consumption are added to form a daily energy consumption  $E = 0.001 \cdot 24 \cdot (P_{ss} + \Delta E_{d-f} / t_{d-f})$  in kWh/24h, specific to the settings applied;
- auxiliary energy ( $E_{aux}$ ) in kWh/a. The auxiliary energy is limited to the ambient controlled anti-condensation heater.

**Table 3**  
**Storage conditions and target temperature per compartment type**

Group	Compartment type	Note	Storage conditions		$T_c$ note [1]
			$T_{min}$	$T_{max}$	
Name	Name	no.	°C	°C	°C
Unfrozen compartments	Pantry	[2]	+14	+20	+17
	Wine storage	[3][7]	+5	+20	+12
	Cellar	[2]	+2	+14	+12
	Fresh food	[2]	0	+8	+4
Chill compartment	Chill	[4]	-3	+3	+2
Frozen compartments	0-star & ice-making	[5]	n.a.	0	0
	1-star	[5]	n.a.	-6	-6
	2-star	[5][6]	n.a.	-12	-12
	3-star	[5][6]	n.a.	-18	-18
	freezer (4-star)	[5][6]	n.a.	-18	-18
<p><i>Notes:</i></p> <p>[1] <math>T_c</math> is the target temperature for testing energy consumption and is the average over time and over a set of sensors.</p> <p>[2] <math>T_{min}</math> and <math>T_{max}</math> are the average values measured over the test period (average over time and over a set of sensors).</p> <p>[3] The average temperature variation over the test period for each sensor shall be no more than <math>\pm 0,5</math> K. During a defrost and recovery period the average of all sensors is not permitted to rise more than 1.5 K above the average value of the compartment.</p> <p>[4] <math>T_{min}</math> and <math>T_{max}</math> relate to instantaneous values during the test period.</p> <p>[5] <math>T_{max}</math> relates to the maximum value measured over the test period (maximum over time and over a set of sensors).</p> <p>[6] If the compartment is of the auto-defrosting type, the temperature (defined as the maximum of all sensors) is not permitted to rise more than 3.0 K during a defrost and recovery period.</p> <p>[7] <math>T_{min}</math> and <math>T_{max}</math> relate to the average values measured over the test period (average over time for each sensor) and define the maximum allowed temperature operating range.</p> <p>n.a.=not applicable</p>					

Each of these parameters shall be determined through a separate test or set of tests. To improve the efficiency and accuracy of testing, the test period shall not be fixed, but is determined by whether a ‘steady state’ is reached.

The  $AE$ , expressed in kWh/a and rounded to two decimal places, shall be calculated as follows:

$$AE = 365 \cdot E_{daily} / L + E_{aux};$$

with the load factor  $L = 0.9$  for dedicated 3 star and 4 star appliances or combi appliances with only 3- and 4-star compartments and  $L=1.0$  for all other appliances, and with the daily energy consumption  $E_{daily}$  in kWh/24h and rounded to three decimal places calculated from the daily energy consumption at an ambient temperature of 16 °C ( $E_{16}$ ) and at an ambient temperature of 32 °C ( $E_{32}$ ) as follows:

$$E_{daily} = 0.5 \cdot (E_{16} + E_{32});$$

where  $E_{16}$  and  $E_{32}$  are derived by interpolation of the energy test at the target temperatures set out in Table 3.

- (b) For low noise refrigerating appliances:

The energy consumption shall be determined as provided for in point 3(a), but at an ambient temperature of 25 °C instead of at 16 °C and 32 °C.

The daily energy consumption  $E_{daily}$  in kWh/24h and rounded to three decimal places for the calculation of the  $AE$  is then as follows:

$$E_{daily} = E_{25}$$

where  $E_{25}$  is derived by interpolation of the energy tests to the target temperatures listed in Table 3.

