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ANNEXES 1 to 5

ANNEXES

to the

COMMISSION REGULATION

implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for refrigerating appliances with a direct sales function

ANNEX I
Definitions applicable for the Annexes

In addition to the definitions set out in Directive 2009/125/EC and the definitions set out in Article 2 of this Regulation, the following definitions shall apply:

(1) 'supermarket cabinet' means a cabinet intended for the sale and display of items in retail applications, including supermarkets, with the exception of beverage coolers, vending machines, gelato-scooping cabinets and ice-cream freezers. Supermarket cabinets can be refrigerator or freezers;

(2) 'multi-temperature supermarket cabinet' means a supermarket cabinet including at least one compartment exclusively intended for chilled operating temperature and at least one compartment exclusively intended for frozen operating temperature;

(3) 'beverage cooler' means a cabinet designed to refrigerate (*'pull down'*) at a specified speed, packaged non-perishable beverages loaded at ambient temperature, for sale at specified temperatures below the ambient temperature. The beverages are accessible directly through open sides or via one or more doors, and/or drawers. Because of the non-perishable nature of beverages, during periods of no demand the temperature inside the cooler may increase for energy saving purposes;

(4) 'vending machine' or 'refrigerated vending machine' means a cabinet designed to accept consumer payments or tokens to dispense chilled items without on-site labour intervention;

(5) 'multi-temperature vending machine' means a vending machine including at least two compartments with different operating temperatures;

(6) 'ice-cream freezer' means a horizontal closed cabinet intended to store and/or display and sell pre-packed ice cream, where access by the consumer to the pre-packed ice cream is gained by opening a lid (solid or transparent) from the top, with a net volume $\leq$ 600 litres and, only for transparent lid ice-cream freezers, a Net Volume/TDA $\geq$ 0,35m;

(7) 'total display area (TDA)' means the total visible items area, including visible area through glazing, defined by the sum of horizontal and vertical projected surface areas of the net volume;

(8) 'gelato-scooping cabinet' means a cabinet in which ice-creams can be stored, displayed and scooped, within prescribed temperature limits;

(9) 'semi-vertical cabinet' means a vertical cabinet whose overall height does not exceed 1.5m and having either a vertical or inclined display opening;

(10) 'combined cabinet' means a cabinet which combines display and opening directions from a vertical, a horizontal or a semi-vertical cabinet;

(11) 'roll-in cabinet' means a vertical supermarket cabinet typically used for fresh dairy products, which is normally an open cabinet;

(12) 'transparent lid' means a door made of a transparent material that allows the user to clearly see items through it;

(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) ‘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;

(15) ‘freestanding appliance’ means a refrigerating appliance that is not a built-in appliance;

(16) ‘spare part’ means a separate part that can replace a part with the same or similar function in a product;

(17) ‘commercial guarantee’ means any undertaking by the trader or a producer (the guarantor) to the consumer, in addition to any legal obligation relating to the guarantee of conformity, to reimburse the price paid or to 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;

(18) ‘product database’ means a collection of data concerning products, which is arranged in a systematic manner and consists of a consumer-oriented public part, where information concerning 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 per Regulation (EU) 2017/1369;

(19) ‘daily energy consumption’ (E_{daily}) means the electricity used by a refrigerating appliance over 24 hours at reference conditions expressed in kWh/24h, calculated as per Annex III.3;

(20) ‘operating temperature’ means the reference temperature inside a compartment during testing;

(21) ‘M’ and ‘N’ means modelling parameters that take into account the volume-dependence of the energy use, with values as set out in Annex III;

(22) ‘annual energy consumption’ (*AE*) means the average daily energy consumption multiplied with 365 (days per year) expressed in kWh, as calculated in Annex III;

(23) ‘standard annual energy consumption’ (*SAE*) means the reference annual energy consumption of a refrigeration appliance expressed in kWh, as calculated in Annex III;

(24) ‘equivalent model’ means a model with the same relevant technical and performance characteristics but placed on the market under a different model identifier;

(25) ‘M-package’ means a test package fitted with a temperature measuring device;

(26) ‘gross volume’ means the volume within the inside liner of the compartment with an external door, in every case without internal fittings and with doors or lids closed;

(27) ‘net volume’ means the part of the gross volume of any compartment that remains after deduction of the volume of components and spaces unusable for the storage and display of items;

(28) 'global warming potential' (GWP) means the climatic warming potential of a greenhouse gas relative to that of carbon dioxide (CO_2), calculated in terms of the 100-year warming potential of one kilogram of a greenhouse gas related to one kilogram of CO_2. GWP values considered are those set out in Annexes I, II and IV to Regulation (EU) No 517/2014. GWP values for mixtures of refrigerants shall be based on the method presented in Annex IV of Regulation (EU) No 517/2014;

(29) 'foaming or blowing agent' means the gas trapped in the bubbles forming the insulation panel (typically PUR foams in a closed-cell shape) of a cabinet, this gas provides the necessary expansion and support to the structure, together with the insulating properties.