4. Determination of the standard annual energy consumption ( $SAE$ ):

- (a) For all refrigerating appliances:

The standard annual energy consumption  $SAE$ , in kWh/a and rounded to two decimal places, is calculated as follows:

$$SAE = C \cdot D \cdot \sum_{c=1}^n A_c \cdot B_c \cdot [V_c/V] \cdot (N_c + V \cdot r_c \cdot M_c)$$

where  $c$  is the compartment index and  $n$  is the total number of compartment types;  $V_c$  (in dm<sup>3</sup> or litres, rounded to the first decimal place) is the compartment volume;  $V$  (in dm<sup>3</sup> or litres, rounded to the nearest integer) is the total volume with  $V \leq \sum_{c=1}^n V_c$ ;  $r_c$ ,  $N_c$ ,  $M_c$  and  $C$  are modelling parameters specific to each compartment with values as set out in Table 6; and  $A_c$ ,  $B_c$  and  $D$  are the compensation factors with values as set out in Table 7.

When carrying out the calculations above, for the variable temperature compartments, the compartment type with the lowest target temperature for which it is declared suitable is chosen.

- (b) Modelling parameters per compartment type for the calculation of the  $SAE$ :

The modelling parameters are set out in Table 4.

- (c) Correction factors per compartment type in the calculation of the  $SAE$ :

The correction factors are set out in Table 5.

5. Determination of the energy efficiency index (EEI):

The energy efficiency index (EEI), expressed in % and rounded to the first decimal place is calculated as:

$$EEI = AE / SAE$$

**Table 4**  
**The values of the modelling parameters per compartment type**

Compartment type	$r_c^a$	$N_c$	$M_c$	$C$
Pantry	0,35	75	0,12	between 1,15 and 1,56 for refrigerator-freezers <sup>b</sup> , 1,15 for other combis, 1,00 for dedicated refrigerating appliances
Wine storage	0,60			
Cellar	0,60			
Fresh food	1,00	138	0,12	
Chill	1,10			
0-star & ice-making	1,20	138	0,15	
1-star	1,50			
2-star	1,80			
3-star	2,10			
Freezer (4-star)	2,10			

<sup>a</sup>  $r_c = (T_a - T_c) / 20$ ; with  $T_a = 24$  °C and  $T_c$  with values as set out in Annex III, Table 5.

<sup>b</sup>  $C$  for refrigerator-freezers is determined as follows:  
where  $frzf$  is the freezer volume  $V_{freezer}$  as a fraction of total volume with  $frzf = V_{freezer} / V$ :

- if  $frzf \leq 0,3$  then  $C = 1,3 + 0,87 \cdot frzf$ ;
- else if  $0,3 < frzf < 0,7$  then  $C = 1,87 - 1,0275 \cdot frzf$ ;
- else  $C = 1,15$ .

**Table 5**  
**The values of the correction factors per compartment type**

Compartment type	$A_c$		$B_c$		$D$			
	Manual defrost	Auto-defrost	Freestanding appliance	Built-in appliance	$\leq 2^a$	$3^a$	$4^a$	$> 4^a$
Pantry	1,00		1,00	1,04	1,00	1,0	1,03	1,0
Wine storage								
Cellar								
Fresh food								
Chill	1,00	1,10	1,00	1,10	1,00	1,0	1,03	1,0
0-star & ice-making								
1-star								
2-star								
3-star								
Freezer (4-star)								

<sup>a</sup> number of doors or compartments, whichever is lowest.

## *ANNEX IV*

### **Verification procedure for market surveillance purposes**

The verification tolerances set out in this Annex relate only to the verification of the measured parameters by Member State authorities and shall not be used by the manufacturer or importer as an allowed tolerance to establish the values in the technical documentation or in interpreting these values with a view to achieving compliance or to communicating better performance by any means.

When verifying the compliance of a product model with the requirements laid down in this Regulation pursuant to Article 3(2) of Directive 2009/125/EC, the authorities of the Member States shall apply the following procedure for the requirements referred to in Annex II:

1. The Member State authorities shall verify one single unit of the model.
2. The model shall be considered to comply with the applicable requirements if:
  - (a) the values given in the technical documentation pursuant to point 2 of Annex IV to Directive 2009/125/EC (declared values), and, where applicable, the values used to calculate these values, are not more favourable for the manufacturer or importer than the results of the corresponding measurements carried out pursuant to point (g) thereof; and
  - (b) the declared values meet any requirements laid down in this Regulation, and any required product information published by the manufacturer or importer does not contain values that are more favourable for the manufacturer or importer than the declared values; and
  - (c) when the Member State authorities test the unit of the model, the determined values (the values of the relevant parameters as measured in testing and the values calculated from these measurements) comply with the respective verification tolerances as set out in Table 6; and
  - (d) when the Member State authorities check the unit of the model, it complies with the functional requirements and the requirements on repair and end-of-life aspects.
3. If the results referred to in point 2(a),(b) and (d) are not achieved, the model and all models that have been listed as equivalent models in the manufacturer's or importer's technical documentation shall be considered not to comply with this Regulation.
4. If the result referred to in point 2(c) is not achieved, the Member State authorities shall select three additional units of the same model for testing. As an alternative, the three additional units selected may be of one or more different models that have been listed as equivalent models in the manufacturer's or importer's technical documentation.
5. The model shall be considered to comply with the applicable requirements if, for these three units, the arithmetical mean of the determined values complies with the respective verification tolerances set out in Table 6.
6. If the result referred to in point 5 is not achieved, the model and all models that have been listed as equivalent models in the manufacturer's or importer's technical documentation shall be considered not to comply with this Regulation.

7. The Member State authorities shall provide all relevant information to the authorities of the other Member States and to the Commission without delay once a decision has been taken on the non-compliance of the model according to points 3 and 6.

The Member State authorities shall use the measurement and calculation methods set out in Annex III.

The Member State authorities shall only apply the verification tolerances that are set out in Table 6 and shall use only the procedure described in points (a) to (g) for the requirements set out in this Annex. No other tolerances, such as those set out in harmonised standards or in any other measurement method, shall be applied.

**Table 6**  
**Verification tolerances**

Parameters	Verification
Volume	The determined value shall not more than 3 % or 1 litre lower — whichever is the greater value — than the declared value.
Freezing capacity	The determined value shall not be more than 10 % lower than the declared value.
Annual energy consumption	The determined value shall not be more than 10% higher than the declared value.
Airborne acoustical noise emission	The determined value shall not be higher the declared value.

## **ANNEX V**

### **Benchmarks**

At the time of entry into force of this Regulation, the best available technology on the market for refrigerating appliances in terms of their energy efficiency index EEI and airborne acoustical noise emissions was identified as outlined below.

The figures below were obtained using a simplified conversion from the EEI-values as determined according to the repealed Regulation (EC) No 643/2009. The figures in brackets indicate the EEI-value as determined according to the repealed Regulation (EC) No 643/2009.

Refrigerating appliances:

#### Dedicated fresh food refrigerating appliance ('refrigerator'):

Large: EEI= 57 % [18 %], V=309 litre, AE=70 kWh/a

Table-top: EEI= 63 % [22 %], V=150 litre, AE=71 kWh/a

#### Wine storage appliance (no glass door)

Insulated door: EEI=113 % [33 %], V=499 litre, AE=111 kWh/a

Glass door: EEI=140 % [42 %], V=435 litre, AE=133 kWh/a

#### Refrigerator-freezer:

EEI=59 % [18 %], V=343 litres (223/27/93 litres for fresh-food/chill/freezer),  
AE=146 kWh/a

#### Dedicated freezer refrigerating appliance:

Upright Small: EEI=52 % [20 %], V=103 litre, AE=95 kWh/a

Upright Medium: EEI=63 % [22 %], V=206 litre, AE=137 kWh/a

Chest: EEI=55 % [22 %], V=230 litre, AE=116 kWh/a

Lowest noise reported (of all models): 34-35 dB(A)

Low-noise refrigerating appliance (dedicated cellar or pantry refrigerating appliance):

Insulated door: EEI=233 % [73], V=30 litre, AE=182 kWh/a

Transparent door: EEI=330 % [102], V=40 litre, AE=255 kWh/a

Low noise appliances are reported to have airborne acoustical noise emissions lower than 15 dB(A) according to current test standards.