ANNEX II
Ecodesign requirements

1. Energy efficiency requirements:

(a) From 1 January 2020, the EEI of refrigerating appliances with a direct sales function shall not be above the values in Table 1.

Table 1
Maximum EEI for refrigerating appliances, expressed in % from 01/01/2020 onwards

	EEI
All refrigerating appliances with a direct sales function	110

(b) From 1 January 2023, the EEI of refrigerating appliances with a direct sales function shall not be above the values in Table 2.

Table 2
Maximum EEI for refrigerating appliances, expressed in % from 01/01/2023 onwards

	EEI
All refrigerating appliances with a direct sales function	80

2. Functional requirements and requirements on repair and end-of-life aspects:

From 1 January 2020, refrigerating appliances with a direct sales function shall meet the following requirements:

(a) vacuum insulation panels shall be labelled with the letters 'VIP' in a clearly visible and readable way;

(b) manufacturers shall ensure that refrigerating appliances with a direct sales function are designed so that the components described in Annex VII of Directive 2012/19/EU can be identified and removed with non-proprietary and commonly available tools. The identification of the components described in Annex VII of Directive 2012/19/EU shall be ensured by marking the back panel of the appliance with a sketch showing the location of these components and naming them. The appliance shall be designed so that no gluing or welding fastening technique is encountered for any of the dismantling operations leading to the removal of relevant component.

Within two weeks of a request made by a market surveillance authority or a recycler, manufacturers shall provide them with technical instructions illustrating the operations needed to access the relevant components, including: the type of operation, the type and number of fastening technique(s) to be unlocked, and the tool(s) to be used;

(c) manufacturers shall be able to supply end-users with spare parts, including at least thermostats, temperature sensors and printed circuit boards, for their refrigerating appliances with a direct sales function for at least 10 years after the production of the specific model has ceased;

(d) where present, door gaskets and light sources shall be replaceable without special tools and without permanent damage, and manufacturers shall be able to supply end-

users with door gaskets and light sources for their refrigerating appliances for at least 10 years after the production of the specific model has ceased;

(e) manufacturers of refrigerating appliances with a direct sales function shall mark in the back panel of the appliances the chemical name of the principal component of the blowing agent used in the insulation of the appliance. In case of using flammable blowing agents, manufacturers shall mark the appliance with the applicable international warning symbol for flammable material or fire hazard.

3. Information requirements:

(a) From 1 April 2021, instruction manuals for installers and end-users, and free access websites of manufacturers, their authorised representatives and importers shall include the following information, in the order as set out below:

(1) the recommended setting of temperatures in each compartment for optimum food preservation;

(2) instructions for the correct installation and maintenance of the refrigerating appliance;

(3) access to professional repair (internet webpages, addresses, contact details);

(4) relevant information for ordering spare parts, directly or through other channels;

(5) the minimum date until when spare parts, necessary for the repair of the appliance, are available;

(6) the duration of the commercial guarantee of the product in years;

(7) information on end of life requirements specified in point 3 of this Annex;

(8) weblink to the product database, as defined in Regulation [*Please insert here references of the specific energy labelling regulation*].

(b) Where the information included in the technical documentation file for a particular model has been obtained by calculation based on design, or extrapolation from other models, or both, the documentation shall include details of such calculations or extrapolations, or both, and of tests undertaken by manufacturers to verify the accuracy of the calculations undertaken. The information shall also include a list of all other models where the information was obtained on the same basis.

(c) 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 Table 6 of Regulation [*Please insert here references of the specific energy labelling regulation*]. For market surveillance purposes, manufacturers may refer to the technical documentation uploaded to the product database that contains the same information as per Regulation [*Please insert here references of the specific energy labelling regulation*].

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 the reference numbers of which have been published for this purpose in the *Official Journal of the European Union*, 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 following provisions:

1. General conditions for testing:

(a) The ambient conditions shall correspond to Set 1 as detailed in Table 4, except for small ice-cream freezers and gelato scooping cabinets which shall be tested in ambient conditions corresponding to Set 2, as detailed in Table 5;

(b) If one or several compartment(s) can be set to different temperatures, it/they shall be tested at the lowest operating temperature;

(c) Vending machines having compartments with variable volumes shall be tested when the volume of the compartment with the highest operating temperature is adjusted to its minimum volume.

Table 5 – Ambient conditions

	Dry bulb temperature, °C	Relative humidity, %	Dew point, °C	Water vapour mass in dry air, g/kg
Set 1	25	60	16.7	12.0
Set 2	30	55	20.0	14.8

2. Determination of the Energy Efficiency Index (EEI):

(a) For all refrigerating appliances with a direct sales function, the EEI, expressed in % and rounded to the first decimal place, compares the Annual Energy consumption AE (in kWh/a) with the reference Standard Annual Energy consumption SAE (in kWh/a) and is calculated as:

$EEI = AE / SAE$

(b) The Annual Energy consumption *AE*, expressed in kWh/a and rounded to two decimal places, is calculated as follows:

$$AE = 365 \cdot E_{daily}$$

With:

AE = Annual Energy consumption of the cabinet in kWh/a, which is the sum of the AE of all compartments of the cabinet;

E_{daily} = the energy consumption of the cabinet over 24 hours rounded to three decimal places.

(c) The Standard Annual Energy consumption SAE, expressed in kWh/a and rounded to two decimal places, is calculated as follows:

$$SAE = (M + N \cdot Y) \cdot 365 \cdot C \cdot P$$

(1) M and N are the coefficient values of the modelling parameters per cabinet type and are given in Table 6.

Table 6 – M and N coefficient values of the modelling parameters

Category	Value for M	Value for N
Beverage coolers	2,1	0,0006
Ice-cream freezers	2,0	0,009
Vending machines	4,1	0,004
Gelato-scooping cabinets	25	30,4
Vertical, semi-vertical and combined supermarket refrigerator cabinets	9,1*	9,1*
Horizontal supermarket refrigerator cabinets	3,7	3,5
Vertical, semi-vertical and combined supermarket freezer cabinets	7,5	19,3
Horizontal supermarket freezer cabinets	4,0	10,3
*For roll-in cabinets these values apply from 1 January 2023. From 1 January 2020 to 31 December 2022 the values for roll-in cabinets are: M = 9,2 and N = 11,6		

(2) C is the temperature coefficient value per cabinet type: the values are given in Table 7.

Table 7 – Temperature coefficient values, C

Category* **	**Temperature class**				**Value for C**
	Name of the class***	**Highest temperature of warmest M-package**	**Lowest temperature of coldest M-package**	**Highest minimum temperature of all M-**	

		colder than or equal to:	**warmer than or equal to:**	**package colder than or equal to:**	
Vertical, semi-vertical and combined supermarket refrigerator cabinet*	M2	+7 °C	−1°C	Not relevant	$C = 1$
	H1 and H2	+10 °C	−1°C	Not relevant	$C = 0{,}82$
	M1	+5 °C	−1°C	Not relevant	$C = 1{,}15$
Horizontal supermarket refrigerator cabinets*	M2	+7 °C	−1°C	Not relevant	$C = 1$
	H1 and H2	+10 °C	−1°C	Not relevant	$C = 0{,}92$
	M1	+5 °C	−1°C	Not relevant	$C = 1{,}08$
Vertical, semi-vertical and combined supermarket freezer cabinets*	L1	−15°C	Not relevant	−18°C	$C = 1$
	L2	−12°C	Not relevant	−18°C	$C = 0{,}9$
	L3	−12°C	Not relevant	−15°C	$C = 0{,}9$
Horizontal supermarket freezer cabinets*	L1	−15°C	Not relevant	−18°C	$C = 1$
	L2	−12°C	Not relevant	−18°C	$C = 0{,}92$
	L3	−12°C	Not relevant	−15°C	$C = 0{,}92$
Vending machine **	Not relevant	Not relevant	Not relevant	Not relevant	$C = 1 + \frac{12 - T_V}{25}$
Other appliances****	Not relevant	Not relevant	Not relevant	Not relevant	$C = 1$

Notes:

*For all supermarket cabinets the ambient conditions are those of Set 1 in Table 4.

**T_V is the maximum measured product temperature. For multi-temperature vending machines, T_V shall be the average of T_{V1} (the maximum test package temperature in the warmest compartment) and T_{V2} (the maximum test package temperature in the coldest compartment).

***For cabinets with multiple temperature classes, the SAE is calculated separately for each cabinet compartment and added together to obtain the total SAE of the cabinet.

**** For ice-cream freezers and beverage coolers the ambient conditions are those of Set 2 in Table 4.

*****Following EN ISO 23953-2:2005+A1:2012.

(3) As regards the coefficient Y:

(a) For beverage coolers:

Y is the equivalent volume of the appliance (*Veq*), calculated as follows:

$$Y = Veq = GrossVolume \cdot ((25 - Tc)/20) \cdot Cc$$

where Tc is the average compartment classification temperature of the compartment and Cc is the climate class factor. The values for Tc are given in Table 8. The values for Cc are given in Table 9.

Table 8
Tc values for beverage coolers

*Class of the beverage cooler**	T_c
K1	+3,5°C
K2	+2,5°C
K3	−1°C
K4	+5°C
Note: *The classes of the beverage cooler are defined according to EN 16902.	

Table 9
Cc values for beverage coolers

Warmest temperature and relative humidity of the beverage cooler	C_c
+25 °C, 60 %	1,00
+32 °C, 65 %	1,05
+40 °C, 75 %	1,10

(b) For ice-cream freezers:

Y is the equivalent volume of the appliance (*Veq*), calculated as follows:

$$Y = Veq = NetVolume \cdot ((12 - Tc)/30) \cdot Cc$$

where Tc is the average compartment classification temperature of the compartment and Cc is the climate class factor. The values for Tc are given in Table 10. The values for Cc are given in Tables 11.

Table 10
Tc values for ice-cream freezers

Class of the ice-cream freezer		T_c
Warmest M-package temperature colder or equal to in all tests (except lid opening test)	*Warmest M-package maximum temperature rise allowed during the lid opening test*	
-18°C	2°C	+18°C
-7°C	2°C	+7°C

Table 11
Cc values for ice-cream freezers

Ice-cream freezer type	*Operating conditions of the ice-cream freezer*		C_c
	Minimum temperature and relative humidity	*Maximum temperature and relative humidity*	

Ice-cream freezer with transparent lid	+16 °C, 80 %	30 °C, 55 %	1,00
	+16 °C, 80 %	35 °C, 75 %	1,10
	+16 °C, 80 %	40 °C, 40 %	1,20
Ice-cream freezer with solid lid	+16 °C, 80 %	30 °C, 55 %	1,00
	+16 °C, 80 %	35 °C, 75 %	1,04
	+16 °C, 80 %	40 °C, 40 %	1,10

(c) For vending machines:

Y is the volume of the appliance, which is the sum of the volumes of all compartments of the cabinet, expressed in litres. For vending machines the net volume shall be used and only those compartments are to be considered that are directly available for vending without service visit.

(d) For all other cabinets:

Y is the total display area, which is the sum of the display areas of all compartments of the cabinet, expressed in squared meters (m^2).

(4) P is the coefficient to distiguish between remote and non-remote cabinets. The values for P are given in Table 12.

Table 12
P values

Cabinet type	***P***
Non-remote supermarket cabinets	1,10
Other cabinets	1,00

ANNEX IV
Verification procedure for market surveillance purposes

The verification tolerances defined 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 communicate 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, for the requirements referred to in Annex II, the authorities of the Member States shall apply the following procedure:

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 4 of Annex II 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 paragraph (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 given in Table 13; 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 refrigerating appliance 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 given in Table 13.

6. If the result referred to in point 5 is not achieved, the model and all models that have been listed as equivalent refrigerating appliance 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 after a decision being 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 13 and shall use only the procedure described in points (a) to (g) for the requirements referred to in this Annex. No other tolerances, such as those set out in harmonised standards or in any other measurement method, shall be applied.

Table 13
Verification tolerances

Parameters	Verification
Volume (net or gross) or total display area	The determined value shall not be less than the declared value by more than 3 % or 1 litre, whichever is the greater value.
Energy consumption	The determined value shall not exceed the declared value of the annual energy consumption *AE* by more than 10 %.

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 was identified as follows.

	Total Display Area (m^2 - square metres) (when applicable)	Net volume (L- litres) Gross volume (for beverage coolers) (L-litres) (when applicable)	T_1 / T_V accord. to Annex IV	Annual energy consumption (kilowatt-hour per year - kWh/yr)
Supermarket cabinets (Vertical refrigerator)	3.3	-		4526 (= 12.4 kWh/day)
Supermarket cabinets (Horizontal refrigerator)	2.2			2044 (=5.6 kWh/day)
Supermarket cabinets (Vertical freezer)	3			9709 (=26.6 kWh/day)
Supermarket cabinets (Horizontal freezer)	1.36 or 2.76			2336 (= 6.4 kWh/day) or 6424 (=17.6 kWh/day)
Drum/carrousel machine	-	695	3 °C	2120 (= 242 Whr/hr in ready mode)
Can and bottle machine		871	4.4 °C	1737 (= 4.76 kWh/day, at 25°C)
Spiral vending machine		714	12 °C	1051 (= 120 Whr/hr in ready mode)
Beverage cooler	-	520		511 (= 1.4 kWh/day)
Small ice-cream freezer	-	302		584 (= 1.6 kWh/day)
Gelato-scooping cabinet	1.43	-		10862 (= 29.76 kWh/day)